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The Relationship between Corporate Governance and Stock Prices of MAI-Listed Companies Using the Feltham-Ohlson Valuation Model

Supranee Sugaraserani[1]

[1]Faculty of Accountancy, Rangsit University, Pathumthani 12000 Thailand
Email: Supranee.s@rsu.ac.th

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Abstract

This study's objective was to examine the relationship between corporate governance and the stock prices of companies listed on the Market for Alternative Investment (MAI) by using the Feltham-Ohlson (FO) Valuation Model. The study's population was 45 MAI-listed companies whose securities were first traded before 2008. Regression analysis was used to test the research hypotheses. The findings show that the CG Rating met the "Clean surplus relation" condition and furthermore, with 95% confidence, the changes in 2009, 2010 and 2011 stock prices could possibly be explained by the FO valuation model. Nonetheless, the unusual correlations that did not follow the FO framework provide two conclusions: (1) MAI-listed companies' capital structure during 2009-2011 might not have had an impact on firm valuations, and (2) investors did not use publicized CG Ratings in their decision-making.

***Keywords**: CG rating, corporate governance, stock price, CG, FO model, valuation model*

1. Introduction

Do investors use publicized CG Ratings in trading stocks listed on the Market for Alternative Investment (MAI)? This paper tried to find a realistic answer to the question. The MAI serves as an exchange for small and medium enterprises (SMEs) to attract additional capital from the public. Prior to listing on the MAI, the majority of SMEs faced fiscal and operational pitfalls such as poor management skills, a lack of local financial resources and low competitive skills that act as barriers to their growth prospects. Despite these challenges, the Office of SMEs Promotion's report 2011 still confirms the role of SMEs as a major engine of growth in Thailand's economy. So the essential guidelines for MAI's implementation are to continuously develop SMEs both before and after their listings so they can progress from informally run family businesses to those managed professionally and thus have the competitive ability required to enable feasible growth.

Corporate governance (Montreevat, 2006) is seen by the Board of Governors of the Stock Exchange of Thailand (SET) as a necessary tool for listed companies to develop and maintain a transparent working environment and enhance a company's competitiveness so as to preserve capital and increase shareholders' long-term value. At first, the Securities and Exchange Commission (SEC) selected the Thai Rating and Information Services Co., Ltd., (TRIS) to conduct a corporate governance rating service with "voluntary" CG Codes. It is believed that CG Ratings help investors differentiate the most promising stocks from others. In December 1999, the Thai Institute of Directors (IOD) was established with the support of the SET, and since 2001 one of its important functions has been to conduct annual surveys on the state of corporate governance of listed companies in Thailand and announce the rankings according to their CG performance. The IOD's survey results have been endorsed by the National Corporate Governance Committee (NCGC) and have been used by the SEC and SET to provide a roadmap for improving corporate governance. Consequently, the NCGC has disclosed CG Rankings to the public and featured them equally with the financial data of listed companies.

As the SEC believes that CG Ratings help investors differentiate the most promising stocks from others, the relationship between CG Ratings and stock prices on the MAI is investigated in order to answer this paper's question. Moreover, corporate governance itself is believed to be the tool to enhance a company's competitiveness to preserve capital and eventually increase shareholders' long-term value. This

study will use a valuation model that takes into account stock prices, CG Ratings and accounting data in financial statements that represent competitiveness.

The remainder of this paper is as follows: the second section discusses hypothesis development; the third section details sample and research methodology; the fourth section presents the study's results; and they are followed by a summary and conclusion.

2. Hypothesis Development

2.1 Corporate Governance (CG) and Its Previous Studies

Black (2001) was one of the first to study the relationship between CG and a firm's performance and to find a positive relationship. Gompers, Ishii and Metrick (2003) used Return on Assets (ROA), net profit and growth rate as performance measurements in their study and found a high correlation in the same direction between CG and firm performance. Later, the study of Brown and Caylor (2004) found a relationship between bad corporate governance and lower performance. In another study, Drobetz, Schilhofer and Zimmerman (2004) found a positive impact of CG on a firm's value. When they compared performance between firms with good and bad CG, the results showed that investors paid attention to the performance of the good CG firms. Moreover, Durnev and Kim (2007), Klapper, Leora, & Love (2002), and Black, Jang and Kim (2006) provide evidence that companies with higher governance and transparency scores enforce higher firm values—and that this governance valuation effect is more pronounced in countries with weaker legal systems. On the contrary, Bebchuk and Ferrell (2009) found that increases in the level of an entrenchment index based on six governance provisions are monotonically associated with economically significant reductions in firm valuation. They also found that firms with higher levels of the entrenchment index were associated with large negative abnormal returns during 1990-2003.

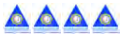
The adoption of CG practices by stock markets in developing countries stimulated new approaches in research and study. Utama and Utama (2005) studied the effect of CG on a firm's performance as measured by Economic Value Added (EVA) and found that the CG index had a positive and significant effect on EVA. They also investigated the effect of the CG index on ROA and ROE as a measurement of firm performance. Their results show that the CG index has a positive and significant effect on these performance measurements. A few years later, Martani and Saputra (2009) reached the same conclusion: listed companies with high CG have higher EVA than those with lower CG. Morey, Gottesman, Baker, & Godridge (2009) studied the correlation between governance quality and share prices in emerging markets, using samples from 21 countries, and found that improvements in CG were associated with higher share prices. Recently, Moradi, & Aldin (2012) investigated the effects of corporate governance mechanisms and financing activities on firms' performance by studying 84 firms listed on the Tehran stock exchange selected through random sampling. Their findings reveal that CG, financing decisions and capital structures are affected by firms' performance. In the same year, Ergin (2012) studied listed companies on Turkey's stock exchange and used the price model to discover whether investors consider using CG in evaluating a stock's price. His results show that CG rankings are positively and significantly associated not only with financial performance but also with accounting performance.

Returning to Thailand, a survey of 202 firms listed on the SET in mid-1996 by Price Waterhouse (1997) revealed that about 70% of senior management felt that improvements should be made on CG issues in Thailand, which confirmed CG weaknesses in the 1990s. Hence, since the economic crisis in 1997, Thailand has deeply realized the importance of rebuilding capital market confidence by monitoring strong disclosure and accounting standards and practices, legal and regulatory enforcement, and CG. Since then, significant CG reforms have been introduced and are underway, including the SET's adoption of 15 Principles of Good CG. To promote good practices, the Thai Rating and Information Service (TRIS) has been assigned by the authorities as the sole corporate governance rating agency for listed companies in Thailand. The SET and SEC provided incentives to companies to be rated by TRIS as a means of promoting good practices. Several listed firms have already been rated. In December 1999, the Thai Institute of Directors Association (IOD) was founded with support from the SET, Bank of Thailand and World Bank. Apart from providing various training programs, the Thai IOD, acting since 2001, conducts research and surveys on corporate governance. Its report has been recognized by the National Corporate Governance

Committee and agencies concerned as the most comprehensive corporate governance study of Thai listed companies to date (Montreevat, 2006).

The Thai IOD's assessment criteria for CG are based on the principles of good corporate governance as set forth by the Organization for Economic Cooperation and Development and SET. The sources for information scoring are company annual reports, annual information filings (Form 56-1), notice and minutes of company shareholder meetings, company websites, information from the SET/SEC database and other publicly available information. After scoring, listed companies are classified into six groups according to their corporate governance scores (Table 1) in the CGR publication. A list of companies receiving a good CG rating and above are publicized by the SET and IOD.

Table 1 Classified CG scores, icons, and description

Score	Range number of Logo (publicized)	Description
90-100		***Excellent***
80-89		***Very Good***
70-79		***Good***
60-69		Satisfactory
50-59		Pass
Lower than 50	No logo given	N/A

Source: Corporate Governance Report of Thai Listed Companies (CGR) 2006

2.2 Feltham-Ohlson Valuation Model

The most prominent valuation model in the empirical accounting research is the Feltham-Ohlson (FO) model (1995). The two main assumptions of the FO model are (1) the relevance of publicly disclosed accounting information and a firm's market value, and (2) the existence of linear information dynamics.

Many studies attempted to form models that could predict the stock market reaction to disclosed information, especially accounting data in financial statements. Ohlson (1995) and Feltham & Ohlson (1995) proposed a basic valuation model that expressed a firm's value as the sum of traditional accounting data highlighted by abnormal earnings. The stated model defines firm value (P_t) as the summation of the book value of shareholder equity (y_t), same year, and the present value of future abnormal earnings. Later, Ohlson developed the valuation model and accepted "other non-accounting information" as a control variable according to its encouragement of abnormal earnings.

This paper will begin with the following basic FO valuation model:

$$P_t = \beta_0 + \beta_1 BVA_t + \beta_2 BVL_t + \beta_3 AE_t + \omega^1 v^1 + \omega^2 v^2 + \varepsilon$$

Where:

P_t = stock price at period t

BVA_t = book value of assets at period t

BVL_t = book value of liabilities at period t

AE_t = abnormal earnings of period t

v^1, v^2 = other non-accounting information

ε = tolerance value

The above equation must be based on the following key assumptions:

1) The present value of expected future dividends determines the intrinsic firm value considering neutrality to the risk or a fair game.

P_t = present value of all future dividends: PVED

$$P_t = \sum_{\tau-1}^{\infty} R^{-\tau} E_t [\tilde{d}_{1+t}]$$

Where:

P_t = market value of asset or stock price at year t

$\tilde{d}_{1+t}$ = expected future dividend

≥ 0

R = fixed expected return

2) Clear profit or Clean surplus relation: CSR
The clean surplus concept derives from conservative accounting. It requires that entries to retained earnings be recorded only as periodic earnings and dividends (Ota, 2002).

$b_t = b_{t-1} + x_t - d_t$

Where:

b_t = book value of equity at period t

x_t = periodic profit for period t

d_t = dividend paid at period t

3) Linear Information Dynamics or Linear Information Model
The Linear Information Model explains the time-series behavior of the variables (Ota, 2002). In other words, the relationship of control variables must exist in a linear equation.

The development FO model emphasizes abnormal earnings as a variable that inspires the firm value. Abnormal earnings are estimated by the difference between the periodic profit and a return of the use of capital (Dahmash and Qabajeh, 2012).

$$x_t^a = x_t - r(y_{t-1})$$

Where:

x_t^a = abnormal earning for period t

x_t = periodic profit for period t

r = risk-free rate

y_{t-1} = shareholders' equity at the beginning of the period

According to the literature review, the FO model is well defined for this study and CG rating will be used as a proxy for other non-accounting information.

3. Sample and Research Methodology

The research relies on statistical inference methods for testing hypotheses. All calculations are analyzed in a regression program.

3.1 Model

To answer the question of this paper, the relationship between corporate governance and the stock prices of MAI-listed companies is investigated. Despite the core objective, this paper wants to strengthen the study to prove the SEC's belief in the influence of CG mechanisms, so the Feltham-Ohlson valuation model in equation (1) is applied.

$$P_t = \beta_0 + \beta_1 BVA_t + \beta_2 BVL_t + \beta_3 AE_t + \omega^1 v^1 + \omega^2 v^2 + \mathcal{E} \quad \text{..... (1)}$$

Where:

P_t	=	stock price at period t
BVA_t	=	book value of assets at period t
BVL_t	=	book value of liabilities at period t
AE_t	=	abnormal earnings of period t
$\boldsymbol{v}^1$, $\boldsymbol{v}^2$	=	other non-accounting information
$\mathcal{E}$	=	tolerance value

The equation (1) was built within a framework whereby stock price appears as a dependent variable with contemporary accounting data and other data are treated as explanatory variables (Ohlson, 1995). Moreover, it is designed to adopt a back-to-basics approach that relies on a "measurement perspective". The highlights of the FO valuation equation (1) are the ''other non-accounting information'' variables, $\boldsymbol{v}^1$ and $\boldsymbol{v}^2$, which are undefined, and any expected variables can be substituted by way of a linear relationship. This paper substitutes publicized IOD's CG ratings for the ''other non-accounting information'' variables.

Note that the core assumption required for all explanatory variables in the model is the clean surplus relation (CSR). In traditional accounting, the CSR ensures that all changes in the book value of equity are reported as either income (accounting earnings) or dividends. As permission to be explanatory variables, CSR is the relation between current and next-period data as linear and stationary, which is called the Linear Information Dynamics relation (LIDOM). Consequently, the horizontally collected IOD's CG ratings must be tested for clean surplus relation, equation (2), before plugging data into the FO valuation model.

$$CG_{t+1} = \gamma CG_t + \mathcal{E} \quad \text{..... (2)}$$

Where:

CG_t	=	CG Rating for current period
CG_{t+1}	=	CG Rating for the following period
$\mathcal{E}$	=	tolerance value

Applying IOD's CG ratings to any expression will cause a problem because the IOD and SET publish a volume of icons instead of CG scores, and only those companies receiving good CG ratings and above are publicized. To use the data in the analysis, CG ratings are decoded using a four-level rating scale before substituting the ''other non-accounting information'' variable in the FO model.

4	=	Excellent	or	
3	=	Very good	or	
2	=	Good	or	
1	=	Lower than good	or	no logo

In fact, the range of CG scores for each classified group can be collected and for this reason, in the case of testing clean surplus relation, a ceiling score for each group will be used instead of the four-level rating scale.

Eventually, a major issue related to variables application is the type of data used in the FO model. Stock price, book value of asset, book value of liability and abnormal earnings are quantitative data, but CG ratings are qualitative data. To solve this problem, the basic equation is transformed into the following equation (3), which is suitable for studying the relationship between corporate governance and stock prices of MAI-listed companies.

$$P_t = \beta_0 + \beta_1 CG_{t-1}BVA_t + \beta_2 CG_{t-1}BVL_t + \beta_3 CG_{t-1}AE_t + \beta_4 CG_{t-1} + \varepsilon$$

$$= \beta_0 + CG_{t-1}(\beta_1 BVA_t + \beta_2 BVL_t + \beta_3 AE_t) + \beta_4 CG_{t-1} + \varepsilon \quad \ldots\ldots\ldots\ldots (3)$$

3.2 Population

The data for this study were collected from 45 listed companies on the MAI whose securities were first traded before 2008 and had reported and disclosed financial information and other non-accounting information according to SET regulations continuously through 2012.

3.3 Variable Measurement

Table 2 Variable measurement and definition

Variable	Definition	Calculation and Measurement
Pt	Firm's value at period t	Market price per share at the end of period
BVA_t	Firm's size at period t	Common logarithm of moving average of the book value of assets at the end of period
BVL_t	Liability at period t	Common logarithm of moving average of the book value of liabilities at the end of period.
AEt	Operating efficiency or abnormal earning at period t	The percentile ranking of abnormal earnings. Abnormal earnings are the difference between operating profit after tax and a return, at a risk-free rate, to the moving average of equity at the beginning of period.
CGt-1	Corporate governance rating at period before t	a) FO valuation model using a four-level rating scale instead of the number of icons awarded. b) Testing clean surplus relation: a ceiling score for each group will be used instead of the number of icons awarded.

3.4 Hypotheses

This paper conducts the test by replacing CG ratings with non-accounting information in the FO model as an explanatory variable. Therefore, a CG rating must be tested for a CSR condition. Consequently, the approach to answering this paper's question rests on two hypotheses:

H1: The relationship of CG ratings meets the assumption of clean surplus relation;

H2: The relationship of stock price, CG rating, firm size, liability and abnormal earnings must exist in a linear equation.

4. Results of the Study

Do investors use CG Ratings when trading capital stocks on the MAI? This paper uses the FO model as a tool to answer the question. To adhere to the main FO model concepts, the two hypotheses must be tested and presented in series. First comes the testing of the CSR condition using simple regression, followed by an analysis of the linear relation between stock price and CG rating together with the controlled variables in the FO model.

4.1 H1: The relationship of CG rating meets the assumption of clean surplus relation.

Using simple regression to examine the relationship of CG rating between 2008 and 2011, the empirical results are reported in table 3.

Table 3 Simple regression analysis output (n = 45)

CG_{08} , CG_{09}

Independent variable	Unstandardized coefficient		t	Sig.
	B	Standard error		
constant	0.365	0.062	5.889	0.000
CG $rating_{08}$	0.567	0.102	5.567	0.000

R = 0.647 R^2 = 0.419 Std. Error of the estimate = 0.277439 F = 30.986 Sig. = 0.000

CG_{09} , CG_{10}

Independent variable	Unstandardized coefficient		t	Sig.
	B	Standard error		
constant	0.223	0.057	3.939	0.000
CG $rating_{09}$	0.751	0.079	9.473	0.000

R = 0.822 R^2 = 0.676 Std. Error of the estimate = 0.189069 F = 89.736 Sig. = 0.000

CG_{10} , CG_{11}

Independent variable	Unstandardized coefficient		t	Sig.
	B	Standard error		
constant	0.117	0.046	2.524	0.015
CG $rating_{10}$	0.836	0.061	13.735	0.000

R = 0.902 R^2 = 0.814 Std. Error of the estimate = 0.132583 F = 188.654 Sig. = 0.000

Table 3 shows that with 95% confidence, the change in CG $rating_{09}$ can be explained by CG $rating_{08}$; the change in CG $rating_{10}$ can be explained by CG $rating_{09}$; and the change in CG $rating_{11}$ can be explained by CG $rating_{10}$. When looking at R^2, their values prove that the longer the IOD conveys its survey of CG, the higher the impact of the current-period CG to the following-period CG (t value and F value were increasing).

However, the output models have pointed out the question about the significance of constant values because the beta coefficient of the constant values in the models is decreasing. Curve fit is tested and the predictions from equations without constants are better, so the relationship of CG rating meets the assumption of clean surplus relation and the null hypothesis is rejected. The expressions that prove the clean surplus relation are as follows:

$$CG_{09} = 0.567CG_{08} \quad \text{……..…… (2.1)}$$

$$CG_{10} = 0.751CG_{09} \quad \text{……..… (2.2)}$$

$$CG_{11} = 0.836CG_{10} \quad \text{…….. (2.3)}$$

4.2 H_2: The relationship of stock price, CG rating, firm size, liability and abnormal earning exist in a linear equation.

As mentioned earlier, CG rating is qualitative data and as such this type of data will cause a problem in exercising the FO model. To solve this problem, this paper applies a four-level rating scale to the number of icons and, unavoidably, the control variables are adjusted with the following equation (3) used to test the hypothesis:

$$P_t = \beta_0 + \beta_1 CG_{t-1}BVA_t + \beta_2 CG_{t-1}BVL_t + \beta_3 CG_{t-1}AE_t + \beta_4 CG_{t-1} + \varepsilon \quad \text{……...…} (3)$$

Using multiple regressions to analyze the relationship of current-period stock price and previous-period CG rating together with the current-period controlled variables that mention in basic FO model, firm size, liability, abnormal earning, and empirical result are reported in table 4.

Table 4 Multiple regression analysis output

Year 2009 (n = 45)

Control variables	Unstandardized coefficient		t	Sig.	Collinearity statistics	
	B	Std. error			Toler.	VIF
constant	4.010	1.206	3.324	0.002		
CG_{08} Firm $Size_{09}$	3.751	1.829	2.051	0.047	0.003	287.784
CG_{08} $Liability_{09}$	0.271	0.972	0.279	0.782	0.014	70.819
CG_{08} Abnormal	2.154	1.077	2.001	0.052	0.441	2.269
CG $Rating_{08}$	-24.887	6.885	-3.615	0.001	0.009	113.034

R = 0.644 R^2 = 0.415 Std. error of the estimate = 3.012932 F = 7.091 Sig. = 0.000

Year 2010 (n=45)

Control variables	Unstandardized coefficient		t	Sig.	Collinearity Statistics	
	B	Std. error			Toler.	VIF
constant	2.752	1.621	1.697	0.097		
CG_{09} Firm $Size_{10}$	3.228	1.708	1.890	0.066	0.005	214.078
CG_{09} $Liability_{10}$	-0.578	0.957	-.604	0.549	0.015	64.624
CG_{09} Abnormal	0.867	1.096	.791	0.433	0.459	2.177
CG $Rating_{09}$	-15.801	6.274	-2.518	0.016	0.014	73.654

R = 0.505 R^2 = 0.255 Std. error of the estimate = 3.429150 F = 3.430 Sig. = 0.017

Year 2011 (n = 43: delete data of two companies because of the high volatility in their stock prices)

Control variables	Unstandardized coefficient		t	Sig.	Collinearity statistics	
	B	Std. error			Tolerance	VIF
constant	0.709	1.682	0.422	0.676		
CG_{10} Firm $Size_{11}$	3.822	1.535	2.490	0.017	0.005	206.24
CG_{10} $Liability_{11}$	-1.163	0.951	-1.223	0.229	0.013	76.824
CG $Rating_{10}$	-14.694	5.458	-2.692	0.011	0.015	67.091

$R = 0.532$ $R^2 = 0.283$ Std. error of the estimate = 3.171487 $F = 3.755$ Sig. = 0.011

Table 4 shows that with 95% confidence, the changes in stock prices in each year during 2009-2011 can be explained by all control variables in the FO model and CG rating of the previous year, but the power of the explanation decreases over time (R^2 and F value). When looking at the impact of each independent variable in the equations, only two independent variables have a significant effect on stock price: firm size and CG rating (beta coefficient). Nonetheless, the model comprising the control variables in table 4 can explain the change in stock prices significantly.

Even though these equations have shown a significant correlation, both tolerance values and VIFs indicate problems of autocorrelation that are unacceptable in a regression equation. To test the autocorrelation, Durbin-Watson values have been measured.

- 2009: when comparing Durbin-Watson values to the critical value, the result cannot conclude whether there is an autocorrelation.
- 2010: when comparing Durbin-Watson values to the critical value, the result can conclude that there is no autocorrelation.
- 2011: when comparing Durbin-Watson values to the critical value, the result cannot conclude whether there is an autocorrelation.

Therefore, the findings prove that all control variables can explain changes in stock prices and the relationship exists in a linear equation, so the null hypothesis is rejected. What follows are expressions for 2009, 2010 and 2011.

$$P_{09} = 4.01(+/-3.012932) + 3.751CG_{08}BVA_{09} + 0.271CG_{08}BVL_{09} + 2.154CG_{08}AE_{09} - 24.887CG_{08} \quad \ldots\ldots. (3.1)$$

$$P_{10} = 2.752(+/-3.42915) + 3.228CG_{09}\,BVA_{10} - 0.578CG_{09}\,BVL_{10} + 0.867CG_{09}AE_{10} - 15.801CG_{09} \quad \ldots\ldots. (3.2)$$

$$P_{11} = 0.709(+/-3.171487) + 3.822CG_{10}\,BVA_{11} - 1.163CG_{10}\,BVL_{11} - 0.573CG_{10}AE_{11} - 14.694CG_{10} \quad \ldots\ldots.. (3.3)$$

5. Summary and Conclusion

This paper applied the FO model to test the relationship between CG ratings and stock prices of MAI-listed companies. The CG rating is substituted for non-accounting information in the model with the requirement that the rating must pass the test of clean surplus relation**.** Moreover, in the FO framework, all control variables should have positive correlation, especially non-accounting information that is used by investors to predict future earnings (Liu, J, Ohlson, J, 2000).

From the hypotheses testing, this study finds that: (1) the CG rating meets the clean surplus relation condition, and (2) CG rating, firm size, liability and abnormal earnings can explain the change in stock prices and that the relationship exists in a linear equation. Even though the analysis proves the linear relationship in the applied FO model, the FO framework on positive correlation has not been followed. Control variables in the model show negative correlations are CG rating and liability. As for CG Rating,

this finding implies that investors do not pay attention to publicized CG ratings, do not use such information for decision-making, and this is contrary to the studies of Klapper & Love (2002), Durnev & Kim (2005), and Black, Jang Kim (2003). However, this finding has the same conclusion as the later study of Hodgson, Lhaopadchan, and Buakes (2011). CG ratings are not employed by investors because the rules governing Thai IOD's assessment criteria for CG are being updated to meet international standards. Indeed, little research supports the interpretation of a negative correlation as an insignificant relationship. What Bauer et al. (2004) and Beiner et al. (2006), for example, claimed as negative correlations between a CG rating and a firm's performances were, in fact, insignificant correlations between those two variables.

Another control variable that breaks the FO framework is liability. It appears that liability has both positive and negative signs. As the relationship between debt size and stock price each year does not indicate a coefficient sign in the same direction, the capital structure of MAI-listed companies during this study may not be relevant to determine a firm's value and its operating results in the future (Modigliani & Miller, 1958). In particular, interest expense can be a tax credit (Modigliani & Miller, 1963).

The last issue is the model's power to explain the relationship. The outcomes show a weak power of explanation. When looking at the economy during 2008-2011, Thailand had a downturn that would unavoidably cause abnormalities to the capital market. In times like that, investors' decisions in weighing risks with potential benefits received would be different from a period of normal capital markets. In the 1960s, for example, when the economy was in recession and capital markets were not in a normal condition, the study of Fama (1965) found that investors hardly used past stock prices to forecast returns in the very near future and they could be affected by changes very easily (Fama, 1969). Supported by the work of Markowitz (1952) about investor behavior, securities cannot be evaluated in isolation, but only as a group. The decision to hold any security would depend on what other securities an investor wanted to hold. Very often, deviations in asset prices came from unreasonable investors. Such events could have occurred in Thailand's capital market during 2008-2011 and, of course, the model's ability to explain changes in stock prices would be less than 50%.

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