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Overinvestment Propensity and Firm's Value*

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Abstract

This study empirically analyzes the effect of firm overinvestment propensity on the value relevance of capital investment. In order to verify this point, this study attempts to analyze the value relevance of overinvestment firms' capital investments. The analysis was performed according to the model of Biddle et al. (2009) and McNichols and Stubben (2008) on overinvestment propensity for analysis, and the results are as follows. First, in terms of overinvestment, corporate capital investment shows negative value relevance, so the excessive investments above reasonable levels have reduced firm's value. In contrast, the value relevance for capital investment showed a positive value for firms whose managerial propensity changed, that is, from under-investment in the previous year, it shifted to overinvestment in the current year. Second, as a result of analyzing the value relevance of the investment increase according to the investment propensity, the overinvestment firms showed negative values and the underinvested firms showed positive values; thus, the value relevance of the increase in investment was opposite to the investment propensity of the firm. These findings confirm that the stock market differentially evaluates investment efficiency according to investment propensity, continuity, and investment alterations, and reflects it appropriately in the firm's value.

Keywords: Investment Decisions, Capital Investment, Overinvestment, Firm's Value

JEL Classification Code: G14, F64, F65 G31, G38

1. Introduction

Firms are continuously investing in tangible and intangible assets for sustainable growth, and these investment activities can enhance the firm's competitiveness. Thus, sound capital investment at an appropriate level is an essential activity of a company that allows it to grow and ensure its survival. In addition, a management's active investment can be a driving force for firm growth as the overinvestment of a firm can raise future profitability and growth potential, and increase future profitability. Recently, however, the Korean government has introduced the Corporate Earnings Circulation Taxation System, pointing out that the domestic economy is stagnant due to a decline in consumption because managers have not actively invested and, thus, the company's growth has declined and household income has not increased. The government wanted to stimulate domestic investment by boosting corporate investments and boosting household incomes through the introduction of the Corporate Earnings Circulation Taxation System. However, contrary to the government's intentions, firms have become cautious about investing actively since the global economy has become unstable recently, and uncertainty about investment success has increased. This is because the timely and bold investment of managers can make a company grow rapidly in the short term, but if an excessive investment fails in an uncertain economic situation, the financial structure of the firm may become weak and even the risk of bankruptcy may turn out to be serious.

Given that managers' investment decisions produce a significant impact on a company's growth and survival, managers' investment propensity can be a notable basis for investors when evaluating a firm's value. For example, if a firm's manager renders an optimal investment that takes into account his/her given business environment, that investment will raise the firm's value. However, if managers conduct

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overinvestment only for the external growth of the company without considering the business environment, the investment value is expected to be damaged. Therefore, this study attempts to verify whether the capital investment of companies with overinvestment propensity decreases the firm's value through empirical analysis. The results of this study were as follows. First, investments above the appropriate level lowered the enterprise value, and even if such investment was continuous, the enterprise value decreased due to the investment of the company. However, the capital investment of companies increased enterprise value with changed investment propensity, namely, from under-investment in the previous year to overinvestment in the current year. This suggests that the stock market recognizes that the overinvestment of companies that have shifted from underinvestment to overinvestment is a form of strategic investment by managers to maintain the appropriate level of investment, rather than an overinvestment acting as an inefficient investment.

Second, as a result of analyzing the value relevance of the increase in investment according to the investment propensity, the overinvestment firms showed negative values and the underinvestment firms showed positive values, and so the value relevance of the increase in investment was opposite to the investment propensity of the firm. In other words, it could be ascertained whether the stock market recognizes the increase in investment of the overinvestment group as excessive investment and, on the contrary, the increase in investment of the underinvestment group as an increase in investment to reach an appropriate level. The results of this study confirm that the investment of overinvestment firms undermines firm's value. In the stock market, it was found that the efficiency of investment was differentially evaluated according to the investment propensity, continuity, and change of managers, and is reflected in the firm's value.

Following the introduction in Chapter 1, the remainder of the study sets up the hypotheses after reviewing the theoretical background and previous studies in Chapter 2; the research methodology is explained in Chapter 3. Chapter 4 presents the results of the empirical analysis, while Chapter 5 summarizes the conclusions.

2. Literature Review

2.1. Citation in Text

As mentioned above, a number of studies focused on verifying the investment efficiency according to the characteristics of the firm, predicting the future management performance of the overinvestment companies, and whether to adjust profits. However, this study aims to examine the effect of managers' overinvestment directly on corporate value by analyzing the value relevance of overinvestment firms' capital investment.

Biddle, Hilary, and Verdi (2009) provide evidence both in documenting a conditional negative (positive) association between financial reporting quality and investment for firms operating in settings more prone to over-investment (under-investment). These results suggest that one mechanism linking reporting quality and investment efficiency is a reduction of frictions such as moral hazard and adverse selection that hamper efficient investment. Choi, Kim, and Hong (2013) investigate the relationship between the characteristics of board of directors and the efficiency of investments of capital expenditures and R& D. Their research suggest that, in case of the firms belonging to the large Chaebol groups, the efficiency of over-R&D expenditures firms has increased as a result of frequent board meetings, leading to suppressing over-R&D investment behavior.

Lee, Cho, and Oh (2013) analyze whether the corporate overinvestment propensity increases the audit fees practically through the risk of the audit, or not. The result of their research proved that the overinvestment raises the actual audit risk, so do the expenses of the corporate share, which is the negative point of the overinvestment. In addition, it shows that the auditors distinguish the original risk of the corporate appropriately related to the investment and reflect on the audit fees for efficient application of the audit related to the overinvestment. Pank and Kwon (2012) examine the relationship between foreign ownership and investment efficiency. They find a conditional negative (positive) association between foreign ownership and investment for firms operating in settings more prone to over-investment (under-investment). Interestingly, the results were significant only for capital expenditure, and not for R&D expenditure. This results shed light on the literature that examines the effect of foreign investors on firms' decisions.

Choi (2014) investigated the relationship between the level of capital expenditures and future firm performance measured as the accounting figures. The result suggest that the efficiency of capital expenditures promotes the future accounting performance of only overinvestment sample firms, while the level of capital expenditures increases the future accounting performance of only under-investment sample firms, which has the theoretical validity. Lee and Paek (2015) examine the effect of investment efficiency on earnings persistence and value relevance of earnings. The result is that earnings are less persistent for firms with inefficient investment than for firms with efficient investment. This suggests that inefficient investment deteriorates earnings persistence. Zhang and Yin (2018) imply that improvement in the financial market, such as remove entry barriers and create a fairly competitive environment among banks, positively affects firms‟ investment efficiency in an emerging country.

Le and Kim (2019) investigate how economic freedom affected firm investment in Vietnam. They suggest that small

firms are likely to gain more advantage in access to external finance than do larger firms when the government removes restrictions from capital movement and the domestic credit market.

2.2. Hypotheses

Previous studies have reported that managers overinvest to gain greater rewards, ensure controllable decision-making rights, and gain reputation (Kim & Song, 2008). However, it is reported that in Korea, the overinvestment of large firms groups is not inefficient; rather, it has helped grow the firm (Siegel & Choudhury, 2012), and in the high-tech industry, managers' drastic overinvestment can develop the firm rapidly and help it gain an advantage in competitiveness.

However, as the recent Daewoo Shipbuilding & Shipbuilding and Hanjin Shipping incidents indicate, the firm may go bankrupt due to management overinvestment. In other words, if managers' strategic overinvestment fails, excessive cash outflow could deteriorate profitability and ultimately threaten a firm's survival. Therefore, the stock market is expected to negatively assess managers' excessive capital investment. To verify this, the following hypothesis is formulated.

H1: *The value relevance of capital investment by overinvestment firms will be lower than that of non-overinvestment firms.*

Managers may continually show excessive or underinvestment propensity or strategically change investment propensity depending on various environmental factors. Accordingly, in the stock market, the value relevance of capital investment can be evaluated differently according to the investment decisions of these managers.

For example, if the overinvestment continues to exceed the optimal level of investment, capital investment would reduce the firm's value because the firm's financial structure would deteriorate due to a series of excessive cash outflows (Lee & Baek, 2015). In addition, the value relevance of capital investment will decline in the stock market as managers' continuous overinvestment is not perceived as a bold investment for firm growth, but rather as an action to enhance their reputation and private profit (Kwak & Choi, 2010). Therefore, it is expected that the value relevance of the capital investment of consecutive overinvestment firms would be very low.

On the other hand, managers can change their investment propensity due to given environmental factors (Erum, Hussain, & Yousaf, 2016). For example, after underinvestment due to opaque economic conditions and uncertain investment performance, overinvestment can be achieved to reach an appropriate level if the opaque situation is resolved. If the stock market recognizes these managerial investment changes as strategic policy changes to maintain the appropriate level of investment in accordance with the business environment, the value relevance of these groups' capital investments will be high. However, if the stock market perceives this policy change as simply an overinvestment that is out of acceptable level, the stock market's assessment of the capital investment of these groups would be negative. In conclusion, the following hypothesis is established.

H2: *The overinvestment propensity continuity of managers and the change in overinvestment propensity will have a different value relevance for capital investment.*

3. Research Methods and Materials

3.1. Measurement of the Investment

In this study, a firm's investment propensity was measured in two ways:

3.1.1. Biddle et al. (2009) Tobin-Q and Growth Model

The first investment propensity was measured by Tobin-Q and revenue growth in a study by Biddle et al. (2009), and the method described is below.

$$\mathrm{INV}_t = a_0 + a_1 Q_{t-1} + a_2 \mathrm{SaleGr}_{t-1} + e_t \quad (1)$$

Definitions of variables: INV_t = t capital investment (the amount of cash outflow from the investment activity that has been leaked for facility assets / tangible assets$_{t-1}$); Q_{t-1} = Q of the t–1 Tobin (common stock market capitalizationz$_{-1}$+ total debt$_{t-1}$)/total assets$_{t-2}$; SaleGr_{t-1} = t–1 sales growth (((sales$_{t-1}$ – sales$_{t-2}$)/sales$_{t-2}$) × 100).

A specific method of measurement is to obtain the residuals of each firm by performing regression analyses of equation (1) by industry and year. It was then defined as an overinvestment if the residuals were higher than 75% (fourth-minute) by industry and year.

3.1.2. McNichols and Stubben (2008) Model

The second investment efficiency measurement measured each firm's investment propensity using the research model presented by McNichols and Stubben (2008). In this study, asset growth and investment level in the previous year were included in the model to reduce the problem of omitting variables when measuring investment propensity. In addition, to mitigate the assumption that each firm's level of investment is consistent with Tobin-Q, the fourth-percentile of Tobin-Q was additionally included in the model

and the firm's investment propensity was measured using equation as follows:

$$\mathrm{INV}_t = a_0 + a_1 Q_{t-1} + a_2 Q_{2t-1} + a_3 Q_{3t-1} + a_4 Q_{4t-1} + a_5 \mathrm{CFO}_t + a_6 \mathrm{AsGr}_{t-1} + a_7 \mathrm{INV}_{t-1} + e_t \quad (2)$$

Definitions of variables: INV_t = t year capital investment (the amount of cash outflow from the investment activity that has been leaked for facility assets /type assets_{t-1}); Q_{t-1}= Q of the t–1th Tobin (common stock market $\mathrm{capitalization}_{t-1}$ + total debt_{t-1})/total assets_{t-2})); $Q_{2(3,4)t-1}$ 1 = t–1 If the quality of Tobin at the end of the year belongs to the industry-year 2 (3, 4) segment, 1 or 0; CFO_{t-1} = t year cash flows from operating activities (Cash_t /Total Asset_{t-1}); AsGr_{t-1} = asset growth at the end of t–1 (ln (Total Asset_{t-1} / Total Asset_{t-2})); INV_{t-1} = capital investment in t–1.

A specific measurement method is to perform a regression analysis on an year-by-industry basis of the model of equation (2) to obtain the residuals of each firm. In addition, a firm whose size is greater than 75 percent by industry and year was defined as an overinvestment frim.

3.2. Research Model Design

In this study, the valuation model for corporate value was based on Ohlson (1995) to analyze the value-relevance of capital investments. The model combined assumptions about the primary correlation of excess income in the discount allocation model to represent the value of a firm's equity as a linear function that includes net assets, net income and other information.

This linear function shows that the share price multiplier on net income increases as the persistence of excess profit increases. In addition, if the stock market is efficient, it can be assumed that the valuation of the equity value of the share market consists of a combination of net income and net assets. On the other hand, it was very difficult to measure O, other than excess profit, and if the average value differs from zero, there could be a correlation between the terms of the error, replacing other information other than the excess gain with the clause and the clause of the error. In addition, negative net income (NEG_E) was included to distinguish between negative and positive net income information known to have a discriminatory effect on share prices (Hayn, 1995; Collins et al., 1999). Based on this, the following basic models are set up:

$$P_{t+1} = a_0 + a_1 \mathrm{BV}_t + a_2 E_t + a_2 \mathrm{NEG\_}E_t + e_t \quad (3)$$

Definitions of variables: P_{t+1}= t + 1 March stock price; BV_t = net book-value per share at the end of t year; E_t = net income per t year; $\mathrm{NEG\_E}_t$ = 1 if E_t is negative, otherwise 0.

Next, to analyze the value relevance of capital investments, the model in (3) is classified capital as assets and liabilities, and then divided the assets back into capital investments and the rest of them, so that equation (4) was designed:

$$P_{t+1} = a_0 + a_1 \mathrm{AAS}_t + a_2 \mathrm{NIVN}_t + a_3 LI_t + a_4 E_t + a_5 \mathrm{NEG}_{E_t} + a_6 \sum_{t=1}^{n} \mathrm{YR} + a_7 \sum_{j=1}^{n} \mathrm{IND} + e_t \quad (4)$$

Definitions of variables: AAS_t = t year assets (total asset-capital investment) taking into account capital investment per share in year; NINV_t = Capital investment per t year (the amount of cash outflows from investment activities per t share for facility assets); LI_t = t year debt per share. YR = Year Dummy. IND = Industrial Dummy; Refer to Equation (3) for the remaining variables.

Equation (5) was designed to analyze the value relevance of capital investments by overinvestment firms:

$$P_{t+1} = a_0 + a_1 \mathrm{AAS}_t + a_2 \mathrm{NIVN}_t + a_3 \mathrm{NINV}_t \times \mathrm{OVERINV}_{jt} + a_4 \mathrm{OVERINV}_{jt} + a_5 \mathrm{LI}_t + a_6 E_t + a_7 \mathrm{NEG}_{E_t} + a_8 \sum_{t=1}^{n} \mathrm{YR} + a_9 \sum_{j=1}^{n} \mathrm{IND} + e_t \quad (5)$$

Definitions of variables: $\mathrm{OVERINV}_{jt}$ = the j^{th} measure of over-investment propensity of a t Firm; $\mathrm{OVERINV}_1$= Tobin-Q and investment propensity measurements by the growth model in Biddle et al. (2009), if the size is 75% or greater, then 1, or 0; $\mathrm{OVERINV}_2$ = investment propensity measurement by McNichols and Stubben (2008) if it is 75% or greater, then 1, or 0; Refer to Equation (3), (4) for the remaining variables.

The most important variable in equation (5) is the interaction variable between capital investment and overinvestment (NINV × $\mathrm{OVERINV}_j$). If share market participants were aware of the capital investment of an overinvestment as a reasonable and bold investment for future firm growth, these interaction variables would have a significant positive of regression coefficients. However, on the contrary, if a firm's overinvestment is assessed by the management as an unreasonable and inefficient investment conducted for its own over-confidence or private gain, a significant negative regression coefficient will be present.

Next, equation (6) was designed to analyze the value-relevance of capital investments resulting from the continuation of overinvestment:

$$P_{t+1} = a_0 + a_1 \mathrm{AAS}_t + a_2 \mathrm{NIVN}_t + a_3 \mathrm{NINV}_t \times \mathrm{Con\_OVERINV}_{jt} + a_4 \mathrm{CON\_OVERINV}_{jt} + a_5 \mathrm{LI}_t + a_6 \mathrm{E}_t + a_7 \mathrm{NEG}_{E_t} + a_8 \sum_{t=1}^{n} \mathrm{YR} + a_9 \sum_{j=1}^{n} \mathrm{IND} + e_t \quad (6)$$

Definitions of variables: Con_OVERINV$_{jt}$ = For each investment measure, one or two consecutive years of overinvestment is included in the group; Refer to Equation (3), (4), and (5) for the remaining variables.

Continuous overinvestment by managers is a series of irrational investments that deviates from appropriate levels, which are less efficient in investment and more likely to reduce the value of Firm. Therefore, it is expected that the value relationship of this Firm' capital investments will be very low.

In other words, the interaction variable (NINV × Con_OVERINV$_j$) of a capital investment and a continuous overinvestment firms is expected to have a significant negative.

Next, equation (7) was designed to analyze the value-relevance of capital investments resulting from changes in a firm's overinvestment:

$$P_{t+1} = a_0 + a_1 \mathrm{AAS}_t + a_2 \mathrm{NIVN}_t + a_3 \mathrm{NINV}_t \times Ch\_\mathrm{OVERINV}_{jt} + a_4 Ch\_\mathrm{OVERINV}_{jt} + a_5 \mathrm{LI}_t + a_6 E_t + a_7 \mathrm{NEG}_{E_t} + a_8 \sum_{t=1}^{n} \mathrm{YR} + a_9 \sum_{j=1}^{n} \mathrm{IND} + e_t \quad (7)$$

Definitions of variables: Ch_OVERINV$_{jt}$ = If the measure of each investment belongs to underinvestment in t–1 and overinvestment in t year 1, or 0; Refer to Equation (3), (4), and (5) for the remaining variables.

If, in the stock market, a firm's excess investment is assessed as a change in management's strategic investment considering its management situation, it is expected that both the capital investment and the interaction variable (NINV × (Ch_OVERINV$_j$) will exhibit a significant positive of regression coefficients. However, if the previous year's under-investment results in recognising this year's over-investment change as just overinvestment beyond the appropriate level, the regression coefficients of these interaction variables will all have a significant negative.

3.3. Sample Selection

Sample selection on the relevance of investment propensity and capital investment was conducted between 2001 and 2016 by selecting 7,769 firm-year among listed securities companies that met the following conditions:

4. Empirical Analysis

4.1. Descriptive Statistics

Table 2 shows the amount of technical notices for the major variables of the entire sample used in this study. The mean (medium) of the share price (P) is 25,431 (6,640).

1) Definitions of variables: P_{t+1} = Stock price on March of the next year; AS$_t$ = Total Asset per share; LI$_t$ = Liabilities per share; E_t = net income per share; NINV$_t$= Cash outflows from capital investing activities per share; OVERINVES$_{t1}$ = Measure of Investment Efficiency which is residual for the investment. Regressing Biddle et al. (2009) model; OVERINVES$_{t2}$ = Measure of Investment Efficiency which is residual for the investment regressing McNichols and Stubben (2008) model.

Table 1: Selection for Window Dressing Settlement Sample

Contents	
Total number of listed firms from 2001 to 2016	11,784
(Exclude) Listed firms with Financial Firms or not DEC Closing Firms	(2,672)
(Exclude) firms without available data from KISVALUE	(637)
(Exclude) Observations with missing financial data	(535)
Outlier	(171)
Final Sample Firms	7,769

Table 2: Descriptive Statistics (n = 7,769)

Variables	Mean	Median	Std	1%	99%
P_{t+1}	25,431	6,640	55,961	190	299,000
AS$_t$	56,786	28,571	85,329	974	412,184
LI$_t$	25,389	11,876	39,002	312	203,825
E$_t$	1,970	610	5,512	–9,172	25,580
NINV$_t$	2,323	606	5,491	1.000	26,546
OVERINVEST$_{1t}$	–0.024	–0.025	0.191	–0.705	0.632
OVERINVEST$_{2t}$	–0.004	0.000	0.145	–0.434	0.560

Each investment-oriented measure showed an average of –0.024 for $OVERINVEST_1$ and an average of –0.004 for $OVERINVEST_2$, indicating that the firm's investment propensity would be lower than zero. The average (medium) of an asset per share (AS) is 56,786 (28,571). The average (middle) debt per share (LI) was then 25,389 (middle) and the average (middle) of net income (E) per share was 1,970 (610) and the average (medium) of capital investment (NINV) per share was 2,323 (616), which was higher than net income per share.

4.2. Correlation

Table 3 shows the correlation of the major variables. First, looking at the correlation between the principal variables, share price (P) and each investment propensity measurement ($OVERINVEST_{1,2}$), neither of them showed a significant correlation. However, a significant positive (+) correlation with capital investment (NINV) indicates that the higher the capital investment of the firm, the higher the frim value. In addition, capital investment (NINV) shows a significant positive (+) correlation between earnings per share (E) and each investment propensity ($OVERINVEST_{1,2}$) indicating that the higher the firms earning, the higher the capital investment, and the higher the capital investment, the higher the firm's tendency to overinvestment.

4.3. Regression

4.3.1. Value-Relevance Capital Investment Based on the Investment of the Firm

A regression analysis was performed on Model 1 to verify the value-relevance of capital investments in overinvestment firms.

Table 4 shows the result of the value-relevance of the capital investment resulting from the firm's over-investment propensity. The analysis shows that, first of all, the regression coefficients for capital investments (NINV) is significantly positive (0.977, $t = 6.52$** / 1.572, $t = 10.11$***), indicating that the higher the firm's investment activity, the higher its value. However, an analysis of the effects of capital investment on overinvestment entities showed a significant negative regression coefficient for both the interaction variables NINV × $OVERINV_1$(–0.277, $t = -1.78$**) and NINV × $OVERINV_2$(–0.994, $t = -6.05$***)

In other words, the value relevance of capital investments in overinvestment is very low compared to those that do not. This can be inferred that in the stock market, the value relevance of capital investment is reduced because it is perceived as an irrational overinvestment to pursue management's reputation or private gain rather than a bold investment to grow the firms.

Looking at the control variables, the regression coefficients for liabilities (LI) per share are all significant negative and the regression coefficients for earnings per share (E) are all significantly positive, indicating that the higher the liability of the entity, the lower the value of the entity, and the higher the profit, the higher the firm's value, the higher the firm's value.

Next, Model 2 was designed and analyzed to verify the value relevance of capital investments based on investment-oriented continuity.

The analysis in Table 5 indicates that the regression coefficients in NINV × $Con\_OVERINV_{1,2}$, which refer to the value relevance of a continuous over-investment firm's capital investments, all are significantly negative (–0.370, $t = -1.84$*/–0.439, $t = -2.02$**). In other words, the value relevance of a continuous overinvestment firm's capital investments can be seen as a decrease in the value of the firms.

This can be seen as a very low valuation of value relevance investment by these groups in the stock market, as a continuation of excess investment in a firm will likely result in a cash outflow due to excessive investment and a significant deterioration in the financial structure if the investment fails.

Table 3: Correlation Coefficients

Variable	P_{t+1}	AS_t	LI_t	E_t	$NINV_t$	$OVERINVEST_{1t}$
AS_t	0.645***					
LI_t	0.473***	0.877***				
E_t	0.641***	0.585***	0.372***			
$NINV_t$	0.513***	0.675***	0.598***	0.519***		
$OVERINVEST_{1t}$	0.014	0.001	–0.005	0.033***	0.178***	
$OVERINVEST_{2t}$	–0.005	–0.003	0.003	0.008	0.141***	0.490***

1) ***,** and * denotes the significance of the parameter estimates at the 0.01, 0.05 and 0.10 levels, respectively.
2) Variables are defined : Refer to Table 4-1 for the variable definitions.

Table 4: Overinvestment-Firms and Value Relevance

Model 1:

$$P_{t+1} = a_0 + a_1\text{AAS}_t + a_2\text{NIVN}_t + a_3\text{NINV}_t \times \text{OVERINV}_{jt} + a_4\text{OVERINV}_{jt} + a_5\text{LI}_t + a_6E_t + a_7\text{NEG}_{E_t} + a_8\sum_{t=1}^{n}\text{YR} + a_9\sum_{j=1}^{n}\text{IND} + e_t$$

Variable	Model 1–1		Model 1–2	
	Coeff.	*t*-stat	Coeff.	*t*-stat
Intercept	1.430	2.57**	1.011	1.72**
AAS_t	0.326	26.04***	0.315	23.75***
$NINV_t$	0.967	6.52***	1.572	10.11***
$NINV_t \times OVERINV_{1t}$	–0.277	–1.78**		
$NINV_t \times OVERINV_{2t}$			–0.994	–6.05***
$OVERINV_{1t}$	–242	–0.24		
$OVERINV_{2t}$			413.711	0.39
LI_t	–0.297	–12.87***	–0.310	–12.61***
E_t	4.616	38.81***	4.888	38.62***
NEG_E_t	–5.383	–20.01***	–5.780	–20.23***
YR and IND dummy	**Include**			
Adj-R^2	0.568		0.556	

1) Variables are defined; P_{t+1}= Stock price on March of the next year; AAS_t= Adjust asset(total asset-Cash outflows from capital investing activities) per share; $NINV_t$= Cash outflows from capital investing activities per share; $OVERINVEST_{1t}$ = Takes of the value one if the residual from the investment regression (Biddle et al. (2009) Model) is in the top quartile of the distribution, else Zero (i.e., firms classified as over-investing); $OVERINVEST_{2t}$ = Takes of the value one if the residual from the investment regression (McNichols & Stubben (2008) model) is in the top quartile of the distribution, else Zero(i.e., firms classified as over-investing); LI_t = Liabilities per share; E_t = net income per share; NEG_E_t = Equals Et if net income per share is negative, zero, otherwise; YR = Year Dummy, IND = Industry Dummy.

2) ***,** and * denotes the significance of the parameter estimates at the 0.01, 0.05 and 0.10 levels, respectively.

Next, to analyze the value relevance of capital investment that has changed from oligopoly to over-investment, a regression analysis was performed using Model 3 as follows: The results in Table 5 showed a significant positive of the regression coefficients in NINV × $Ch\_OVERINV_{1,2}$(0.489, t = 1.96***/0.379, t = 1.76*), meaning value-relevance to an firm's capital investment that has changed its investment propensity from underinvestment to excess. This shows that in the stock market, an assessment of capital investment is very positive as it is perceived as a strategic investment policy by the management to address the shortfall in the previous year for over-investment by an entity that has changed its investment propensity from over-investment. The results showed that the stock market assessment was positive for the excess investment managers made to maintain an appropriate level of investment.

The above points indicate that the value-relevance of capital investment is negative, as the stock market expects that the financial soundness of the entity will decline due to unreasonable investments by such managers if excess investment beyond the appropriate level continues. However, for an firm's over-investment that has changed its investment propensity, the change in the strategic investment policy was recognized by the management to maintain the appropriate level of investment, indicating that the value related to capital investment was positive.

These results indicated that the value-related nature of capital investments was reflected in the value of the entity in the stock market, taking into account both continuity and change, as well as in the direction of management's.

4.3.1. Value Relevance of Capital Investment-Increment According to Investments Propensity

Next, managers will increase investment if future growth is high, and vice versa, if future prospects are uncertain or

Table 5: Continuing and Change Overinvestment and Value Relevance

Model 2:

$$P_{t+1} = a_0 + a_1\text{AAS}_t + a_2\text{NIVN}_t + a_3\text{NINV}_t \times \text{Con\_OVERINV}_{jt} + a_4\text{CON\_OVERINV}_{jt} + a_5 LI_t + a_6 E_t + a_7\text{NEG}_{E_t} + a_8\sum_{t=1}^{n}\text{YR} + a_9\sum_{j=1}^{n}\text{IND} + e_t$$

Model 3:

$$P_{t+1} = a_0 + a_1\text{AAS}_t + a_2\text{NIVN}_t + a_3\text{NINV}_t \times Ch\_\text{OVERINV}_{jt} + a_4 Ch\_\text{OVERINV}_{jt} + a_5 LI_t + a_6 E_t + a_7\text{NEG}_{E_t} + a_8\sum_{t=1}^{n}\text{YR} + a_9\sum_{j=1}^{n}\text{IND} + e_t$$

Variable	Model 2–1		Model 2–2		Model 3–1		Model 3–2	
	Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*t*-stat
Intercept	1.373	2.61***	1.211	2.34**	1.049	1.96**	1.037	1.91*
AAS_t	0.335	26.06***	0.338	26.58***	0.322	24.33***	0.323	24.34***
$NINV_t$	0.829	7.37***	0.809	7.33***	0.786	7.04***	0.790	7.04***
$NINV_t \times Con\_OVERINV_{1t}$	–0.370	–1.84*						
$NINV_t \times Con\_OVERINV_{2t}$			–0.439	–2.02**				
$NINV_t \times Ch\_OVERINV_{1t}$					0.489	1.96**		
$NINV_t \times Ch\_OVERINV_{2t}$							0.397	1.76*
$Con\_OVERINV_{1t}$	–1.211	–0.77						
$Con\_OVERINV_{2t}$			16.686	0.10				
$Ch\_OVERINV_{1t}$					–1.110	–0.57		
$Ch\_OVERINV_{2t}$							–652	–0.42
LI_t	–0.306	–12.98***	–0.308	–13.12***	–0.293	–11.97***	–0.293	–11.98***
E_t	4.644	38.30***	4.618	37.96***	4.972	39.37***	4.955	39.20***
NEG_E_t	–5.418	–19.71***	–5.404	-19.64***	–5.810	–20.30***	–5.798	–20.24***
YR and IND dummy	**Include**							
Adj-R^2	0.560		0.554		0.553		0.535	

1) Variables are defined; $Con\_OVERINV_{jt}$ = Takes of the value one if firms with Each Measures($OVERINV_{1,2}$) did over-investing continuously from *t*-1 to *t*. else zero; $Ch\_OVERINV_{jt}$ = Takes of the value one if firms with Each Measures($OVERINV_{12}$) changed from under-investing (Takes of the value one if firm is bottom quartile of the distribution with Each Investment Measures, else Zero (i.e., firms classified as Under-investing); refer to Table 4 for the variable definitions.

2) ***,** and * denotes the significance of the parameter estimates at the 0.01, 0.05 and 0.10 levels, respectively.

investment success is uncertain. Thus, an increase in a firm's investment in the stock market could have a significant impact on assessing the firm value.

This study further analyzes whether the impact of capital increases on the firm value depends on the management's investment. To this end, we would like to analyze the value relevance of capital increases in over-investment through Model 4.

The analysis in Table 6 shows that the regression coefficient in ΔNINV, which represent each firm's investment increase, all are significantly positive (1.219, t = 7.32***/0.943, 5.57***), which increases the firm's value. However, the regression coefficients for $\Delta NINV \times OVERINV_{1,2}$, which represent an increase in investment by an overinvestment, all are significantly negative (–1.206, t = –5.05***/–0.439, t = –2.16**).

In other words, the value-related to the increase in capital investment of an overinvestment firm all showed negative regression coefficients, indicating that an increase in investment in an overinvestment firm would rather reduce the firm value. This result could be interpreted as negative value-related to the increase in investment in the stock market because the increase in investment has caused excessive investment beyond the appropriate level in excess of the investment.

Table 6: Over-Investing Firms and Under-Investing Firms Value Relevance of Investment-Increment

Model 4:

$$P_{t+1} = a_0 + a_1\mathrm{AAS}_t + a_2\mathrm{NIVN}_{t-1} + a_3\Delta\mathrm{NIVN}_t + a_4\Delta\mathrm{NINV}_t \times \mathrm{OVERINV}_{jt} + a_5\mathrm{OVERINV}_t + a_6 LI_t + a_7 E_t + a_8\mathrm{NEG}_{E_t} + a_9\sum_{t=1}^{n}\mathrm{YR} + a_{10}\sum_{j=1}^{n}\mathrm{IND} + e_t$$

Model 5:

$$P_{t+1} = a_0 + a_1\mathrm{AAS}_t + a_2\mathrm{NIVN}_{t-1} + a_3\Delta\mathrm{NIVN}_t + a_4\Delta\mathrm{NINV}_t \times \mathrm{UNDERINV}_{jt} + a_5\mathrm{UNDERINV}_t + a_6 LI_t + a_7 E_t + a_8\mathrm{NEG}_{E_t} + a_9\sum_{t=1}^{n}\mathrm{YR} + a_{10}\sum_{j=1}^{n}\mathrm{IND} + e_t$$

Variable	Model 4–1		Model 4–2		Model 5–1		Model 5–2	
	Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*t*-stat
Intercept	847	1.45	1,357	2.32**	1,808	3.19***	1,280	2.21**
AAS_t	0.312	23.33***	0.313	23.32***	0.305	23.34***	0.312	23.32***
$NINV_{t-1}$	1.435	10.31***	1.235	9.57***	1.188	9.83***	1.228	9.69***
$\triangle NINV_t$	1.219	7.32***	0.934	5.57***	0.652	5.57***	0.505	4.16***
$\triangle NINV_t \times OVERINV_{1t}$	–1.206	–5.05***						
$\triangle NINV_t \times OVERINV_{2t}$			–0.439	–2.16**				
$\triangle NINV_t \times UNDERINV_{1t}$					0.698	2.55**		
$\triangle NINV_t \times UNDERINV_{2t}$							0.820	3.42***
$OVERINV_{1t}$	669	0.66						
$OVERINV_{2t}$			–1,444	–1.44				
$UNDERINV_{1t}$					–2168	–2.21**		
$UNDERINV_{2t}$							–1,074	–1.06
LI_t	–0.304	–12.42***	–0.300	–12.24***	–0.286	–11.98***	–0.301	–12.29***
E_t	4.866	38.36***	4.903	38.65***	4.806	38.98***	4.932	39.06***
NEG_E_t	–5.743	–20.09***	–5.758	–20.13***	–5.355	–19.17***	–5.813	–20.33***
YR and IND dummy	Include							
Adj-R^2	0.556		0.555		0.560		0.556	

1) Variables are defined; $NINV_{t-1}$= Cash outflows from capital investing activities per share at *t*–1 year; $\Delta NINV_t$= Change in NIVN (($NINV_t$ – $NINV_{t-1}$); $UNDERINV_{jt}$ = Takes of the value one if firm is bottom quartile of the distribution with Each Inverstment Measures, else Zero (i.e., firms classified as Under-investing); Refer to Table 4 for the variable definitions.
2) ***,** and * denotes the significance of the parameter estimates at the 0.01, 0.05 and 0.1 levels, respectively.

Next, in order to analyze the value related to the increase in investment by under-investment entities, a regression analysis was performed using Model 5 as follows:

The analysis in Table 6 showed that the regression coefficients in $\triangle NINV \times UNDERINV_{1,2}$ meaning value-related increases in capital investment in under-investment entities, all were significantly positive (0.698, t = 2.55**/ 0.820, t = 3.42***)

In other words, unlike overinvestment firm, the increase in investment by under-investment was shown to contribute more to the appreciation of the firm's value. These results translate into positive value-related gains for under-investment entities in the stock market, which are recognized as an increase in the management's investment in order to achieve an appropriate level of the firm's investment. This analysis shows that high earn levels in the stock market place a high valuation on capital investments in these groups because of the high probability of growth of the firm and the low risk of deterioration in the financial structure caused by investment failures. However, in these groups,

if management's unreasonable overinvestment was made, the value of firms decreased due to the capital investment.

5. Conclusions

Recently, the Korean government has introduced the reflux tax system, pointing out that the domestic economy is stagnant because managers are not actively investing. The government sought to boost corporate investments with the introduction of the reflux tax system. However, contrary to the government's intentions, leading companies are more cautious about aggressive investment activities as the global economy has recently become unstable and uncertainty about investment success has increased. This is because excessive investment in this uncertain economic situation can lead to a loss of corporate financial structure and even bankruptcy. Seeing as managerial investment decisions have a significant impact on the company's growth and survival, managers' investment propensity for investors can serve as essential information for evaluating the value of a company. If managers make the appropriate investments for their given business environment, these investments will increase their value. On the contrary, however, if managers generate investments beyond the appropriate level, the company's value is expected to fall because it causes excessive cash outflow. In order to verify this, this study attempts to analyze the value relevance of overinvestment firms' capital investment.

The analysis results are as follows. First, as regards the value relevance of firms' capital investment, the value relevance of overinvestment firms' capital investment is low. Second, as a result of analyzing the value relevance of the capital investment according to the continuity of manager investment propensity, the value relevance of the capital investment of the companies that have continuously performed overinvestment show a significantly negative value, and the stock market recognizes that continuous overinvestment is a low-efficiency and irrational investment. However, the value relevance of the capital investment of firms whose investment propensity has changed from overinvestment to underinvestment is all positive. In the stock market, it is found that the overinvestment of these firms is regarded as the strategic investment of the manager to maintain the appropriate level of investment for the firms that change their investment from underinvestment to overinvestment.

Third, as a result of analyzing the value relevance of the increase in investment according to the investment propensity, the value relevance of the increase in investment of overinvestment firms is extremely negative while the value relevance of the increase in investment of underinvestment firms is highly positive. Through this, it is verified that the value relevance of the increase in investment is contradicted by the investment propensity.

The implication of this study is to analyze the value relevance of capital investment in the stock market of overinvestment firms. The findings also contribute to verify that stock market stakeholders perceive investment efficiency differently and reflect it appropriately in corporate value according to the firm's overinvestment propensity and continuity or investment propensity change.

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