

Detection of Earnings Management as a Measure of Income Smoothing on Fluctuations in Exchange Rates: Managerial Implications for Korean Exporters

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Abstract

Purpose – Foreign Exchange Rates (FER) have been one of the most significant factors for both Korean exporters and the economy of Korea. The purpose of this study is to evaluate whether exporters with a high level of Exchange Rate Elasticity of Sales (ERES) make the use of earnings management for Income Smoothing (IS).

Design/methodology – Income smoothing was obtained using the methodology suggested by Leuz, Nanda and Wysocki (2003). Accruals-based Earnings Management (AEM) was estimated using Discretionary Accruals (DA) calculated by the operant Jones Model developed by Dechow, Sloan and Sweeney (1995). Real Earnings Management (REM) was obtained using the methodologies suggested by Roychowdhury (2006) and Cohen and Zarowin (2010). Data were 2,402 firm years of public listed companies on the KRX, which were not in the financial industry and had a settlement of accounts in December for the period from 2013 to 2017.

Findings – Results of the evaluation are as follows. First, companies with higher levels of ERES have relatively lower levels of smoothing of reported income. This might be because a fluctuation in sales caused by an exchange rate fluctuation has a direct impact on the volatility of the reported income. Second, companies with high levels of both ERES and IS have a positive correlation with both AEM and REM. This might be because companies with high levels of IS engage in earnings management to smooth reported income. Specifically, it is possible to assume that for smoothing the reported income, not only AEM but also REM is practiced. Third, companies with high levels of ERES but low levels of IS have a negative correlation with both AEM and REM. This could be interpreted as companies exhibiting low levels of IS due to higher levels of ERES tend to control IS. In addition, such results were supported by firms relying highly on exporting, and are consequently sensitive to exchange rate fluctuation. Therefore, it may conclude that companies with high levels of ERES make the use of earnings management as a means of IS.

Originality/value – This study can find its significance from the fact that it is the first study, empirically verifying that companies of Korea, where exportation is a large part, use both AEM and REM as a means for smoothing reported income upon facing exchange rate fluctuations. In addition, it is highly expected that the results of this study could be useful for participants of financial markets when making IS-related decisions.

Keywords: Earnings Management, Exporters, Fluctuations in Exchange Rates, Income Smoothing

JEL Classifications: F31, M16, M41

1. Introduction

It would be no exaggeration to say that the main engine of the economy of Korea with constant growth since the 50s is exportation. Until now, the exportation-dependent growth strategy of Korea has been a major means for innovative growth, and it also has served as a

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breakwater to prevent economic recession in Korea. Therefore, Foreign Exchange Rates (FER) have been one of the most significant factors for both Korean exporters and the economy of Korea. Since the 1990s, when the financial market of Korea was fully opened upon joining the OECD, the influence of the international financial market over the economy of Korea has increased, in turn expanding the influence of FER on the economy and companies of Korea. Since the recent launch of the Trump Administration, the treasury department of the U.S. suspects that the foreign exchange authority of Korea has intervened in the market and manipulated FER, and has placed Korea on the 'monitoring list'. Therefore, there has been a great pressure for the local industries of Korea sensitive to FER.

Of course, besides FER, there are many other significant factors in exportation, such as quality competitiveness, technology competitiveness, and brand values. Still, this fact cannot allow the underestimating of the importance of price competitiveness in business. In addition, after the recent launch of the Trump Administration, due to a series of trends, including the spread of protectionism, the Korea-US FTA revision, and the US-China trade dispute, the importance of FER is further increased. Specifically, due to the instability of the global financial market, there have been significant changes in the global financial market, including soaring FER fluctuations and changes in global oil prices, and now is the critical point to prepare proper measures to cope with such changes not only by the government of Korea in protecting its economy but also individual the companies of Korea.

This study aims to examine FER, which is the most important factor for most companies in Korea. In a nation where exportation is an essential part of the economy, a company's sales is highly influenced by FER, so this study will address companies' measures to cope with FER fluctuations. In detail, this study is designed to address the association between exchange rate elasticity and income smoothing, and to evaluate the level of the income management of companies exhibiting high levels of income smoothing (IS), despite of having high levels of exchange rate elasticity of sales (ERES), from the perspective of accruals-based earnings management and of real earnings management. This will examine whether companies with high levels of exchange rate elasticity are likely to achieve IS through various forms of income management. In addition, it also aims to examine the level of income management in companies with low levels of IS despite high levels of ERES in order to evaluate how much IS is employed regarding IS.

The methodologies of this study are as follows. First, it evaluates the association between ERES and IS, and based on the result, evaluates the association between companies exhibiting high levels of ERES, high levels of IS, and IS from the perspective of accruals-based earnings management and of real earnings management. It is to reveal the use of earnings management activities as a means of IS to cope with FER fluctuations.

This study contributes to academia for the following differentiations from previous research. First, this study addresses an issue of reported income smoothing level based on exchange rate fluctuation. Second, this study examines earnings management as a means of income smoothing based on exchange rate fluctuation in the perspective of real earnings management in addition to accrual earnings management. Third, the research target of this study is significant not only because Korea is a representative of semi-developed countries but also because Korean enterprises are concerned considerably with exchange rate fluctuation.

This study is constructed as follows. Chapter 1 suggests the background and purpose of this study. Chapter 2 it reviews related literature and states hypotheses. Chapter 3 suggests the model and sample selection process. Chapter 4 describes the results of empirical analysis for the verification of the hypotheses. Chapter 5 summarizes this study and states the significance and limitations.

2. Literature Review and Hypothesis

2.1. Literature Review

2.1.1. Literature on Currency Fluctuations

Companies in Korea have experienced major fluctuations in earnings due to the extreme currency fluctuations led by the financial crisis in 1997, and began to acknowledge the importance of earnings management based on currency fluctuations. Also, as the market average currency exchange rate regime was changed to a floating currency exchange rate regime in December 1997, it initiated a huge academic interest in the business risks attributable to currency fluctuations. Also, there have been various academic attempts to address the association between currency fluctuations and business performance to reveal changes in earnings led by currency fluctuations as well as to examine the effects of currency fluctuations on pricing, the association between currency fluctuations and financial failures, and the effects of currency fluctuations on earnings management and the results (Lee Sung-Mi, 2018). Specifically, the following are studies on currency fluctuations and earnings management related to this study.

Cho Myung-Soo and Oh Tae-Hyung (2012) examined the influence of ERES on earnings management and found that the larger the ERES, the larger the discretionary accruals. Jung Yong-Woo (2010) evaluated the association between currency fluctuations and discretionary accruals, and reported that in export companies, the amount of discretionary accruals decreased during a currency rising period if all the other conditions remained the same. Lee Seung-Mi (2018) analyzed the types of earnings management in consideration of the direction of currency fluctuations, and reported that the level of earning management in exporting companies and non-exporting companies are different when they are subject to the same level of currency fluctuations, and with the direction of currency fluctuations, the type of earning management varies.

2.1.2. Literature on Income Smoothing

Accounting income is a representative measure of a company's business performance and is used as the most basic and important financial information by various stakeholders. Therefore, companies use every competence they have to generate more accounting income while trying to distribute them in a stable manner. This is because most stakeholders not only pursue large accounting income but also stable and constant accounting income for business management and investment safety. From this perspective, there are sufficient reasons for companies to smooth incomes using various measures, and in fact, it is well known that companies exercise the smoothing of reported incomes from various aspects.

Early studies on income smoothing were mostly designed as descriptive research due to a lack of diverse perspectives on earnings management acts of companies, and it was considered a negative act made to manipulate actual income (Beidleman, 1973; Gordon, 1964; Ronen and Sadan, 1981). However, accounting income reported using income smoothing (IS) could be useful to predict cash flows in the future, in turn reducing uncertainty (Suh Chung-Woo, Park Jong-Il and Shin Jae-Young, 2013). Recent studies on the reactions of capital markets to IS reveal that if a company reduces fluctuation in the time-series accounting income by executing IS, it can reduce information risks for estimating future cash flows, and consequently, raise its predictability for future income. From this aspect, IS can be used as a means to deliver a company's private information regarding the prediction of future accounting income, and in turn, it might become possible to raise the company's value (Li

and Richie, 2009; Sankar and Subramanyam, 2001; Suh Chung-Woo, Park Jong-Il and Shin Jae-Young, 2013; Tucker and Zarowin, 2006).

In the case of studies in foreign nations on IS, Beidleman (1973) reported that a decrease in income volatility due to a reason attributable to IS lowers a financial analyst's income prediction errors, in turn enhancing the accuracy of a company's income prediction. Li and Rich (2009) also reported that reducing the time-series fluctuation in accounting income through the use of IS can raise the strength of information on income in the future, and consequently, it can enhance a company's credit rating and lower its capital cost. Park Jong-Il, Nam Hye-Jeong and Choi Sung-Ho (2011) examined the association between IS and credit rating for corporate bonds, and reported that credit rating institutes have a favorable response to higher level of IS. Tucker and Zarowin (2006) reported that lower information risks attributable to a decrease in income volatility are perceived as a positive signal in financial markets, and consequently, companies exhibiting higher levels of IS have higher levels of stock return. In the case of studies in Korea on IS, Yang Dong-Hun, Park Yeon-Hee and Choi Sin-Jae (2007) evaluated the influence of IS on a credit rating determined upon the issuance of corporate bonds, and found that the higher the level of IS, the lower the cost of raising capital. Yang Dong-Hoon (2008) also evaluated the influence of IS on information symmetry, and reported that IS reduces information symmetry and ultimately leads to various benefits, such as a decrease in a company's cost of raising capital.

2.1.3. Literature on Earnings Management

Until now, most of studies in Korea on earnings management (Kwak Jae-Woo, Cho Mun-Ki and Seo Jung-Mo, 2015; Hong Su-Hee and Kim Myong-Seo, 2011; Kim Young-Hwa, 2014; Lee Gyun-Bong, 2018; Lee Jong-Rae and Suh Hi-Youl, 2017; Lee Seung-Tae, 2018; Park Won and Kim Tae-Young, 2103; Ryu In-Gyu, Ryu Jang-Ryeol and Ha Seok-Tae, 2016) focused on accruals-based earnings management using the amount of accruals. However, since the mid-2000s when BTD (book-tax difference), which is the difference between accounting and taxable income, could be a proxy variable for income management, there have been a number of studies using it as a proxy variable for income management (Cho Yong-Eon, Choi Mi-Hwa and Lee Jin-Soo, 2011; Joo In-Ki, Choi Won-Wook and Yum Ji-In, 2005; Jung Mi-Hwa, Lee Yun-Weon and Roh Hyun-Sub, 2008; Park Jong-Il and Jeon Kyu-An, 2008).¹ However, these studies evaluated earnings management from only the accounting perspective when not only accruals-based earnings management (AEM) but real earnings management (REM) is exhibited in actual management. Graham, Haverly and Rajgopal (2005) suggested REM to AEM as a preferable means of earnings management in business, and reported that AEM would be as significant as REM since AEM can have a direct influence over a cash flow.²

After Roychowdhury (2006) developed an REM-related empirical model with which a company's normal business activities can be differentiated from abnormal business activities, and it has been widely used for studies on REM. First, Cohen, Dey and Lys (2008) suggested

¹ Besides these, there are other previous studies using the difference between accounting and taxable income such as Choi Su-Bi (2016), Ji Sang-Hyun (2014), Ji Sang-Hyun(2014), Ji Sang-Hyun and Ryu Ye-Rin (2015), Juraf Aziz, Ji Sang-Hyun and Lee Kyun-Bong (2018), Kim Ji-Young and Ji Sang-Hyun (2018), Lee Gyun-Bong, Ji Sang-Hyun and Ryu Ye-Rin (2011), Lee Gyun-Bong, Ryu Ye-Rin and Ji Sang-Hyun (2012a), Lee Gyun-Bong, Ryu Ye-Rin and Ji Sang-Hyun (2012b), Oh Ik-Hoon and Jeong Jae-Won (2016), Ryu Ye-Rin et al. (2017), Ryu Ye-Rin and Ji Sang-Hyun (2017), Ryu Ye-Rin and Ji Sang-Hyun (2018) and others.

² Graham, Haverly and Rajgopal (2005) reported that companies prefer real earnings management over accruals-based earnings management which can be subject to monitoring by outside accounting audits, government authorities, and regulatory authorities.

that REM (having a relatively lower legal expense and responsibility than AEM) has become more widely used for earnings management after the enforcement of the SOX act, and Cohen and Zarowin (2010) reported that managers were more likely to use REM upon recapitalization. As for recent studies in Korea on REM, Kim Jee-Hong, Goh Jai-Min and Koh Yun-Sung (2008) revealed that companies manage incomes by manipulating management activities to avoid losses and normalize earnings. AEM and REM vary in each earnings management section, and a means of earnings management could be varied by the property and given situation of an individual company. Choi Jong-Seo and Kwak Young-Min (2010) reported that unlisted SMS suspected of earnings management have broadly adjust earnings by adjusting not only real accruals but also operating cash flows, manufacturing costs, and SG&A.³

2.2. Hypotheses

The purpose of this study is to evaluate the association between exchange rate elasticity of sales (ERES) and the smoothing of reported income, and then analyze whether earnings management is utilized as a means of IS to cope with currency fluctuations. Thus, this study has proposed the following.

2.2.1. Hypothesis 1. Exchange Rate Elasticity of Sales (ERES) and Reported Income Smoothing (RIS)

Exchange rates are one of the most significant external variables that cannot be controlled by companies, along with oil prices and interest rates, and it is a very sensitive and important factor for both companies and investors. In the case of companies, this could cause a huge variance in sales, unit prices of raw materials, and credit sales and credit purchase, and a huge variance in valuation gains or losses on investments for investors. In fact, the drop in KRW/USD exchange rates inflicted a significant difficulty on exporting companies in Korea. The collapse of the KRW/USD exchange rate to 1,100 KRW had direct influences on foreign-exchange losses, reduced volume of exportation, exportation consultation, and the securing of orders, but measures of corresponding companies were almost none, except for simple measures such as decreases in exportation expenses and reduced unit prices for exportation, and requests to the government for strengthened support for currency fluctuation insurance and provisions of information on equivalent currencies.

As seen above, the influence of FER is significant, but FER is a rate of currency exchange between nations, so it is not easy to artificially adjustor cope with it. Especially, FER has a direct influence over companies' sales, in turn influencing reported incomes. Therefore, it is possible to predict that companies exhibiting higher levels of RIS have higher levels of fluctuation in reported income if it is assumed that all other conditions are the same. Thus, this study suggests as follows.

H1: The higher a company's level of exchange rate elasticity of sales, the lower the level of income smoothing.

³ Besides these, there are other previous studies on REM from various perspectives, including: Ji Sang-Hyun(2018); Ji Sang-Hyun and An Sang-Bong (2019). Lee Gyun-Bong, Ryu Ye-Rin and Ji Sang-Hyun (2012a), Park Mi-Hee and Cho Mun-Kee (2013) and Yun Woo-Young, Ji Sang-Hyun and Ryu Ye-Rin (2019).

2.2.2. Hypothesis 2. Earnings Management as a Means for Income Smoothing

Not only CEOs but also various stakeholders of companies prefer a stabilized level of income. It is because sharp volatility of income not only causes financial difficulty to companies, but also has a negative influence on stabilized management activities, and consequently, sustainability. In terms of investment, investment sentiment may deteriorate in companies with unstable business performance, and incomes are likely to deteriorate. On the other hand, a time-series flow of stabilized income reduces uncertainty in cash flow and as a result, it reduces the discount rate that investors use to evaluate a company's current value, and consequently, raises its value. Therefore, it is highly likely that Korean companies with higher levels of exportation use various means to suppress currency fluctuation-dependent reported income volatility, secure stabilized management activities, raise corporate value, and pursue smoothing of reported income. Such a tendency can be more significant in companies more sensitive to FER, or companies with higher levels of ERES, to be more specific. Therefore, it is possible to assume that companies with higher levels of ERES would be likely to use various means to lower currency fluctuation-dependent reported income volatility. To be more specific, companies might use AEM as the most effective means of IS.⁴ However, AEM using discretionary accruals is accompanied with a negative image of 'income manipulation' and legal responsibilities, and they might consider other measures along with AEM: In fact, it is highly likely that for IS, they would use REM with which normal management activities cannot be clearly distinguished from abnormal management activities, and legal liabilities cannot be easily imposed. There is also a possibility that they only pursue REM because of the market's monitoring, legal responsibility, and reputation, rather than AEM.

In consideration of the aforementioned, this study has aimed to verify whether companies with higher levels of ERES are engaged in earnings management for IS, and if they do, which IS methodology is preferred. To this end, first, the levels of AEM and REM in companies with higher levels of ERES and IS should be evaluated. Second, the levels of AEM and REM in companies with higher levels of ERES, but lower levels of IS, should be evaluated. In the case of companies exhibiting higher levels of ERES, it is expected that they would have relatively lower levels of IS. It could be interpreted that companies not artificially controlling this negative influence are less likely to exercise IS through the use of earnings management. Therefore, for companies with higher levels of ERES and lower levels of IS, it could be assumed that they are not engaged in, or suppress, IS. Therefore, the purpose of this study is to examine IS activities as a means of currency fluctuation-dependent IS. Thus, this study suggests the following.

H2: The levels of exchange rate elasticity of sales and of income smoothing are related to earnings management.

H2_1: If the level of exchange rate elasticity of sales and of income smoothing are high, there will be a direct (+) association with earnings management.

H2_2: If the level of exchange rate elasticity of sales is high but of income smoothing is low, there will be an insignificant association or indirect (-) association with earnings management.

⁴ Cho Myung-Su and Oh Tae-Hyung (2012) reported that companies execute earnings management through the use of discretionary accruals to lower the volatility of income.

3. Study Design

3.1. Samples

The data for this study were drawn from publicly listed companies on the KRX covering the period 2013 to 2017 and satisfying the following conditions.

- ① Settlement of accounts on December 31
- ② Companies with financial information available on the database of the Korea Listed Companies Association (TS-2000) and FnGuide
- ③ Non-financial industry
- ④ Companies of which audit opinions are appropriate

First, financial information of companies and information on FER were collected from the database of the Korea Listed Companies Association (TS-2000) and FnGuide. Then, using the collected financial information, ERES, IS, discretionary accruals, and REM were measured. Out of 3,846 firm years, after excluding 237 companies for which financial information could not be found, 9 companies for which audit opinions were inappropriate, 637 companies not able to measure levels of IS, discretionary accruals, and REM, and 561 companies with extreme values for variables (average ± 3 *STD), a total of 2,402 firm years were obtained as the final samples for the study. Table 1 shows the detailed information of the selected samples.

Table 1. Sample Selection

Public Listed Company in the Korea Stock Exchange from 2013~2017, Settlement of Account in December, Non-Financial Industry	3,846
Companies with financial information not available on the database of the Korea Listed Companies Association (TS-2000) and FnGuide	(237)
Companies for which audit opinions are inappropriate	(9)
Companies not able to measure levels of IS, discretionary accruals, and REM	(637)
Companies with extreme values for variables (average ± 3 *STD),	(561)
Final Samples	<u>2,402</u>

3.2. Study Model

3.2.1. Study Model for Hypothesis Verification

Models (1) and (2) developed in this study to verify the activities of earnings management as a means of IS and the level of IS depending on a currency fluctuation are as follows.

Study model (1), developed to verify the association between ERES and IS, is as follows. First, its dependent variable is the estimated measure of IS, obtained by using the methodology suggested by Leuz, Nanda and Wysocki (2003), and its independent variable is the exchange rate elasticity of sales (ERES). Also, it includes SIZE, the size of a company; LEV, the debt ratio of a company; CFO, cash flow from operating activities; R&D, research and development; FirmAge, the no. of listing days of a company; BIG4, the scale of auditors; and

LOSS, the loss in a previous quarter, all included as control variables. If a significant indirect association between ERES and IS is shown in Model 1, H1 will be supported.

Study Model(1)

$$IS_{i,t} = \alpha_1 + \beta_2(ERES) + \beta_3SIZE_{i,t} + \beta_4LEV_{i,t} + \beta_5CFO_{i,t} + \beta_6R\&D_{i,t} + \beta_7FirmAge_{i,t} + \beta_8OWN_{i,t} + \beta_9BIG4_{i,t} + \beta_{10}AF_{i,t-1} + \beta_{11}LOSS_{i,t-1} + \beta_{12}-16YEAR + \beta_{16}\sim 23IND + \epsilon_{i,t}$$

- Dependent Variable: Estimated measure of IS (Income Smoothing) [by Leuz, Nanda and Wysocki (2003)]

- Independent Variable: Absolute value of ERES (Exchange Rate Elasticity of Sales)

- Control Variables(1) :

SIZE = Company Size, LEV = Company's Debt Ratio, CFO = Cash Flow from Operating Activities, R&D = R&D Expense, FirmAge = No. of Listing Days, OWN = Major Shareholders' Shares, BIG4 = Scale of Auditors, AF = Audit Fee, LOSS = Loss in a previous quarter, YEAR = year dummy, and IND = industry dummy

Second, Study Model (2) was developed to detect earnings management activities as a means of IS (H2). First, dependent variables are discretionary accruals (DA) and real accruals management (REM), and the independent variable is an interaction variable (ERES*IS_High, ERES*IS_Low) between ERES and the dummy variable for IS. In addition, control variables are SIZE, the size of a company; LEV, the debt ratio; ROA, return on assets; OWN, major shareholders' shares; OUT, ratio of outside auditors; BIG4, the scale of auditors; GRW, total asset growth; and AT, audit time.

In Study Model (2), if there is a significant direct (+) relation between an interaction variable (ERES*IS_High, ERES*IS_Low) between ERES and the dummy variable for IS, and the estimates of earnings management (DA, REM), H2-1 will be supported. On the other hand, if there is an insignificant relationship or an indirect relationship between an interaction variable (ERES*IS_High, ERES*IS_Low) between ERES, and the dummy variable for IS and estimates of earnings management (DA, REM), H2-2 will be supported.

Study Model(2)

$$DA, REM_{i,t} = \alpha_1 + \beta_1(ERES_High \times IS_High, ERES_High \times IS_Low) + \beta_2(IS_High, IS_Low) + \beta_3SIZE_{i,t} + \beta_4LEV_{i,t} + \beta_5ROA_{i,t} + \beta_6OWN_{i,t} + \beta_7OUT_{i,t} + \beta_8BIG4_{i,t} + \beta_9GRW_{i,t} + \beta_{10}AT_{i,t-1} + \beta_{11}-15YEAR + \beta_{16}\sim 23IND + \epsilon_{i,t}$$

- Control Variable: Estimated Earnings Management Measure

(1) Absolute Value of Discretionary Accruals (Dechow, Sloan and Sweeney, 1995): DA

(2) Real Earnings Management (Cohen & Zarowin, 2010; Roychowdhury, 2006): REM

REM1: Abnormal CFO $\times (-1)$,

REM2: Abnormal Production Cost,

REM3: Abnormal SG&A $\times (-1)$,

④ REM4: Abnormal Production Cost + Abnormal SG&A $\times (-1)$,

⑤ REM5: Abnormal CFO $\times (-1)$ + Abnormal SG&A $\times (-1)$

⑥ REM6: Abnormal CFO $\times (-1)$ + Abnormal Production Cost + Abnormal SG&A $\times (-1)$

- Independent Variable: ERES-IS Dummy Variable Interaction Variable

① ERES High×IS High Interaction Variable (ERES_High×IS_High)

② ERES High×IS Low Interaction Variable (ERES_High×IS_Low)

- Control Variables(2):

SIZE = Company Size, LEV = Company's Debt Ratio, ROA = Return on Assets, OWN = Major Shareholders' Shares, OUT = Ratio of Outside Auditors, BIG4 = Scale of Auditors, GRW = the Growth Ratio of Total Asset, AT = Audit Time, YEAR = year dummy, and IND = industry dummy.

3.2.2. Operational Definitions of Variables

a) Dependent Variable

(a) Income Smoothing (IS)

Income Smoothing (IS), a control variable in Study Model (1), was calculated using the methodology developed by Leuz, Nanda and Wysocki (2003), of which the standard deviation of a net income for five years is divided by the standard deviation of CFO. In addition, since the IS estimate originates from a fluctuation in income measured by the standard deviation of net income for five years, to use it as a proxy for IS, a negative (-) sign was added to the IS estimates, as shown in Tucker and Zarowin (2006) for ease of interpretation. In this study, the higher the value of the IS estimate, the higher a company's level of IS.

$$IS = (\sigma \text{ Net Income} / \sigma \text{CFO}) \times (-1)$$

(b) Accruals Earnings Management (AEM): Discretionary Accruals (DA)

AEM estimate, a dependent variable of Study Model (2), is the amount of DA, measured using the operant Jones model (Dechow, Sloan and Sweeney, 1995). The operant Jones model, as follows, is applied to an individual company using the cross-sectional area of each industry, and the amount of non-discretionary accruals become estimated.

$$\frac{TA_{i,t}}{A_{i,t-1}} = \beta_{1,i} \left(\frac{1}{A_{i,t-1}} \right) + \beta_{2,i} \left(\frac{\Delta REV_{i,t} - \Delta REC_{i,t}}{A_{i,t-1}} \right) + \beta_{3,i} \left(\frac{PPE_{i,t}}{A_{i,t-1}} \right) + \epsilon_{i,t} \quad (1)$$

TA_{i,t} = Total Accruals (Current Net Income - CFO), A_{i,t-1} = ROA

REV_{i,t} = Sales, REC_{i,t} = Account Receivable, PPE_{i,t} = Depreciable Fixed Assets

By applying the total amount of non-discretionary accruals, estimated using Eq. 1 into Eq. 2 to estimate the total amount of discretionary accruals:

$$\frac{DA_{i,t}}{A_{i,t-1}} = \frac{TA_{i,t}}{A_{i,t-1}} - \left[\hat{\beta}_{1,i} \left(\frac{1}{A_{i,t-1}} \right) + \hat{\beta}_{2,i} \left(\frac{\Delta REV_{i,t} - \Delta REC_{i,t}}{A_{i,t-1}} \right) + \hat{\beta}_{3,i} \left(\frac{PPE_{i,t}}{A_{i,t-1}} \right) \right] \quad (2)$$

Since currency fluctuations could lead to a change in sales, there could be not only positive earnings management but also negative earnings management. Therefore, in consideration of the aforementioned, the absolute value of discretionary accruals (| DA |) should be used for the analysis.

(c) Real Accruals Management (REM)

In this study, the level of REM, a dependent variable of Study Model (2), was estimated using the methodology suggested by Cohen and Zarowin (2010) and Roychowdhury (2006).

Using the aforementioned methodology, the management of operation activities, production activities, and sales activities were divided into normal/abnormal activities, and abnormal elements of each variable were estimated by subtracting the actual values of management activities from the estimated values of normal activities.⁵ Therefore, in this study, the estimates of REM consisted of three individual REM estimates and three integrated REM estimates.

First, the level of REM calculated using the abnormal CFO was estimated as follows.

$$\left(\frac{CFO_{i,t}}{Asset_{i,t-1}}\right) = \beta_1\left(\frac{1}{Asset_{i,t-1}}\right) + \beta_2\left(\frac{Sales_{i,t}}{Asset_{i,t-1}}\right) + \beta_3\left(\frac{\Delta Sales_{i,t}}{Asset_{i,t-1}}\right) + c_{i,t}$$

$$abCFO_{i,t} = \left(\frac{CFO_{i,t}}{Asset_{i,t-1}}\right) - \left[\hat{\beta}_1\left(\frac{1}{Asset_{i,t-1}}\right) + \hat{\beta}_2\left(\frac{Sales_{i,t}}{Asset_{i,t-1}}\right) + \hat{\beta}_3\left(\frac{\Delta Sales_{i,t}}{Asset_{i,t-1}}\right)\right]$$

Second, the level of REM calculated using abnormal production costs was estimated as follows.

$$\left(\frac{Prod_{i,t}}{Asset_{i,t-1}}\right) = \beta_1\left(\frac{1}{Asset_{i,t-1}}\right) + \beta_2\left(\frac{Sales_{i,t}}{Asset_{i,t-1}}\right) + \beta_3\left(\frac{\Delta Sales_{i,t}}{Asset_{i,t-1}}\right) + \beta_4\left(\frac{\Delta Sales_{i,t-1}}{Asset_{i,t-1}}\right) + c_{i,t}$$

$$abProd_{i,t} = \left(\frac{Prod_{i,t}}{Asset_{i,t-1}}\right) - \left[\hat{\beta}_1\left(\frac{1}{Asset_{i,t-1}}\right) + \hat{\beta}_2\left(\frac{Sales_{i,t}}{Asset_{i,t-1}}\right) + \hat{\beta}_3\left(\frac{\Delta Sales_{i,t}}{Asset_{i,t-1}}\right) + \hat{\beta}_4\left(\frac{\Delta Sales_{i,t-1}}{Asset_{i,t-1}}\right)\right]$$

Third, the level of REM calculated using the abnormal SG&A was estimated as follows.

$$\left(\frac{SG\&A_{i,t}}{Asset_{i,t-1}}\right) = \beta_1\left(\frac{1}{Asset_{i,t-1}}\right) + \beta_2\left(\frac{Sales_{i,t-1}}{Asset_{i,t-1}}\right) + c_{i,t}$$

$$abSG\&A_{i,t} = \left(\frac{SG\&A_{i,t}}{Asset_{i,t-1}}\right) - \left[\hat{\beta}_1\left(\frac{1}{Asset_{i,t-1}}\right) + \hat{\beta}_2\left(\frac{Sales_{i,t-1}}{Asset_{i,t-1}}\right)\right]$$

In this study, for the readability of the analysis results, abnormal CFO (abCFO) and abnormal SG&A (abSG&A) were multiplied by a negative value to match the direction of REM with the direction of REM estimation. In addition, in order to reflect the comprehensive effect of the level of REM, the aforementioned three individual REM estimates were partially integrated as shown in the following three integrated REM estimates for the analysis.

REM1=(-)abCFO, REM2=abProd, REM3=(-)abSG&A REM4=abProd+(-)abSG&A,
REM5=(-)abCFO+(-)abSG&A, REM6=(-)abCFO+abProd+(-)abSG&A

b) Independent Variables

(a) Exchange Rate Elasticity of Sales (ERES)

ERES, an independent variable of Study Model (1), was calculated by dividing the year-on-year change in sales by the change in the KRW/USD exchange rate and then obtaining its absolute value.

Exchange Rate Elasticity of Sales (ERES) = | Change in Sales | / | Change in KRW/USD Exchange Rate |

⁵ Regression coefficients of each model were estimated for each industry-year by using only the industries having 10 or more measures.

(b) ERES – IS High Dummy Variable Interaction Variable (ERES×IS_High)

ERES – IS High Dummy Variable Interaction Variable (ERES×IS_High) is an independent variable of Study Model (2). It was calculated by dividing ERES and the entire sample by two groups based on the level of IS, and then, the group exhibiting the higher level of IS was considered ERES – IS High Dummy Variable Interaction Variable (ERES×IS_High).

(c) ERES – IS High Dummy Variable Interaction Variable (ERES×IS_Low)

ERES – IS High Dummy Variable Interaction Variable (ERES×IS_Low) is an independent variable of Study Model (2). It was calculated by dividing ERES and the entire sample by two groups based on the level of IS, and then, the group exhibiting the lower level of IS was considered ERES – IS High Dummy Variable Interaction Variable (ERES×IS_Low).

c) Control Variables

Operant definitions of control variables of Study Models (1) and (2) are as follows. First, SIZE of a company was measured as the natural logarithm of its total. Second, LEV was measured by dividing total debt by total assets. Third, CFO was measured by dividing operating cash flow by total assets. Fourth, ROA was measured by dividing operating profit by total assets. Fifth, GRW was measured with an increase in total assets from the previous quarter. Sixth, OWN was measured as the sum of the shareholding ratio of major shareholders and related parties. Seventh, FirmAge was measured as the natural logarithm of the number of listing days. Samil, Samjung, Anjin, and Hanyeong, and 0 if not (Ryu Ye-Rin and Ji Sang-Hyun, 2018). Ninth, OUT was measured by dividing the total number of auditors by the total number of outside auditors. Tenth, GRW was measured with a growth rate of total assets compared to the previous quarter. Eleventh, AF was measured as the natural logarithm of auditors' fees, and AT was measured as the natural logarithm of audit time. Last, LOSS was a dummy variable at 1 if there was loss in the previous quarter, and 0 if not. To control variances attributable to each industry and year, IND (industry dummy) and YEAR (year dummy) were included.

4. Results of the Empirical Analysis

4.1. Descriptive Statics

Table 2 shows results of the descriptive statistics analysis. First, the mean of ERES, an independent variable of Study Model (1), was 2,897, showing a higher level of ERES. The mean of IS, an independent variable of Study Model (1), was -.035. In addition, the mean of discretionary accruals, a dependent variable of Study Model (2), was .040; the mean of Abnormal CFO(REM1) was -.032; the mean of Abnormal SG&A(REM3) was -.013; the mean of integrated REM (1) [$REM4 = \text{Abnormal Production Cost} + \text{Abnormal SG\&A} \times (-1)$] was -.039; the mean of integrated REM (2) [$REM5 = \text{Abnormal CFO} \times (-1) + \text{Abnormal SG\&A} \times (-1)$] was -.045; and the mean of integrated REM (3) [$REM6 = \text{Abnormal CFO} \times (-1) + \text{Abnormal Production Cost} + \text{Abnormal SG\&A} \times (-1)$] was -.071. On the other hand, in consideration of standard variables for variables of the study models, the difference between the mean and the median was not severe, so it was considered possible to assume a normal distribution of the samples (Park Jeong-Hwan and Ryu Ye-Rin 2018).

Table 2. Descriptive Statics

	Mean	Median	Std. Deviation	Percentiles	
				25	75
ERES	2.879	1.559	3.640	0.615	3.522
IS	-0.035	-0.027	0.030	-0.043	-0.016
DA	0.040	0.028	0.039	0.012	0.056
REM ₁	-0.032	-0.034	0.076	-0.074	0.009
REM ₂	-0.026	-0.031	0.150	-0.091	0.033
REM ₃	-0.013	-0.013	0.115	-0.058	0.034
REM ₄	-0.039	-0.041	0.246	-0.141	0.062
REM ₅	-0.045	-0.047	0.146	-0.119	0.033
REM ₆	-0.071	-0.078	0.276	-0.201	0.055
SIZE	27.047	26.885	1.639	26.032	27.873
LEV	0.469	0.480	0.203	0.307	0.620
CFO	0.051	0.051	0.060	0.017	0.084
ROA	0.040	0.037	0.048	0.014	0.065
R&D	0.006	0.001	0.011	0.000	0.006
FirmAge	8.904	9.117	0.742	8.587	9.519
OWN	0.459	0.461	0.164	0.341	0.569
OUT	0.377	0.400	0.164	0.286	0.500
BIG4	0.647	1.000	0.480	0.000	1.000
GRW	0.027	0.027	0.110	-0.020	0.076
AF	11.578	11.429	0.819	11.082	11.983
AT	7.304	7.196	0.769	6.773	7.743
LOSS	0.224	0.000	0.418	0.000	0.000

4.2. Correlation Analysis

Table 3 shows the results of the Pearson correlation analysis among major variables prior to the verification of the hypotheses of this study, displaying the bivariate correlation coefficient without considering the influence of other experimental variables or control variables (Yang Hae-Myun and Noh Gil-Kwan, 2019).⁶ From the results of the correlation analysis, it was first revealed that ERES and IS have a negative correlation at $p = 0.01$. This means that companies exhibiting a higher impact of exchange rate changes on the total amount of sales have a lower level of IS. Second, it was revealed that ERES and DA have a positive correlation at $p = 0.01$. This means that companies exhibiting a higher impact of exchange rate changes on the total amount of sales have a lower level of DA. Third, for certain measures (REM₁, REM₅, REM₆) only, ERES and REM have a positive correlation at $p = 0.1$. This means that companies exhibiting a higher impact of exchange rate changes have higher levels of IS. Fourth, IS and DA have a negative correlation at $p = 0.01$. This means that the higher the level of IS, the lower the level of DA. Fifth, there are no significant correlations between IS and REM estimates. This study was made with these results. However, since the

⁶ Due to the spatial constraint, a result of the REM₆, an integrated measure of the analysis is shown.

forementioned analysis did not consider any control variables, the significance of the results is very limited (Ryu Ye-Rin, Ji Sang-Hyun and Lee Kyun-Bong, 2015).

Table 3. Pearson Correlations

	ERES	IS	DA	REM ₁	REM ₂	REM ₃	REM ₄	REM ₅	REM ₆	SIZE	LEV	CFO
IS	-.159** 0.000											
DA	.089** 0.000	-.073** 0.000										
REM ₁	.047* 0.021	0.000 0.999	.093** 0.000									
REM ₂	0.031 0.123	0.000 1.000	.079** 0.000	.341** 0.000								
REM ₃	0.024 0.244	-0.005 0.810	-0.015 0.465	.144** 0.000	.723** 0.000							
REM ₄	0.030 0.148	-0.003 0.870	.041* 0.047	.274** 0.000	.947** 0.000	.907** 0.000						
REM ₅	.040* 0.049	-0.008 0.695	0.034 0.097	.632** 0.000	.742** 0.000	.857** 0.000	.852** 0.000					
REM ₆	0.038 0.065	-0.005 0.799	.060** 0.003	.519** 0.000	.935** 0.000	.845** 0.000	.964** 0.000	.932** 0.000				
SIZE	-.064** 0.002	.147** 0.000	-.139** 0.000	0.008 0.686	-.042* 0.041	0.012 0.558	-0.019 0.364	0.019 0.354	-0.011 0.577			
LEV	.087** 0.000	-.100** 0.000	.116** 0.000	.174** 0.000	0.031 0.133	-0.031 0.123	0.003 0.867	.064** 0.002	.050* 0.015	.257** 0.000		
CFO	-0.023 0.260	.130** 0.000	-.091** 0.000	-.565** 0.000	-.059** 0.004	0.009 0.660	-0.033 0.108	-.291** 0.000	-.187** 0.000	.067** 0.001	-.159** 0.000	
ROA	-0.039 0.055	.157** 0.000	-.062** 0.002	-.266** 0.000	-.151** 0.000	-0.039 0.056	-.111** 0.000	-.173** 0.000	-.174** 0.000	.093** 0.000	-.241** 0.000	.574** 0.000

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. (for both sides).

4.3. Evaluation of the Hypotheses

4.3.1. Evaluation of Hypothesis 1. Exchange Rate Elasticity of Sales (ERES) and Income Smoothing (IS)

Table 4 shows results of the evaluation of Hypothesis 1, a negative association between ERES and IS. From the empirical analysis, it was shown that ERES and IS have a very high negative correlation at $p = 0.01$. This means that companies exhibiting a higher impact of exchange rate changes on the total amount of sales have a lower level of IS. Therefore, Hypothesis 1 has been supported.

The following are the results of the analysis of control variables. First, SIZE was shown to have a positive correlation with IS at $p = 0.01$. Second, LEV, CFO, and R&D were shown to have no significant correlations with IS. Third, FirmAge was shown to have a positive correlation with IS at $p = 0.05$. Fourth, OWN and BIG each had a positive correlation with IS at $p = 0.01$. Fifth, AF and LOSS each had a very high negative correlation with IS at $p = 0.01$.

Table 4. Hypothesis 1. Exchange Rate Elasticity of Sales (ERES) and Income Smoothing (IS)

$$IS_{i,t} = \alpha_1 + \alpha_2(ERES) + \text{Control Variables}(1) + \epsilon_{i,t}$$

	Dependent Variable: Income Smoothing (IS)		
	Coef.	t	p
Intercept	-0.123	-10.102	0.000
ERES	-0.002	-8.963	0.000
SIZE	0.006	8.762	0.000
LEV	0.001	0.351	0.726
CFO	0.006	0.579	0.563
R&D	-0.074	-1.429	0.153
FirmAge	0.002	2.426	0.015
OWN	0.010	2.888	0.004
BIG4	0.004	3.261	0.001
AF	-0.010	-7.391	0.000
LOSS	-0.017	-11.303	0.000
IND/YEAR		Included	
Adj-R ²		.261	
F-value		30.201***	

Notes: 1. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. (for both sides).

2. VIF Max : 5.676.

4.3.2. Hypothesis 2-1. High Levels of Exchange Rate Elasticity of Sales and High Levels of IS, and Earnings Management

a) Hypothesis 2-1. High Levels of Exchange Rate Elasticity of Sales and High Levels of IS, and Discretionary Accruals (DA)

Table 5 shows results of the evaluation of Hypothesis 2-1. The positive correlation between the case exhibits the higher levels of ERES and IS, and AEM(DA). From the empirical analysis, it was shown that the aforementioned case (ERES_High \times IS_High) and DA have a very high positive correlation at $p = 0.05$. Specifically, a case exhibiting a higher level of IS (IS_High) and DA was shown to have a negative correlation at $p = 0.05$, showing that the higher the level of IS, the lower DA. In other words, in the case of companies exhibiting higher levels of IS, DA is lower, so DA is not a means for IS in those companies. On the other hand, in the case of companies having higher levels of both ERES and IS, DA is higher, so it is possible to see that in companies with higher levels of ERES, earnings management using DA is used as a means of IS. Therefore, Hypothesis 2-1 has been supported. The following are the results of the analysis of the control variables. First, SIZE showed a negative association with DA at $p = 0.01$. Second, LEV was shown to have a positive association with DA at $p = 0.01$. Besides these, ROA, OWN, OUT, BIG4, GRW, and AT were found to have no significant association with DA.

b) Hypothesis 2-1. High Levels of Exchange Rate Elasticity of Sales and High Levels of IS, and Real Earnings Management (REM)

Table 6 shows the results of the evaluation of Hypothesis 2-1. The positive correlation between the case exhibiting higher levels of ERES and IS, and REM. From the empirical

Table 5. Hypothesis 2-1. High Levels of Exchange Rate Elasticity and High Levels of Income Smoothing, and Discretionary Accruals

$$DA_{i,t} = \alpha_1 + \beta_1(\text{ERES_High} \times \text{IS_High}) + \beta_2(\text{IS_High}) + \text{Control Variables}(2) + \epsilon_{i,t}$$

<u>Dependent Variable: Discretionary Accruals (DA)</u>			
	Coef.	t	p
Intercept	0.145	7.590	0.000
ERES_High×IS_High	0.004	2.426	0.015
IS_High	-0.005	-2.380	0.017
SIZE	-0.005	-4.918	0.000
LEV	0.026	5.905	0.000
ROA	-0.004	-0.199	0.843
OWN	-0.004	-0.753	0.452
OUT	0.009	1.470	0.142
BIG4	-0.001	-0.697	0.486
GRW	0.007	0.860	0.390
AT	0.002	0.933	0.351
IND/YEAR		Included	
Adj-R ²		0.122	
F-value		14.897***	

Notes: 1. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. (for both sides).

2. VIF Max : 4.375.

analysis, it was revealed that cases exhibiting high levels of ERES and IS (ERES High x IS High) were shown to have a positive correlation with REM (REM1-6) at around $p = 0.10$. First, cases exhibiting high levels of ERES and IS (ERES High x IS High) were shown to have a positive correlation with Abnormal CFO (REM1) at $p = 0.10$. Second, cases exhibiting high levels of ERES and IS (ERES High x IS High) were shown to have a positive correlation with Abnormal Production Cost (REM2) at $p = 0.05$. Third, cases exhibiting high levels of ERES and IS (ERES High x IS High) were shown to have a positive correlation with Abnormal SG&A (REM3) at $p = 0.05$. Fourth, cases exhibiting high levels of ERES and IS (ERES High x IS High) were shown to have a positive correlation with Abnormal Production Cost and Abnormal SG&A (REM4) at $p = 0.05$. Fifth, cases exhibiting high levels of ERES and IS (ERES High x IS High) were shown to have a positive correlation with Abnormal CFO and Abnormal SG&A (REM5) at $p = 0.05$. Last, cases exhibiting high levels of ERES and IS (ERES High x IS High) were shown to have a positive correlation with Abnormal CFO, Abnormal Production Cost, and Abnormal SG&A (REM6) at $p = 0.05$. Therefore, from these results, it could be seen that companies exhibiting high levels of ERES are likely to have high levels of REM if they have high levels of IS, so it is reasonable to assume that companies exhibiting high levels of ERES use REM as a means of IS.⁷

⁷ Since the results of control variables varied with measures of REM, considering the spatial constraint, results of the analysis of control variables are omitted herein.

Table 6. Hypothesis 2-1. Cases Exhibiting High Levels of Exchange Rate Elasticity and High Levels of Income Smoothing, and Real Earnings Management

$$REM_{1-6,i,t} = \alpha_1 + \beta_1(ERES_High \times IS_High) + \beta_2(IS_High) + \text{Control Variables}(2) + \epsilon_{i,t}$$

Dependent Variable: Measures of Real Earnings Management in Detail (REM₁₋₃)						
	<u>Abnormal CFO</u> (REM ₁)		<u>Abnormal Production Cost</u> (REM ₂)		<u>Abnormal SG&A</u> (REM ₃)	
	Coef.	t	Coef.	t	Coef.	t
Intercept	-0.063	-1.785*	-0.208	-2.887***	-0.284	-5.043***
ERES_High× IS_High	0.002	1.740*	0.009	2.247**	0.009**	2.170**
IS_High	-0.001	-0.038	-0.007	-1.032	-0.008	-1.370
SIZE	0.002	1.076	0.017	4.358***	0.019	5.954***
LEV	0.036	4.499***	-0.016	-0.974	-0.027	-2.086**
ROA	-0.455	-3.551***	-0.577	-8.422***	-0.157	-2.924***
OWN	0.002	0.244	0.017	0.925	0.002	0.107
OUT	0.015	1.271	-0.000	-0.003	-0.014	-0.761
BIG4	0.008	2.194**	0.024	3.298***	0.010	1.789*
GRW	0.052	3.654***	0.017	0.598	-0.016	-0.692
AT	-0.004	-1.103	-0.044	-5.360***	-0.032	-5.030***
IND/YEAR	Included		Included		Included	
Adj-R ²	.248		.180		.141	
F-value	25.825***		20.888***		15.897***	
Dependent Variable: Integrated Measures of Real Earnings Management (REM₄₋₆)						
	<u>Abnormal Production Cost & Abnormal SG&A</u> (REM ₄)		<u>Abnormal CFO & Abnormal SG&A</u> (REM ₅)		<u>Abnormal CFO, Abnormal Production Cost, Abnormal SG&A</u> (REM ₆)	
	Coef.	t	Coef.	t	Coe	t
Intercept	-.492	-4.106***	-.347	-4.932***	-.555	-4.170***
ERES_High× IS_High	.018	2.364**	.011**	2.370**	.021	2.102**
IS_High	-0.015	-1.246	-0.008	-1.116	-0.015	.251
Control Variable(2)	Included		Included		Included	
Adj-R ²	.153		.175		.173	
F-value	17.350***		20.316***		20.037***	

Notes: 1. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. (for both sides).

2. VIF Max : 4.375.

4.3.3. Hypothesis 2-2. High levels of Exchange Rate Elasticity and Low Levels of Income Smoothing, and Income Smoothing

a) Hypothesis 2-2. High Levels of Exchange Rate Elasticity of Sales and Low Levels of IS, and Discretionary Accruals (DA)

Table 7 shows results of the evaluation of Hypothesis 2-2 on the association between the cases exhibiting high levels of ERES and lower levels of IS, and AEM(DA). From the empirical

analysis, it was shown that cases exhibiting high levels of ERES and lower levels of IS (ERES_High×IS_Low) have a negative correlation at $p=0.10$. Therefore, companies with high levels of exchange rate elasticity of sales (ERES) were shown to have low levels of discretionary accruals if they had low levels of income smoothing (IS). Accordingly, it is shown that a firm with a high level of exchange rate elasticity of sales little conducts income smoothing by means of earnings management through discretionary accruals in a low level of income smoothing because the firm can have a low level of discretionary accruals. Therefore, Hypothesis 2-2 of this study is supported.⁸

Table 7. Hypothesis 2-2. Cases Exhibiting High Levels of Exchange Rate Elasticity and Low Levels of Income Smoothing, and Discretionary Accruals

$$DA_{i,t} = \alpha_1 + \beta_1(\text{ERES_High} \times \text{IS_Low}) + \beta_2(\text{IS_Low}) + \text{Control Variables}(2) + \epsilon_{i,t}$$

Dependent Variable: Discretionary Accruals (DA)			
	Coef.	t	p
Intercept	0.142	7.331	0.000
ERES_High×IS_Low	-0.004	-1.774	0.076
IS_Low	0.000	0.192	0.848
SIZE	-0.005	-4.887	0.000
LEV	0.026	5.888	0.000
ROA	-0.002	-0.130	0.897
OWN	-0.004	-0.786	0.432
OUT	0.010	1.587	0.113
BIG4	-0.001	-0.623	0.533
GRW	0.007	0.915	0.360
AT	0.002	0.878	0.380
IND/YEAR		Included	
Adj-R ²		0.172	
F-value		19.889***	

Notes: 1. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. (for both sides).

2. VIF Max : 4.375.

b) Hypothesis 2-2. High Levels of Exchange Rate Elasticity of Sales and Low Levels of IS, and Real Earnings Management (REM)

Table 8 shows the results of the evaluation of Hypothesis 2-2, the association between cases exhibiting a high level of ERES and a low level of IS, and REM. From the empirical analysis, it was revealed that cases exhibiting high levels of ERES and low levels of IS (ERES High x IS Low) were shown to have a negative correlation with REM (REM1-6) at around $p = 0.10$. First, cases of ERES High x IS Low were shown to have a negative correlation with Abnormal CFO (REM1) at $p = 0.10$. Second, cases of ERES High x IS Low were shown to have a negative correlation with Abnormal Production Cost (REM2) at $p = 0.10$. Third, cases of ERES High x IS Low were shown to have an insignificant correlation with Abnormal SG&A (REM3). Fourth, cases of ERES High x IS Low were shown to have a negative correlation with

⁸ Results of the analysis of control variables are similar with the results stated in Table 5, so the description of the results is omitted herein.

Abnormal Production Cost and Abnormal SG&A (REM4) at $p = 0.05$. Fifth, cases of ERES High x IS Low were shown to have an insignificant correlation with Abnormal CFO and Abnormal SG&A (REM5). Last, cases of ERES High x IS Low were shown to have a negative correlation with Abnormal CFO, Abnormal Production Cost, and Abnormal SG&A (REM6) at $p = 0.05$. Therefore, from these results, it could be seen that companies exhibiting high levels of ERES are likely to have low levels of REM if they have low levels of IS, so it is reasonable to assume that companies exhibiting high levels of ERES use REM as a means of IS, so Hypothesis 2-2 of this study is supported.⁹

Table 8. Hypothesis 2-2. Cases Exhibiting High Levels of Exchange Rate Elasticity and Low Levels of Income Smoothing, and Real Earnings Management

$$REM_{1-6,i,t} = \alpha_1 + \beta_1(ERES_High \times IS_Low) + \beta_2(IS_Low) + \text{Control Variables}(2) + \epsilon_{i,t}$$

Dependent Variable: Measures of Real Earnings Management in Detail (REM₁₋₃)						
	Abnormal CFO (REM₁)		Abnormal Production Cost (REM₂)		Abnormal SG&A (REM₃)	
	Coef.	t	Coef.	t	Coef.	t
Intercept	-0.061	-1.697*	-0.206	-2.825***	-0.287	-5.019***
ERES_Highx IS_Low	-0.008	-1.789*	-0.023	-2.665***	0.001	0.155
IS_Low	0.004	0.944	0.017	2.115**	0.000	0.503
SIZE	0.002	1.057	0.017	4.336***	0.019	5.960***
LEV	0.037	4.593***	-0.014	-0.823	-0.026	-2.045**
ROA	-0.458	-13.626***	-0.586	-8.544***	-0.157	-2.920***
OWN	0.002	0.208	0.016	0.861	0.001	0.068
OUT	0.014	1.204	-0.002	-0.095	-0.014	-0.722
BIG4	0.008	2.096**	0.023	3.151***	0.010	1.780*
GRW	0.053	3.763***	0.022	0.778	-0.014	-0.606
AT	-0.004	-1.085	-0.044	-5.346***	-0.032	-5.052***
IND/YEAR	Included		Included		Included	
Adj-R ²	.249		.182		.140	
F-value	30.995***		21.203***		15.806***	
Dependent Variable: Integrated Measures of Real Earnings Management (REM₄₋₆)						
	Abnormal Production Cost & Abnormal SG&A (REM₄)		Abnormal CFO & Abnormal SG&A (REM₅)		Abnormal CFO, Abnormal Production Cost, Abnormal SG&A (REM₆)	
	Coef.	t	Coef.	t	Coef.	t
Intercept	-.493	-4.056***	-.348	-4.868***	-.554	-4.103***
ERES_Highx IS_Low	-.022	-1.903**	-.007	-1.252	-.030	-2.098**
IS_Low	.020	1.506	.007	.875	.023	1.606
Control Variable(2)	Included		Included		Included	
Adj-R ²	.153		.175		.174	
F-value	17.387***		20.259***		20.133***	

Notes: 1. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. (for both sides).
2. VIF Max : 4.375.

⁹ Since the results of control variables varied with measures of REM considering the spatial constraint, the results of the analysis of control variables are omitted herein.

On the other hand, results of the evaluation of H 2-1 and H 2-2 were also consistently supported by the results of the evaluation made by classifying the companies' IS levels by three quintiles, and the top 20%, middle 60%, and bottom 20%.

4.4. Additional Analysis: Samples with Export-to-Total Sales Ratios within the Top 1/3

Under the US-oriented free trade system, exports now account for about 24% of global GDP. In Korea, the export-to-GDP ratio has continued to rise since the 60s and is currently over 40%, far higher than the global average. Therefore, it is possible to see that Korea still relies on highly exports, and exports have a significant impact not only businesses but also the nation. Exchange rates are the most important factor and critical element of exports. Thus, hypotheses of this study were evaluated by companies with a relatively higher levels of exports. In the analysis, the ratio of exports was calculated as the export-to-total sales ratio. Results of the analysis are as follows.

4.4.1. Hypothesis 1. Exchange Rate Elasticity of Sales (ERES) and Income Smoothing (IS)

Table 9 shows the negative associations between ESER and IS in companies with the top 1/3 export-to-sales ratios. From the empirical analysis, in companies with the top 1/3 export-to-sales ratios, for ERES and IS, there was a negative association at $p = 0.01$. This means that companies with high levels of exports would have lower levels of IS if they have higher levels of ERES. Therefore, Hypothesis 1 was also supported in this additional analysis for companies with higher levels of exports.

Table 9. Additional Analysis: Hypothesis 1. Exchange Rate Elasticity of Sales (ERES) and Income Smoothing (IS)

- Samples with Export-to-Total Sales Ratios within Top 1/3 -

$$IS_{i,t} = \alpha_1 + \alpha_2(SER) + \text{Control Variables}(1) + \epsilon_{i,t}$$

Dependent Variable: Income Smoothing (IS)			
	Coef.	t	p
Intercept	-0.195	-3.564	0.000
SER	-0.002	-4.196	0.000
Control Variables(1) ¹⁰		Included	
Adj-R ²		.274	
F-value		27.546***	

Notes: 1. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. (for both sides).

2. VIF Max : 3.159.

¹⁰ Considering the spatial constraint, results of the analysis of control variables in Tables 9, 10, and 11 are omitted herein.

4.4.2. Hypothesis 2-1. High Levels of Exchange Rate Elasticity of Sales and High Levels of Income Smoothing, and Earnings Management

a) Hypothesis 2-1. High Levels of Exchange Rate Elasticity of Sales and high Levels of IS, and Discretionary Accruals (DA)

Table 10 shows results of the evaluation of Hypothesis 2-1, the Positive correlation between the case exhibiting higher levels of ERES and IS, and AEM(DA). From the empirical analysis with samples exhibiting the top 1/3 export-to-total sales ratios, it was revealed that cases exhibiting high levels of ERES and IS (ERES High x IS High) were shown to have a positive correlation with discretionary accruals (DA) at around $p = 0.05$. Specifically, cases exhibiting higher level of IS (IS_High) and DA were shown to have a negative correlation at $p = 0.05$, showing that the higher the level of IS, the lower the DA. Thus, it is possible to assume that in companies relying highly on exports, the higher the level of ERES, earnings management using DA is more likely to be used as a means of IS. Therefore, Hypothesis 2-1 was also supported in this additional analysis for companies with higher levels of exports.

Table 10. Additional Analysis: Hypothesis 2-1. High Levels of Exchange Rate Elasticity of Sales and High Levels of Income Smoothing, and Discretionary Accruals
- Samples with Export-to-Total Sales Ratios within the Top 1/3 -

$$DA_{i,t} = \alpha_1 + \beta_1(\text{SER_High} \times \text{IS_High}) + \beta_2(\text{IS_High}) + \text{Control Variables}(2) + \epsilon_{i,t}$$

Dependent Variable: Discretionary Accruals (DA)			
	Coef.	t	p
Intercept	0.054	0.745	0.457
SER_High×IS_High	0.014	2.100	0.037
IS_High	-0.014	-2.047	0.041
Control Variables(2)		Included	
Adj-R ²		0.109	
F-value		13.027***	

Notes: 1. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. (for both sides).

2. VIF Max : 4.378.

b) Hypothesis 2-1. High Levels of Exchange Rate Elasticity of Sales and high Levels of IS, and Real Earnings Management (REM)

Table 11 shows results of the evaluation of Hypothesis 2-1, the positive correlation between cases exhibiting higher levels of ERES and IS, and AEM, in samples exhibiting the top 1/3 export-to-total sales ratio. From the empirical analysis, it was revealed that samples exhibiting high levels of ERES and IS (ERES High x IS High) were shown to have a positive correlation with real earnings management (REM₁₋₆) at around $p = 0.10$. Specifically, samples exhibiting high levels of IS (IS High) were shown to have a positive correlation with REM (REM₁₋₆) at $p = 0.10$. Thus, in samples with high levels of IS, levels of REM were lower. In other words, unlike the results of Table 6, addressing the entire samples, in this additional analysis targeting only companies with higher levels of exports, it was shown that samples exhibiting high levels of ERES and IS also have high levels of REM. Thus, it is possible to assume that in companies relying highly on exports, the higher the level of ERES, earnings management using real activities is more likely to be used as a means of IS. Therefore, Hypothesis 2-1 was also supported in this additional analysis for companies with the higher levels of exports.

Table 11. Additional Analysis: Hypothesis 2-1. High Levels of Exchange Rate Elasticity of Sales and Income Smoothing, and Real Earnings Management

- Samples with Export-to-Total Sales Ratios within the Top 1/3

$$REM_{1-6s,t} = \alpha_1 + \beta_1(SER_High \times IS_High) + \beta_2(IS_High) + \text{Control Variables}(2) + \epsilon_{i,t}$$

Dependent Variable : Measures of Real Earnings Management in Detail (REM₁₋₃)						
	Abnormal CFO (REM₁)		Abnormal Production Cost (REM₂)		Abnormal SG&A (REM₃)	
	Coef.	t	Coef.	t	Coef.	t
Intercept	-0.121	-1.149	-0.344	-2.248**	-0.139	-1.080
SER_High× IS_High	0.004	1.900*	0.015	2.411**	0.011	2.224**
IS_High	-0.006	-0.624	-0.040	-2.788***	-0.046	-3.764***
Control Variables(2)	Included		Included		Included	
Adj-R ²	.234		.202		.109	
F-value	23.689***		15.398***		13.117***	

Dependent Variable: Integrated Measures of Real Earnings Management (REM₄₋₆)						
	Abnormal Production Cost & Abnormal SG&A(REM₄)		Abnormal CFO & Abnormal SG&A(REM₅)		Abnormal CFO, Abnormal Production Cost, Abnormal SG&A(REM₆)	
	Coef.	t	Coef.	t	Coef.	t
Intercept	-.483	-1.790*	-.260	-1.471	-.604	-1.960*
SER_High× IS_High	.024	2.512**	.017	1.730*	.026	2.114**
IS_High	-.086	-3.375***	-.052	-3.113***	-.093	-3.169***
Control Variable(2)	Included		Included		Included	
Adj-R ²	.151		.107		.160	
F-value	14.101***		12.870***		14.317***	

Notes: 1. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. (for both sides).

2. VIF Max : 4.377,

4.4.3. Hypothesis 2-2. Cases Exhibiting the High Levels of Exchange Rate Elasticity of Sales and Low Levels of Income Smoothing, and Earnings Management

a) Hypothesis 2-2. High Levels of Exchange Rate Elasticity of Sales and Low Levels of IS, and Discretionary Accruals (DA)

Table 12 shows the results of the evaluation of Hypothesis 2-2, the association between cases exhibiting high levels of ERES and low levels of IS, and AEM(DA), in samples exhibiting the top 1/3 export-to-total sales ratio. From the empirical analysis, it was shown that cases exhibiting high levels of ERES and low levels of IS (ERES High x IS Low) were shown to have a negative association with discretionary accruals at around $p = 0.05$. In other words, in companies with higher levels of exports, it was shown that samples exhibiting high levels of ERES but low levels of IS have low levels of DA. Thus, it is possible to assume that in companies relying highly on exports, the higher the level of ERES, earnings management

using DA is not likely to be used as a means of IS. Therefore, Hypothesis 2-2 was also supported in this additional analysis for companies with higher levels of exports.

Table 12. Additional Analysis: Hypothesis 2-2. Cases Exhibiting High Levels of Exchange Rate Elasticity and Low Levels of Income Smoothing, and Discretionary Accruals - Samples with Export-to-Total Sales Ratios within the Top 1/3

$$DA_{i,t} = \alpha_1 + \beta_1(\text{SER_High} \times \text{IS_Low}) + \beta_2(\text{IS_Low}) + \text{Control Variables}(2) + \epsilon_{i,t}$$

Dependent Variable: Discretionary Accruals(DA)			
	Coef.	t	p
Intercept	0.068	.933	0.351
SER_High×IS_Low	-0.015	-2.104	0.036
IS_Low	-0.001	-0.069	0.945
Control Variables(2)		Included	
Adj-R ²		0.115	
F-value		13.135***	

Notes: 1. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. (for both sides).
2. VIF Max : 4.393.

b) Hypothesis 2-2. High Levels of Exchange Rate Elasticity of Sales and Low Levels of IS, and Real Earnings Management (REM)

Table 13 shows the results of the evaluation of Hypothesis 2-2, the association between cases exhibiting high levels of ERES and low levels of IS, and REM, in samples exhibiting the top 1/3 export-to-total sales ratio. From the empirical analysis, it was shown that some cases exhibiting high levels of ERES and low levels of IS (ERES High x IS Low) were shown to have a negative association with real earnings management (REM_{1-6}) at around $p = 0.10$. Thus, it is possible to assume that in companies highly relying on exports, the higher the level of ERES, earnings management using real activities is not likely to be used as a means of IS. Therefore, Hypothesis 2-2 was also supported in this additional analysis for companies with higher levels of exports.

Table 13. Additional Analysis: Hypothesis 2-2. Cases Exhibiting High Levels of Exchange Rate Elasticity and Low Levels of Income Smoothing, and Real Earnings Management - Samples with Export-to-Total Sales Ratios within the Top 1/3

$$REM_{1-6,it} = \alpha_1 + \beta_1(\text{SER_High} \times \text{IS_Low}) + \beta_2(\text{IS_Low}) + \text{Control Variables}(2) + \epsilon_{i,t}$$

Dependent Variable: Measures of Real Earnings Management in Detail (REM₁₋₃)						
	Abnormal CFO (REM₁)		Abnormal Production Cost (REM₂)		Abnormal SG&A (REM₃)	
	Coef.	t	Coef.	t	Coef.	t
Intercept	-0.125	-1.172	-0.380	-2.448**	-0.172	-1.319
SER_High×IS_Low	-0.005	-1.226	-0.012	-1.957*	0.004	0.270
IS_Low	0.005	0.457	0.040	1.719*	0.006	0.859
Control Variable(2)	Included		Included		Included	
Adj-R ²	.135		.202		.108	
F-value	13.701***		15.399***		13.100***	

Table 13. (Continued)

	<u>Dependent Variable: Integrated Measures of Real Earnings Management (REM_{t-6})</u>					
	<u>Abnormal Production Cost & Abnormal SG&A(REM_t)</u>		<u>Abnormal CFO & Abnormal SG&A(REM_t)</u>		<u>Abnormal CFO, Abnormal Production Cost, Abnormal SG&A(REM_t)</u>	
	Coef.	t	Coef.	t	Coef.	t
Intercept	-.553	-2.016**	-.297	-1.658*	-.678	-2.165**
SER_High× IS_Low	-.009	-1.827*	-.008	-1.684*	-.014	-1.723*
IS_Low	.030	1.228	.015	.960	.035	1.263
Control Variable(2)	Included		Included		Included	
Adj-R ²	.150		.198		.160	
F-value	14.073***		12.878***		14.096***	

Notes: 1. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. (for both sides).

2. VIF Max : 4.391.

5. Conclusion

Due to the nature of the economy of Korea exhibiting a high level of industry opening, a current account deficit caused by an abrupt fluctuation in foreign exchange rate has often led to an economic crisis in Korea. For instance, just before the financial crisis in 1997, the economy of Korea had experienced years of account surplus in the late 80s, but suffered a sharp decline in export growth due to the fall in yen value in the 90s, and when the value of won compared to yen increased by 30.3% from April 1995 until February 1997, the account surplus continued for 17 months from January 1996 until May 1997. This eventually contributed the economy of Korea receiving a bail-out from the IMF. As shown in this current example, foreign exchange rates are the most important factor in the economy of Korea, and currency fluctuations are a significant variable that could cause a fluctuation in the entire economy. Therefore, this study placed its focus on Korean companies' accounting-based measures to cope with currency fluctuations. To be more specific, this study investigated the influence of exchange rate fluctuation on the volatility of reported earnings, and whether income smoothing is used as a means of IS for reported earnings upon the incurrence of an exchange rate fluctuation.

The results of the empirical analysis are as follows. First, companies with a higher level of ERES have relatively lower levels of IS. Second, companies with high levels of ERES and IS exhibit not only high levels of AEM but also REM. Therefore, it could be assumed that companies with high levels of IS as well as of ERES tend to smooth income through not only AEM but also REM. Third, companies with high levels of ERES but the low levels of IS exhibit not only a low level of AEM, but also of REM. In other words, companies with low levels of IS while exhibiting high levels of ERES tend to not engage in IS, in turn not using both AEM and REM, and rather suppress IS. In addition, these results were supported for firms with high export ratios that are relatively substantially affected by exchange rate fluctuation. From these results, it is possible to conclude that companies with high levels of ERES tend to smooth income through not only AEM but also REM.

Considering the fact that foreign exchange rates are a very significant factor for businesses in Korea, as this study is designed to verify companies' accounting-based measures to cope

with currency fluctuations from the perspective of IS, it could provide meaningful data for businesses in Korea. Specifically, this study has revealed that earnings management is executed from various aspects as a measure of IS to cope with currency fluctuations, so its finding could be significant to participants in the capital market.

On the other hand, the results of this study may have limitations because both income smoothing and discretionary accruals were measured only with a single method. This study was designed to use a direct comparison between currency fluctuations and accounting variables, so generalization of the findings could be somewhat limited. Therefore, it may be necessary to have more sophisticated control of factors that may affect such association in the future study.

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