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Article

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Income Smoothing and Overvaluation

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ABSTRACT

Purpose: This research evaluates two views of the effect of income smoothing on stock overvaluation. There is a view that income smoothing impairs the usefulness of profit information by distorting the economic substance of a company. While another view is income smoothing can serve as a means of conveying classified information within a company. With the two views, it is unclear to predict income smoothing's relevance to overvaluation of stocks. Therefore, this paper aims to analyze the relationship between income smoothing and stock overvaluation in the capital market.

Design/methodology/approach: The study conducted on the KOSPI and KOSDAQ markets from 2011 to 2020, and measured income smoothing using the methods suggested by Leuz et al. (2003), Park et al. (2011), and Tucker and Zarowin (2006). For stock overvaluation, the method of Rhodes-Kropf et al. (2005) used.

Findings: This study provided empirical evidence that there is a negative relation of income smoothing with stock overvaluation, which may be interpret that income smoothing may lower stock overvaluation. In other words, privileged information delivered by the manager through income smoothing may alleviate the overvaluation of stocks caused by excessive stock price relative to its intrinsic value. This result was more observable as the greater majority shareholder ownership interest, the greater the foreign investors share, and for companies listed on the KOSDAQ.

Research limitations/implications: This study makes contribution to the literature by supplying other evidence on the effect of income smoothing on capital market and supplies meaningful guidance to capital market stakeholders.

Originality/value: This study is valuable not only because it expands earlier research on income smoothing and stock overvaluation, but also because it empirically confirms the usefulness of income smoothing in the capital market.

Keywords: Income smoothing, Overvaluation, Firm specific errors

I. Introduction

In capital markets, valuation errors occur as the difference between market value and intrinsic value, caused by firm characteristics, industry factors, and growth opportunities (Rhodes-Kropf et al., 2005).

In other words, valuation errors occur when the market value does not accurately reflect a firm's intrinsic value. Valuation errors take place in the form of either overvaluation or undervaluation. Jensen (2005) study pointed out that agency costs may occur in companies where stocks are overvalued. The study found that managers may engage in a prominent level of financial reporting intervention to support overvaluation. Jensen (2005) argued that this was bound to be a phenomenon that negatively affects firm value in the end. The process by which managers of overvalued firms form

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stock overvaluation through earnings management, and earnings management to support overvaluation again creates a vicious cycle (Jensen, 2005). Stock overvaluation is known to have a negative effect on capital market investors because it creates a plunge in stock prices or an opaque information environment in the future (Kothari et al., 2006; Chi and Gupta, 2009; Badertscher, 2011; Chiou and Shu, 2017; Momeni et al., 2020). This study aims to examine whether income smoothing plays a factor that intensifies or alleviates stock valuation errors. Accounting standards give managers discretion in reporting economic substance, which is known to smooth earnings (Gordon, 1964; Ahn, 1990). There are two main conflicting hypotheses about whether this act of income smoothing is beneficial to investors in the capital market. One is the garbling hypothesis, and the other is the efficient communication of privileged information. The information distortion hypothesis (called garbling hypothesis) does not supply concrete information about future cash flows or earnings because reported earnings have already distorted by managers (Tucker and Zarowin, 2006). The efficient conversation hypothesis is when the volatility of earnings decreases the reliability; income smoothing can reduce this problem. These two hypotheses on income smoothing may have opposite relationships with overvaluation. If income smoothing is confirmed by the information distortion hypothesis, it will show a positive relationship with overvaluation. In other words, errors in valuation can occur as the smoothed earnings in accounting information may distort the economic substance of a company since it is inaccurate information. On the other side, the efficient conversation hypothesis confirmed when income smoothing can act as a factor to alleviate overvaluation. Therefore, this study aims to empirically confirm which of the two hypotheses is related to firm valuation. To confirm this, we analyze KOSPI and KOSDAQ firms from 2011 to 2020. Income smoothing using the method put forth by Leuz et al. (2003) and Park et al. (2011), which presented a measurement using net income and cash flow. We also use a discretionary income smoothing method using discretionary accruals suggested

in Tucker and Zarowin (2006). Our overvaluation measure follows Rhodes-Kropf et al. (2005). This study differs from earlier studies in that it will expand research on the relationship of income smoothing and overvaluation. We examine two conflicting hypotheses on income smoothing from the perspective of capital market investors by focusing on which hypothesis supplies greater support. The composition of this study is as follows. Chapter 2 describes earlier studies and empirical questions. Chapter 3 presents a research method to verify the hypothesis. The definition of variables and the empirical model presented, and the sample selection process discussed. Chapter 4 presents the analysis results. Univariate analysis and multiple regression analysis presented. For regression analysis, robustness analysis and other analysis conducted to support the research results. Finally, Chapter 5 presents conclusions.

II. Prior Studies and Hypothesis

A. Income Smoothing

The study of Yang (2008) and Chen (2013) verified the relationship between income smoothing and information asymmetry. Yang (2008) confirmed and showed there are the two conflicting hypothesis (i.e., efficient conversation hypothesis and information distortion hypothesis) on income smoothing which affect the capital market.

Yang (2008) reported that income smoothing lowered information asymmetry. It means that through income smoothing, managers supply classified information on future earnings and cash flows to alleviate information asymmetry. It is called an efficient conversation hypothesis. It shows that income smoothing can play a role in increasing the usefulness of accounting information for investors. In this hypothesis, income smoothing can be as a variable that has a positive effect on investors. As showed by this, the higher the level of income smoothing, the greater the comparability of financial

statements (Kim and Park, 2018), or the lower the capital cost (Yang, 2008; Park et al., 2011; Park et al., 2012; Li and Richie, 2016). Choi and Song (2021) suggest that the greater the income smoothing, the more managers perform capital raising through private debt. Considering the results of Park et al. (2011), which previously dealt with the negative relationship between income smoothing and debt financing costs, income smoothing is highly related to various strategic decisions of managers. Baik et al. (2020, 2022) reported that the better the manager's ability to produce high quality of information on earning by using income smoothing, the better the information usefulness of earnings to investors. Chang et al. (2021) reported that income smoothing, and audit fee showed a negative relationship, arguing that income smoothing lowers the risk perceived by auditors.

However, there is a group of research to prove that income smoothing harms information usefulness for investors. It is called information distortion hypothesis. In this hypothesis, earnings quality deteriorated through income smoothing when managers intervene in financial reporting. A study by Lee and Park (2016) and Shin and Kang (2020) suggested that income smoothing, and stock price crash showed a positive relationship. Stock price crash is a phenomenon that occurs when managers hide bad information and pour out at once later. Income smoothing can be used as a means of hiding negative news from other stakeholders including investors (Zhong et al., 2021).

B. Overvaluation

The stock price reflects not only news related to the company but also the influence of macroeconomic variables. In inefficient capital markets, there is likely to be a difference between the firm's stock price and its true value, leading to stock overvaluation. Several studies have verified Jensen's (2005) theoretical research on the managerial decision-making of overvalued firms. For instance, the study by Badertscher

(2011) examined how earnings are managed in overvalued firms. Badertscher (2011) found that earnings management through accruals manipulation occurred initially, followed by real earnings management. Additionally, managers of overvalued stocks differed in the extent and way they utilized earnings management techniques over that period. However, a study by Park (2020) focusing on the Korean local stock market reported contrasting results to Badertscher (2011), suggesting that overvalued firms exhibited decreased levels of earnings management.

Various factors contribute to overvaluation, including high growth potential, diversification of businesses such as mergers and acquisitions, and large variance in stock analysts' earnings predictions. Previous research on valuation errors has aimed to identify variables that intensify valuation errors. Studies on the Korean market suggest that leading management strategies, higher levels of tax avoidance (Cha et al., 2019; 2021), conservatism (Cha et al., 2020), lower comparability (Kim and Lee, 2020), and competition (Cha and Park, 2020) are associated with greater stock overvaluation. These empirical findings indicate that an opaque information environment may hinder proper valuation using accounting information. Several earlier studies have reported that deeper managerial intervention in financial reporting is associated with greater stock overvaluation.

However, further research is needed to deepen our understanding of this topic, as recent studies have reached conflicting conclusions. In particular, the relationship between income smoothing and stock overvaluation, which is the focus of this study, has not been extensively explored.

C. Hypothesis

The main empirical question in this study is to determine which of the two conflicting hypotheses of income smoothing is further confirmed and related to stock overvaluation. As discussed earlier, income smoothing is likely to distort the economic substance by intentionally intervening in financial reporting,

potentially hindering investors' ability to properly evaluate the company. For instance, if income smoothing is used as a form of earnings management to conceal adverse news, negative factors may accumulate within the company, leading to a significant decline in stock prices. In this scenario, a positive relationship between income smoothing and overvaluation would be expected, as prior literature suggests that income smoothing may hide negative factors within a company, ultimately leading to stock overvaluation and a subsequent sharp decline in stock prices.

On the contrary, if income smoothing is used to convey classified information, it may mitigate information asymmetry among stakeholders outside the company and promote proper valuation. Thus, if income smoothing facilitates the delivery of classified information, it could lead to a decrease in stock overvaluation. Moreover, it may be anticipated that investors in the capital market possess the ability to discern the extent of income smoothing beyond mere reliance on accounting information, thereby influencing stock valuation. Prior literature has empirically confirmed the role of income smoothing in delivering classified information. For example, studies by Park et al. (2011) and Park et al. (2012) suggest that higher levels of income smoothing are associated with higher corporate credit ratings, reduced information asymmetry, and more efficient investment.

As discussed above, income smoothing does not exhibit a clear and consistent direction in the capital market and may vary depending on each study. The relationship between income smoothing and stock valuation can be either positive or negative from the perspective of equity investors. Therefore, considering the possibility of both directions, the hypothesis in this study is formulated as a null hypothesis:

H. Income smoothing has no relationship with stock overvaluation.

III. Methodology

A. Research Model

To confirm the hypothesis of this study, a research model was established by referring to earlier studies. The dependent variable, FSE (firm stock overvaluation), and the variable of interest, IS (income smoothing), were identified, with specific measurement methods described below.

$$\begin{aligned} FSE_{i,t} = & \beta_0 + \beta_1 IS_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 ROA_{i,t} \\ & + \beta_5 GRW_{i,t} + \beta_6 BIG_{i,t} + \beta_7 FOR_{i,t} \\ & + \beta_8 LARGE_{i,t} + \beta_9 BETA_{i,t} + \beta_{10} VOL_{i,t} \\ & + \beta_{11} KOSPI_{i,t} + \Sigma YEAR + \Sigma KSIC + \varepsilon \end{aligned}$$

FSE: Overvaluation by Rhodes-Kropf et al. (2005)

IS: Income Smoothing Measure

IS^{Leuz}: Income Smoothing by Leuz et al. (2003)

IS^{PARK}: Income Smoothing by Park et al. (2011)

IS^{TK}: Income Smoothing by Tucker and Zarowin (2006)

SIZE: Firm Size

LEV: Leverage

ROA: Profitability

GRW: Growth

BIG: Auditor Size

FOR: Foreign Investor Ownerships

LARGE: Large Investor Ownerships

BETA: Systemic Risk

VOL: Volatility

KOSPI: Type of Listed Market

YEAR: Year Dummy

KSIC: Industry Dummy

If a significantly positive value of β_1 appears, it can be interpreted that the higher the level of income smoothing, the greater the stock overvaluation. Conversely, if a negative value appears, it can be considered that the higher the level of income smoothing, the lower the stock overvaluation. The statistical significance and direction of β_1 are the core of this study.

Stock overvaluation, the dependent variable, is measured by Rhodes-Kropf et al. (2005). They

measured the intrinsic value and the market value, which are two variables for determining stock overvaluation. To this end, the model of Ohlson (1995) was based on the same method used in Rhodes-Kropf et al. (2005). In his study, book value, net income, leverage, and loss are found to be the best variables for explaining stock prices among accounting variables, and later studies also used this method of measuring stock overvaluation in the following model.

$$\text{Market}_{i,t} = \beta_0 + \beta_1 \text{Book}_{i,t} + \beta_2 \text{NI}_{i,t} + \beta_3 \text{LEV}_{i,t} + \beta_4 \text{LOSS}_{i,t} + \varepsilon$$

Market: Market Value of Equity

Book: Book Value of Equity

NI: Net Income

LEV: Leverage

LOSS: Loss Dummy

The error term estimated in the equation above on an industry-year basis represents the portion where accounting information of individual companies fails to explain market value, except for sector and time series characteristics. If the error term has a positive value (negative value), the stock is considered overvalued (undervalued). In this study, the estimated error is defined as FSE.

Income smoothing, the variable of interest, is intended to be measured in two commonly used ways in related studies. The first method is taken from the study of Leuz et al. (2003), which measures changes in net income (NI) over the past four years, including the current period, divided by changes in cash flows from operating activities (CFO). The larger this value, the smaller the degree of income smoothing. It was multiplied by -1 for intuitive interpretation and convenience, and it was named IS^{Leuz} . The formula is as follows:

$$IS^{\text{Leuz}} = (-1) \times \{ \sigma(\text{NI}_t, \text{NI}_{t-1}, \text{NI}_{t-2}, \text{NI}_{t-3}) / \sigma(\text{CFO}_t, \text{CFO}_{t-1}, \text{CFO}_{t-2}, \text{CFO}_{t-3}) \}$$

NI: Net Income

CFO: Cash Flow from Operating Activities

The second method is measured based on Leuz et al. (2003) as the difference between net income and cash flow over the last four years used in Park et al. (2011). This value (IS^{PARK}) also shows that the greater the value means the greater the earnings volatility, so income smoothing was measured by multiplying by -1.

The third method is the method proposed in the study of Tucker and Zarowin (2006) and is measured using discretionary accruals. In this study, the level of income smoothing is measured based on the correlation between the change in discretionary accruals (ΔDACC) and the change in non-discretionary earnings determined by excluding discretionary accruals (DACC) from net income (NI). The higher the correlation, the lower the level of income smoothing. To interpretation, it is multiplied by -1 like the variables measured previously and named IS^{TZ} . The formula for calculation is as follows.

$$IS^{\text{TZ}} = (-1) \times \{ \text{Corr} (\Delta \text{DACC} / \Delta (\text{NI} - \text{DACC})) \}$$

DACC: Discretionary Accruals by Dechow et al. (1995)

NI: Net Income

In the above IS^{TZ} , the discretionary accruals are error terms estimated by regression of the following model by industry-year. However, if the sample size by industry-year is less than 20, we exclude it from the samples.

$$\begin{aligned} \text{TACC}_{i,t} / \text{ASSET}_{i,t-1} = & \beta_0 + \beta_1 (1 / \text{ASSET}_{i,t-1}) \\ & + \beta_2 ((\Delta \text{SALES}_{i,t} - \Delta \text{AR}_{i,t}) / \text{ASSET}_{i,t-1}) \\ & + \beta_3 (\text{PPE}_{i,t} / \text{ASSET}_{i,t-1}) + \varepsilon \end{aligned}$$

TACC: Total Accruals

ASSET: Total Asset

ΔSALES : Change in sales

ΔAR : Change in accounts receivable

PPE: Tangible Asset

The control variables of this study are as follows. SIZE was calculated by taking a natural logarithm of the firm's total assets. Since SIZE holds various

information on the firm's characteristics, it is also possible to play a role in controlling the firm characteristics omitted in this study (Becker et al., 1998). LEV was included for the purpose of controlling the financial stability of the company. ROA measures profitability by dividing net income by total assets. GRW was measured by dividing increase in the firm's sales during the current period by the earlier sales. BETA and VOL were selected for the purpose of controlling market risk. BETA measured systematic risk and VOL measured the volatility of returns. To consider the ownership and governance structure, the ownership interests of major shareholders (LARGE) and foreign shareholders (FOR) were included. BIG is a dummy variable showing whether the auditor is Big 4 or not. If the auditor is PwC, KPMG, EY, or Deloitte, the dummy variable is 1 or 0 otherwise. The KOSPI was included for the purpose of controlling the size of stock exchange where a share of a firm is traded. Dummy variables by year (Σ YEAR) and industry (Σ KSIC) were included for the purpose of controlling the fixed effects of year and industry.

B. Samples Selection

This study evaluated a sample using a period of 10 years from 2011 to 2021 to verify the hypothesis. Kim and Lee (2019) documented that Korean listed companies report a greater tendency to use income smoothing after the adoption of Korean International Financial Reporting Standard(K-IFRS). Therefore, this study excluded the period before the adoption of K-IFRS. For the variable of income smoothing, data in the period from 2008 to 2021 was collected because earnings information for the prior four years was needed to figure out income smoothing. Data from the period of 2008 to 2010 was also used to prevent a decrease in test period and sample size even though financial data during that period is not following the K-IFRS.

For financial data, KISVALUE, a database from NICE Evaluation Information Co., Ltd., was used and the following excluded from the test sample.

- (1) Firms listed by the KSIC as part of the financial industry;
- (2) Firms whose accounting period ends other than December;
- (3) Firms whose shares are issues for administration;
- (4) Firms with capital impairment;
- (5) Excluded from the measuring process for each variable.

In the case of the last (5) above, among the variables, the income smoothing was the accounting information for the last four years, and in the case of discretionary accruals, the sample size by industry-year was more than 20, so the sample decreased because it had to meet the operational definition of our variables. The final sample size used for the analysis was 10,718 firm-year observations and the sample distribution by year and industry is shown in <Table 1> and <Table 2>. With respect to the distribution of samples by year, we see no significant concentration of samples in any specific year. The samples were evenly distributed over the test period. The sample size was slightly larger in KOSDAQ than in KOSPI. The manufacturing industry accounted for the largest part of the sample (66.16%) about the sample distribution by industry. Next was information and communication (10.80%), wholesale and retail trade (7.38%), professional, scientific, and technical activities (7.26%), and construction (3.18%), while

Table 1. Sample distribution by year

Year	KOSPI	KOSDAQ	Total
2011	432	482	914
2012	431	501	932
2013	421	512	933
2014	443	553	996
2015	475	605	1,080
2016	516	629	1,145
2017	515	629	1,144
2018	488	679	1,167
2019	470	728	1,198
2020	478	731	1,209
Total	4,669	6,049	10,718

other industries accounted for around 1%. We cannot say the samples in <Table 1> and <Table 2> in this study were affected by a specific year or a specific industry.

IV. Result

A. Descriptive Statistics

Descriptive statistics of the variables used in this study are presented in <Table 3>. First, the mean of *FSE* was 0.006, but the standard deviation was

Table 2. Distribution by industry

Industry	Freq.	Percent
Agriculture, forestry, and fishing	34	0.32
Manufacturing	7,091	66.16
Electricity, gas, steam, and air conditioning supply	82	0.77
Water supply; sewage, waste management, materials recovery	33	0.31
Construction	341	3.18
Wholesale and retail trade	791	7.38
Transportation and storage	172	1.60
Accommodation and food service activities	10	0.09
Information and communication	1,158	10.80
Real estate activities	22	0.21
Professional, scientific, and technical activities	778	7.26
Business facilities management and business support services	110	1.03
Education	58	0.54
Arts, sports, and recreation related services	38	0.35
Total	10,718	100

Table 3. Descriptive statistics (n=10,718)

Variable	Mean	S.D.	.25	Mdn	.75
<i>FSE</i>	0.006	0.529	-0.348	-0.015	0.321
<i>IS_{LEUZ}</i>	0.500	0.289	0.250	0.500	0.750
<i>IS_{PARK}</i>	0.500	0.289	0.250	0.500	0.750
<i>IS_{TZ}</i>	0.500	0.289	0.250	0.500	0.750
<i>SIZE</i>	26.161	1.363	25.224	25.910	26.780
<i>LEV</i>	0.343	0.185	0.189	0.333	0.484
<i>ROA</i>	0.054	0.047	0.020	0.041	0.074
<i>GRW</i>	0.061	0.230	-0.024	0.011	0.120
<i>BETA</i>	0.846	0.390	0.560	0.836	1.114
<i>VOL</i>	0.484	0.238	0.335	0.438	0.581
<i>FOR</i>	0.081	0.112	0.011	0.032	0.105
<i>LAR</i>	0.429	0.157	0.311	0.426	0.537
<i>BIG</i>	0.522	0.500	0.000	1.000	1.000
<i>KOSPI</i>	0.436	0.496	0.000	0.000	1.000

0.529, showing that the distribution span within *FSE* was large. However, that distribution was like that of prior studies on the Korean capital market (Ji, 2017, Hwang et al., 2017, Kim, 2023). The averages of variables indicating income smoothing are almost same as these income smoothing variables (*IS^{LEUZ}*, *IS^{PARK}*, and *IS^{TZ}*) were all measured with fractional rank.

With respect to the control variables, *SIZE* had an average of 26.161, and the debt-to-equity ratio which shows firm's financial stability had an average of 34.3%. *ROA* which shows a firm's profitability had an average of 5.4%, and growth (*GRW*) had 6.1% on average (Ji, 2017). The systematic risk (*BET*), which is a market risk, was found to have an average of less than 1, and the mean of volatility of the stock yield (*VOL*) was seen at around 48.4%. Foreign ownership (*FOR*) was 8.1% on average and major shareholder ownership (*LAR*) was 42.9%. Big firm auditors (*BIG*) accounted for about 52.2% of the sample, and firms in *KOSPI* market accounted for 43.6%.

B. Correlation

In this section, an analysis was performed for the purpose of checking the correlation of variables. <Table 4> presents the Spearman correlation analysis

above the diagonal line, and the Pearson correlation analysis results below the diagonal line.

First, significant negative correlation coefficients were seen for the two variables *FSE* and income smoothing (*IS^{LEUZ}* *IS^{PARK}*). It means that income smoothing, and corporate valuation errors have a negative relationship. No significance coefficient was seen between discretionary income smoothing (*IS^{TZ}*) and *FSE*. However, these results were obtained with no control variables, we will add them to the analysis and examine the test results further later.

With respect to relationship between *FSE* and control variables, *ROA*, *GRW*, *BET*, *VOL*, *FOR*, and *BIG* showed a significant positive correlation with *FSE*. While *SIZE*, *LAR*, and *KOSPI* showed a significant negative correlation with *FSE*. This shows that profitability, growth, high market risk, high foreign ownership, and large external auditor increases the valuation error. However, the larger the company size and the higher the major shareholder's stake may lead to less valuation error.

To examine the problem of multicollinearity that may occur due to the high correlation between independent variables in the model, we reviewed the *VIF* in the regression. But it was considered that there was no concern about the problem because more than three appeared.

Table 4. Correlation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) <i>FSE</i>	1	-0.072***	-0.023**	0.001	-0.068***	0.014	0.056***	0.102***	0.196***	0.242***	0.059***	-0.088***	0.036***	-0.080***
(2) <i>IS^{LEUZ}</i>	-0.069***	1	0.899***	0.368***	0.032***	0.163***	-0.066***	0.023**	-0.031***	-0.049***	-0.032***	0.041***	-0.009	-0.011
(3) <i>IS^{PARK}</i>	-0.023**	0.899***	1	0.367***	-0.024**	0.134***	0.008	0.029***	0.012	-0.003	-0.043***	0.008	-0.025***	-0.084***
(4) <i>IS^{TZ}</i>	0.005	0.368***	0.367***	1	-0.752***	-0.101***	0.015	0.016*	0.053***	0.250***	-0.465***	-0.079***	-0.324***	-0.484***
(5) <i>SIZE</i>	-0.020**	0.006	-0.049***	-0.737***	1	0.238***	-0.113***	0.006	-0.080***	-0.343***	0.537***	0.136***	0.387***	0.596***
(6) <i>LEV</i>	0.013	0.158***	0.131***	-0.109***	0.226***	1	-0.287***	0.071***	0.079***	0.098***	-0.104***	-0.088***	0.061***	0.124***
(7) <i>ROA</i>	0.076***	-0.124***	-0.048***	-0.034***	-0.092***	-0.268***	1	0.223***	0.010	0.009	0.145***	-0.024**	-0.001	-0.150***
(8) <i>GRW</i>	0.080***	-0.006	0.021**	0.002	-0.008	0.040***	0.221***	1	0.041***	0.058***	0.032***	-0.044***	0.004	-0.048***
(9) <i>BETA</i>	0.192***	-0.029***	0.013	0.052***	-0.025***	0.075***	0.018*	0.051***	1	0.545***	-0.016*	-0.237***	-0.060***	-0.173***
(10) <i>VOL</i>	0.227***	-0.035***	0.005	0.226***	-0.280***	0.055***	0.069***	0.033***	0.424***	1	-0.250***	-0.172***	-0.195***	-0.287***
(11) <i>FOR</i>	0.100***	-0.028***	-0.038***	-0.381***	0.492***	-0.083***	0.159***	0.021**	-0.058***	-0.203***	1	-0.123***	0.254***	0.291***
(12) <i>LAR</i>	-0.084***	0.038***	0.006	-0.080***	0.079***	-0.079***	-0.043***	-0.038***	-0.230***	-0.101***	-0.100***	1	0.125***	0.179***
(13) <i>BIG</i>	0.029***	-0.009	-0.025***	-0.324***	0.395***	0.058***	-0.011	-0.016*	-0.055***	-0.135***	0.260***	0.128***	1	0.296***
(14) <i>KOSPI</i>	-0.076***	-0.011	-0.084***	-0.484***	0.569***	0.127***	-0.142***	-0.054***	-0.165***	-0.232***	0.245***	0.178***	0.296***	1

1) The operational definition of the variable described at the bottom of Table 2

2) *, **, *** is significant level of 10%, 5%, 1%, respectively

C. Regression Result

The results of assessing the hypothesis of this study are presented in <Table 5>. The first three columns presented the test results in models (1)-(3) by using income smoothing in the form of continuous variables, and the next three columns showed the test results by

using fractional rank variables of income smoothing. Overall, the F-value, showing the model fitness, was significant as presented in <Table 5>, and adj. R^2 , showing the model's explanatory power has 10.5% or 10.8% depending on the variable of income smoothing. This shows that the model of this study was suitable for assessing the hypothesis. These test

Table 5. Regression result

	Continuous Variable			Fraction rank Variables		
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: FSE						
Contant	0.409** (2.46)	0.371** (2.23)	0.594*** (3.00)	0.418** (2.51)	0.374** (2.25)	0.563*** (2.85)
IS^{LEUZ}	-0.112*** (-6.38)			-0.115*** (-6.53)		
IS^{PARK}		-0.051*** (-2.94)			-0.053*** (-3.00)	
IS^{TZ}			-0.064** (-2.41)			-0.057** (-2.16)
SIZE	-0.023*** (-4.15)	-0.023*** (-4.15)	-0.032*** (-4.74)	-0.023*** (-4.16)	-0.023*** (-4.15)	-0.031*** (-4.60)
LEV	0.038 (1.22)	0.029 (0.92)	0.021 (0.67)	0.038 (1.23)	0.029 (0.93)	0.021 (0.67)
ROA	0.259** (2.25)	0.313*** (2.73)	0.279** (2.40)	0.260** (2.26)	0.314*** (2.73)	0.286** (2.46)
GRW	0.141*** (6.47)	0.141*** (6.43)	0.141*** (6.42)	0.141*** (6.46)	0.141*** (6.44)	0.140*** (6.41)
BETA	0.179*** (12.08)	0.181*** (12.14)	0.181*** (12.16)	0.179*** (12.07)	0.180*** (12.14)	0.181*** (12.15)
VOL	0.005*** (19.27)	0.005*** (19.42)	0.005*** (19.52)	0.005*** (19.27)	0.005*** (19.42)	0.005*** (19.52)
FOR	0.831*** (15.04)	0.828*** (14.97)	0.825*** (14.92)	0.831*** (15.04)	0.828*** (14.97)	0.825*** (14.91)
LAR	-0.139*** (-4.03)	-0.143*** (-4.14)	-0.146*** (-4.23)	-0.139*** (-4.02)	-0.143*** (-4.14)	-0.147*** (-4.24)
BIG	0.057*** (5.09)	0.057*** (5.13)	0.056*** (5.01)	0.057*** (5.08)	0.057*** (5.13)	0.056*** (5.02)
KOSPI	-0.071*** (-5.42)	-0.070*** (-5.36)	-0.072*** (-5.44)	-0.071*** (-5.42)	-0.071*** (-5.36)	-0.072*** (-5.41)
ΣYEAR	included	included	included	included	included	included
ΣKSIC	included	included	included	included	included	included
F-value	19.028***	18.528***	18.484***	19.058***	18.534***	18.466***
Adj. R^2	0.108	0.105	0.105	0.108	0.105	0.105
N	10,708	10,708	10,708	10,708	10,708	10,708

1) The operational definition of the variable described at the bottom of Table 2

2) *, **, *** is significant level of 10%, 5%, 1%, respectively

results are after controlling the fixed effects by industry and year.

IS (IS^{LEUZ} , IS^{PARK} , IS^{TZ}) had negative coefficients at the 1% significant level in Model (1) and Model (2), and a negative coefficient at the 5% significant level in Model (3). This shows that the null hypothesis of this study was rejected. These results imply that there is a negative relationship between income smoothing and overvaluation, which is interpreted that income smoothing may lower overvaluation. The results supply empirical evidence to support efficient conversation hypothesis which argues that income smoothing lowers information asymmetry by supplying classified information on future earnings and cash flows. However, it is far from the information distortion hypothesis which argues that income smoothing may hurt information usefulness for investors. The potential positive effect of income smoothing including production of high-quality accounting information was confirmed in this test, given that stock overvaluation arises when proper and prompt information on the stock is lacking. This means that managers may supply information on future cash flows that cannot be included in current financial statements to the market through income smoothing.

In the model (4)-(6) using fractional rank variables to prevent potential distortion of test results due to the outliers, we also observed a significantly negative coefficients on IS (IS^{LEUZ} , IS^{PARK} , IS^{TZ}). These results also shows that income smoothing has a negative association with overvaluation which supports the efficient conversation hypothesis.

On the other hand, the significance and the direction of the control variables are consistent across the models used. ROA, BETA, VOL, FOR, and BIG had significantly positive coefficients and SIZE, LARGE, and KOSPI had significantly negative coefficients in all the models. These results show that higher profitability, greater market risk, the larger foreign shareholder ownership, the external auditor's size are positive associated with the overvaluation. However, firms with larger size, higher major shareholder's ownership interest, and shares listed in KOSDAQ have negative correlations with stock

overvaluation.

D. Robustness Check

Leone et al. (2019) pointed out that the problem of OLS regression analysis may appear in accounting studies. Leone et al. (2019) suggested the robust regression method using Cook's D to mitigate the potential problems arising in OLS regression.

To verification of main test results presented previously, our study performed robustness analysis using Cook's D. The first three columns in <Table 6> showed the test results under the method suggested by Leone et al. (2019). As <Table 6> presented, the test results obtained through Cook's D are like the main test results. Significant negative coefficients on IS were seen even after inclusion of the control variables, which rejects the null hypothesis in this study. These results show that income smoothing is negatively related to corporate valuation errors and income smoothing and stock overvaluation have a negative relationship. The results supply an implication that income smoothing may prevent stock overvaluation by lowering information asymmetry.

In addition, we performed the Newey-West test, the results of which were presented in <Table 6>. The Newey-West test is an analysis considering the econometric problems of time series dependency and heteroscedasticity. <Table 6> shows the Newey-West test results in the last three columns and the F-value was even larger in the test. We also see significant negative coefficients on IS with FSE which is like the test results obtained previously. These results prove that the main results of this study are still valid even after considering the econometric problems.

E. Additional Test

In this section, more analysis was conducted to verify whether the results of this study differ according to ownership interests. The ownership interests analyzed are major shareholder ownership (*LAR*) in <Table 7>

Table 6. Robustness test

	Robust Regression			Newey-West Test (1987)		
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: FSE						
Contant	0.298* (1.78)	0.261 (1.56)	0.491** (2.46)	0.049 (0.37)	0.019 (0.14)	0.244 (1.43)
IS^{LEUZ}	-0.128*** (-7.25)			-0.104*** (-5.87)		
IS^{PARK}		-0.062*** (-3.55)			-0.049*** (-2.74)	
IS^{TZ}			-0.067** (-2.51)			-0.060** (-2.48)
Control Variables	included	included	included	included	included	included
ΣYEAR	included	included	included	included	included	included
ΣKSIC	included	included	included	included	included	included
F-value	19.831***	19.177***	19.057***	95.649***	93.143***	93.072***
Adj. R²	0.112	0.109	0.108	0.112	0.109	0.108
N	10,708	10,708	10,708	10,708	10,708	10,708

1) The operational definition of the variable described at the bottom of Table 2

2) *, **, *** is significant level of 10%, 5%, 1%, respectively

Table 7. Additional test using major shareholder ownership.

	Model (1)	Model (2)	Model (3)
Dependent Variable: FSE			
Constant	0.284* (1.70)	0.248 (1.48)	0.401** (2.00)
HLAR	-0.091*** (-4.51)	-0.089*** (-4.39)	-0.019 (-0.90)
IS^{LEUZ}	0.067** (1.97)		
HLAR×IS^{LEUZ}	-0.163*** (-6.69)		
IS^{PARK}		0.062* (1.82)	
HLAR×IS^{PARK}		-0.094*** (-3.96)	
IS^{TZ}			-0.077** (-2.20)
HLAR×IS^{TZ}			-0.028* (-1.86)
Controls Variables	included	included	included
ΣYEAR	included	included	included
ΣKSIC	included	included	included
F-value	19.771***	19.109***	18.940***
Adj. R²	0.113	0.110	0.109
N	10,718	10,718	10,718

1) The operational definition of the variable described at the bottom of Table 2

2) *, **, *** is significant level of 10%, 5%, 1%, respectively

and foreign shareholder ownership (*FOR*) in <Table 8>.

<Table 6> presented the test results by interacting the income smoothing variable (IS^{LEUZ} , IS^{PARK} , IS^{TZ}) with bifurcated major shareholder ownership (*HLAR*). The bifurcated major shareholder ownership was measured as a dummy variable (*HLAR*) which equals one if the major shareholder ownership of a company was larger than the median of test sample by year or zero otherwise. If $HLAR \times IS$ has a significant positive coefficient, it can be interpreted that income smoothing makes the overvaluation larger where the major shareholder stake is high. On the other hand, if the interaction term has a significant negative coefficient, it can be interpreted that income smoothing further alleviates stock overvaluation where major shareholder stake is high.

As <Table 7> presented, all the coefficients on the interaction term of *HLAR* and *IS* ($HLAR \times IS$)

were significantly negative regardless of the IS proxies. This means that income smoothing further reduces overvaluation when the major shareholder ownership is high.

There are two hypotheses that divide the majority shareholder's stake. The first hypothesis is that interests are consistent with shareholders and the other is the hypothesis that interests conflict. Earlier studies suggest that the higher the major shareholder ownership interest, the more shareholders and managers try to align on their interests, which leads to a positive effect on firm value. Given the discussions of prior studies, our test results may imply that managers deliver classified information to investors more adequately through income smoothing when the shareholding held by major shareholders is higher.

Second, we conducted another test to examine whether ownership of foreign shareholders affect

Table 8. Additional test using foreign investors ownership

	Model (1)	Model (2)	Model (3)
<i>Dependent Variable: FSE</i>			
<i>Constant</i>	-0.292* (-1.80)	-0.331** (-2.03)	0.120 (0.61)
<i>HFOR</i>	0.077*** (3.67)	0.067*** (3.17)	0.222*** (8.95)
IS^{LEUZ}	-0.115*** (-4.71)		
$HFOR \times IS^{LEUZ}$	-0.030* (-1.88)		
IS^{PARK}		-0.059** (-2.43)	
$HFOR \times IS^{PARK}$		-0.013** (-2.38)	
IS^{TZ}			0.068** (2.16)
$HFOR \times IS^{TZ}$			-0.298*** (-7.50)
<i>Controls Variables</i>	included	included	included
$\sum YEAR$	included	included	included
$\sum KSIC$	included	included	included
<i>F-value</i>	17.342***	16.694***	17.314***
<i>Adj. R²</i>	0.100	0.097	0.100
<i>N</i>	10,708	10,708	10,708

1) The operational definition of the variable described at the bottom of Table 2

2) *, **, *** is significant level of 10%, 5%, 1%, respectively

stock overvaluation when income smoothing is involved. To take the test, we created a dummy variable which equals to 1 if the foreign ownership is larger than the median by year, 0 otherwise, and multiplied the dummy by income smoothing variables to create the interaction term (HFOR \times IS).

<Table 8> showed significant positive coefficients on HFOR which may imply that the higher the foreign shareholder stake, the greater the firm's market value. This may be attributed to the concentration of investors' attentions potentially derived from higher foreign ownership interest which may lead to stock overvaluation. However, the interaction term of HFOR \times IS is significantly negative. This result was more pronounced in the model (3) which uses a measure of discretionary income smoothing. This could be interpreted that the delivery of classified information to the stock market through income smoothing reduces stock overvaluation when the ownership interest held by foreign shareholders is higher.

The sample of our study is a mixture of KOSPI firms and KOSDAQ firms. According to earlier studies, the characteristics of companies, the extent

of information asymmetry and company's information environment differ depending on the stock exchange. (i.e., KOSPI or KOSDAQ) (Yoon, 2001; Park and Song, 2017; Choi, 2020; Cha and Park, 2021). In that sense, we conducted further analysis to examine whether there is a difference in stock overvaluation depending on the stock exchange involved. KOSPI firms may be expected to have lower stock overvaluation than KOSDAQ firms since KOSPI is a larger securities market and has stricter market regulations.

The results of this analysis presented in <Table 9>. Models (1)-(3) are the results of the KOSPI market, and models (4)-(6) are the results of the KOSDAQ market. According to the test results in Models (1)-(2) and (4)-(5), which uses current net income and cash flow, both KOSPI samples and KOSDAQ samples have statistically significant negative coefficients, but the KOSDAQ samples showed higher negative coefficients than KOSPI samples. Comparing the results of model (3) and model (6), no significant coefficient was found in the KOSPI samples, but statistically significant negative coefficient was found in the KOSDAQ samples. This means that income smoothing can be used as a means of

Table 9. Additional test by listed market

	<i>KOSPI listed</i>			<i>KOSDAQ listed</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Dependent Variable: FSE</i>						
<i>Contant</i>	-1.079*** (-4.95)	-1.146*** (-5.23)	-1.124*** (-4.19)	2.221*** (9.02)	2.217*** (8.99)	3.111*** (10.13)
<i>IS^{LEUZ}</i>	-0.097*** (-3.58)			-0.111*** (-4.85)		
<i>IS^{PARK}</i>		-0.034* (-1.73)			-0.051** (-2.40)	
<i>IS^{TZ}</i>			-0.016 (-0.38)			-0.165*** (-4.86)
<i>Controls Variables</i>	included	included	included	included	included	included
Σ YEAR	included	included	included	included	included	included
Σ KSIC	included	included	included	included	included	included
<i>F-value</i>	9.184***	8.987***	8.967***	16.060***	15.741***	16.061***
<i>Adj. R²</i>	0.104	0.102	0.101	0.139	0.137	0.139
<i>N</i>	4,663	4,663	4,663	6,045	6,045	6,045

1) The operational definition of the variable described at the bottom of Table 2

2) *, **, *** is significant level of 10%, 5%, 1%, respectively

delivering classified information to alleviate more valuation errors in the KOSDAQ market.

The three research results examined in the above other analysis can be summarized as follows. First, the classified information delivery function through income smoothing may be more pronounced and further alleviate stock overvaluation when the major shareholder ownership or the foreign shareholder stake is high. This may be considered as circumstances where information asymmetry is low, or manager's interest is consistent with shareholders' interest. In addition, the discretionary income smoothing in the KOSDAQ market considered to have higher information asymmetry reduces valuation errors more than the KOSPI market. Second, the results of this study are consistent, even if the interpretation of the case where the major shareholder's stake is high, and the value evaluation error is intensified due to the high major shareholder's stake. This is because the function of income smoothing is still positive even in the face of growing valuation errors.

V. Conclusion

This research evaluates two views (i.e., efficient conversation hypothesis and information distortion hypothesis) of the effect of income smoothing on stock overvaluation. There is a view (i.e., information distortion hypothesis) that income smoothing impairs the usefulness of profit information by distorting the economic substance of a company. While another view (i.e., Efficient conversation hypothesis) is income smoothing can serve as a means of conveying classified information within a company. With the two views, the prior research has not explored the issue of income smoothing's relevance to overvaluation of stocks. This paper aims to analyze the relationship between income smoothing and stock overvaluation in the Korean capital market.

This study supplies empirical evidence that income smoothing lowered stock overvaluation. By using

the multiple income smoothing variables of Leuz et al. (2003), Park et al. (2011), and Tucker and Zarowin (2006), and stock overvaluation variable of Rhodes-Kropf et al. (2005), we found that there is a statistically significant negative relation between income smoothing and stock overvaluation. This means that the income smoothing which may supply other information alleviates the overvaluation of stocks. Additionally, in this study, the results were divided into overvalued and undervalued samples <Table 10>, and the result was significant in the overestimated sample. We analyze the relevance of income smoothing to corporate value while other studies on the impact of income smoothing on the capital market were lacking. This study expands the

Table 10. Results of dividing over and undervalued

	(1)	(2)	(3)
	FSE>0		
IS^{LEUZ}	-0.051*** (-2.83)	-0.051*** (-2.83)	
IS^{PARK}		-0.040** (-2.37)	
IS^{TZ}			-0.084*** (-3.10)
Controls	includede	includede	includede
Year	includede	includede	includede
Industry	includede	includede	includede
F-value	10.553***	10.512***	10.580***
Adj. R ²	0.115	0.114	0.115
N		5,007	
	(4)	(5)	(6)
	FSE<0		
IS^{LEUZ}	-0.008 (-0.60)		
IS^{PARK}		0.021 (1.56)	
IS^{TZ}			0.013 (0.67)
Controls	includede	includede	includede
Year	includede	includede	includede
Industry	includede	includede	includede
F-value	11.384***	11.418***	11.385***
Adj. R ²	0.115	0.115	0.115
N		5,519	

accounting literature on the relationship of income smoothing and valuation errors that has not been previously explored. This study contributes to the literature by supplying other evidence of the effect of income smoothing on capital market and supplies meaningful results to capital market stakeholder.

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