

Over-investment and Free Cash Flow: Evidence from Thailand

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Abstract—This paper examines whether there is a relation between over-investment and free cash flow. In perfect capital market, it is expected that investment decision should not be influenced by the level of cash flow. However, the free cash flow hypothesis predicts that firms with higher free cash flow will be vulnerable to the agency problem like over-investment. Using the data from listed firms in the Stock Exchange of Thailand during 2001-2013, the result indicates that there is a positive relation between over-investment and free cash flow. Therefore, this evidence supports the free cash flow hypothesis and it implies that corporate governance mechanism is required to mitigate the agency cost of free cash flow.

Keywords—Over-investment, Free cash flow hypothesis, Agency theory, Stock Exchange of Thailand

I. INTRODUCTION

IN the perfect capital market, firm's investment decision should be independence with free cash flow. However, with the existence with capital market frictions, there can be association between firm's investment and free cash flow as documented in prior researches. This paper will employ the accounting-based model in determining the level of over-investment or under-investment as in [1].

Using empirical data from listed firms in the Stock Exchange of Thailand during 2001-2013, the level of over-investment is determined by the difference between actual investment measured by capital expenditure and expected investment. The expected investment is determined by the residuals from the regression of a set of variables on the level of capital expenditure. The final result reveals that the level of over-investment is not independent to free cash flow. There is a positive relation between over-investment and free cash flow. Although the regression is modified in order to capture an asymmetric relation, the result is still similar. The level of over-investment representing that the actual investment is too much compared to the expected one will be higher in the firms with higher level of free cash flow.

The evidence from this paper will contribute to the agency cost of free cash flow proposed by Jensen [2]. Firms with higher level of free cash flow will be more vulnerable to the over-investment problem. These firms will use this free cash flow in low return projects that have been never taken if the fund

needs to be raised externally. This over-investment may arise from managers who concern about their own private benefits rather than to maximize shareholders' wealth. document is a template for *Word (doc)* versions. If you are reading a paper version of this document, so you can use it to prepare your manuscript.

II. PREVIOUS LITERATURE ABOUT OVER-INVESTMENT

Modigliani and Miller [3] have proposed the capital structure theory under the assumption of perfect capital market. In that situation, firm's investment decision should be independence with free cash flow. If internally-generated free cash flow is not enough for their investment plan, firms can raise fund externally from the capital market. However, if the free cash flow is more than their investment plan, firms can invest or lend the excess cash flow in the capital market. Therefore, the investment decision should not depend on the availability of free cash flow.

However, with the existence with capital market frictions, there can be association between firm's investment and free cash flow as documented in prior researches. Jensen [2] proposed the role of free cash flow in the agency theory that is known as free cash flow hypothesis. Firms can be more vulnerable to the agency problem if the level of free cash flow is higher. Managers may invest too much by taking some projects with low return. The potential of monitoring difficulty can encourage this problem. It is possible that managers invest this internally-generated free cash flow for their own benefits but it can deteriorate firm value and shareholder value [4]

There are many previous researches that provide empirical evidences to support this free cash flow problem. In diversified firms, the segment with higher level of cash balance tends to perform poorly compared to other segments [5]. There is also an evidence from takeover transaction from the firms with higher cash balance, which is known as "cash rich firms"[6]. The acquisition done by such firms will usually result in poorer performance. Moreover, firms with excess cash balance would have higher level of capital expenditures and involve more with acquisition activities though they are poor investment opportunities [7].

Corporate governance is a mechanism designed to mitigate the agency problem based on monitoring and incentives. Therefore, firms with better governance will be less vulnerable to the over-investment problem and managers tend to make better investment decisions. Richardson [1] has provided the

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evidence of over-investment based on the accounting-based model. Firms with poor governance will have higher level of investment compared to other firms in the same industry. Moreover, there is other evidence to show that firms with poor governance will make investment too little, which is known as under-investment [8]. Furthermore, there is a study about the impact of investor sentiment on firms' investment decisions and found the adverse effect of investor sentiment. Investor sentiment has a positive relation with the level of new investment and will result in over-investment. However, corporate governance can play an important role to reduce the adverse effect of investor sentiment [9].

III. DATA AND METHODOLOGY

The data used in this paper is collected from all listed firms in the Stock Exchange of Thailand during 2001-2013. The required accounting information of each firm includes Capital Expenditures, Total Assets, Total Liabilities, Total Shareholders' Equity, Cash and Short-term Investment, and Cash Flow from Operating Activities. Other required data for each firm are Stock Returns and Market Capitalization (Market Value of Equity). Firms with incomplete data are excluded from the analysis. Finally, there are 414 firms and 4,122 firm-year observations from eight different industries, which are Agro & Food Industry, Consumer Products, Financials, Industrials, Property & Construction, Resources, Services, and Technology.

The level of investment is determined by capital expenditure. However, in order to determine over-investment (under-investment), the actual amount of investment of each firm will be compared to the expected amount. The expected amount of investment is determined based on Richardson (2006) by the following equation.

$$INVEST = \beta_0 + \beta_1 MB + \beta_2 LEV + \beta_3 CASH + \beta_4 SIZE + \beta_5 RETURN + \beta_6 INVEST_{t-1} + \sum YEAR + \sum IND + \varepsilon, \quad (1)$$

where *INVEST* is the investment measured by total capital expenditure scaled by total assets. *MB* is a proxy for growth opportunity and is calculated by the ratio between market value of total assets and book value of total assets. *LEV* is a financial leverage, which is measured by debt-to-equity ratio (the ratio between total liabilities and total shareholders' equity). *CASH* is the amount of cash and short-term investment scaled by total assets. *SIZE* is the size of firm, which is measured by the natural logarithm of total assets. *RETURN* is a stock return that includes both capital gains and dividends. *YEAR* is the year dummy variable and *IND* is the industry dummy variable.

The discrepancy between actual investment and expected investment will represent the level of over-investment or under-investment. Therefore, the level of over-investment (under-investment) will be measured by the residual from (1). The positive residual means the actual investment is more than the expected one and implies over-investment. The negative

residual means the actual investment is below the expected one and implies under-investment.

Thereafter, this paper will further examine the association between over-investment (under-investment) and free cash flow. Free cash flow is calculated from cash flow from operations minus cash outflow for investment or capital expenditure. In order to allow for asymmetric relation, the regression model is as follows.

$$OVERINVEST = \beta_0 + \beta_1 FCF^+ + \beta_2 FCF^- + \varepsilon, \quad (2)$$

where *OVERINVEST* is over-investment (under-investment), which is the residual from (1). *FCF⁺* equals to the amount of free cash flow if it is positive, or zero otherwise. *FCF⁻* equals to the amount of free cash flow if it is negative, or zero otherwise. The objective of this regression is to determine the impact of free cash flow on investment decision e.g. higher amount of free cash flow can lead to the decision to invest more than the appropriate level (over-investment). Therefore, the association between lag free cash flow and over-investment in the following year.

IV. ANALYSIS AND RESULT

Table I reports the descriptive of important variables used in this paper.

TABLE I
VARIABLE DESCRIPTION

	mean	25th Percentile	Median	75th Percentile
INVEST	0.0523	0.0105	0.0319	0.0709
MB	1.2519	0.8160	1.0253	1.3711
LEV	4.3375	0.3162	0.7976	1.5524
CASH	0.1043	0.0200	0.0574	0.1445
FCF	0.0226	-0.0338	0.0269	0.0884

From table I, in average, sample firms has invested around 5.23% of total asset. The market-to-book ratio that represents the growth opportunity is at around 1.25 times. Moreover, sample firms use extensive debt, which is 4.34 times of equity. However, the median of debt-to-equity ratio is only 0.80 times and the third quartile (75th percentile) is at only 1.55 times. Therefore, the high mean of debt-to-equity ratio is affected by small number of firms who use extensive debt level. The average cash balance is 10.43% of total asset whereas the average level of free cash flow is 2.26% of total asset. In order to measure the level of over-investment (under-investment), the regression based on (2) is estimated and the result is reported in table II.

Table II reports the result of regression of explanatory variables on investment as in (1). The first column shows the result of regression without year dummy variables and industry dummy variables. The second column includes all of them. In the first column, all coefficients have the sign as expected except firm size. The coefficient of *MB* is positive and statistically significant, which represents the impact of growth opportunities on investment. Firms with higher growth opportunity tend to invest more. The coefficient of leverage

(LEV) is significantly negative, which represents the impact of leverage or debt financing in restricting the investment opportunity. The coefficient of cash is also positive and significant. This means firms with higher cash balance tend to invest more than firms with lower cash balance. The coefficient of size is different from expectation. Larger firms should invest more because they can afford and well-utilize of investment opportunity compared to smaller ones. However, the coefficient of size from table II is negative and not statistically significant.

TABLE II
REGRESSION ON INVESTMENT LEVEL

	Panel 1	Panel 2
Constant	0.0199 ^a (2.56)	0.0230 ^a (2.32)
MB	0.0029 ^a (2.34)	0.0022 ^a (1.99)
LEV	-0.0001 ^a (-4.80)	-0.0001 ^a (-4.09)
CASH	0.0196 ^a (2.95)	0.0223 ^a (3.22)
SIZE	-0.0003 (-0.54)	-0.0001 (-0.10)
RETURN	0.0006 (0.96)	-0.0001 (-0.13)
CAPEX _{t-1}	0.5911 ^a (22.27)	0.5802 ^a (20.82)
YEAR	Not included	Included
IND	Not included	Included
Adjust R ²	0.3634	0.3749

The number in parenthesis is t-statistics for each coefficient. This t-statistic is based on robust standard error.

^aThe coefficient is significant at 5% level.

The result in the second column including year dummy variables and industry dummy variables is similar to the first column. However, the adjusted r-squared of the regression with dummy variables is 0.3749 higher than the adjusted r-squared of 0.3634 from the regression without dummy variable. Therefore, adding both time dummy variables and industry dummy variables can improve the explanatory power of regression model.

The residuals from (1) are estimated for each firm-year observation. These residuals represent over-investment and under-investment from the expected level of investment. Thereafter, the paper will examine the relation between over-investment and free cash flow as in (2). The result is this regression is reported in table III.

Table III reports the result of regression analysis between over-investment and free cash flow. In panel 1 of table III, based on pooled OLS regression, free cash flow has a positive impact on over-investment. This evidence supports the agency cost of free cash flow. Firms with higher free cash flow will be more vulnerable to the agency problem as managers may over-invest for their own private benefits instead of shareholders' wealth maximization. Based on panel regression analysis, the

result of Hausman test reveals that fixed-effect regression model is more appropriate. The result of fixed-effect panel regression is similar that there is also a positive relation between over-investment and free cash flow.

TABLE III
OVER-INVESTMENT AND FREE CASH FLOW

	Panel 1		Panel 2	
	Pooled	Panel	Pooled	Panel
Constant	-0.0011 (-1.47)	-0.0018 ^a (-2.42)	-0.0004 (-0.36)	-0.0005 (-0.49)
FCF	0.0457 ^a (7.90)	0.0734 ^a (10.84)		
FCF ⁺			0.0380 ^a (4.07)	0.0604 ^a (5.48)
FCF ⁻			0.0547 ^a (5.29)	0.0882 ^a (7.35)

Pooled is the pooled regression whereas Panel is the fixed-effect panel regression.

^aThe coefficient is significant at 5% level.

Panel 2 of table III reports the result of regression allowing for an asymmetric relation between over-investment and free cash flow. The results of both pooled OLS regression and fixed-effect panel regression are similar. The coefficient of both positive free cash flow and negative free cash flow are significantly positive.

V. CONCLUSION

This paper aims to examine the association between investment and free cash flow. Based on theory, the investment decision should be independent of free cash flow in the perfect capital market. However, the market frictions like agency costs can lead to the different result. Firms with higher free cash flow can be more vulnerable to the agency problem because managers may invest too much beyond the optimal level of investment in order to maximize shareholders' wealth. This problem is known as an over-investment problem.

Over-investment is determined by the difference between the actual investment (capital expenditure) and the expected investment. The expected investment is estimated from the regression with explanatory variables like growth opportunity, leverage, firm size, cash, and stock return. The positive (negative) residuals from this regression will represent over-investment (under-investment). Thereafter, the relation between over-investment and free cash flow will be further examined.

Using data from listed firms in the Stock Exchange of Thailand from 2001 to 2013, the result reveals that there is an association between over-investment and free cash flow. Firms with higher free cash flow may invest too much whereas firms with negative free cash flow may invest too little. This evidence supports the agency cost of free cash flow. Firms with higher free cash flow will be more vulnerable to the agency problem because managers may over-invest this free cash flow for their own private benefits and this will finally deteriorate shareholder value.

REFERENCES

- [1] S. Richardson, "Over-investment of free cash flow," *Review of Accounting Studies* vol. 11, pp. 159-189, 2006.
<http://dx.doi.org/10.1007/s11142-006-9012-1>
- [2] M. C. Jensen, "Agency costs and free cash flow, corporate finance and takeovers," *American Economic Review*, vol. 76, pp. 659-665, 1986.
- [3] F. Modigliani and M. Miller, "The cost of capital, corporation finance and the theory of investment," *American Economic Review*, vol. 48, pp. 261-297, 1958.
- [4] R. M. Stulz, "Managerial discretion and optimal financing policies," *Journal of Financial Economics*, vol. 26, pp. 3-27, 1990.
[http://dx.doi.org/10.1016/0304-405X\(90\)90011-N](http://dx.doi.org/10.1016/0304-405X(90)90011-N)
- [5] O. Lamont, "Cash flow and investment: Evidence from internal capital markets," *Journal of Finance* vol. 52, pp. 83-109, 1997.
<http://dx.doi.org/10.1111/j.1540-6261.1997.tb03809.x>
- [6] J. Harford, "Corporate cash reserves and acquisitions," *Journal of Finance*, vol. 54, pp. 1969-1997, 1999.
<http://dx.doi.org/10.1111/0022-1082.00179>
- [7] T. Opler, L. Pinkowitz, R. Stulz, and R. Williamson, "The determinants and implications of corporate cash holdings " *Journal of Financial Economics*, vol. 52, pp. 3-46, 1999.
[http://dx.doi.org/10.1016/S0304-405X\(99\)00003-3](http://dx.doi.org/10.1016/S0304-405X(99)00003-3)
- [8] X. Giroud and H. M. Mueller, "Does corporate governance matter in competitive industries? ," *Journal of Financial Economics*, vol. 95, pp. 312-331, 2010.
<http://dx.doi.org/10.1016/j.jfineco.2009.10.008>
- [9] W.-J. Chen, "Can corporate governance mitigate the adverse impact of investor sentiment on corporate investment decisions? Evidence from Taiwan," *Asian Journal of Finance and Accounting*, vol. 5, pp. 101-126, 2013.
<http://dx.doi.org/10.5296/ajfa.v5i2.4117>