



**FREE CASH FLOW, OVERINVESTMENT
AND CORPORATE GOVERNANCE:
EVIDENCE FROM THAILAND**

BY

MISS SARUNYA PIRIYAKRIANGKRAI

**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

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ABSTRACT

The independent study investigates the relationship between free cash flow and overinvestment of the firms using data in SET market between 2011 and 2015. The result shows significant positive sign on free cash flow that means higher firm's free cash flow causes more overinvestment expenditures. It is consistent with agency cost theory. Managers of companies with massive free cash flow will invest in low-return projects or overinvested. This research also includes corporate governance factor to see whether it can resolve overinvestment issue. Instead of using CG data from annual report, I use CG score from Thai-IOD that record firm's governance of all listed companies. The result indicates investment level in Thailand highly depends on free cash flow. Governance may not be relevant to firm's investment.

Keywords: Free cash flow, Overinvestment, Corporate Governance, Agency cost

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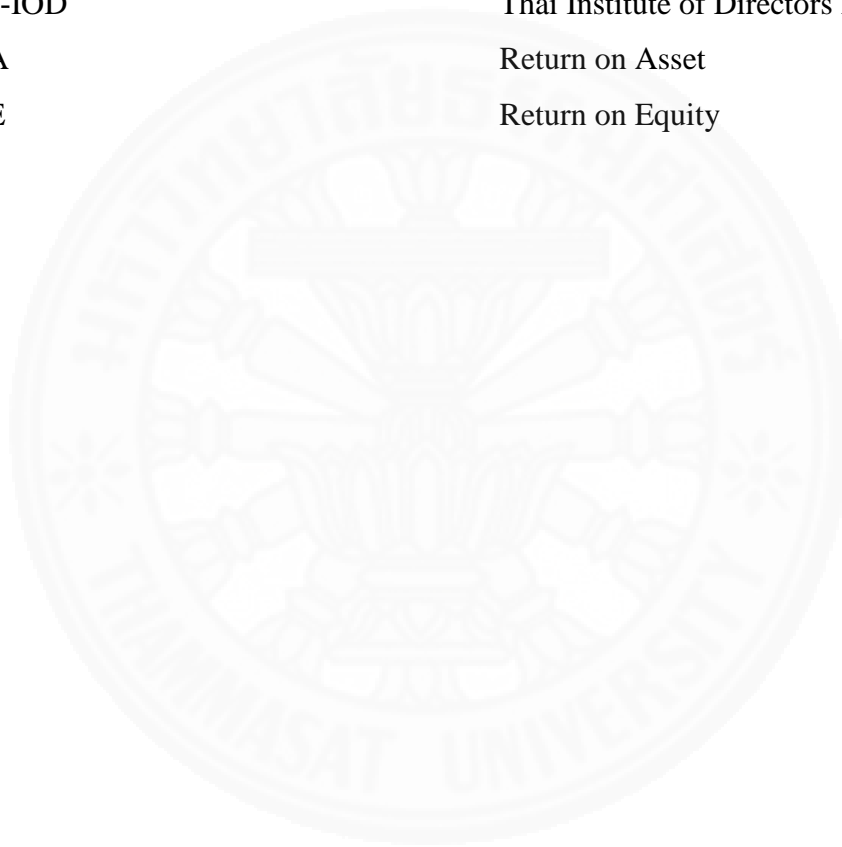
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LIST OF ABBREVIATIONS

Symbols/Abbreviations	Terms
FCF	Free Cash Flow
NPV	Net Present Value
CG	Corporate Governance
Thai-IOD	Thai Institute of Directors Association
ROA	Return on Asset
ROE	Return on Equity



CHAPTER 1

INTRODUCTION

In the market perfection hypothesis, investment policy of firm should not be relevant to internal free cash flow (Modigliani and Miller, 1985). There should be no gap between cost of internal source (free cash flow) and cost of external finance (issuing debt, and equity). Therefore, if firms have investment opportunities and firms do not have enough internal free cash flow, they can access to external source of fund without any constraint. Therefore, under capital perfect market, the investment level of the firms is not affected by the internal free cash flow of the firms. No relevant between both.

However, in the real world, many prior researchers find the relevant between investment and free cash flow (Hubbard 1998). The explanation of the relation between free cash flow and firm investment come from two reasons. First (i) is information asymmetry which relates to under investment of the firm. Myers and Majluf (1984) explain that information asymmetry between insiders and outsiders create additional cost for firm to raise external capital. Outsiders, such as investors or lenders, have less information than insiders like managers of the firm. The lender needs to raise extra cost to compensate the risk that come from less information. This situation may lead to financial constraint for some firms. Consequently, firm's investment policy is reduced and is rely more on free cash flow due to its lower cost of capital (Fazzari et al. 1988; Hoshi et al. , 1991; Whited, 1992; Hubbard, 1998). This cause firm face under-investment situation when firms do not have potential to access external source and do not have enough internal source to invest as the expected investment level. Second (ii) reason is agency cost that brings over-investment situation. In corporate finance, agency cost occurs when there is a separation between ownership – shareholders- and control – management. Shareholders, who are owners or principal of the company, allow managers to act as the agent for shareholders to operate and maximize firm value. Conflict comes from the different perspective of these two parties. Since internal source of capital is too cheap comparing with external finance, managers sometimes may invest to serve their own interest instead of maximizing the firm value for shareholder's

benefit, especially when the weak monitoring to management. This finally leads to over-investment.

As you can see from reasons above that under- and over- investment are generated from information asymmetry and agency cost, respectively. Corporate governance is the mechanism that protects shareholders' interests, and decreases agency cost (La Porta, Lopez-de-Silanes, Shleifer and Vishny (1997)). It is interesting to observe whether corporate governance relates to the firms' level of investment or not. Therefore, the objective of our paper intends to find the two research questions.

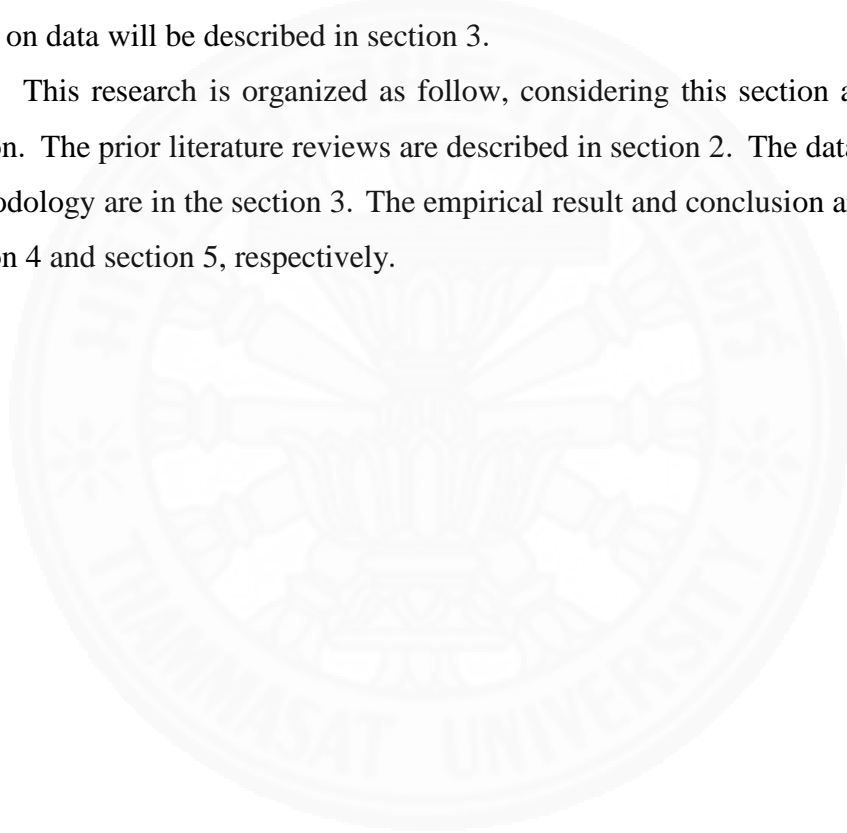
First research question is to find out the relationship between firms' s free cash flow and level of investment focusing on over-investment. According to the theory, management tends to waste investment expenditures (over-investment) when internal source of fund is positive – cash flow after deduction of the investment for maintain asset in place ($I_{\text{MAINTENANCE}}$) and optimal new investment (I_{NEW}^*). The first research question can confirm that relation of free cash flow and over-investment follows the theory or not.

The Second research question of this paper intends to find out whether corporation governance can mitigate the firm's unsuitable level of investment or not.

The contribution of this research is beneficial to Thai investors to let them aware of the consequence of free cash flow to investment level of the companies. This research finds that companies with substantial free cash flow tend to invest more in negative NPV projects. Moreover, this research benefits to the readers who would like to see the impact of governance to overinvestment. This research includes the governance factor into analysis. Normally, in Thailand, it might take time to collect the CG data and too many CG categories. Therefore, this research uses IOD score which IOD collected CG level. Apart from that, in the process of finding optimal investment expenditures, the result indicates that book-to-market factor which is one of determinants from the main paper is not significant in Thailand. Instead, TobinQ and sales factors are significant. The r-squared of the model that adds these two factors is also improved from the original one. Therefore, I use this customized model (the model from Richardson's framework in 2006 by adding TobinQ and sales instead of book-to-market factor) because it is more suitable to obtain new investment expenditure on Thailand data.

In order to answer the research questions, we will use data from listed firms in the Stock Exchange of Thailand during 2011-2015. However, I exclude financial institutions, property funds and REIT fund from the dataset since these data have difference financial structure from others. The data in this research is divided into two groups. First, data to analyst free cash flow of the listed firms. In addition, data to examine investment level of the firms whether firms have under-investment or over-investment. I collect these data from Thomson Reuters Eikon. The second set of data is corporate governance. I use corporate governance score from IOD organization. More detail on data will be described in section 3.

This research is organized as follow, considering this section as introduction section. The prior literature reviews are described in section 2. The data selection and methodology are in the section 3. The empirical result and conclusion are presented in section 4 and section 5, respectively.



CHAPTER 2

REVIEW OF LITERATURE

The Investment should not be linked to internal free cash flow in the market perfection world. Modigliani and Miller (1985) describe that under the assumption of frictionless market, internal source and external source are perfectly substitution. In other words, there is no significant gap between the cost of external and internal source. Therefore, the investment policy of company does not depend on source of fund. Even though firms do not have enough internal retention, firms should be able to excess external source as long as that firms have investment opportunities.

However, in the real world, market friction– tax, transaction cost, and asymmetric information- causes the gap between external cost and internal cost (Myers and Majluf, 1984). Many prior researches (Jensen, 1986; Hubbard, 1988) find the positive relation between the level of investment and internal cash flow of firms. It is believed that the explanation of this relation originates from two reasons. First reason is agency cost, and the other reason is information asymmetry. More explanations on the two theories are the following.

2.1 Agency cost

The agency cost theory explains the conflict between the management of the firms and shareholder of the firms. There is a separation between ownership – shareholders, and control –management. However, theoretically, firm’s management supposes to manage firms in order to maximize firm value and focus to the benefit of shareholders. On the other hand, practically, firm’s managers are likely to ignore their responsibility and tend to manage to serve their own interest. This situation leads to conflict called “Agency cost”.

According to Jensen (1986), and Stulz (1990), managers of positive free cash flow firms tend to involve with wasteful expenditures. Managers invest to serve for their own interest instead of investing in positive NPV projects. Therefore, internal free cash flow of the firms that has lower cost than external source creates the potential to be squandered (Richardson, 2006). Company’s management may waste free cash flow

of the firms in negative net present value projects. So, over-investment occurs (Degryse, Jong, 2006).

2.2 Information asymmetry

The Asymmetric Information theory describes the problem between two parties – insider/ management and outsider/investors. A classic case that is used to explain Asymmetric Information in the market belongs to Akerlof's paper in 1970. The paper proposes theory called "the market for Lemon" which states that firms and investors have difference information level. His paper elaborates that asymmetric information can affect the quality of tradable goods. Buyers in used car market who have less information than sellers cannot exactly know which second-hand car is high-quality car or just a lemon car (low quality car). Therefore, buyers will pay at the average price of high-quality car and low-quality car. This leads to adverse selection since sellers of high-quality car refuse to sell at average price and left the market eventually. Only lemons exist in the market and entire market will collapse finally. It is obvious that market system falls because of different information or asymmetric information.

In case of information asymmetry and investment level, Asymmetric information causes the difference between the internal and external cost. Therefore, some firms may face with financial constraint. As a result, it blocks firms to borrow external source because of credit rationing (Greenwald et al., 1984) so the firm's level of investment is under-expectation (Myer and Majluf, 1984). It consists with the finding of Fazzari et al. (1988) and Gertler and Hubbard (1998). Their papers mention that under capital market imperfection, external cost will have higher rate than internal fund because of asymmetric information. The actual level of investment depends on internal fund of the firms which reflects by free cash flow and lead to under-investment situation.

2.3 Investment and free cash flow

Many researchers try to investigate the relationship between investment expenditures and internal free cash flow of the firms (Meyer and Kuh, 1957; Kuh, 1963; Fazzari et al, 1988; Carpenter and Guariglia, 2008). Fazzari et al (1988) find the evidence of the relation between investment and internal cash flow. In their paper, they

separate data into two groups by using dividend as a proxy of financial constraint to separate firms with financial constraint and firms without financial constraint. Low dividend means firms with financial constraint. High dividend can be interpreted as firms without financial constraint. They report higher positive investment cash flow sensitivity when firms have more financial constraint and the investment of these firms depend more on internal source. Therefore, in this case, it affects investment decision of the firms. Firms with financial constraint face the problem when they would like to borrow from external finance. The investment expenditures of the firms have to rely on their internal source like free cash flow since the cost of internal source is cheaper. That is why positive relation between investment and free cash flow exist. This finding can be used to argue the market perfection assumption of Modigliani and Miller (1958). Modigliani and Miller (1958) specify that firms' investment expenditures are not relevant to financing source as long as firms have investment opportunities that reflect by Tobin's Q. Firms also can raise external fund whenever they need. Therefore, in the finding of Fazzari et al (1988), coefficient of investment-cash flow sensitivity was not supposed to be significant.

Nevertheless, the finding and the explanation of Fazzari et al (1988) are still in a controversial. Many later papers support this finding (Gilchrist and Himmelberg, 1995; Carpenter and Guariglia, 2008; Schleicher et al, 2010). On the other hand, some researchers cast a doubt on the result of Fazzari et al (1988). For example, an important paper belongs to Kaplan and Zingales in 1997. Their paper does not find the significant difference between firms that face financial constraint and firms without financial constraint. Kaplan and Zingales (1997) criticize that the dividend criteria that Fazzari et al (1988) use to define financial constraint firms is not a suitable criterion. It is because dividend payout policy is just the choice of firm. Therefore, it does not reflect the financial situation of the firms. Hence, they use other criteria to classify the financial constraint firms. Kaplan and Zingales (1997) find that higher investment-cash flow sensitivity means firms have less financial constraint while lower cash flow-investment sensitivity means firms with high financial constraint. In addition, they conclude in their finding that investment-cash flow sensitivity cannot identify market imperfection.

Apart from that, another paper from Degryse and Jong (2006) in Netherlands also detects positive investment-cash flow sensitivity. They distinguish data into

managerial discretion group and asymmetric information group by using Tobin's Q to separate. Low Q means managerial discretion problem that causes overinvestment. They give the reason that overinvestment usually occurs when bad prospect and weak in monitoring. In contrast, high Q means firms with asymmetric information. The result shows high the sensitivity in low Q firms. It can be interpreted that the problem of managerial discretion in Netherlands is more serious than asymmetric information.

As we can see that, the explanation and interpretation of investment cash flow sensitivity are still in a long discussion. Another paper of Richardson (2006) measures overinvestment and free cash flow by using accounting based framework to find out the reason why firms' level investment is related to internal free cash flow of the firms. His paper is the first paper that starts to investigate the over-investment of internal free cash flow by using large set of data. He uses U.S. data during 1988 to 2002 and finds that firms tend to overinvest when firms have positive free cash flow. This is consistent with agency cost theory since internal fund is too cheap and managers are likely to waste money to serve their own-interest. In his paper, he also checks the link between governance structure and overinvestment of free cash flow. The result confirms that activist shareholders can mitigate overinvestment of the firms.

In Thailand, Tangjitprom (2015) examines the relation between overinvestment and free cash flow by using listed companies in SET market between 2001 and 2013. Result finds positive relation between two of them. This also confirms agency theory since management tends to over spend internal cash flow to serve own interest. Apart from that, Lertjirakun (2011), one paper of MIF faculty, also studies the impact of asymmetric information under the limited of free cash flow of Thailand listed. The result confirms that the higher information friction firms leads to the higher investment-cash flow sensitivity. Her study is consistence with the finding of Fazzari et al (1988) and Asiloglu et al (2007). That is the higher asymmetric information and firm's financial constraint can be lower the firm's investment level even though firms have high rate of investment opportunities. Her paper also suggests that investors and companies should be aware of information announcement and try to reduce information friction in order to increase the investment capability of the companies.

2.4 Corporate governance and level of investment

Corporate governance is the system that provide framework and it relates to balancing all stakeholders' interest. Therefore, corporate governance is believed to reduce agency problem and protect shareholders' benefit (Vishny, 1997). In terms of the relation between corporate governance and investment level of firms, high-governance is expected to reduce the over-investment situation. The relation between corporate governance and over-investment is confirmed by Richardson's paper in 2006. His paper reports that firm with poor corporate governance leads to over investment and certain corporate governance structures, such as the presence of activist shareholders, can mitigate over-investment. Another research e.g. Wei and Zhang in 2008 study the relationship of investment and firms' free cash flow in Asian emerging countries e.g. Hong Kong, Indonesia, Japan, Korean, Malaysia, Philippines, Singapore, Taiwan, and Thailand before the crisis in 1997. Wei and Zhang's paper (2008) add corporate governance perspective into their study and they point out that coefficient between investment and cash flow cannot measure market perfection. However, it reflects the using level of internal source instead. According to the market imperfect assumption, when the relation between investment-cash flow sensitivity is higher, firms have problem to excess external. It leads under-investment of the firms. However, Wei and Zhang's paper (2008) explain that the higher investment-cash flow relation reflects the higher using level of internal cash flow. Firms' management usually overinvests the firms' expenditures instead of under-investment as specific in the theory.

Chen et al (2015) also follows Richardson (2006) paper to find out how internal free cash flow of the firms and corporate governance affects both under-investment and over-investment by using Chinese company data during 2001-2004. Their finding in terms of the relation between over-investment and free cash flow is consistence with agency cost theory. That is, they find that firms with positive internal free cash flow are likely to have over-investment situation. Turning to consider their result related to corporate governance characteristics, they separate into over-investment result and under-investment result. For over-investment group, they have evidence that some characteristics such as large board size, high tradable shares, or high leverage can reduce over-investment. For under-investment group, corporate governance characteristics e.g. large board size, large outside directors increase the level of under-

investment. However, some characteristics such as high leverage and high tradable share decrease the under-investment level of the firms.

Literatures above can prove that it is crucial to find out how free cash flow and corporate governance characteristics influence firms' investment level. Nevertheless, earlier papers examine only the relationship between investment and internal free cash flow. However, in Thailand, rarely papers observe these relations and link them to corporate governance of the firms. This paper intends to observe if corporate governance characteristics relate to investment level of Thai listed firms.



CHAPTER 3

THEORETICAL FRAMEWORK

3.1 Data and sample selection

For data selection, the data consists of two parts. First is financial statement data in order to find internal free cash flow and investment level of the firms -overinvestment and underinvestment. I use data from listed companies in the Stock Exchange of Thailand during 2011 – 2015. I exclude financial institutions firms, property funds, and REIT funds from the sample because financial structures of these firms are difference from others. Data from this part are taken from Thomson Reuters Eikon. Finally, I have 357 listed companies or 1785 firm-year observation.

Second part is the firms' corporate governance data from the Thai Institute of Directors Association (IOD). IOD surveys governance characteristics of all listed companies in Thailand and provides CG level of each firm as 1 – 5 score. Low scores (1 or 2) include poor governance firms and no IOD data firms while highest scores mean excellent governance firms. IOD refers OECD principles to define corporate governance level of firm.

Table 3.1 Descriptive Statistics of CG score

CG level	2012	2013	2014	2015	2016
CG = 5	41	61	23	40	58
CG = 4	108	113	71	96	103
CG = 3	110	94	103	98	95
CG =1, 2, and no IOD score	98	89	160	123	101
Total	357	357	357	357	357

Table 3.1 shows descriptive statistics of corporate governance score data that I collect from Thai IOD between 2012 and 2016. Thai IOD provides only score three, four, and five which mean “Good”, “Very Good”, and “Excellent” governance firms, respectively. The last CG category includes CG score1, CG score2 and no IOD score data. The CG data that published in current period is used as the score of the prior year. For example, CG score of year 2012 is used to be the data of year 2011, and so on.

3.2 Definition

This research follows methodology of Chen, and Xu (2016) in order to investigate how internal free cash flow and governance have an impact on firms' investment level. This section shows the details how to define internal free cash flow, total investment expenditures, and new investment expenditures of the firms.

3.2.1 Internal free cash flow (FCF)

It is derived from cash flow from operating activities after deducting what is necessary to maintain assets in place ($I_{\text{MAINTENANCE}}$) and to finance expected new investment (I_{NEW}^*)

Table 3.2 Definition of free cash flow

$FCF_{i,t} = CFO_{i,t} - I_{\text{MAINTENANCE}i,t} - I_{\text{NEW}i,t}^*$	
Variable	Definition
$FCF_{i,t}$	Internal free cash flow
$CFO_{i,t}$	Cash flow from operating activities
$I_{\text{MAINTENANCE}i,t}$	Investment expenditure in order to maintain asset in place. It is mapped to depreciation and amortization
$I_{\text{NEW}i,t}^*$	The expected investment expenditure on new projects which obtain from regression equation in section 3.3

3.2.2 Total investment expenditures

It is total investment expenditures of the firms. Therefore, it comes from the summation of capital expenditure (CAPEX), acquisition expense (Acquisition). All are subtracted by sale of property, plant and equipment expenses (SalePPE)

Table 3.3 Definition of total investment expenditures

$I_{TOTALi,t} = CAPEX_{i,t} + Acquisitions_{i,t} - SalePPE_{i,t}$	
Variable	Definition
$I_{TOTALi,t}$	Total investment expenditure
$CAPEX_{i,t}$	Capital expenditure
$Acquisitions_{i,t}$	Acquisition
$SalePPE_{i,t}$	Sale of property, plant and equipment

I have to use this variable in order to find the new investment expenditures which is defined in section 3.2.3

3.2.3 New investment expenditures

Total investment (I_{TOTAL}) also consists investment spending on new project (I_{NEW}), and investment expenditure to maintain assets in place ($I_{MAINTENANCE}$). Therefore, new investment expenditures of the companies will equal to total investment minus maintenance investment spending (see in table 3.4).

Table 3.4 Definition of new investment expenditures

$I_{NEWi,t} = I_{TOTALi,t} - I_{MAINTENANCEi,t}$	
Variable	Definition
$I_{NEWi,t}$	Actual investment expenditures on new positive NPV project
$I_{TOTALi,t}$	Obtain from Table 3.3
$I_{MAINTENANCEi,t}$	Investment expenditure in order to maintain asset in place. Depreciation and amortization

Apart from that, investment spending on new project (I_{NEW}) can be separated into expected investment level on new positive NPV projects which I obtain from the model in section 3.3, and residual (see in table 3.5).

Table 3.5 Definition of optimal investment expenditures and over/underinvestment

$I_{NEWi,t} = I_{NEWi,t}^* + I_{NEWi,t}^{\xi}$	
Variable	Definition
$I_{NEWi,t}$	Actual investment expenditures on new positive NPV projects
$I_{NEWi,t}^*$	Obtain from regression result from model in section 3.3
$I_{NEWi,t}^{\xi}$	Residual of investment level of the firms

Table 3.6 Descriptive Statistics of investment expenditure

$I_{TOTALi,t} = CAPEX_{i,t} + Acquisitions_{i,t} - SalePPE_{i,t}$					
$I_{NEWi,t} = I_{TOTALi,t} - I_{MAINTENANCEi,t}$					
Variable	Mean	Std. Dev	Median	Minimum	Maximum
I_{TOTAL}	0.0587	0.0776	0.0357	-0.1496	0.4672
CAPEX	0.0584	0.0670	0.0370	0.0001	0.4143
Acquisitions	0.0049	0.0358	0	0	0.4898
SalePPE	0.0047	0.0177	0.0006	0	0.1622
$I_{MAINTENANCE}$	0.0376	0.0314	0.0326	0	0.3659
I_{NEW}	0.0211	0.0742	0.0019	-0.1664	0.4367

Table 3.6 describes statistics of expenditures that firms use to invest and the decomposition of firm's investment spending. The total investment expenditures consist of capital expenditures, acquisition, and sales of PPE. All investment-spending variables are divided by average total asset. The table reports that the major part of total investment comes from capital expenditures. The average value of CAPEX is 0.0584 which is quite closed to data from China (0.061) reported by Chen and Xu (2016). Next, sale PPE value, the average value equals to 0.0047 that is the same as China data. However, the statistics of acquisition in Thailand is different from China data. Average value of acquisitions in Thailand data is equal to 0.0049 while it is equal to 0.044 in China paper. Therefore, when I calculate new investment expenditures, the average value is quite small when comparing to Chen and Xu (2016)'s paper. Average value of new investment expenditure from SET data is equal to 0.02 when the average value of new investment from main paper (Chen and Xu 2016) is equal to 0.072.

3.3 A model to obtain expected investment expenditure

In order to determine over- or under-investment, we need to know suitable investment or firms' expected investment (I_{NEW}^*) first. Then, the residual of expected investment (I_{NEW}^e) will be the over/under-investment. I will follow Chen and Xu (2016)'s paper to measure the level of investment of the firms. The models to measure the expected investment expenditures (I_{NEW}^*) is as follows

$$I_{NEWi,t} = \alpha + \beta_1 \frac{B}{M_{i,t-1}} + \beta_2 \text{Leverage}_{i,t-1} + \beta_3 \text{Cash}_{i,t-1} + \beta_4 \text{Age}_{i,t-1} + \beta_5 \text{Size}_{i,t-1} + \beta_6 \text{Stock Returns}_{i,t-1} + \beta_7 I_{NEWi,t-1} + \text{Year dummy}$$



Table 3.7 The summary table of independent variables

Variable	Definition	Predict sign
$\frac{B}{M}_{i,t-1}$	Growth opportunities $\frac{\text{Book value of equity at t-1}}{\text{Market value of equity at t-1}}$	- Firms with high B/M ratio, value firms, tend to have lower investment since it means that firms are at mature stage and it may not require more investment
Leverage _{i,t-1}	Debt level. $\frac{(\text{Total Debt at t-1})}{(\text{Total Debt at t-1} + \text{Total Equity at t-1})}$	- Leverage is a factor to measure financial constraint. Firms with high leverage give up positive NPV projects (Myers, 1997)
Cash _{i,t-1}	$\frac{\text{Cash and short term investments at t-1}}{\text{Total Asset at t-1}}$	+ Cash is the available money and it is the most liquidity asset. Firms can use cash to distribute to shareholder or allocate to further investment.
Age _{i,t-1}	log of years since firms listed of the previous year	- Recent introduced firms require a lot of investment to expand their business. However, firms at mature stage have lower investment.
Size _{i,t-1}	log of total assets of the previous year	+ Small firms are difficult to access external fund since higher asymmetric information. However, large firms have more public information available and monitoring is higher. (Kadapakkam et al., 1998)
Stock Returns _{i,t-1}	stock return of the previous year	+ This factor is added to capture the change of firms' market value and has positive impact to investment decision

Variable	Definition	Predict sign
$I_{NEWi,t-1}$	new investment of the previous year	+ This factor is added to capture non-modeled characteristics of firms Firms with higher investment level from last period have tendency to continue more investment in current period (Richardson, 2006).
Year dummy	variable that capture annual fixed effects	

Table 3.8 Descriptive Statistics of independent variables to obtain expected investment expenditures

Variable	Mean	Std. Dev	Median	Minimum	Maximum
B/M	0.8438	0.6045	0.7049	0.0000	4.4197
Leverage	0.2937	0.2369	0.2869	0.0000	0.8657
Cash	0.1124	0.1252	0.0630	0.0009	0.6106
Age	2.7393	0.5575	2.9444	0.6932	3.6636
Size	22.3014	1.4685	22.0854	19.5023	26.7558
Return	0.2895	0.6370	0.1208	-0.6089	4.2778
Lag Inew	0.0226	0.0924	0.0016	-0.1664	1.0779

Table 3.8 shows the descriptive statistics of determinant used to explain expected investment expenditures. The average value of all variables from Thailand data do not seem to have any surprises. The ratio of average book-to-market is 0.843 meaning that the average book value of our data is lower than market value. Average value of leverage that represents the proportion of total debt to total asset of Thai listed companies is equal to 0.29. The average value of cash comparing to company's total asset is equal to 11.24%. Average age of Thai companies that derived from log of number of years since firms listed is equal to 2.7393. The average size that is log of total asset is equal to 22.3014. The value of new investment expenditure from last period is quite similar to new investment expenditure in current period that is equal to around 0.02.

Summary the structure of Investment Expenditures

Total Investment Expenditures = Investment to Maintain Asset + New Investment

$$I_{TOTALi,t} = I_{MAINTENANCEi,t} + I_{NEWi,t}$$

$$I_{NEWi,t} = I_{NEWi,t}^* + I_{NEWi,t}^\epsilon$$

$$I_{NEWi,t}^\epsilon = \alpha + \beta_1 \frac{B}{M_{i,t-1}} + \beta_2 \text{Leverage}_{i,t-1} + \beta_3 \text{Cash}_{i,t-1} + \beta_4 \text{Age}_{i,t-1} + \beta_5 \text{Size}_{i,t-1} + \beta_6 \text{Stock Returns}_{i,t-1} + \beta_7 I_{NEWi,t-1} + \text{Year dummy}$$

3.4 A model to investigate the relationship between free cash flow and firms' overinvestment

In this section, I use the following model to find the relationship between free cash flow and over-investment level of firms.

$$I_{NEWi,t}^\epsilon = \beta_0 + \beta_1 \text{FCF}_{i,t} + \epsilon$$

Where

Table 3.9 Definition of free cash flow and over-investment

Variable	Definition
$I_{NEWi,t}^\epsilon$	The residual or abnormal investment expenditure on new project. The value comes from residual in running regression in section 3.3. We get data that have positive value that means over-investment level.
$\text{FCF}_{i,t}$	The same as defined in section 3.2.1. Therefore, free cash flow equals to Cash flow from Operating activities minus investment to remain asset in place and expected investment expenditures.

3.5 A model to measure the impact of corporate governance

Apart from examining relationship between free cash flow and over-investment from the previous section, this section will add governance characteristics to see the impact of corporate governance characteristics on level of investment. The model from the main paper is as follow.

$$I_{NEWi,t}^{\epsilon} = \beta_0 + \beta_1 FCF_{i,t} + \sum \Phi_i \text{Governance Factors}_{i,t} + \sum \varphi_j \text{Governance Factors}_{i,t} * FCF_{i,t} + \epsilon$$

For Governance Factors in this paper, I use CG score from IOD. IOD surveys all listed firms and provides rank score to three, four, and five. Rank three refers to companies with good governance score. Rank four means companies with very good governance characteristics. Moreover, rank five means companies with excellent governance characteristics. However, IOD does not show the result for the rest companies and it can imply that these companies have poor corporate governance. I include the rest companies in rank two. Therefore, I define the model as follows.

$$I_{NEWi,t}^{\epsilon} = \beta_0 + \beta_1 FCF_{i,t} + \Phi_2 \text{IODScore2}_{i,t} + \Phi_4 \text{IODScore4}_{i,t} + \Phi_5 \text{IODScore5}_{i,t} \\ + \varphi_2 \text{IODScore2}_{i,t} * FCF_{i,t} + \varphi_4 \text{IODScore4}_{i,t} * FCF_{i,t} + \varphi_5 \text{IODScore5}_{i,t} * FCF_{i,t} + \epsilon$$

Where

Table 3.10 Definition of governance variables

Variable	Type	Value
IODScore2	dummy variable	Value =1 if firms have poor CG score. Otherwise, value =0
IODScore4	dummy variable	Value =1 if firms have IOD CG score =4. Otherwise, value =0
IODScore5	dummy variable	Value =1 if firms have IOD CG score =5. Otherwise, value =0

CHAPTER 4

EMPIRICAL RESULT

4.1 Analysis of the optimal investment expenditure

4.1.1 Optimal level of investment expenditure by using Inew

In order to determine what the over-investment level is, we need to measure the optimal investment expenditures first. Before running this section, I performed the Hausman test to check random and fixed effect for this analysis. Table 4.1 shows the result from Hausman test. P-value from Hausman test is less than 0.05 that confirms that I should conduct this research by using fixed effect method.

Table 4.1 Hausman test result fixed effect v.s. random effect

	---- Coefficients ----			
	(b) FixedEffect	(B) RandomEffect	(b-B) Difference	sqrt(diag(V_b- V_B)) S.E.
lagbm	-0.0019266	-0.0084375	0.0065109	0.0051246
lagleverage	-0.0970245	-0.0206293	-0.0763952	0.0155737
lagcash	0.0953712	0.0382986	0.0570726	0.0230941
laglnage	-0.0259939	-0.0085266	-0.0174673	0.0208458
lagsize	-0.0211524	0.0013632	-0.0225156	0.006832
lagreturn	0.0048251	0.0087459	-0.0039208	0.0013298
laginew	0.0340504	0.2376843	-0.2036339	0.0085176
year1	-0.0103894	0.0055679	-0.0159572	0.0065398
year2	0.0019145	0.0150072	-0.0130927	0.0044063
year3	0.0093872	0.0141618	-0.0047746	0.0022668
year4	0.0040551	0.0069771	-0.002922	.

b = consistent under Ho and Ha; obtained from xtreg

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

Test: Ho: difference in coefficients not systematic

$$\begin{aligned} \text{chi2}(11) &= (b-B)'[(V_b-V_B)^{-1}](b-B) \\ &= 796.16 \end{aligned}$$

$$\text{Prob}>\text{chi2} = 0.0000$$

(V_b-V_B is not positive definite)

The table 4.4 reports the optimal new investment expenditures. Model (1) shows the result from the model in section 3.3. The determinants in model (1) are lag book-to-market, lag leverage, lag cash, lag age, lag size, lag stock return, and lag of new investment expenditures. As reported in the table, the major factors that drive investment of the firms are lag leverage, lag cash, and lag size of the firms. Leverage of the last period has negative sign to investment expenditures which is consistent with predicted sign. Apart from that, cash from the last period also has a positive impact to investment expenditures. The sign of cash factor and leverage factor from Thailand are consistent with Chinese data (Chen, and Xu (2016)). These mean that when firms have high debt, the firms cannot spend much on new investment projects. On the other hand, when the firms have higher cash, the firms have a potential to invest more in new projects. The coefficient of leverage is equal to 0.09 which is a bit higher than Chen, and Xu (2016)'s paper (0.075). However, the coefficient of cash factor in this report is lower than Chen and Xu (2016) (0.09 V.S. 0.13). Another factor that also significant is size. This research expects large firms have more invest because they may have less asymmetric information. However, the result shows negative sign (coefficient = 0.02) while Chen, and Xu (2016) reports positive sign with 0.006 coefficient. It means that small firms in Thailand tend to invest more because they would like to expand their business. Large firms may have less invest because they are in mature stage. Turning to consider lag of book-to-market from the model (1). Book-to-market, which represents the growth opportunities of the firms, does not appear to have a significant impact on new investment expenditures. Moreover, r-squared generated from model (1) is equal to 7.5 percentage. It means that there may be other factors can explain the expenditures. This leads my research to find others factors to be the proxy of the growth opportunities instead of book-to-market factor.

In the model (2), I add sales from the last period and TobinQ from the last period instead of lag book/market. The result of model (2) shows that sales of last period and lag of TobinQ have a positive significant to investment expenditures. The r-squared from this model also improves from the original model. I also add lag term of ROE and ROA in the model (3), and (4), respectively to check if these two factors can explain more on firms' investment spending or not. However, the result from model (3) and (4) do not have much improve from model (2). Therefore, to find the optimal investment,

I design to use model (2) which add lagsales and lagTobinQ and drop lag book-to-market factor from the original model.

The definition of sales, TobinQ, ROE, and ROA are defined as in the table 4.2.

Table 4.2 Definition of additional variables in regression model (2) – (4)

Variable	Definition
Sales _{i,t-1}	$\frac{\text{Total Sales}}{\text{Total Asset}}$
TobinQ _{i,t-1}	$\frac{\text{BV(Asset)+MV(Equity)}-(\text{BV(Equity)+deferred taxes})}{\text{BV(Asset)}}$
ROE _{i,t-1}	$\frac{\text{Net Income}}{\text{Total Equity}}$
ROA _{i,t-1}	$\frac{\text{Net Income}}{\text{Total Asset}}$

All variables are the value of the prior period

Table 4.3 Model specification to obtain expected investment expenditures

Model	Equation
(1)	$I_{NEWi,t} = \alpha + \beta_1 \frac{B}{M_{i,t-1}} + \beta_2 \text{Leverage}_{i,t-1} + \beta_3 \text{Cash}_{i,t-1} + \beta_4 \text{Age}_{i,t-1} + \beta_5 \text{Size}_{i,t-1} + \beta_6 \text{Stock Returns}_{i,t-1} + \beta_7 I_{NEWi,t-1} + \text{Year dummy}$
(2)	$I_{NEWi,t} = \alpha + \beta_2 \text{Leverage}_{i,t-1} + \beta_3 \text{Cash}_{i,t-1} + \beta_4 \text{Age}_{i,t-1} + \beta_5 \text{Size}_{i,t-1} + \beta_6 \text{Stock Returns}_{i,t-1} + \beta_7 I_{NEWi,t-1} + \beta_8 \text{Sales}_{i,t-1} + \beta_9 \text{TobinQ}_{i,t-1} + \text{Year dummy}$
(3)	$I_{NEWi,t} = \alpha + \beta_2 \text{Leverage}_{i,t-1} + \beta_3 \text{Cash}_{i,t-1} + \beta_4 \text{Age}_{i,t-1} + \beta_5 \text{Size}_{i,t-1} + \beta_6 \text{Stock Returns}_{i,t-1} + \beta_7 I_{NEWi,t-1} + \beta_8 \text{Sales}_{i,t-1} + \beta_9 \text{TobinQ}_{i,t-1} + \beta_{10} \text{ROE}_{i,t-1} + \text{Year dummy}$
(4)	$I_{NEWi,t} = \alpha + \beta_2 \text{Leverage}_{i,t-1} + \beta_3 \text{Cash}_{i,t-1} + \beta_4 \text{Age}_{i,t-1} + \beta_5 \text{Size}_{i,t-1} + \beta_6 \text{Stock Returns}_{i,t-1} + \beta_7 I_{NEWi,t-1} + \beta_8 \text{Sales}_{i,t-1} + \beta_9 \text{TobinQ}_{i,t-1} + \beta_{10} \text{ROA}_{i,t-1} + \text{Year dummy}$

Table 4.3 describes the details of independent variables that are used to run regression test in table 4.4.

Table 4.4 Analysis result of investment expenditures by using I_{NEW}

Variable	Predicted sign	I_{NEW}			
		(1)	(2)	(3)	(4)
Lagbm	-	-0.00193 (-0.32)			
Lagleverage	-	-0.0970*** (-5.39)	-0.0924*** (-5.17)	-0.0920*** (-5.13)	-0.0911*** (-4.98)
Lagcash	+	0.0954*** (3.4)	0.0895** (3.21)	0.0895** (3.21)	0.0891** (3.19)
Lagnage	-	-0.026 (-1.23)	-0.0183 (-0.87)	-0.018 (-0.86)	-0.018 (-0.86)
Lagsize	+	-0.0212** (-3.05)	-0.0171* (-2.46)	-0.0174* (-2.48)	-0.0174* (-2.48)
Lagreturn	+	0.00483 (1.49)	-0.00183 (-0.56)	-0.002 (-0.61)	-0.00198 (-0.61)
Lagnew	+	0.0341 (1.7)	0.0254 (1.26)	0.0256 (1.27)	0.0259 (1.28)
Lagsales	+		0.0141* (2.43)	0.0134* (2.18)	0.0134* (2.19)
LagTobinQ	+		0.0129*** (4.00)	0.0129*** (4.01)	0.0129*** (4.00)
Lagroe	+			0.00501 (0.32)	
Lagroa	+				0.0129 (0.35)
Year dummies		Yes	Yes	Yes	Yes
Constant		0.580*** (3.61)	0.431** (2.65)	0.438** (2.67)	0.437** (2.67)
Observations		1785	1785	1785	1785
R-squared		0.075	0.09	0.09	0.09

t statistics in parentheses. *, **,*** Significant at the 10%, 5% , and 1% level.

4.1.2 Optimal level of investment expenditure by using CAPEX

Because the r-squared from the previous section is not much high. Therefore, in this section, I perform the test to find out the optimal level of investment spending by using the model in section 3.3. However, I use CAPEX value to be a proxy of investment spending instead of new investment expenditures (I_{NEW}). I use CAPEX as a proxy because CAPEX is a major source of total investment expenditures. I also change the lag term of investment expenditures ($I_{NEW,t-1}$), one of independent variables of the regression model, to be lag term of capital expenditures ($CAPEX_{t-1}$) instead. Model (1) of table 4.5 shows original model from main paper. The overall result in this section is quite similar to the previous section. From the result of model (1) in table 4.5, the factors that have significant impact toward firms' capital expenditures are leverage of last period and cash from the last period. Lag of leverage has negative sign while lag of cash has positive sign which correct as expected sign. Lag of capital expenditures is also significant with coefficient 0.14. It means that firms with higher invest from last period can continue to invest more in the current period.

Model (2) shows the regression model that I drop Lag book-to-market factor but add lagsales, and lag TobinQ instead. The result indicates that lagsales and lag TobinQ significant with positive sign. The r-squared of this model also improve from original model (2). I add lag ROE factor into model (3) and lag ROA into model (4). However, the result from these two models do not improve from model (2).

Table 4.5 Analysis result of optimal investment expenditures by using CAPEX

Variable	Predicted sign	CAPEX			
		(1)	(2)	(3)	(4)
Lagbm	-	-0.00287 (-0.63)			
Lagleverage	-	-0.0758*** (-5.50)	-0.0725*** (-5.29)	-0.0728*** (-5.30)	-0.0720*** (-5.14)
Lagcash	+	0.0713** (3.27)	0.0655** (3.01)	0.0654** (3.01)	0.0654** (3.00)
Lagnage	-	-0.00888 (-0.55)	-0.00338 (-0.21)	-0.00359 (-0.22)	-0.00329 (-0.20)
Lagsize	+	-0.00836 (-1.55)	-0.00496 (-0.92)	-0.00472 (-0.86)	-0.00509 (-0.93)
Lagreturn	+	0.00397 (1.6)	-0.000135 (-0.05)	-0.0000173 (-0.01)	-0.000191 (-0.08)
Lagcapex	+	0.140*** (5.28)	0.120*** (4.48)	0.119*** (4.45)	0.120*** (4.47)
Lagsales	+		0.0123** (2.80)	0.0128** (2.73)	0.0120** (2.59)
LagTobinQ	+		0.00839*** (3.37)	0.00838*** (3.37)	0.00838*** (3.36)
Lagroe	+			-0.00343 (-0.28)	
Lagroa	+				0.00482 (0.17)
Year dummies		Yes	Yes	Yes	Yes
Constant		0.271* (2.18)	0.153 (1.21)	0.148 (1.16)	0.155 (1.22)
Observations		1785	1785	1785	1785
R-squared		0.081	0.093	0.093	0.093

t statistics in parentheses

*, **, *** Significant at the 10%, 5% , and 1% level, respectively.

4.1.3 Optimal level of investment expenditure by separating industry

I perform this section by using regression model (2) from section 4.1.1 which improve from original model but I separate by industry. From table 4.6, r-squared from each industry improves better than I run all together. As you can see in the table that r-squared is vary by industry. Agricultures and food industry has highest r-squared (25.8%) while services industry has lowest r-squared (10%). When considered each factor, lag leverage and lag cash are significant for consumer product, industrial goods, and real estate's section but different sign. Coefficient of lag leverage on the three industries are -0.242, -0.209, -0.0779, respectively while the coefficient of lag cash on the three industries are 0.258, 0.274 and 0.155, accordingly. The result also shows that lag TobinQ and lag sales has positive significant for some industries. For example, coefficient of lag TobinQ factor shows positive significantly for resources (0.0422), services (0.0146), and technology (0.0403) sector. Lag sales factor is significant on agricultures and food industry (coefficient = 0.0421), consumer product (coefficient = -0.0867), services (coefficient = 0.0515), and technology (coefficient = -0.0412) areas. These show that each determinant effect and can explain firms' expenditures differently across industry. Some factors are significant to one industry but not others. Therefore, r-squared from separated industry is higher and can explain more than I run them all together (shown in section 4.1.1).

Table 4.6 Analysis of optimal investment separated by industry

Variable	Agricultures, food industry	Consumer	Industrial goods	Real estates	Resources	Services	Technology
Lag leverage	0.0372 (0.55)	-0.242* (-2.58)	-0.209*** (-4.49)	-0.0779** (-2.74)	-0.0691 (-0.99)	-0.0474 (-0.96)	-0.102 (-1.66)
Lag cash	0.0638 (0.83)	0.258** (2.7)	0.274*** (3.78)	0.155* (2.52)	0.222 (1.92)	0.0685 (1.02)	0.0383 (0.42)
Lag ln age	0.0599 (0.72)	-0.0329 (-0.42)	-0.0223 (-0.53)	-0.0215 (-0.58)	-0.0255 (-0.31)	-0.0508 (-0.74)	-0.0394 (-0.63)
Lag size	-0.163*** (-4.41)	-0.00202 (-0.04)	-0.0189 (-0.80)	-0.0241* (-2.11)	-0.00255 (-0.14)	-0.0296 (-1.41)	-0.0134 (-0.49)
Lag return	0.00375 (0.50)	0.0122 (0.74)	0.00818 (1.39)	-0.00634 (-0.99)	-0.0222 (-1.26)	-0.0156 (-1.73)	0.00956 (0.76)
Lag new	-0.170** (-2.74)	0.272** (2.76)	0.122* (2.07)	-0.0567 (-1.27)	0.00522 (0.09)	0.0565 (1.33)	0.127 (1.24)
Lag sales	0.0421* (2.46)	0.0867* (2.40)	0.00797 (0.63)	0.00968 (0.72)	0.00884 (0.69)	0.0515* (2.12)	-0.0412* (-2.20)
Lag to binq	0.00945 (0.92)	-0.00512 (-0.42)	-0.0152 (-1.94)	0.00174 (0.19)	0.0422** (3.14)	0.0146* (2.07)	0.0403** (2.98)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	3.402*** (4.11)	0.0817 (0.08)	0.507 (1.02)	0.641* (2.36)	0.0626 (0.14)	0.773 (1.58)	0.436 (0.68)
Observation	190	175	345	380	140	385	170
R-squared	0.258	0.209	0.207	0.122	0.224	0.100	0.167

t statistics in parentheses. *, **, *** Significant at the 10%, 5% , and 1% level.

4.2 Descriptive statistics: Expected investment, over/under-investment, and FCF

Table 4.7 Descriptive Statistics of expected investment, over/underinvestment, and FCF

$$I_{NEWi,t} = \alpha + \beta_2 \text{Leverage}_{i,t-1} + \beta_3 \text{Cash}_{i,t-1} + \beta_4 \text{Age}_{i,t-1} + \beta_5 \text{Size}_{i,t-1} + \beta_6 \text{Stock Returns}_{i,t-1} + \beta_7 I_{NEWi,t-1} + \beta_8 \text{Sales}_{i,t-1} + \beta_7 \text{TobinQ}_{i,t-1} + \text{Year dummy}$$

$$I_{NEWi,t} = I_{NEWi,t}^* + I_{NEWi,t}^\epsilon$$

$$\text{FCF}_{i,t} = \text{CFO}_{i,t} - I_{MAINTENANCEi,t} - I_{NEWi,t}^*$$

Variable	Mean	Std. Dev.	Median	Minimum	Maximum
I_{NEW}^*	0.0211453	0.0949845	0.0206096	-0.6864671	0.3622202
I_{NEW}^ϵ	1.57E-10	0.1132375	-0.00735	-0.3461356	0.8971481
$I_{NEW}^{\epsilon+}$	0.0855532	0.0991605	0.0591228	0.0001092	0.8971481
FCF	0.0126985	0.1338678	0.0213553	-0.5735177	0.6974771

Table 4.7 describes the descriptive statistics of firms expected investment expenditures (I_{NEW}^*), unexpected investment expenditures (I_{NEW}^ϵ), over-investment expenditures ($I_{NEW}^{\epsilon+}$), and internal free cash flow. I perform panel regression with fixed effect method to obtain expected investment expenditures. Lag leverage, lag cash, lag age, lag size, lag stock return, lag investment, lag sales, lag TobinQ are used to be determinants to explain optimal investment. This is because the evidence in section 4.1.1 shows that lag sales and lag TobinQ can also explain the investment expenditures. Therefore, I include these two variables to the regression model and take book-to-market variable out of the model. The residuals from this regression are unexpected investment expenditures. Mean of expected investment expenditure reported in table 4.7 is equal to 0.02. The unexpected investment expenditure (I_{NEW}^ϵ) is almost equal to zero since the average value of residual value is zero. The table reports FCF value as positive (1.2%) but FCF is a negative value in Chen, and Xu (2016)'s report (-0.05%).

4.3 Result of the relationship between over-investment and free cash flow

Table 4.8 Analysis result between over-investment and free cash flow

$I_{NEWi,t}^{\epsilon} = \beta_0 + \beta_1 FCF_{i,t} + \epsilon$			
Variable	Predicted sign	Over-investment	
		Pooled	Panel
FCF	+	0.300*** (12.64)	0.220*** (8.93)
Constant		0.0665*** (18.99)	0.0716*** (21.15)
Observation		825	825
R-squared		0.163	0.089

t statistics in parentheses

*, **, *** Significant at the 10%, 5% , and 1% level, respectively.

The purpose of this section is to answer the first research question whether free cash flow has an impact on firm's over-investment. Table 4.8 displays the relationship between over-investment and free cash flow of the firms. I use free cash flow shown in table 4.7 as an independent variable. In order to obtain over-investment value, I filter only positive residual generated from the model in table 4.7. The result in table 4.8 shows that internal free cash flow has positive impact on over-investment. The table reports result with 0.3 coefficient of free cash flow positive sign. The sign of free cash flow reported in this research and in the main paper (Chen, and Xu (2016)) are the same. The result is also consistent with agency cost theory that internal fund is too cheap and firm's management is likely to over spending on investment expenditures when firms have higher internal free cash flow.

4.4 Result of the relationship when adding CG score

Table 4.9 The result to show the relationship between Overinvestment and Corporate Governance

$$I_{NEWi,t}^{\epsilon} = \beta_0 + \beta_1 FCF_{i,t} + \Phi_2 IODScore2_{i,t} + \Phi_4 IODScore4_{i,t} + \Phi_5 IODScore5_{i,t} + \varphi_2 IODScore2_{i,t} * FCF_{i,t} + \varphi_4 IODScore4_{i,t} * FCF_{i,t} + \varphi_5 IODScore5_{i,t} * FCF_{i,t} + \epsilon$$

Variable	Predicted sign	Over-investment			
		(1) Pooled	(2) Panel	(3) Pooled	(4) Panel
FCF	+	0.296*** (12.17)	0.222*** (8.79)	0.0854 (1.57)	0.0621 (1.17)
IODScore2	+	0.00281 (0.33)	0.00718 (0.86)	-0.00179 (-0.20)	0.00246 -0.29
IODScore4	-	0.0088 (1.02)	0.00137 (0.17)	-0.0144 (-1.53)	-0.0144 (-1.58)
IODScore5	-	0.00344 (0.35)	0.00344 (0.36)	-0.0347** (-3.21)	-0.0296** (-2.77)
IODScore2*FCF	+			-0.0015 (-0.02)	0.00324 (0.05)
IODScore4*FCF	-			0.341*** (5.09)	0.257*** (3.91)
IODScore5*FCF	-			0.533*** (6.85)	0.459*** (6.07)
Constant		0.0629*** (9.98)	0.0684*** (11.31)	0.0733*** (11.3)	0.0761*** (12.08)
Observation		825	825	825	825
R-squared		0.164	0.09	0.242	0.151

t statistics in parentheses

*, **, *** Significant at the 10%, 5% , and 1% level, respectively.

This section intends to answer the second research question of this study. That is to investigate if corporate governance can mitigate the firm's overinvestment or not. IODScore2 includes poor CG firms (category CG 1, 2) and companies with no IOD score. Therefore, expected sign of IODScore2 is positive. On the other hand, IODScore4 represent firms with very good CG and IODScore5 represents firms with excellent CG. Therefore, the expected sign of both factors is negative. Table 4.9 displays the results when I include governance factor into analysis.

Model (1) does not include interaction terms with pooled regression while model (2) does not include interaction terms either but using panel regression. Model (3) shows the result of pooled regression with interaction terms. However, model (4) includes interaction terms with panel method. For model (1) and (2), the results are almost the same but different only r-squared reported (r-squared =16.4% for Pooled result and r-squared =9% for Panel). That is only FCF is positive significant with high coefficient (29.6% in pooled result). From (1) and (2), it seems like CG factors are not relevant to firms' over-spending.

This research further investigates by adding interaction terms between CG factors and FCF in model (3) and (4). IODScore5 which represent companies with excellent CG score has negative sign with coefficient only 0.0347 (Pooled) and significant. This can conclude that companies with excellent governance level can have a little impact on firm's over-spending.

Nevertheless, in model (3), FCF is not significant and its coefficient is dropped from 29.6% to 8.54% comparing to model (1). This is because FCF is spread into interaction term between CG score and FCF instead. Both "IODScore4*FCF" and "IODScore5*FCF" variables, the interaction term between CG and FCF, show significant positive sign with coefficient 0.341(Pooled result), and 0.533(Pooled result), respectively. This can be interpreted that in fact the over-investment in Thailand mostly affects from internal free cash flow. The companies with excellent governance may also have higher internal cash flow than the companies with low governance. As a result, when we observe the effect from both governance and free cash flow toward overinvestment expenditures, it turns out that excellent governance and higher internal cash flow increase overinvestment.

CHAPTER 5

CONCLUSION

This analysis intends to find out the relationship between internal funding of the firms and firms' over-investment. According to the agency cost theory, management has the potential to over spending on new projects to serve their own interest when the firms have available internal money. This is because internal funding has less expensive when comparing to external funding. Consequently, management can over-investment when firm's free cash flow is available. The first research question of this analysis is to examine that firm's free cash flow has the positive influence on over-investment expenditures. For the sample data, I focus on Thailand Stock Exchange market between 2011 and 2015. The data also excludes all financial companies. The result of this analysis shows that from the evidence in Thailand, firms with higher internal free cash flow lead to over spending in investment expenditures.

This research also try to find out whether any factors can mitigate over investment issue. Referring to the agency cost theory that over-spending comes from management side, corporate governance, which is the framework that can reduce agency cost, can be used to solve over-spending problem. This leads to the second question of this research that firms' governance can be used to reduced overinvestment or not. For this part, I use corporate governance score provided by Thai Institute of Directors Association. For the result, we can conclude that investment level in Thailand significantly depends on firms' free cash flow. Moreover, excellent governance companies may have higher free cash flow comparing to poor governance companies. Therefore, firms with excellent governance can have more free cash flow and leads to more overinvestment eventually.

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