CORPORATE GOVERNANCE AND FAMA-FRENCH FIVE-FACTOR: EVIDENCE FROM STOCK EXCHANGE OF THAILAND

BY

MR. VISARUT PUGDEEPUNT

AN INDEPENDENT STUDY SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE PROGRAM IN FINANCE (INTERNATIONAL PROGRAM) FACULTY OF COMMERCE AND ACCOUNTANCY THAMMASAT UNIVERSITY ACADEMIC YEAR 2016

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ENTITLED

CORPORATE GOVERNANCE AND FAMA-FRENCH FIVE-FACTOR EVIDENCE FROM STOCK EXCHANGE OF THAILAND

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ABSTRACT

Corporate governance is one of the fundamental tools to ensure that a firm has suitable governance and to reduce principal-agent problems. The Fama-French five-factor model, consisting of market return, size-effect, value-effect, profitability-effect and investment-effect, is used to determine the abnormal return with governance level portfolio scores evaluated by Thai-IOD. The results indicate that the poor or unscored governance firms have the abnormal return of 9.88 percent annually during sample period. This is significantly higher than the abnormal return for firms with higher governance scores.

Keywords: Corporate Governance, Fama-French, Five-Factor, Asset Pricing Model

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Mr. Visarut Pugdeepunt

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Symbols/Abbreviations	Terms
CG	Corporate Governance
Thai-IOD	Thai Institute of Directors Association

CHAPTER 1
INTRODUCTION

Nowadays, Corporate Governance is the fundamental tool that is dramatically interesting in the financial world. The governance is a mechanism to ensure an appropriate return from the company (Shleifer and Vishny 1997). (Klapper and Love 2004) They confirm that good operating performance is related with good governance. Many researches study between corporate governance and the importance ratios such as expected return, liquidity ratio, profitability ratio (return on asset, return on equity) as well as the role of corporate governance in the Asian Financial Crisis.(eg,. Stiglitz, 1998; Greenspan, 1999; and Johnson et al., 1999). Each firm has the main problem in agency conflict due to different information and incentive. The firm managers try to increase their wealth. Occasionally, they intentionally invest in the risky project or negative NPV projects in order to receive the higher return, however, this investment increase the risk of projects as well. Those risks strongly impact to debt holder. On the other hand, the investors or the shareholders would like to increase the value of firms because they would like to get the capital gain and the dividend payout. These problems can be solved by good corporate governance. Corporate governance conception comes from the Organization for Economic Co-operation and Development (OECD) focusing on 5 main standards namely, Rights of shareholders, Equitable Treatment of Shareholders, Roles of Stakeholders, Disclosure and Transparency and Board Responsibilities. These criteria are a guidance for evaluating the corporate governance score. In Thailand, there is Thai Institute of Directors (Thai-IOD) who provide this corporate governance score. Thai-IOD also applies the same standard as OECD. It has 5 topics of evaluation but different in weight.

Initially, I show the researches that are applied corporate governance concept with important financial ratios. For example, GIM index was constructed by Gompers, Ishii and Metrick (2003). This index is the representative of corporate governance level. Gompers and his team studied the relationship between corporate governance and the abnormal return in United State during 1990s. They found the abnormal returns from their paper. In Asia, (Sawicki 2009) she found the significant relationship between

corporate governance and dividend policy. She used her constructed standard consist of four categories. That are Board of director, Audit, Remuneration and Nomination to evaluate the CG score of each firm. In Thailand, there are researches that construct this index and liquidity (Prommin 2011). Another one is the study of tax aggressiveness, corporate governance and firms value (Koanantachi 2013).

Next, I explain the abnormal return with each corporate governance score. I apply the method of asset pricing model to explain this relationship by checking at the intercept term (Alpha). First, we have known a Capital Asset Pricing Model (CAPM). According to unequally zero value of the intercept term, we have to implement the method of arbitrage pricing theory models such as three factors of Fama-French, four factors of Cahart. By putting the additional factors, the models still cannot show the zero value of the intercept term. On the last year 2016, Fama-French just published their new five factors model. A five-factor asset pricing model using the market return, size, value, profitability, and investment patterns is better than the three-factor model (Fama and French 1993) in terms of explanation of expected stock returns. (Fama and French 2015) The latest pricing model still cannot capture all the systematic risks due to the alpha is not equal to zero. However, this model is now the best asset pricing model in the financial field. In this paper, I will use this pricing model to explain the relationship between the expected stock returns and its explained variables.

In conclusion, I am going to examine the relationship between the corporate governance index with the five-factor asset pricing model in order to check how well of explanation of the model after forming the value-weighted corporate governance portfolios. The corporate governance that I use in this paper is the governance score from Thai Institute of Directors (Thai-IOD). I would like to find the zero value in the intercept term from the return of the best corporate governance portfolios. The scope of this study is all stock in stock exchange of Thailand (SET) during Y2011 to Y2015.

Therefore, this paper will be beneficial to people who are interested in corporate governance and the five-factor asset pricing model in Thailand. The result of this research, I can find the abnormal return from the poor or unscored corporate governance firms. The abnormal return is 0.19 percent per week, or 9.88 percent per year. I hope that this paper can contribute the readers on the concept of applying the Fama-French five-factor asset pricing model, how to create each factor and apply in Thai stocks. This

research is the first research that apply corporate governance concept with Fama-French five-factor model as well. Moreover, you can find the strategy of investment by buying in weak profitability firms and selling in robust profitability firms which can find the abnormal returns. The following sections are Literature reviews that will show the main research and reviewed researches' ideas, Theoretical Framework that I try to link between corporate governance concept, agency problems and the asset pricing model used for explaining the abnormal return, Data Selection that will show the sourcing of each data including the corporate governance data, accounting data and the descriptive data, Methodology that will show the methods using in this paper, Empirical result and Conclusion.

CHAPTER 2
LITERATURE REVIEWS

Gompers, Ishii and Metrick (2003) already studied the relationship between corporate governance and equity prices. They constructed a "Governance Index" by using the sum of one point for the existence of each provision. The evaluating criteria consisted of 24 distinct corporate-governance provision. Therefore, the governance score would be 0 to 24. The group of highest score would be called as the "Dictatorship Portfolio" ($G \geq 14$). This was the poor corporate governance portfolio. The group of lowest would be called as the "Democracy Portfolio" ($G \leq 5$). This was the good corporate governance portfolio. They employed the method to explain the return by using the four-factor model of Carhart (1997). The result of their paper showed that the difference abnormal returns by buying the democracy portfolio and selling the dictatorship portfolio is 8.5 percent per year during 1990s. They also concluded that the company with stronger shareholder rights had higher firms value. Drobetz et al. (2003) constructed a corporate governance rating (CGR) for German firms. They confirmed that if you bought high-CGR firms and shorted low-CGR firms, you would have earned abnormal return around 12 percent per year.

In Thailand, it might hard to find the information as GIM index. I find further papers constructing the corporate governance index. Sawicki (2009) already constructed corporate governance index in five East Asian countries: Hong Kong, Indonesia, Malaysia, Singapore and Thailand. She constructed the governance index by using nine criteria that capture various aspects of a firm's structure, policies and practices constituting good governance practices. The evaluating information was received from the annual report. So, the score would be 0 to 9. The higher score was a better governance. She found a strong positive relationship between governance and dividends emerges post-crisis. Prommin (2011) studied the relationship between corporate governance and liquidity in SET50. He used this constructing method of governance score same as Sawicki's method. He found that corporate governance would improve stock market liquidity. Koanantachai (2013) studied tax aggressiveness, corporate governance, and firm value used same above method as well, but she

magnified the score in each criteria to be zero-point for no governance standard, one-point for meeting the standard and two-point for above standard. Then, the score would be 0 to 18. Her paper stated that firms with good corporate governance will pay tax less than firms with bad corporate governance. Kouwenberg et al. (2012) studied the governance rating of Credit Lyonnais Securities Asia (CLS) and stock return in Asia, the result showed that investors who can find the firms that are going to improve their governance will find abnormal returns.

Jumreornvong (2013) studied about the relationship between corporate governance, corporate social responsibility, sustainability index and shared value: the case of Thailand. The result found that these variables have significant impact on shared value. He used return on asset, return on equity and Tobin's Q to be shared value. The main reasons that corporate governance and corporate social responsibility positively impact on shared value was these variables can solve the problem on agency problems and incomplete contract.

In the Gompers's study, they used the four-factor model of Carhart using the size, value, and momentum as loading factors (on zero-investment factor-mimicking portfolios) to find the return in good and bad governance. Recently, Fama and French (2015) published their paper about a five-factor model capturing the size, value, profitability, and investment that performs better than the three-factor model of theirs. The result of their paper showed that with the addition of new two factors, the value factors of the FF three-factor model becomes excessive for explaining average returns in the sample they examined.

From various reviewed papers, they used both manual governance rating and the score rated by the institution. I prevent the error from my evaluating by using the public governance score from the public institute association, Thai-IOD. This institute was created in 2001. The purpose to survey and measure the corporate governance in the listed company, compare the governance with the global standard as well as analyze the strength and weakness points of each company in order to be the guild line for determining the policy and improving the governance in Thai firms. The criteria of evaluating follow OECD principles of corporate governance. It can be separated into 5 groups namely Rights of shareholders, Equitable Treatment of Shareholders, Roles of Stakeholders, Disclosure and Transparency and Board Responsibilities

Conclusion, I will use the corporate governance score evaluated by Thai-IOD and explain this relationship between governance and its return by using the latest asset pricing model from Fama and French 5 factors and I will show how well of explanation by checking the value of intercept term and R-squared. The detail of forming variables as well as theatrical framework will be explained in the next chapter.

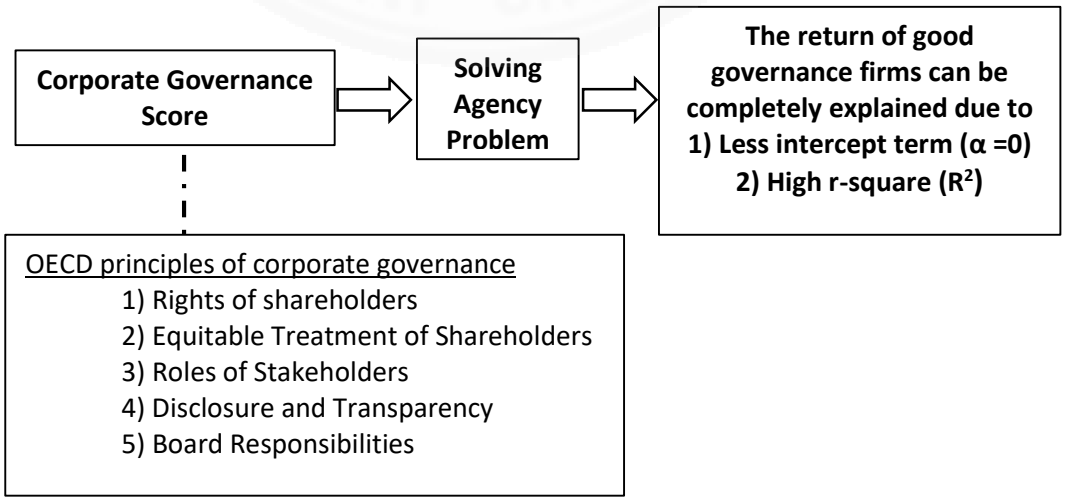
CHAPTER 3
THEORETICAL FRAMEWORK

3.1 Corporate Governance and Equity Prices

From Literature reviews, there are many researches study about the relationship between corporate governance and the equity prices. The result of these studies also confirm that it has a relationship. There is the problem between managers and shared holder that is agency problem due to difference of information (Stock prices and returns, Issues of shares and other securities, Dividends, Financing) and difference of objectives (Managers vs Stockholders, Top management vs operating management). The agency problem can be reduced by having board of directors. However, Board of directors is the one of good governance standard. Some director should be independence. Dahya and McConnell (2007) studied that the company with higher quantity of independence directors per total directors affect to higher market value.

Not only independence director was added in one of good corporate governance standard, the audit system also was added in the good governance. Schauer (2003) suggested that the quality of audit improves disclosure by reducing information asymmetry. I summarize the framework between corporate governance and equity prices in following figure 3.1

Figure 3.1 The framework between Corporate Governance and Equity Price



3.2 Capital Asset Pricing Model and Fama-French Models

I start from capital asset pricing model that use to explain the relationship between return of asset and return of the market. The problem of CAPM is on the intercept term (Alpha). If this term is significantly different from zero, we cannot use this CAPM because the model cannot capture all systematic risk. Based on non-arbitrage opportunities, we have another model called arbitrage pricing theory "APT". The model was formed by the zero-mean common factor. There are many APT model such as Fama-French 3 factors, 4 factors as well as 5 factors. I also need to check the intercept team that should equal to zero also.

From the capital asset pricing model (CAPM) by sharpe(1964), he showed the relationship between the market return and stock return. However, the intercept of CAPM is not significantly equal to zero. Then, we have to add another loading factors that are trying to capture all systematic risks. Banz(1981) observes that frim with small market can generate higher average excess return than the firms in large market capital. He stated about the 'size effect' is his paper. The size effect is not linear in the market proportion. There is no theoretical foundation that support on this effect. Moreover, Lakonishok(1994) mentioned about the value premium in average excess return between the Growth stock (Low Book-To-Market ratio) and the Value stock (Hi Book-To-Market ratio). He found that the value stock will get a higher excess return due to misunderstanding about the stock price. Fama-French(1993) combined both the size premium (SMB) and the value premium (HML) with the market return in their paper, three factors asset pricing model.

In 1997, Carhart augmented a factor that related to recent performance which is momentum return. It was the difference between the average of the return on the two high prior return portfolios and two low prior return portfolios. Nattapon et al.(2016) examined the validity of beta factor in Thai stock market return. They used the five-factor consisted of the market return, the size premium, the value premium, the momentum return and the beta factor. The result of their research showed that using Gibbons-Ross-Shanken (GRS) test reject the null hypothesis of zero intercept in every model. However, their paper claimed that their model get the highest adjusted-R2 value. Although the beta factor model is the best model to explain the excess stock return but

this model still cannot completely explain the excess stock return in the Thai stock market.

Novy-marx(2013) found that profitable firms generate significantly higher returns that unprofitable firms. Aharoni et al.(2013) documented a statistically reliable relation between investment and average return in their paper. In 2015, Fama-French constructed their model by using five-factor model at capturing the market return, the size, the value, the profitability and the investment. They explained these relationship between five-factor and the excess return by using the dividend discounted model (Equation 1).

$$m_t = \sum_{\tau=0}^{\infty} E(d_{t+\tau})/(1+r)^{\tau} \quad (1)$$

$$m_t = \sum_{\tau=0}^{\infty} E(Y_{t+\tau} - \Delta B_{t+\tau})/(1+r)^{\tau} \quad (2)$$

$$\frac{m_t}{B_t} = \frac{\sum_{\tau=0}^{\infty} E(Y_{t+\tau} - \Delta B_{t+\tau})/(1+r)^{\tau}}{B_t} \quad (3)$$

m_t : The share price at time t

$E(d_{t+\tau})$: The expected divined per share for period t+ τ

r : (approximately) the long-term average expected stock return

$Y_{t+\tau}$: The total equity earnings for period t+ τ

$\Delta B_{t+\tau}$: The change in total book equity

They explained that the price (m) related with the dividend paying in next period. The dividend (d) depended on the earning and the investment on next period. By this relationship, we got the equation 2. Finally, we divined the equation 2 with the book equity. We got the equation 3. Fama-French (2015) explained the relationship between the excess return, the value premium (r and B/M ratio), the profitability premium (r and Y) and the investment premium (r andΔB). In conclusion, they stated

that their model still be rejected by the GRS test. But, the five-factor model performs better than the three-factor model of FF-3 factor.

This study will find the relationship between corporate governance and the return by using asset pricing model, Fama-French five-factor. So, I construct the hypothesis as follows.

- If the corporate governance score is one of the systematic risk, the higher level of corporate governance score will have the value of intercept term that be significantly and closely equal to zero and the value of R-squared should be higher due to more completed explanation.

CHAPTER 4
DATA SELECTION

4.1 Corporate Governance Score

4.1.1 Detail of corporate governance score

My data have two groups to use to construct the model. First group, I decide to use the evaluated score by Thai Institute of Directors Association (Thai-IOD). The score have six groups shown as table 4.1. In the publication, the score of firms will be published only 3, 4 and 5 score. I show the number of firms in each corporate governance level and each year of my study in table 4.2. Thai-IOD uses the firms' information such as annual report, 56-1 form, Invitation of meeting form, minutes of meeting in general meeting. For report published in Y2016, they will use information of firms in Y2015.

Table 4.1 The corporate governance score from THAI-IOD

Score	Range Number of Logo	Description
90 - 100	▲▲▲▲▲	Excellent
80 - 89	▲▲▲▲	Very Good
70 - 79	▲▲▲	Good
60 - 69	▲▲	Satisfactory
50 - 59	▲	Pass
< 50	No logo given	N/A

Table 4.2 The Descriptive Statistics of CG score in each year

	2012	2013	2014	2015	2016
Corporate Governance Score					
Minimum	N/A	N/A	N/A	N/A	N/A
Maximum	5	5	5	5	5
Mean	3	3	3	3	3
Number of firms					
CG= 5	59	87	30	55	80
CG = 4	150	166	107	159	195
CG =3	171	152	171	191	180
CG = 1,2,N/A***	133	121	242	183	146
Total	513	526	550	588	601

* The result from presentation of CRG2016
** Thai-IOD published only firms evaluated 3 and greater
*** N/A score is unscored.

In this paper, I focus only the firms in stock exchange of Thailand (SET) due to higher liquidity. For the full samples is the firms that have the annual report, 56-1 form, Invitation of meeting form, minutes of meeting in general meeting, trading price, market capitalization and accounting data in previous year. For example, the full samples in Y2016, I will check the firms that have above information in Y2015. The result of manipulating shown in following table 4.3.

Table 4.3 The Number of firms in each score**

	2012	2013	2014	2015	2016
Number of firms					
CG= 5	54	79	30	52	75
CG = 4	130	138	94	129	157
CG =3	126	114	134	145	139
CG = 1,2,N/A***	103	97	187	139	115
Total	413	428	445	465	486

*The total firms in Y2016 is all firms that have Market-cap, price, accounting data in Y2015
**The firms only in SET market
***N/A score is unscored.

4.1.2 Descriptive Statistics of Corporate Governance Portfolios

After I got the name of firms in each corporate governance score, I continue finding the value-weighted corporate governance portfolio in each level, CG=1/2, CG=3 CG=4 and CG=5. The statistics and the correlation of excess return of all corporate governance portfolios shown as follows table 4.4 and table 4.5.

Table 4.4 The descriptive statistics of excess return of each CG portfolios

	CG5	CG4	CG3	CG1_2
Minimum	-7.13%	-9.05%	-11.09%	-8.99%
Maximum	8.12%	10.37%	8.03%	8.74%
Mean	0.05%	0.27%	0.23%	0.34%
Median	0.31%	0.59%	0.45%	0.59%
Standard Deviation	2.44%	2.48%	2.53%	2.43%
Number of observation	261	261	261	261

Table 4.5 The correlation of excess return of each CG portfolios

	CG5	CG4	CG3	CG1_2
CG5	1			
CG4	0.799	1		
CG3	0.7567	0.8483	1	
CG1_2	0.643	0.7795	0.7926	1

I have the return of corporate governance portfolio. Starting from the best corporate governance (CG = 5). The average return of the best corporate governance portfolio is equal to 0.0481% per week, the standard deviation is equal to 2.4366% per week. On poor and unscored corporate governance portfolio, the average return of it is equal to 0.3400% per week, the standard deviation is equal to 2.4298%. I can find that the best corporate governance has lower average return by comparing with the poor or unscored corporate governance portfolios. Same as the comparison between investment grade bonds and high yield bonds.

4.2Asset Pricing Model Factors

4.2.1 Factor forming methods

Second group is data that use for constructing the asset pricing model. I plan to use the five factor asset pricing model. The market and accounting data get from the Eikon. Risk-free data get from ThaiBMA, on zero coupon bonds. The equation was shown as follows equation 4.

$$R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + e_{it} \quad (4)$$

R_{it}	The return of stock at time t
R_{Ft}	The risk free rate at time t
R_{Mt}	The return of Market at time t
SMB_t	The difference of return from diversified portfolio of small and big stocks
HML_t	The difference of return from diversified portfolio of high and low B/M stocks
RMW_t	The difference of return from diversified portfolio of high and low profitability*
CMA_t	The difference of return from diversified portfolio of high and low investment**

* Profitability is revenues minis cost of goods sold, minus selling, general, and administrative expense, minus interest expense all divided by book equity.

** Investment is the change in total assets from the fiscal year ending in year t-2 to the fiscal year ending in t-1, divided by t-2

For the detail of forming loading factor and their components were attached in table 4.6. I follow the method of forming the factors by Fama-French's paper. They separate the size, value, profitability and investment by 50th percentile for size and 30th and 70th percentile for the rests. Value, profitability and investment was separated by the median of size. I will get 6 portfolios in value weight in each Size-Value, Size-profit

and Size-Investment portfolios. After that, I will use the excess return in each portfolio to make the factors, SMB, HML, RMW and CMA, the detail shown in table 4.7.

Table 4.6 The relationship of Size-Value, Size-Profit, Size-Invest Portfolios

	Low B/M (30th Pr)	Natural B/M	High B/M (>70th Pr)
Small Size (<50th percentile)	SL	SN	SH
Big Size (>50th percentile)	BL	BN	BH

	Weak OP (30th Pr)	Natural OP	Robust OP (>70th Pr)
Small Size (<50th percentile)	SW	SN	SR
Big Size (>50th percentile)	BW	BH	BR

	Conservative (30th Pr)	Natural Inv.	Aggressive (>70th Pr)
Small Size (<50th percentile)	SL	SN	SH
Big Size (>50th percentile)	BL	BN	BH

Table 4.7 The method to find the loading factors, SMB, HML, RMW and CMA

Sort	Breakpoints	Factors and their components
2x3 sorts on	Size: SET median	SMB,B/M = (SH + SN + SL)/3 - (BH + BN + BL)/3
Size and B/M, or		SMB,O/P = (SR + SN + SW)/3 - (BR + BN + BW)/3
Size and OP, or		SMB,Inv = (SC + SN + SA)/3 - (BC + BN + BA)/3
Size and Inv		SMB = (SMB,B/M + SMB, O/P + SMB,Inv)/3
	B/M : 30th and 70th SET percentiles	HML = (SH +BH)/2 - (SL+BL)/2
	OP : 30th and 70th SET percentiles	RMW = (SR + BR)/2 - (SW + BW)/2
	Inv : 30th and 70th SET percentiles	CMA = (SC + BC)/2 - (SA+BA)/2

First of data reviewing, I show the result of average return in each portfolios that was formed by method of table 4.6. I have the expectation of each portfolio that was explained in the theoretical framework. I show the actual result of this study in following table 4.8.

Table 4.8 The excess return of each portfolios, Size-Value, Size-Profit, Size-Inv

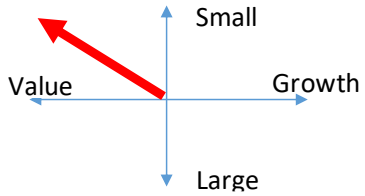
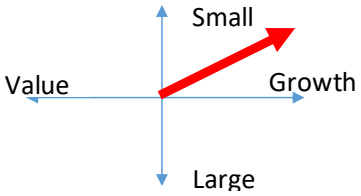
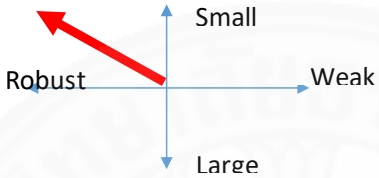
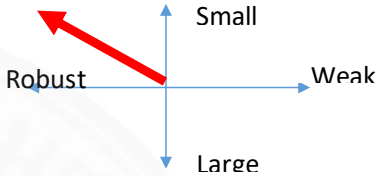
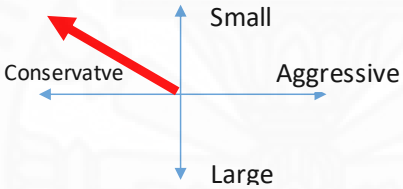
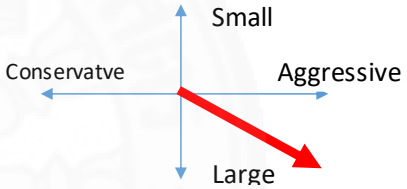
	High B/M (30th Pr)	Natural B/M	Low B/M (>70th Pr)
Small Size (<50th percentile)	-0.14%	0.14%	0.66%
Big Size (>50th percentile)	-0.28%	-0.02%	0.29%

	Robust OP (30th Pr)	Natural OP	Weak OP (>70th Pr)
Small Size (<50th percentile)	0.48%	0.12%	-0.04%
Big Size (>50th percentile)	0.17%	0.06%	0.01%

	Conservative (30th Pr)	Natural Inv.	Aggressive (>70th Pr)
Small Size (<50th percentile)	0.02%	0.14%	0.15%
Big Size (>50th percentile)	0.05%	0.10%	0.37%

Base on the theoretical framework, starting from size-value, I expect that the return from small firms will be higher from the result from big firms due to information asymmetry and the return from high Book-To-Market firms will be higher from the return from the low because the high Book-To-Market firms is undervalued firms. The equity book value is greater than the market value. The return of that firms should be higher than it be. Inversely, the overvalued firms (Low Book-To-Market) return should be lower that it be same as above reason. However, the actual result is not be same as the expectation from theoretical concept. Second, size-profitability, the higher profitability firms will gain higher in its return. This the expectation and the actual result is same. Finally, size-investment, the conservative firms (Low investment) can save a lot of money due to less investment. Then, the investors invest in this kind of firms should get the higher in its return. But, the actual result is different. The return of aggressive firms (High investment) is higher than the conservative firms. I also plot this relationship comparing the expectation and the actual result of each portfolio shown as following figure 4.1.

Figure 4.1 The comparison between expectation and the actual result

Portfolios	Expectation from theoretical framework	The actual result
Size-Value		
Size-Profitability		
Size-Investment		

4.2.2 Descriptive Statistics of loading factors

Next, I summarize the descriptive statistics of each loading factors, Market return (MKRET), size effects (SMB), value effects (HML), profitability effects (RMW) and investment effects (CMA). I show the statistics value and the correlation among these factor as following table 4.9 and table 4.10.

Table 4.9 The descriptive statistics of each loading factors, Mkret, SMB, HML, RMW and CMA

	Mkt	SMB	HML	RMW	CMA
Minimum	-7.75%	-5.55%	-4.50%	-4.79%	-4.41%
Maximum	6.23%	3.83%	3.75%	4.34%	2.80%
Mean	0.11%	0.09%	-0.69%	0.34%	-0.23%
Median	0.37%	0.24%	-0.57%	0.39%	-0.19%
Standard Deviation	2.26%	1.47%	1.38%	1.35%	1.11%
Number of observation	261	261	261	261	261

Table 4.10 The correlation of each loading factors, Mkret, SMB, HML, RMW and CMA

	Mkt	SMB	HML	RMW	CMA
Mkt	1				
SMB	-0.28696	1			
HML	-0.19192	-0.36795	1		
RMW	-0.14188	-0.10175	-0.24617	1	
CMA	0.22781	-0.04676	-0.07494	0.100832	1

For the result of the descriptive statistics of each loading factors, I have the observation in each variable is to 261 samples (Weekly data in 5 years). Starting from the first variable, the excess market return is from the market return minus the risk free. I find that the average return is equal to 0.1133% per week. The standard deviation is equal to 2.2648% per week. Next, SMB, the return of small size firms minus the return of big size firms. The average of this value is equal to 0.08517% per week. The standard deviation is equal to 1.4721% per week. Third, HML, the return of high book-to-market firms minus the return of low book-to-market firms. The average of this value is equal to -0.68740% per week. The standard deviation is equal to 1.3752% per week. Fourth, RMW, the return of robust operating profitability firms minus the return of week operating profitability firms. The average of this value is equal to 0.3399% per week. The standard deviation is equal to 1.3459% per week. For the last variable, CMA, the return of conservative (Low Investment) firms minus the return of aggressive (High Investment) firms. The average of this value is equal to -0.2257% per week. The standard deviation is equal to 1.1136% per week. I collect all variable together and display the correlation of all variables shown as table 4.11.

Table 4.11 The correlation of all regression components

	CG5	CG4	CG3	CG1_2	Mkt	SMB	HML	RMW	CMA
CG5	1								
CG4	0.799	1							
CG3	0.7567	0.8483	1						
CG1_2	0.643	0.7795	0.7926	1					
Mkt	0.9561	0.9223	0.8721	0.7842	1				
SMB	-0.4144	-0.176	-0.0074	0.0734	-0.287	1			
HML	-0.0788	-0.2828	-0.2708	-0.2967	-0.1919	-0.368	1		
RMW	-0.1127	-0.1314	-0.1382	-0.2776	-0.1419	-0.1018	-0.2462	1	
CMA	0.2082	0.2168	0.2179	0.1544	0.2278	-0.0468	-0.0749	0.1008	1

Finally, I will get the weekly data of these factors namely excess market return (Mkt), excess return on size (SMB), excess return on value (HML), excess return on profitability (RMW) and excess return on investment (CMA) and the left hand side are the value weighted return of each corporate governance portfolio. I show the example of forming factors in following table 4.12.

Table 4.12 The Example of forming factors

	Left Hand Side				Right Hand Side				
Date	**CG3**	**CG4**	**CG5**	**CG1_2**	**mkret**	**HML**	**RMW**	**CMA**	**SMB**
4/1/2011	0.006	0.024	0.026	0.014	0.025	0.009	0.007	0.016	-0.011
4/8/2011	0.025	0.005	0.021	0.003	0.017	-0.008	-0.005	0.009	-0.004
4/12/2011	0.010	0.014	-0.004	0.003	0.002	0.022	0.005	0.005	-0.006
4/22/2011	0.004	0.035	0.016	-0.001	0.019	0.001	0.002	-0.013	-0.011
4/29/2011	0.000	-0.013	-0.013	-0.001	-0.011	0.012	0.000	0.000	0.005
5/6/2011	-0.034	-0.023	-0.049	-0.005	-0.040	0.006	-0.009	-0.009	0.014
5/13/2011	0.048	0.042	0.026	0.022	0.032	-0.023	0.016	-0.005	-0.017
5/20/2011	-0.014	-0.016	-0.008	-0.010	-0.011	0.013	0.007	-0.003	0.001
5/27/2011	-0.002	0.000	-0.007	-0.008	-0.006	0.008	0.016	0.003	0.001
6/3/2011	0.016	-0.009	-0.012	0.018	-0.009	-0.005	-0.002	-0.011	0.013
6/10/2011	-0.021	-0.023	-0.042	-0.032	-0.036	-0.023	0.021	0.000	0.009
6/17/2011	-0.006	-0.003	-0.004	0.006	-0.001	0.007	0.006	-0.009	0.006
6/24/2011	0.001	-0.007	0.006	0.011	0.004	-0.024	0.009	-0.004	0.008

CHAPTER 5
METHODOLOGY

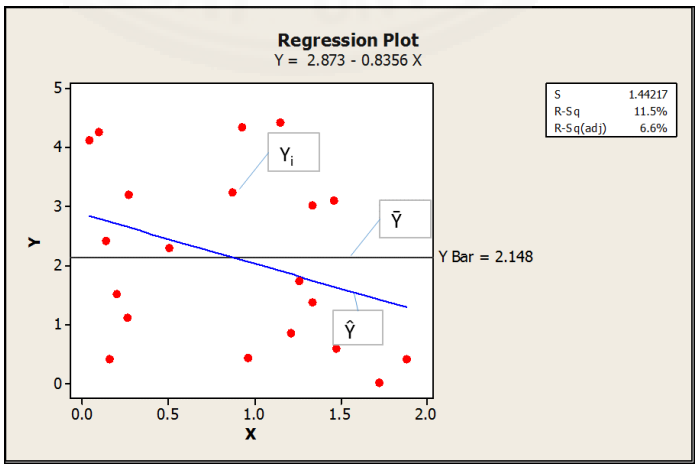
From previous section, I will get the CG score and factor for pricing model. Next, I will separate the corporate governance portfolios in each group by CG score. I will have 4 groups of portfolio shown in the following equation 5. Then, I do ordinary linear regression to find the relationship between each portfolio in term of beta, alpha, overall test and individual t-test.

Example for CG score = 5

$$R_{5t} - R_{Ft} = a_5 + b_5(R_{Mt} - R_{Ft}) + s_5 SMB_t + h_5 HML_t + r_5 RMW_t + c_5 CMA_t + e_{5t} \quad (5)$$

Finally, I will check the intercept term of each portfolio to ensure that this model can capture all systematic risks. I expect that the intercept term will close to zero if higher corporate governance score. Moreover, for checking how model can be completely explained. I will check the R-squared result as well. R-square is calculated by sum square regression divined by sum square total. Higher R-square is higher in completed explanation that mean it shows how model can explain the studying samples. I plot the graph in following table 15 and the equation of calculation of R-square in equation 6.

Figure 5.1 Regression plot to show Y_i, $\hat{Y}_i$ and $\bar{Y}$



$$R^2 = \frac{Sum\ Square\ Regression}{Sum\ Square\ Total} = \frac{\sum(\hat{Y}_i - \bar{Y})^2}{\sum(Y_i - \bar{Y})^2} \quad (6)$$

CHAPTER 6
EMPIRICAL RESULT

6.1 The result of regression

After I get the result of forming of loading factor by using 2x3 portfolios of five factors asset pricing method, I use these variable to do liner regression. I get the result of each coefficients that are market return, size effects, value effect, profitability effects and investment effects as well as the intercept term. I show the result of regression starting from the highest corporate governance score (CG=5) to the lowest corporate governance score (CG=1 or 2) as following Appendix B in panel A, B, C and D.

Firstly, I check the result of the research question. I focus on the intercept term and the R-Squared. For the good corporate governance portfolios (CG=5, 4 and3), I found that the intercept term of these portfolios are significantly equal to zero. Inversely, I found that the intercept term of poor and unscored corporate governance portfolios are not significantly equal to zero due to P-Value less than 0.05. The value of this intercept term are equal to 0.19% per week. That mean I can find the higher abnormal return from the poor or unscored corporate governance return. Moreover, I check the value of R-Squared from the lowest portfolio to the highest one are 73.12%, 82.59%, 86.50% and 93.81%.

I can see that the R-Squared has the increasing trend from the lowest corporate governance score to the highest corporate governance score. I also use another forming method by 2x2 portfolios to check alpha and R-square, the result of alpha and R-squared have same pattern as the current method (2x3 portfolios) finding in table 6.2, for further regression result can find in Appendix C in panel A, B, C and D. I can conclude that the higher corporate governance score can be more completely explained by the asset pricing model due to higher R-squared.

For further explanation, I summarize the coefficient in following table 6.1. I can easily find the coefficient. If that value are significant, it will be displayed the star in any confidential level starting from 95%, 99% and 99.9%. On the second row of each component, it show the result of T-statistic. I also show the number of observation and the result of R-square in the end of table.

Table 6.1 Summary of coefficient of all regression result (2x3 Portfolios)

	CG5	CG4	CG3	CG1_2
Mkret	1.011***	1.000***	1.071***	0.887***
	(50.21)	(33.09)	(30.57)	(21.2)
SMB	-0.198***	0.085	0.482***	0.439***
	(-6.21)	(1.78)	(8.7)	(6.62)
HML	0.111**	-0.167**	0.047	-0.138
	(3.25)	(-3.26)	(0.78)	(-1.94)
RMW	0.045	-0.037	0.060	-0.273***
	(1.42)	(-0.77)	(1.08)	(-4.15)
CMA	-0.020	0.013	0.025	-0.027
	(-0.57)	(0.24)	(0.41)	(-0.36)
Alpha	0.000	0.001	0.001	0.00190*
	(0.16)	(0.81)	(1.05)	(2.07)
N	261.000	261.000	261.000	261.000
R-sq	0.938	0.865	0.826	0.731

t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

Table 6.2 Summary of coefficient of all regression result (2x2 Portfolios)

	CG5	CG4	CG3	CG1_2
Mkret	1.008***	1.010***	1.057***	0.893***
	(52.8)	(33.98)	(30.74)	(21.85)
SMB	-0.217***	0.121*	0.446***	0.474***
	(-7.05)	(2.54)	(8.05)	(7.21)
HML	0.205***	-0.219**	-0.074	-0.229*
	(4.37)	(-3.00)	(-0.88)	(-2.28)
RMW	0.010	0.025	0.056	-0.301**
	(0.23)	(0.35)	(0.69)	(-3.12)
CMA	0.024	0.009	-0.160	0.000
	(0.45)	(0.11)	(-1.66)	(-0.00)
Alpha	0.000	0.001	0.000	0.00180*
	(0.75)	(0.9)	(0.35)	(2.07)
N	261	261	261	261
R-sq	0.943	0.866	0.828	0.738

t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

The coefficient of market return of all corporate governance level are significant. All value are positive value. Moreover, I can see the decreasing trend from high corporate governance to low corporate governance because the higher corporate governance score is higher correlated with the market return showing above in table 13. For the size effects, the result of the coefficient are significant value in CG = 1/2, CG = 3. These value are positive value (0.439 and 0.482), CG = 5 also significant but, I get negative value (-0.198), for CG = 4 portfolios, I did not find the size effects.

Next, I check the value effects. I can found only CG = 5 and CG = 4 portfolios will have this problem due to significant value of the coefficient. The best corporate governance portfolio value is 0.111 and the good corporate governance portfolio value is -0.167 respectively. I can conclude that the best and good corporate governance have these value effect. The value effect is from the different between return of high and low Book-To-Market value that imply about under and overvalue. This problem is caused by the information asymmetry.

For the third factor, RMW, the return between robust operating profitability and weak operating profitability. I found that only the poor or unscored corporate governance portfolio has this problem. The coefficient is negative value (-0.273). That mean the firms in the poor or unscored corporate governance will have different return between robust profitability firms and weak profitability firms. Finally, the investment factors, I don't found this relationship of this factor because all of coefficient are significantly equal to zero.

Furthermore, I robustly check the relationship between the return and corporate governance score by adding CG score in additional explained variable. I can find the significant value of negative number. That means the higher governance score, the excess return will be significantly lower. (Find in Appendix A) Moreover, I also check this relationship with panel regression. First, I use the hausman test for checking whether the model has fixed effect or random effect. I found that this model should use random effect due to P-value of hausman test is greater than 0.05. Next, I check the result of panel regression by adding corporate governance score as dummy variables. By using poor or unscored governance portfolios (CG1/2) as base, we can find the intercept term of the highest governance portfolios (CG=5) is significantly negative due to P-value is lower than 0.05. Finally, I can conclude that from all empirical results the higher corporate governance score causing the lower in excess return find in table 6.3. (Further information please find in Appendix D)

Table 6.3 The result of panel regression using random effects

Return	Coef.	Std. Err.	z	P>z	[95% confidence]	
Mkret	0.992***	0.018	54.280	0.000	0.956	1.028
SMB	0.202***	0.029	6.980	0.000	0.145	0.259
HML	-0.037	0.031	-1.190	0.234	-0.098	0.024
RMW	-0.051	0.029	-1.790	0.074	-0.108	0.005
CMA	-0.002	0.032	-0.070	0.948	-0.065	0.061
CG3	-0.001	0.001	-1.140	0.256	-0.003	0.001
CG4	-0.001	0.001	-0.640	0.522	-0.003	0.001
CG5	-0.003**	0.001	-2.960	0.003	-0.005	-0.001
Alpha	0.002**	0.001	2.750	0.006	0.001	0.003
sigma_u	0.000					
sigma_e	0.011					
rho	0.000	(fraction of variance due to u_i)				

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

6.2 Long/Short strategies explanation

Additionally, the reason that explain the coefficient of each loading factors is from "Asset management" book from Andrew Ang. For example, I will compare the coefficient of the best corporate governance portfolios and the poor or unscored corporate governance portfolios in following equations 6.

$$R_{5t} - R_{Ft} = a_5 + b_5(R_{Mt} - R_{Ft}) + s_5 SMB_t + h_5 HML_t + r_5 RMW_t + c_5 CMA_t + e_{5t} \quad (6)$$

I add R_f both left hand side and right hand side, and, manipulate the equation 7.

$$R = a + bR_m + (1-b)R_{Ft} + sSMB_t + hHML_t + rRMW_t + cCMA_t \quad (7)$$

Then, I separate the SMB HML RMW and CMA terms. I will get following equation 8.

$$R = a + bR_m + (1-b)R_{Ft} + s(R_s - R_b) + h(R_h - R_l) + r(R_r - R_w) + c(R_c - R_a) \quad (8)$$

From the regression result, I get following equation 9 and 10.

CG = 5;

$$R = 0 + 1.011R_m + (-0.011)R_{Ft} + (-0.198)(R_s - R_b) + 0.111(R_h - R_l) \quad (9)$$

CG = 1&2;

$$R = 0.00190 + 0.887R_m + (0.113)R_{Ft} + 0.439(R_s - R_b) + (-0.273)(R_r - R_w) \quad (10)$$

In the best corporate governance portfolios (CG = 5) I get the result of beta is equal to 1.011 that means this portfolio can be formed by long in 101.% of market portfolios and short 1% in risk-free asset. But, for the poor or unscored corporate governance portfolios (CG = 1& 2) I get that the result of beta is equal to 0.887. This portfolio can be formed by long 88.70% in market portfolios and 11.3% in the risk-free assets. I think that the best corporate governance portfolios consist of the main stock in

the market but the poor or unscored corporate governance portfolios consist of the infamous stocks, or stocks that don't mainly contribute to market.

Second, SMB, the return of small size firms minus the return of big size firms, can be separated into two groups "The return of small size firms" and "The return of big size firms". The best corporate governance portfolios' coefficient is equal to -0.198 that means this portfolios short 19.8% in Small-Size firms and long 19.8% in Big-Size firms. Inversely, the poor or unscored corporate governance portfolios' coefficient is equal to 0.438 that mean this portfolios long 43.9% in Small-Size firms and short 43.9% in Big-Size firms. It makes sense because the best governance portfolios mainly consist of the big size firms. But, the poor or unscored governance portfolios mainly consist of the small size firms.

Moreover, HML, the return of high Book-To-Market firms minus the return of low Book-To-Market firms, can be separated into two groups as well. I can conclude from the equation 9th that the best corporate governance portfolios long in 11.1% in high Book-To-Market firms and short in low Book-To-Market firms. For the last factor, RMW, the return of robust operating profitability firms minus the return of weak operating profitability firms, can be separated into two groups. I also can conclude that the poor or unscored corporate governance portfolios can be duplicated by short 27.3% in the robustness profit firms and long 27.3% in the weakness profit firms.

Finally, this research can find the abnormal in the last governance portfolios. The abnormal return is 0.19 percent per week, or 9.88 percent per year. I can see the difference of investment strategy. The last portfolios long in the weak portability firms and short in the opposite site. For example, two companies in the same market have different profitability, weak and robust. They sell the same product with same price. I assume the product price is equal to 100 baht, the weak profit firm can get a profit 10 baht (10%). But, the robust profit firm will get a profit 30 baht (30%). If the product price increase to 150 baht, the weak profit firm will be increased the profitability from 10% to 60% (+500%). But, the robust profit firm will be increase the profitability from 30% to 80% (+167%). That may be the explanation of this investment strategy why it found abnormal return.

CHAPTER 7
CONCLUSION

This study finds the relationship between corporate governance and the excess returns explained by the 5 factors. I use the ordinary least square regression to find this relationship and robustly check by using panel regression. The sample used in this study cover all the Stock Exchange of Thailand (SET) from all industries, during year 2011 until year 2015. The financial data is from Eikon (Reuters), the risk free data is from Thai-BMA and finally the corporate governance score is from Thai-IOD.

Based on the main research question, I expect that the best corporate governance firms will have less problems in information asymmetry problems, governance problems as well as agency problems. I set the main objective to check the result of intercept term and R-Squared. The intercept term represents the abnormal return. The best corporate governance portfolios should have lower intercept terms due to less in principle-agent problems. R-squared, the ratio between predicted value and actual value, represents how fitness of explanation. I think that the best governance portfolios can be more clearly explain by asset pricing model than the poor or unscored portfolios. Then, R-squared of good governance portfolios should be higher than the lowest one.

In conclusion, I find that the intercept term (Alpha) of poor or unscored corporate governance portfolio is not significantly equal to zero. I can find the abnormal return from these governance portfolios around 0.19% weekly or 9.8% annually. I also found that the R-squared result have the increasing trends from the poor or unscored governance to good governance same as my main expectations. I can conclude that the higher corporate governance's alpha is significantly equal to zero, no abnormal return, and can be more completely explained by asset pricing model than the lower one. It means that I can use this asset pricing model to correctly explain for good governance firms. For the poor or unscored governance firms' return, I have to find the additional variables to achieve the correct explanation.

Ultimately, the research can contribute the readers on the concept of applying the Fama-French five-factor asset pricing model in term of creating the factor and applying in Thai stocks. This research can be better if I can find the exact governance score of each firm. I have to assume that the governance score of unpublished firms will be equal to 1, 2 or N/A that is poor or unscored group. I can more correctly find the abnormal return in each level if I can access the exact governance score of each firm. Therefore, I suggest for the future research, the researchers can find the exact corporate governance score by summarizing the data from company's annual reports. Additionally, after getting the exact governance score, you can use that score to create another asset pricing factor same as SMB, HML, etc. by using same concept of constructing these factors.

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APPENDICES

APPENDIX A

THE RESULT OF REGRESSION BY ADDING CG SCORE

Source	SS	df	MS		
Model	0.506	6	0.084	Number of obs =	1044
Residual	0.128	1037	0.000	F (5, 255) =	682.700
Total	0.634	1043	0.001	Prob > F =	0
				R-Squared =	0.798
				Adj R-Squared =	0.797
				Root MSE =	0.011

RETURN	Coef.	Std.Err	t	P >|t|	[95% Conf.	Interval]
Mkret	0.992	0.018	54.260	0.000	0.956	1.028
SMB	0.202	0.029	6.970	0.000	0.145	0.259
HML	-0.037	0.031	-1.190	0.235	-0.098	0.024
RMW	-0.051	0.029	-1.790	0.074	-0.108	0.005
CMA	-0.002	0.032	-0.070	0.948	-0.065	0.061
CG	-0.001	0.000	-2.650	0.008	-0.001	0.000
Alpha	0.004	0.001	3.200	0.001	0.001	0.006

APPENDIX B

THE REGRESSION RESULT OF 2X3 METHOD

Panel A Corporate Governance Score == 5

Source	SS	df	MS		
Model	0.144811387	5	0.028962277	Number of obs =	261
Residual	0.009552625	255	0.000037461	F (5, 255) =	773.13
Total	0.154364012	260	0.000593708	Prob > F =	0
				R-Squared =	0.9381
				Adj R-Squared =	0.9369
				Root MSE =	0.00612

CG5	Coef.	Std.Err	t	P >|t|	[95% Conf.	Interval]
Mkret	1.010727	0.0201316	50.21	0	0.9710814	1.050372
SMB	-0.1980267	0.0318936	-6.21	0	-0.2608351	-0.1352183
HML	0.1112867	0.0342779	3.25	0.001	0.0437828	0.1787906
RMW	0.0449595	0.0317041	1.42	0.157	-0.0174757	0.1073947
CMA	-0.0201467	0.0353942	-0.57	0.57	-0.0898489	0.0495555
Alpha	0.0000711	0.00044	0.16	0.872	-0.0007954	0.0009376

Panel B Corporate Governance Score == 4

Source	SS	df	MS		
Model	0.137846886	5	0.027569377	Number of obs =	261
Residual	0.021519016	255	0.000084388	F (5, 255) =	326.7
Total	0.159365902	260	0.000612946	Prob > F =	0
				R-Squared =	0.865
				Adj R-Squared =	0.8623
				Root MSE =	0.00919

CG4	Coef.	Std.Err	t	P >|t|	[95% Conf.	Interval]
Mkret	0.9999575	0.0302154	33.09	0	0.940454	1.059461
SMB	0.084968	0.0478689	1.78	0.077	-0.0093008	0.1792367
HML	-0.1674748	0.0514475	-3.26	0.001	-0.268791	-0.0661587
RMW	-0.0367895	0.0475845	-0.77	0.44	-0.1304981	0.0569191
CMA	0.0129995	0.0531229	0.24	0.807	-0.0916161	0.1176151
Alpha	0.0005318	0.0006604	0.81	0.421	-0.0007688	0.0018323

Panel C Corporate Governance Score == 3

Source	SS	df	MS		
Model	0.137091925	5	0.027418385	Number of obs =	261
Residual	0.028899467	255	0.000113331	F (5, 255) =	241.93
Total	0.165991392	260	0.000638428	Prob > F =	0
				R-Squared =	0.8259
				Adj R-Squared =	0.8225
				Root MSE =	0.01065

CG3	Coef.	Std.Err	t	P >|t|	[95% Conf. Interval]	
Mkret	1.070551	0.0350156	30.57	0	1.001595	1.139508
SMB	0.4823443	0.0554737	8.7	0	0.3730993	0.5915893
HML	0.0466551	0.0596208	0.78	0.435	-0.0707568	0.1640671
RMW	0.0595009	0.0551441	1.08	0.282	-0.0490949	0.1680967
CMA	0.0251962	0.0615625	0.41	0.683	-0.0960394	0.1464317
Alpha	0.0008028	0.0007653	1.05	0.295	-0.0007043	0.00231

Panel D Corporate Governance Score == 1 or 2 or N/A

Source	SS	df	MS		
Model	0.112230763	5	0.022446153	Number of obs =	261
Residual	0.041264636	255	0.000161822	F (5, 255) =	138.71
Total	0.153495399	260	0.000590367	Prob > F =	0
				R-Squared =	0.7312
				Adj R-Squared =	0.7259
				Root MSE =	0.01272

CG1_2	Coef.	Std.Err	t	P >|t|	[95% Conf. Interval]	
Mkret	0.8868777	0.0418414	21.2	0	0.804479	0.9692764
SMB	0.4386742	0.0662874	6.62	0	0.3081336	0.5692148
HML	-0.1384582	0.071243	-1.94	0.053	-0.2787578	0.0018414
RMW	-0.2733035	0.0658936	-4.15	0	-0.4030684	-0.1435386
CMA	-0.0264828	0.0735631	-0.36	0.719	-0.1713514	0.1183857
Alpha	0.0018951	0.0009145	2.07	0.039	0.0000942	0.0036961

APPENDIX C

THE REGRESSION RESULT OF 2X2 METHOD

Panel A Corporate Governance Score == 5

Source	SS	df	MS		
Model	0.145582346	5	0.029116469	Number of obs =	261
Residual	0.008781665	255	0.000034438	F (5, 255) =	845.48
Total	0.154364012	260	0.000593708	Prob > F =	0
				R-Squared =	0.9431
				Adj R-Squared =	0.942
				Root MSE =	0.00587

CG5	Coef.	Std.Err	t	P >|t|	[95% Conf.	Interval]
Mkret	1.007854	0.0190896	52.8	0	0.9702609	1.045448
SMB	-0.216766	0.0307326	-7.05	0	-0.277288	-0.156244
HML	0.2048744	0.0469215	4.37	0	0.1124714	0.2972774
RMW	0.0102604	0.0450177	0.23	0.82	-0.0783935	0.0989142
CMA	0.0239132	0.0534392	0.45	0.655	-0.0813253	0.1291516
Alpha	0.0003038	0.0004065	0.75	0.456	-0.0004968	0.0011043

Panel B Corporate Governance Score == 4

Source	SS	df	MS		
Model	0.138070259	5	0.027614052	Number of obs =	261
Residual	0.021295643	255	0.000083512	F (5, 255) =	330.66
Total	0.159365902	260	0.000612946	Prob > F =	0
				R-Squared =	0.8664
				Adj R-Squared =	0.8638
				Root MSE =	0.00914

CG4	Coef.	Std.Err	t	P >|t|	[95% Conf.	Interval]
Mkret	1.010249	0.0297272	33.98	0	0.951707	1.068791
SMB	0.1214914	0.0478581	2.54	0.012	0.0272439	0.215739
HML	-0.2188436	0.0730682	-3	0.003	-0.3627377	-0.0749496
RMW	0.0246536	0.0701036	0.35	0.725	-0.1134022	0.1627094
CMA	0.0090794	0.083218	0.11	0.913	-0.1548027	0.1729614
Alpha	0.0005666	0.000633	0.9	0.372	-0.0006801	0.0018132

Panel C Corporate Governance Score == 3

Source	SS	df	MS		
Model	0.137486428	5	0.027497286	Number of obs =	261
Residual	0.028504964	255	0.000111784	F (5, 255) =	245.99
Total	0.165991392	260	0.000638428	Prob > F =	0
				R-Squared =	0.8283
				Adj R-Squared =	0.8249
				Root MSE =	0.01057

CG3	Coef.	Std.Err	t	P >|t|	[95% Conf.	Interval]
Mkret	1.057398	0.0343929	30.74	0	0.9896677	1.125129
SMB	0.4455918	0.0553695	8.05	0	0.336552	0.5546316
HML	-0.0743487	0.0845364	-0.88	0.38	-0.240827	0.0921296
RMW	0.0555587	0.0811064	0.69	0.494	-0.1041651	0.2152824
CMA	-0.1595218	0.0962791	-1.66	0.099	-0.3491252	0.0300816
Alpha	0.0002585	0.0007324	0.35	0.724	-0.0011838	0.0017008

Panel D Corporate Governance Score == 1 or 2 or N/A

Source	SS	df	MS		
Model	0.113227366	5	0.022645473	Number of obs =	261
Residual	0.040268033	255	0.000157914	F (5, 255) =	143.4
Total	0.153495399	260	0.000590367	Prob > F =	0
				R-Squared =	0.7377
				Adj R-Squared =	0.7325
				Root MSE =	0.01257

CG1_2	Coef.	Std.Err	t	P >|t|	[95% Conf.	Interval]
Mkret	0.8930741	0.040878	21.85	0	0.8125727	0.9735755
SMB	0.4744891	0.0658098	7.21	0	0.3448892	0.6040891
HML	-0.2289475	0.1004763	-2.28	0.024	-0.4268165	-0.0310785
RMW	-0.3010162	0.0963996	-3.12	0.002	-0.4908569	-0.1111755
CMA	-0.0000516	0.1144332	0	1	-0.2254061	0.2253028
Alpha	0.0018029	0.0008705	2.07	0.039	0.0000887	0.0035172

APPENDIX D

PANEL REGRESSION OF CG PORTFOLIOS

Panel A Panel regression with Fixed Effect

Fixed-effects (within) regression		Number of obs =	1044
Group variable: cg		Number of groups =	4
R-sq; within =	0.7981	Obs per group :min =	261
between =	.	avg =	261
overall =	0.7966	max =	261
		F (5,1035) =	818.37
corr(u_i, Xb) =	0	Prob > F =	0

Return	Coef.	Std. Err.	t	P>t	[95% confidence]	
mkret	0.992	0.018	54.280	0.000	0.956	1.028
smb	0.202	0.029	6.980	0.000	0.145	0.259
hml	-0.037	0.031	-1.190	0.235	-0.098	0.024
rmw	-0.051	0.029	-1.790	0.074	-0.108	0.005
cma	-0.002	0.032	-0.070	0.948	-0.065	0.061
_cons	0.001	0.000	2.070	0.039	0.000	0.002
sigma_u	0.001					
sigma_e	0.011					
rho	0.012	(fraction of variance due to u_i)				

F test that all u_i = 0 : (F3,1035) = 3.23 Prob >F = 0.0219

Panel B Panel regression with Random Effect

Random-effects GLS regression		Number of obs =	1044
Group variable: cg		Number of groups =	4
R-sq; within =	0	Obs per group :min =	261
between =	0	avg =	261
overall =	0.7966	max =	261
		Wald Chi2(5) =	4091.84
corr(u_i, Xb) =	0	Prob > chi2 =	0

Return	Coef.	Std. Err.	z	P>z	[95% confidence]	
mkret	0.992	0.018	54.280	0.000	0.956	1.028
smb	0.202	0.029	6.980	0.000	0.145	0.259
hml	-0.037	0.031	-1.190	0.234	-0.098	0.024
rmw	-0.051	0.029	-1.790	0.074	-0.108	0.005
cma	-0.002	0.032	-0.070	0.948	-0.065	0.061
_cons	0.001	0.001	1.270	0.204	0.000	0.002
sigma_u	0.001					
sigma_e	0.011					
rho	0.008	(fraction of variance due to u_i)				

Panel C Hausman test

== Coefficients ==

	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
mkret	0.992	0.992	0.000	.
smb	0.202	0.202	0.000	.
hml	-0.037	-0.037	0.000	.
rmw	-0.051	-0.051	0.000	.
cma	-0.002	-0.002	0.000	8.07E-10

b = consistent under H0 and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under H0; obtained from xtreg

Test : H0: difference in coefficients not systematic

chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 0
Prob > chi2 = 1
(V_b-V_B is not positive definite)

Panel D Panel Regression with Random effects and CG dummy variables

Random-effects GLS regression		Number of obs =	1044
Group variable: cg		Number of groups=	4
R-sq; within =	0.7981	Obs per group :min =	261
between =	1	avg =	261
overall =	0.7985	max =	261
		Wald Chi2(5) =	4091.84
corr(u_i, Xb) =	0	Prob > chi2 =	0

Return	Coef.	Std. Err.	z	P>z	[95% confidence]	
mkret	0.992	0.018	54.280	0.000	0.956	1.028
smb	0.202	0.029	6.980	0.000	0.145	0.259
hml	-0.037	0.031	-1.190	0.234	-0.098	0.024
rmw	-0.051	0.029	-1.790	0.074	-0.108	0.005
cma	-0.002	0.032	-0.070	0.948	-0.065	0.061
cg3	-0.001	0.001	-1.140	0.256	-0.003	0.001
cg4	-0.001	0.001	-0.640	0.522	-0.003	0.001
cg5	-0.003	0.001	-2.960	0.003	-0.005	-0.001
_cons	0.002	0.001	2.750	0.006	0.001	0.003
sigma_u	0.000					
sigma_e	0.011					
rho	0.000	(fraction of variance due to u_i)				

BIOGRAPHY

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