

Has The Informativeness Of Accounting Numbers Improved After Accounting Regulations In Korea?

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ABSTRACT

This paper aims to examine whether the level of Earnings Management (EM) and informativeness of accounting information change after the enforcement of Internal Accounting Control System (IACS) Standards established by the Korea Listed Firms Association, introduced as one of the Accounting Reforms. We test the effectiveness of IACS standards using samples of listed large firms that were required to adopt IACS Standards from 2006 and of listed small and medium firms that did not have to adopt IACS Standards to implement IACS as non-adopters. We use absolute values of discretionary accruals as proxies for EM estimated by three models: (1) the Modified Jones model, (2) the Performance Matched model, and (3) the Forward Looking model. We test the hypothesis that there are changes in the level of earnings management before and after the enforcement of IACS Standards for adopters using multivariate regression models. We also test the change in the informativeness of accounting information before and after the enforcement of IACS Standards using earnings response coefficients (ERC) between earnings and returns for both samples. It was found that the level of EM is significantly reduced and the level of informativeness is improved after the enforcement of IACS Standards for adopters, while the levels of EM and informativeness are not significantly changed for not-adopters. Other control variables, such as cash flows from operations, size, debt ratio, and trends variables also turned out to be significant in explaining EM. The results imply that the reliability and the transparency of Korean firms' financial statements were improved by the enforcement of IACS Standards as they reduce earnings management. Also the informativeness of accounting numbers was increased after the enforcement of IACS Standards. This paper provides initial empirical evidence on the effectiveness of IACS Standards enforced in 2006.

Keywords: Internal Accounting Control System Standards, Earnings Management, Informativeness of accounting information

I. INTRODUCTION

An internal accounting control system (IACS)¹ is a sub-part of the internal control system that is developed and operated within a firm to provide a reasonable confidence to users whether the financial statements provided by the firm are prepared and announced according to the generally accepted accounting standards. The IACS of Korea is mainly based on the COSO² Framework of the US and was introduced for the first time in 2001, just after the Korean economic crisis, with very limited application area³. It started to be regularized in full scale through Korean Accounting Reforms at the end of 2003 where relevant laws were amended to incorporate the essence of the Sarbanes-Oxley Act (SOX) in the U.S.A. Since 2004, IACS was

¹ 'IACS' and 'Standards' in this paper have the same meaning of Internal Control over Financial Reporting (ICFR) and the Best Practice Guideline of ICFR, respectably in Korea.

² The official name is 'the Committee of Sponsoring Organizations of the Treadway Commission'.

³ IACS was required only for companies undergoing restructuring at that time.

required for all firms⁴ with assets equal to or greater than 7 billion Korean Won, but there was no operational guideline for companies to practically implement IACS.

In June 2005, Korea Listed Firms Association established the IACS Standards so that companies can implement IACS in more systematic way to ensure the effectiveness of the system. The IACS Standards is a kind of guidelines to provide rigorous principles to follow when managers design and operate as well as evaluate IACS within a firm. The Standards are intended to increase reliability of financial statements provided by firms. Since the Standards are supposed to be costly to adopt in the first year (2006) of their enforcement, only large listed firms were mandated to follow them. Since 2007, all other listed firms, small and medium-sized, were required to adopt the Standards in implementing IACS. Even though those standards are not perfect in the sense that they do not reflect different natures of industries and/or different business environments, they are expected to increase the quality and usefulness of accounting information.

This paper aims to examine whether the level of earnings management (EM) and informativeness of accounting information change before and after the enforcement of IACS Standards for adopters. The same analysis was performed for a control group, non-adopters⁵ to compare with the adopters. If only adopters show improved quality and informativeness of accounting information, it can be concluded that IACS Standards were effective in successfully implementing IACS in Korea. We use absolute values of discretionary accruals estimated by 3 different models: (1)the Modified Jones model, (2)the Performance matched model, and (3)the Forward looking model as proxies for EM. We employ earnings response coefficients (ERC) between earnings and returns, to measure the informativeness.

The empirical results indicate that the level of EM is significantly reduced for firms that adopted IACS Standards in 2006 and the adopters showed a stronger relationship between earnings and returns. On the other hand, non-adopters, small and medium sized firms, showed no significant changes in EM and ERC before and after the enforcement of IACS Standards.

This study differs from the prior researches dealing with the internal control system in that it examines the effectiveness of IACS Standards by comparing prior to and after the IACS Standards application for both adopters and non-adopters of the Standards. It also analyzed the change of the informativeness of accounting numbers before and after the enforcement of IACS Standards for both adopters and non-adopters. Our study contributes to the literature in that it is the first empirical test on the effectiveness of IACS Standards in Korea.

The remainder of this paper is organized as follows. Section 2 reviews relevant prior researches and derives hypotheses. Section 3 explains about sample selection and the empirical model. The empirical results are described in Section 4 followed by the conclusion in Section 5.

II. HYPOTHESIS DEVELOPMENT

There is a paucity of studies on earnings management, comparing post- and pre-SOX period, and the results are not consistent. Jain and Rezaee (2004) study accounting conservatism and the impacts on EM after the passage of SOX in the US. They document there is no significant increase in conservatism of financial reporting after SOX using a book-to-market ratio as a proxy for conservatism. They also find positive abnormal returns around the events that increase the likelihood of the passage of SOX, implying the market's expectation for increased quality of accounting information. Cohen and Lys (2005) compare the level of accrual-based EM in the pre- and post-SOX periods. They document an increasing trend in accrual-based EM in the period up to the passage of SOX and a reversal after the passage of SOX. They argue the option-based compensation is the main reason why there is a significant decrease of accrual-based EM after the passage of SOX. They also document that there are no significant changes in the volatility of stock returns measured by the variance of stock returns and cumulative stock

⁴ All firms audited by an external auditor according to the Act of External Audit of Corporations in Korea.

⁵ The Standards has been enforced to large listed firms and small and medium sized public firms since 2006 and 2007, respectively. Small and Medium sized public firms are allowed to apply a less strict approach in IACS design and operation when adopting the Standards.

returns between pre- and post-SOX period, implying the usefulness of accounting information is not affected. On the other hand, Jain and Rezaee (2004) show that the usefulness of accounting earnings is slightly increased after the SOX when they measure the usefulness with total accruals and market response to good news and bad news.

We have only a few studies on IACS in Korea. Cho and Yoo (2006) examine whether there is a change in the reliability of reported earnings after the IACS was implemented using discretionary accruals (DA). They find a significant decrease of DA estimated by the Modified Jones model after the implementation of IACS for those firms that received a fair opinion on IACS review report by auditors. However, those firms that received internal control deficiency (ICD) from their auditors show higher DAs. But they use very small number of sample firms that are listed on the Korean Securities Dealers' automated quotation (KOSDAQ⁶), and this makes it hard to generalize the result. Shin (2007) performed a similar study including non-listed firms in 2005, before the enforcement of IACS Standards. He compares DAs between firms with weak IACS and firms with strong IACS based upon auditor's opinion on IACS. He reports a significant positive relation between earnings management and the quality of IC.

Adaptors of IACS Standards, large listed firms, follow an internal accounting control system in accordance with standardized process stipulated in the Standards from 2006 whereas non-adaptors, small and medium sized firms, follow it from 2007. We expect managers' ability to control their earnings is reduced for adaptors after the enforcement of IACS Standards. This leads to the following hypotheses:

HYPOTHESIS 1. *EM of adopters is reduced after the enforcement of IACS Standards.*

HYPOTHESIS 1-1. *EM of non-adaptors is not changed after the enforcement of IACS Standards.*

We attempt to examine whether accounting informativeness is changed after the enforcement of IACS Standards for adopters. We expect the relationship between accounting earnings and stock returns is more improved than before if the reliability on accounting information is increased by adopting IACS Standards. This leads to the following hypotheses.

HYPOTHESIS 2. *Accounting informativeness of adopters is improved after the enforcement of IACS Standards.*

HYPOTHESIS 2-1. *Accounting informativeness of non-adaptors is not changed after the enforcement of IACS Standards.*

III. RESEARCH DESIGN

3.1 Models

We aim to examine changes in earnings management and changes in accounting informativeness for Korean listed firms after the enforcement of IACS Standards to test its effectiveness. We use the following multivariate regression to test hypotheses:

[Model 1]

$$|DA_{jit}| = \alpha_0 + \alpha_1 YEAR_t + \alpha_2 |OCF_{it}| + \alpha_3 SIZE_{it} + \alpha_4 LEV_{it} + \alpha_5 TIME + \alpha_6 AUDIT_{it} + e_{it} \quad (1)$$

$|DA_{1it}|$: Absolute value of DA of firm i in year t estimated by the Modified Jones model

$|DA_{2it}|$: Absolute value of DA of firm i in year t estimated by the Performance matched model

$|DA_{3it}|$: Absolute value of DA of firm i in year t estimated by the Forward looking model

$YEAR_t$: Year dummy for Enforcement of IACS Standards (1 if year t is enforced, 0 otherwise)

$|OCF_{it}|$: Absolute value of cash flows from operations

$SIZE_{it}$: Natural log of Total assets

LEV_{it} : Debt ratio of firm i in year t (Total Debt/Total Assets)

⁶ KOSDAQ is the exchange for small and medium firms or ventures, similar to NASDAQ in US.

TIME: Trends dummy during 1993-2006 (Year $t-1992$)

AUDIT_{it}: Audit quality dummy of firm i in year t (1 if the external auditor is a Big 4, 0 otherwise)

[Model 1] is to test changes of EM before and after the enforcement of IACS Standards including control variables that are expected to influence discretionary accruals (DA). The dependent variable is the absolute value of DA estimated by the Modified Jones model, the Performance matched model, and the Forward looking model respectively. We employ the absolute value of DA ($|DA_{jit}|$) to consider the magnitude of EM because earnings management can work in either direction. The absolute value of DA was widely used in such studies as Warfield et al. (1995) and Choi and Kim (2001). The variable of interest in [Model 1] is $YEAR$ dummy. We expect the coefficient of $YEAR$ variable, α_1 , to show a negative value if the level of EM for adopters is reduced after the enforcement of IACS Standards.

Regarding the informativeness of accounting income, associations between earnings and returns at capital markets have been examined continuously since Ball and Brown study (1968) and earnings response coefficients (ERC) is commonly used for these analyses. Most prior researches regarding information usefulness examine earning/return associations using change variables, which confirm their informativeness, but there is a limitation in that this lowers the explanatory power of the model. Easton and Harris (1991) show the level of earnings is more relevant in evaluating earning/return associations than changes of earnings. They convert stock variables to flow variables as firm's book value and market value are both representing the shareholder's portion, and empirically test whether the level of earnings explain the stock returns.

[Model 2]

$$RETURN_{it} = \alpha_0 + \alpha_1 YEAR_t + \alpha_2 EARN_{it} + \alpha_3 YEAREARN_{it} + \alpha_4 LOSS_{it} + \alpha_5 LOSSEARN_{it} + \alpha_6 YEARLOSSEARN_{it} + \alpha_7 MV_{it} + e_{it} \quad (2)$$

$RETURN_{it}$: Stock Returns of firm i in year t [(Changes in Price _{t} + Dividends) / Price _{$t-1$}]

$YEAR_t$: Year dummy for Enforcement of IACS Standards (1 if year t is enforced, 0 otherwise)

$EARN_{it}$: Income before tax of firm i in year t (Income before income tax _{t} / Price _{$t-1$})

$YEAREARN_{it}$: Income before tax of firm i in year t after the enforcement of IACS Standards ($YEAR_t \times EARN_{it}$)

$LOSS_{it}$: Loss firm dummy (1 if $EARN_{it}$ is negative, 0 otherwise)

$LOSSEARN_{it}$: Interaction term ($LOSS_{it} \times EARN_{it}$)

$YEARLOSSEARN_{it}$: Interaction term ($YEAR_t \times LOSS_{it} \times EARN_{it}$)

MV_{it} : Natural log of market value of firm i in year t (Log of MV)

[Model 2] is for testing changes in accounting informativeness after the enforcement of IACS Standards. We pay attention to the coefficient of $YEAREARN_{it}$, α_3 , which means the explanatory power of accounting earnings on stock returns after the enforcement and expect this ERC to be positive if the reliability of accounting earnings is increased after the enforcement of IACS Standards. As prior studies show that associations between earnings and returns in the case of loss firms are qualitatively different from ones of firms with positive earnings (Hayn, 1995; Burgstahler and Dichev, 1997; Collins et al., 1999), we include $LOSS_{it}$ dummy variable in [Model 2]. We use firm's market value⁷ to control for size.

3.2 Measurement of Variables

We employ the absolute value of DA as a proxy of EM and use the Modified Jones model (Dechow et al. 1995) and the Forward looking model (Dechow, Richardson, and Tuna, 2003) to estimate non discretionary accruals (NDA). Total accruals (TA) are defined as the difference between net income (NI) and cash flows from operations (CFO) following prior studies (Collins and Hribar, 1999; Choi and Back, 1998; Park, 2003). Discretionary accruals (DA) are calculated by subtracting NDA from TA . We estimate NDAs using both the Modified Jones model and the Forward looking model by industry and year. As we need lots of time series data to estimate NDA using the Modified Jones model, we circumvent the problem by estimating it cross-sectionally (Subramanyam, 1996). Bartov et al. (2001) document the explanatory power of the Modified Jones model is increased when it estimates NDA

⁷ We use firm's market value for size control in [Model 2] in that it is a test for capital markets and followed by prior studies. We have the same result with firms' total assets instead of market values in both [Model 1] and [Model 2].

cross-sectionally, compared with the Jones model (1991) and the Modified Jones model (1995) with time series data. More recently, Dechow et al. (2003) extend the Modified Jones model and develop the Forward looking model with higher explanatory power. In the case of Modified Jones model, *NDA* is estimated by (4) which used coefficients from (3) and *DA* is estimated by (5).

$$TA/A_{it-1} = a_0(1/A_{it-1}) + a_1(\Delta REV_{it}/A_{it-1}) + a_2(PPE_{it}/A_{it-1}) + e_{it} \quad (3)$$

$$NDA_{it} = \hat{a}_0(1/A_{it-1}) + \hat{a}_1[(\Delta REV_{it} - \Delta AR_{it})/A_{it-1}] + \hat{a}_2(PPE_{it}/A_{it-1}) \quad (4)$$

$$DA_{3it} = (TA_{it}/A_{it-1}) - NDA_{it} \quad (5)$$

TA_{it}: Total accruals of firm *i* in year *t* (Net Income – Cash Flows from Operations)

ΔREV_{it}: Changes in sales of firm *i* in year *t*

ΔAR_{it}: Changes in accounts receivables of firm *i* in year *t*

PPE_{it}: Plant, Property, and Equipments of firm *i* in year *t*

A_{it-1}: Total assets of firm *i* at the beginning year *t*

DA_{3it}: Discretionary accruals estimated by industry and year using the Modified Jones model of firm *i* in year *t*

NDA_{it}: Non discretionary accruals of firm *i* in year *t*

The Forward looking model considers the expected change in accounts receivables for a given change in sales, *k*, and the lagged value of *TA* to capture the predictable components, because some portion of *TA* is predictable based on the last year's accruals. They also adjust the Modified Jones model by including future sales growth. *NDA* from this model is estimated by (4-1), which used coefficients from (3-1) and (3-2). *DA* is estimated by (5-1).

$$\Delta AR_{it} = a + k \cdot \Delta REV_{it} + e_{it} \quad (3-1)$$

$$TA/A_{it-1} = a_0(1/A_{it-1}) + a_1[\{(1+k)\Delta REV_{it} - \Delta AR_{it}\}/A_{it-1}] + a_2(PPE_{it}/A_{it-1}) + a_3(TA_{it-1}/A_{it-2}) + a_4(\Delta REV_{it+1}/SALES_{it}) + e_{it} \quad (3-2)$$

$$NDA_{it} = \hat{a}_0(1/A_{it-1}) + \hat{a}_1[\{(1+k)\Delta REV_{it} - \Delta AR_{it}\}/A_{it-1}] + \hat{a}_2(PPE_{it}/A_{it-1}) + \hat{a}_3(TA_{it-1}/A_{it-2}) + \hat{a}_4(\Delta REV_{it+1}/SALES_{it}) \quad (4-1)$$

$$DA_{3it} = (TA_{it}/A_{it-1}) - NDA_{it} \quad (5-1)$$

TA_{it}: Total accruals of firm *i* in year *t* (Net Income – Cash Flows from Operations)

ΔREV_{it}: Changes in sales of firm *i* in year *t*

ΔAR_{it}: Changes in accounts receivables of firm *i* in year *t*

PPE_{it}: Plant, Property, and Equipments of firm *i* in year *t*

A_{it-1}: Total assets of firm *i* at the beginning year *t*

DA_{3it}: Discretionary accruals estimated by industry and year using the Forward looking model of firm *i* in year *t*

NDA_{it}: Non discretionary accruals of firm *i* in year *t*

Since there is a correlation between performance and accruals, it is problematic to test EM if performance is not properly controlled. Kothari et al (2005) control for the impact of performance on estimated *DA* using a performance-matched firm's *DA*. This is called Performance-matched discretionary accrual approach. Their matching process is based upon ROAs (return on assets). We estimate *DA* using this approach, and a performance-matched firm's *DA* is defined as the difference between *DA* and the median of portfolio *DAs*. *DA* from the Performance matched model means firm's variation from the median of portfolio *DAs* of the same year and the same industry.

$$DA_{2it} = DA_{1it} - DA_{1t}^{median} \quad (6)$$

DA_{2it} : Discretionary accruals estimated by industry and year using the Performance matched model of firm i in year t

We include five control variables in [Model 1] that are expected to influence manager's EM: the absolute value of cash flows from operations ($|OCF|$), size ($SIZE$), debt ratio (LEV), trends dummy ($TIME$), and audit quality ($AUDIT$).

Prior literature suggests that manager's incentive to upward reported earnings is increased when firms have less cash flow from operations (Dechow et al. 1995; Becker et al. 1998; Defond and Subramanyam 1998; Yoon, 1998). We include it in [Model 1] as the absolute value of cash flow from operations because the absolute value of DA is used for a proxy of the magnitude of EM following Kim and Seo (2005). We expect a positive relationship between EM and $|OCF|$. We measure a firm's size as log of total assets at the beginning of fiscal year and this is working as a proxy for omitted variables. We anticipate the magnitude of EM is greater for small firms because their earnings tend to fluctuate more than large firms. Debt ratio (LEV) is measured as total debts divided by total assets⁸ at the beginning of fiscal year. Prior evidence on debt ratio is not conclusive; prior research show both positive relationships with DA (Defond and Jiambalvo, 1994) and negative relationships with DA (DeAngelo et al. 1994; Yoon, 2001; Ashbaugh et al. 2002). Since we are using the absolute value of DA , we expect a positive relationship between the magnitude of EM and debt ratio despite conflicting results of prior research. Trends dummy ($TIME$) is included to control for macro economic factors in the study period. Cohen and Lys (2005) document an increasing trend in accrual-based EM before SOX and a reversal of it after SOX. We expect a positive relationship between trends dummy and EM. We include an audit quality in the model and use the size of an external auditor ($AUDIT$) as a proxy. Prior literature documents that EM is effectively limited by higher audit quality and they use the size of external auditor as a proxy (DeAngelo, 1981; Defond and Jiambalvo, 1993; Becker et al. 1998; Francis and Krishnan, 1999; Krishnan, 2003). We anticipate manager's EM is limited if their external auditors belong to a Big 4.

3.3 Sample Selection

Our sample consists of 5,284 listed firms on the Korea Stock Exchange (KSE) from 1993 to 2006⁹, and obtained from Fn-DataGuidePro database. We restrict our sample to non-financial firms and we require that each firm-year observation has the data necessary to calculate DA and ERC we employed in our analysis. Further, each firm-year observation has to be fiscal year ending in December to secure homogeneity. The distinction between large and small and medium sized firms is based on the Basic Act on Small and Medium Sized Companies in Korea and we designate 2,970 large firm-year observations as adopters of the IACS Standards and 2,314 small and medium firm-year observations as non adopters by this Rule. To test $H2$ and $H2-1$, we use stock returns that are obtained from Fn-DataGuidePro database. Requiring stock returns results in a smaller sample consisting of 2,134 and 1,585 firm-year observations for large and small and medium sized firms, respectively.

Panels A and B of Table 1 report sample distributions by year and by industry. Large firm-year observations are 56% of the samples and show a relatively even spread over years. For industry distribution, the chemicals industry shows the largest representation (16% for adopters, 16.5% for non-adopters) and relatively large portion of non adopters are included in the electronics and textile products industries. In the case of Communication, all of the sample firms are classified as adopters, which is not surprising considering the large size of these firms.

⁸ We use total assets as a denominator because using net assets may result in negative numbers, which can distort the continuity of firm's debt ratio.

⁹ Future sales growth is required to estimate NDA with the Forward looking model. Data of 2007 is excluded from this study because sales figures in 2008 are not available yet.

Table 1
Sample distribution
Panel A: Time Distribution

Year	# of firms	Freq(Adopters)	Freq(Non-adopters)	Total
1993		185	120	305
1994		183	131	314
1995		185	142	327
1996		187	149	336
1997		191	159	350
1998		198	168	366
1999		213	172	385
2000		212	176	388
2001		222	177	399
2002		223	177	400
2003		240	179	419
2004		255	187	442
2005		238	191	429
2006		238	186	424
Total		2,970(56%)	2,314(44%)	5,284(100%)

Panel B: Industry Distribution

Industry	Code	Freq(Adopters)	%	Freq(Non-adopters)	%
Food products	I.005	270	9%	119	5%
Textile products	I.006	159	5%	154	7%
Paper and Paper products	I.007	124	4%	117	5%
Chemical products	I.008	485	16%	383	16.5%
Medicine	I.009	183	6%	94	4%
Nonmetal Minerals	I.010	155	5%	98	4%
Metal and Steels	I.011	224	8%	159	7%
Machine	I.012	142	5%	214	9%
Electronics	I.013	251	8%	306	13%
Health	I.014	30	1%	11	0.5%
Transportation	I.015	203	7%	127	5%
Distributions	I.016	179	6%	198	8%
Electricity and Gas	I.017	55	2%	37	2%
Construction	I.018	222	7.5%	109	5%
Transport and Storage	I.019	102	3.5%	62	3%
Communications	I.020	19	1%	0	0%
Services	I.026	116	4%	62	3%
Manufacturing	I.027	51	2%	64	3%
Total		2,970	100%	2,314	100%

Notes to Table 1:

This classification is by Fn-DataGuidePro database

IV. EMPIRICAL RESULTS

4.1 Descriptive statistics

Table 2 reports summary statistics on earnings management and informativeness measures of the sample; full sample, adopters, and non-adopters.

Table 2
Descriptive Statistics
Panel A: Descriptive Statistics: Full sample

Full Sample	Variables	Mean	Std.Dev	Q2	Median	Q4
Variables in Model 1 (N=5,284)	DA ₁	0.056	0.050	0.018	0.043	0.079
	DA ₂	0.054	0.049	0.017	0.040	0.077
	DA ₃	0.055	0.048	0.019	0.042	0.078
	OCF	0.081	0.065	0.031	0.066	0.115
	SIZE	19.09	1.206	18.00	19.00	20.00
	LEV	0.599	0.247	0.423	0.591	0.751
	AUDIT	0.667	0.471	0.000	1.000	1.000
Variables in Model 2 (N=3,808)	RETURN	0.214	0.763	-0.209	0.063	0.442
	EARN	0.153	0.280	0.042	0.098	0.212
	YEAREARN	0.009	0.043	0.000	0.000	0.000
	LOSS	0.041	0.198	0.000	0.000	0.000
	LOSSEARN	-0.007	0.108	0.000	0.000	0.000
	YEARELOSSEARN	-0.0003	0.007	0.000	0.000	0.000
	MV	11.11	1.276	10.19	10.94	11.85

Panel B: Descriptive Statistics: adopters

Adopters	Variables	Mean	Std.Dev	Q2	Median	Q4
Variables in Model 1 (N=2,970)	DA ₁	0.052	0.046	0.017	0.040	0.072
	DA ₂	0.049	0.045	0.015	0.037	0.071
	DA ₃	0.050	0.044	0.018	0.039	0.071
	OCF	0.080	0.063	0.033	0.067	0.112
	SIZE	19.06	1.126	19.00	20.00	20.00
	LEV	0.625	0.244	0.456	0.621	0.781
	AUDIT	0.782	0.412	1.000	1.000	1.000
Variables in Model 2 (N=2,223)	RETURN	0.239	0.763	-0.206	0.086	0.509
	EARN	0.155	0.263	0.045	0.098	0.215
	YEAREARN	0.009	0.043	0.000	0.000	0.000
	LOSS	0.034	0.182	0.000	0.000	0.000
	LOSSEARN	-0.007	0.135	0.000	0.000	0.000
	YEARELOSSEARN	-0.0003	0.005	0.000	0.000	0.000
	MV	11.62	1.245	10.73	11.46	12.34

Table 2 (continued) Panel C: Descriptive Statistics: Non adopters

Non adopters	Variables	Mean	Std.Dev	Q2	Median	Q4
Variables in Model 1 (N=2,314)	$ DA_{1i} $	0.062	0.054	0.020	0.048	0.087
	$ DA_{2i} $	0.059	0.052	0.019	0.045	0.083
	$ DA_{3i} $	0.061	0.053	0.020	0.047	0.088
	$ OCF_i $	0.082	0.068	0.029	0.064	0.120
	$SIZE$	18.34	0.827	18.00	18.00	19.00
	LEV	0.566	0.247	0.380	0.552	0.717
	$AUDIT$	0.519	0.499	0.000	1.000	1.000
Variables in Model 2 (N=1,585)	$RETURN$	0.179	0.762	-0.215	0.039	0.372
	$EARN$	0.150	0.218	0.039	0.096	0.205
	$YEAREARN$	0.009	0.044	0.000	0.000	0.000
	$LOSS$	0.050	0.218	0.000	0.000	0.000
	$LOSSEARN$	-0.007	0.051	0.000	0.000	0.000
	$YEARELLOSSEARN$	-0.0003	0.010	0.000	0.000	0.000
	MV	10.41	0.939	9.78	10.31	10.93

Definition of Variables:

$|DA_{1it}|$: Absolute value of DA of firm i in year t estimated by the Modified Jones model

$|DA_{2it}|$: Absolute value of DA of firm i in year t estimated by the Performance matched model

$|DA_{3it}|$: Absolute value of DA of firm i in year t estimated by the Forward looking model

$|OCF_{it}|$: Absolute value of current cash flows from operations

$SIZE_{it}$: Natural log of total assets

LEV_{it} : Debt ratio of firm i in year t (total debt / total assets)

$AUDIT_{it}$: Audit quality dummy of firm i in year t (1 if an external auditor is Big4, 0 otherwise)

$RETURN_{it}$: Stock returns of firm i in year t [(Changes in Price _{t} + Dividends) / Price _{$t-1$}]

$EARN_{it}$: Income before tax of firm i in year t (Income before tax _{t} / Price _{$t-1$})

$YEAREARN_{it}$: Interaction term($YEAR_t \times EARN_{it}$)

$LOSS_{it}$: Loss firm dummy (1 if $EARN_{it}$ is negative, 0 otherwise)

$LOSSEARN_{it}$: Interaction term($LOSS_{it} \times EARN_{it}$)

$YEARELLOSSEARN_{it}$: Interaction term($YEAR_t \times LOSS_{it} \times EARN_{it}$)

MV_{it} : Natural log of market value of firm i in year t (Log of MV)

Panel B of Table 2 reports descriptive statistics for adopters of the IACS Standards. Their total assets, cash flows from operations, and debt ratio are larger than those of non-adopters on average and this is not surprising because their classification is based on their sizes. Table 2 shows that the mean of absolute value of DA estimated from the Modified Jones model ($|DA_{1it}|$) for adopters is smaller than that of non-adopters meaning that the magnitude of EM is relatively large for non-adopters (0.052 for adopters and 0.062 for non-adopters). This is true for DAs estimated using other models, the Performance matched model and the Forward looking model. The mean is slightly lower for $|DA_{2i}|$ than $|DA_{1i}|$ or $|DA_{3i}|$ and this is because DA_2 is estimated as the difference between a firm's DA and the median of industry portfolio DAs. Regarding the size of external auditors, the mean is each 0.782 and 0.519 for adopters and non-adopters, respectively and this means as larger firms tend to be audited by BIG4 auditors.

The means of stock returns ($RETURN$) and income before tax ($EARN$) for adopters are higher than non-adopters whereas the mean of loss firms ($LOSS$) is lower, meaning that loss firms are more included in non-adopters (small and medium sized firms). Market values of adopters are larger than those of non-adopters on average, which is expected because adopter are the firms whose total assets are greater than 2 trillion Korean Won as of the end of 2005.

Table 3 reports correlations among variables for adopters. Panel A is for [Model 1] that tests the change in EM before and after the IACS Standards periods, and Panel B is for [Model 2] that tests the change in earnings informativeness.

Table 3
Correlations among variables for adopters
Panel A: Correlations among variables for adopters [Model 1]

Variables (N=2,970)	DA ₁	DA ₂	DA ₃	YEAR	OCF	SIZE	LEV	AUDIT
DA ₁	1.000	0.891 (<0.001 ^{***})	0.814 (<0.001 ^{***})	-0.030 (0.093 [*])	0.291 (<0.001 ^{***})	-0.097 (<0.001 ^{***})	0.122 (<0.001 ^{***})	-0.019 (0.295)
DA ₂		1.000	0.739 (<0.001 ^{***})	-0.033 (0.064 [*])	0.331 (<0.001 ^{***})	-0.094 (<0.001 ^{***})	0.108 (<0.001 ^{***})	-0.012 (0.506)
DA ₃			1.000	-0.023 (0.207)	0.267 (<0.001 ^{***})	-0.090 (<0.001 ^{***})	0.089 (<0.001 ^{***})	-0.006 (0.717)
YEAR				1.000	-0.013 (0.447)	0.053 (<0.003 ^{***})	-0.148 (0.001 ^{***})	0.002 (0.900)
OCF					1.000	-0.024 (0.189)	-0.083 (<0.001 ^{***})	0.075 (<0.001 ^{***})
SIZE						1.000	0.120 (<0.001 ^{***})	0.259 (<0.001 ^{***})
LEV							1.000	0.031 (0.089 [*])
AUDIT								1.000

Notes to *Panel A* of Table 3:

Pearson coefficients

^{***}: significant at the 1% level, ^{**}: significant at the 5% level

|DA_{1it}| : Absolute value of DA of firm *i* in year *t* estimated by the Modified Jones model

|DA_{2it}| : Absolute value of DA of firm *i* in year *t* estimated by the Performance matched model

|DA_{3it}| : Absolute value of DA of firm *i* in year *t* estimated by the Forward looking model

|OCF_{it}| : Absolute value of current cash flows from operations

SIZE_{it}: Natural log of total assets

LEV_{it}: Debt ratio of firm *i* in year *t* (total debt / total assets)

AUDIT_{it}: Audit quality dummy of firm *i* in year *t* (1 if an external auditor is Big4, 0 otherwise)

The correlation between |DA₁| and |DA₂| and the correlation between |DA₁| and |DA₃| are 0.891 and 0.814 respectively, which means that results from three models are consistent. The main variable of interest in [Model 1], YEAR dummy is significantly negatively correlated with |DA|s from the Modified Jones and the Performance matched models. This implies that the magnitude of EM for adopters is reduced after the enforcement of the IACS Standards. As we expected, |DA| is negatively correlated with firm's size and positively correlated with debt ratio. But we do not find a significant correlation between |DA| and the size of external auditors (AUDIT), whereas firm's size is positively correlated with AUDIT. It means that larger firms tend to get audited by the BIG 4.

The correlation between stock returns (RETURN) and income before tax (EARN) is 0.326 and the correlation between RETURN and loss before tax (LOSS) is -0.058, meaning that high accounting earnings imply high stock returns. Correlations between EARN and YEAR, and RETURN and YEAR are -0.048 and -0.057, respectively. That implies there is a decrease on earnings and stock returns after the enforcement of the IACS Standards in 2006¹⁰. The correlation between YEAR and LOSS is 0.055, meaning that the number of loss firms increased after the enforcement of the IACS Standards. As we can see from the positive correlation between YEAREARN and RETURN (0.036, significant at the 10% level), the explanatory power of accounting income on returns is improved after the enforcement of the IACS Standards.

¹⁰ Recall that year 2006 is when IACS Standards was the first enforced for larger firms. Therefore the dummy variable, YEAR, take the value of 1 for 2006, and 0 for all other years.

We test multicollinearity among independent variables, and do not find any variables with VIF above 10, and the maximum VIF is 2.4 in [Model 2].

Table 3 (continued) Panel B: Correlations among variables for adopters [Model 2]

Variables (N=2,223)	YEAR	RETURN	EARN	YEAREARN	LOSS	LOSSEARN	YEARELOSS EARN	MV
YEAR	1.000	-0.048 (0.022 ^{**})	-0.057 (<0.001 ^{***})	0.691 (<0.001 ^{***})	0.055 (<0.001 ^{***})	0.009 (0.665)	0.199 (<0.001 ^{***})	0.197 (<0.001 ^{***})
RETURN		1.000	0.326 (<0.001 ^{***})	0.036 (0.085 [*])	-0.058 (<0.001 ^{***})	-0.040 (0.055 [*])	0.028 (0.180)	0.228 (<0.001 ^{***})
EARN			1.000	0.046 (0.028 ^{**})	-0.271 (<0.001 ^{***})	0.5477 (<0.001 ^{***})	0.055 (<0.001 ^{***})	-0.019 (0.350)
YEAREARN				1.000	0.079 (<0.001 ^{***})	0.016 (0.434)	0.131 (<0.001 ^{***})	0.139 (<0.001 ^{***})
LOSS					1.000	-0.299 (<0.001 ^{***})	-0.323 (<0.001 ^{***})	-0.092 (<0.001 ^{***})
LOSSEARN						1.000	0.034 (0.102)	0.0548 (<0.001 ^{***})
YEARELOSS EARN							1.000	0.015 (0.459)
MV								1.000

Notes to Panel B of Table 3:

Pearson coefficient

***: significant at the 1% level, **: significant at the 5% level

$RETURN_{it}$: Stock returns of firm i in year t [(Changes in Price $_t$ + Dividends) / Price $_{t-1}$]

$EARN_{it}$: Income before tax of firm i in year t (Income before tax $_t$ / Price $_{t-1}$)

$YEAR_t$: Year dummy for enforcement of the IACS Standards (1 if year t is enforced, 0 otherwise)

$YEAREARN_{it}$: Interaction term ($YEAR_t \times EARN_{it}$)

$LOSS_{it}$: Loss firm dummy (1 if $EARN_{it}$ is negative, 0 otherwise)

$LOSSEARN_{it}$: Interaction term ($LOSS_{it} \times EARN_{it}$)

$YEARELOSS_{it}$: Interaction term ($YEAR_t \times LOSS_{it} \times EARN_{it}$)

MV_{it} : Natural log of market value of firm i in year t (Log of MV)

4.2 EM changes before and after the IACS Standards

We employ multivariate regression analysis to investigate changes in EM before and after the enforcement of the IACS Standards. Table 4 provides the results of testing $H1$ of [Model 1]. Model (A), (B), and (C) are the results estimated by the Modified Jones model, the Performance matched model, and the Forward looking model respectively. Panel A of Table 4 shows that α_t , coefficient of $YEAR$ dummy, is significantly negative at the 10% level in both Models (A) and (B) and at the 5% level in Model (C). This means a significant decrease in EM for adopters, and we interpret this result as enforcement of the IACS Standards in 2006 having a positive effect on decreasing earnings management for adopters.

Other control variables are significant with expected signs, except for the size of external auditor ($AUDIT$). This result is consistent over 3 models, (A), (B), and (C). We find that large firms tend to have low EM, while firms with higher debt ratio or larger $|OCF|$ tend to have higher EM. The finding that the size of external auditor ($AUDIT$) is not significant in explaining EM is consistent with prior study (Shin, 2007). The increasing trend in EM over the period in our study was also observed in Cohen and Lys (2005). In summary, we conclude that the level of EM is reduced for adopters after the enforcement of the IACS Standards, which supports $H1$.

Panel B of Table 4 provides the test results of *H1-1*, which examine whether there are changes in EM for non-adopters before and after the enforcement of the IACS Standards. The main variable of interest again is the *YEAR* dummy and the coefficient is negative but insignificant for all three models. This means that there are no significant changes in EM for non-adopters. We can interpret this result as supporting *H1-1*.

Results on other control variables turned out to be as expected in prior research. There is no difference for control variables between the adopters and non-adopters, except for the size of external auditor (*AUDIT*). We find that the coefficient of *AUDIT* for non-adopters is negatively related with $|DA|$, a proxy of EM, at 1% level. This implies that manager's ability to manage earnings is reduced when non-adopters (small and medium sized firms) are audited by a BIG 4.

4.3 Informativeness changes before and after the IACS Standards

In Table 5 we provide test results of *H2* and *H2-1* to see whether there are changes of informativeness of accounting information after the enforcement of the IACS Standards. We measure the informativeness with earnings response coefficients (ERC), which is a relation between earnings and returns.

The main variable of interest in [Model 2], *EARNYEAR*, showed a significantly positive coefficient ($\alpha_3 = 1.241$) at 5% level after the enforcement of the IACS Standards for adopters. On the other hand, the coefficient is almost 0 ($\alpha_3 = 0.001$), and statistically insignificant for non-adopters. This implies that informativeness of accounting earnings improved for adopters, but there was no improvement for non-adopters after the enforcement of the IACS Standards in 2006. So both *H2* and *H2-1* are supported.

The results of [Model 2] for both adopters and non-adopters are very similar, except for *EARNYEAR*, the variable of interest. We note positive coefficients of market value (*MV*) at 1% significance level (1.166, 0.201), which implies that stock returns are higher as firms get larger. We find that there is a significant decrease of stock returns for both adopters and non-adopters (coefficients of *YEAR* for adopter and non-adopters are -0.337 and -0.234, respectively) after the enforcement of the IACS Standards in 2006. And the effect of concurrent earnings (losses) on stock returns are significantly positive (negative) for both adopters and non-adopters at 1% significance level ($\alpha_2 = 1.461, 1.583$ and $\alpha_5 = -1.852, -1.737$ for adopters and non-adopters, respectively). This means accounting information has explanatory power on stock returns for both adopters and non-adopters, regardless whether earnings are positive or not.

It can be concluded that the enforcement of the IACS Standards which is meant to provide a standardized guideline for operating and evaluating internal accounting control system turned out to be effective in the sense that the adopters of the Standards exhibited significant decrease (increase) in earnings management (informativeness of accounting numbers) while there was no significant change in both EM and informativeness for non-adopters.

4.4 Additional Analysis

Since there are concerns about using absolute value, unsigned discretionary accruals on EM study (Hribar and Nichols, 2007), we conduct additional tests using “signed discretionary accruals (*DA*)” as a proxy of accrual-based EM to provide construct validity for our results. We examine whether the reliability of accounting numbers is improved after the enforcement of the IACS Standards using this proxy. Untabulated results are very similar with those reported in this paper, main variable of interest and control variables, and only for adopters, the level of accrual-based EM decreases and that of non-adopters is not associated with the enforcement of the IACS Standards. We infer that the reliability of accounting earnings increases and the enforcement of the IACS Standards is effective only for adopters.

It is possible that including years from 1997 to 1999 in the study period may have resulted in an extraneous result because there was a serious economic crisis in Korea. We examine our analyses excluding those years, and untabulated results are qualitatively the same as those reported in the paper. We also add an industry dummy variable in our models to control for the influence of industrial characteristics on EM, and find similar results.

Table 4
Results of Hypothesis 1 and 1-1
 Panel A: Results of H1 (Adopters)

[Model 1] $|DA_{it}| = \alpha_0 + \alpha_1 YEAR_t + \alpha_2 |OCF_{it}| + \alpha_3 SIZE_{it} + \alpha_4 LEV_{it} + \alpha_5 TIME + \alpha_6 AUDIT_{it} + e_{it}$

	Study period	Estimation model	α_0	α_1	α_2	α_3	α_4	α_5	α_6	Fvalue	R ²
Coefficient (t-statistics)	1993~2006 (N= 2,970)	(A)	0.103 (7.24 ^{***})	-0.005 (-1.71 [*])	0.224 (17.6 ^{***})	-0.005 (-6.70 ^{***})	0.039 (10.2 ^{***})	0.001 (4.49 ^{***})	-0.002 (-1.03)	70.58 ^{***}	0.13
		(B)	0.095 (6.87 ^{***})	-0.005 (-1.75 [*])	0.249 (20.0 ^{***})	-0.004 (-6.40 ^{***})	0.035 (9.43 ^{***})	0.0009 (3.91 ^{***})	-0.001 (-0.86)	83.28 ^{***}	0.14
		(C)	0.100 (7.21 ^{***})	-0.006 (-2.06 ^{**})	0.194 (15.7 ^{***})	-0.004 (-6.50 ^{***})	0.032 (8.76 ^{***})	0.001 (5.35 ^{***})	-0.0004 (-0.21)	56.31 ^{***}	0.10

Panel B: Results of H1-I(Non adopters)

[Model 1] $|DA_{it}| = \alpha_0 + \alpha_1 YEAR_t + \alpha_2 |OCF_{it}| + \alpha_3 SIZE_{it} + \alpha_4 LEV_{it} + \alpha_5 TIME + \alpha_6 AUDIT_{it} + e_{it}$

	Study period	Estimation model	α_0	α_1	α_2	α_3	α_4	α_5	α_6	Fvalue	R ²
Coefficient (t-statistics)	1993~2006 (N= 2,314)	(A)	0.064 (2.69 ^{***})	-0.005 (-1.28)	0.213 (13.5 ^{***})	-0.002 (-2.06 ^{**})	0.045 (9.17 ^{***})	0.001 (3.31 ^{***})	-0.005 (-2.73 ^{***})	45.33 ^{***}	0.11
		(B)	0.047 (2.07 ^{**})	-0.005 (-1.19)	0.246 (16.3 ^{***})	-0.002 (-1.71 [*])	0.043 (9.09 ^{***})	0.001 (3.90 ^{***})	-0.004 (-2.28 ^{**})	58.05 ^{***}	0.13
		(C)	0.078 (3.30 ^{***})	-0.006 (-1.47)	0.182 (11.7 ^{***})	-0.003 (-2.57 ^{***})	0.042 (8.73 ^{***})	0.001 (3.99 ^{***})	-0.006 (-2.96 ^{***})	36.64 ^{***}	0.09

Notes to Table 4:

(A) uses $|DA_{1it}|$ computed using the Modified Jones model, (B)uses $|DA_{2it}|$ computed using the Performance matched model, (C)uses $|DA_{3it}|$ computed using the Forward looking model
 ***: significant at the 1% level, **: significant at the 5% level, *: significant at the 10%

Table 5
Results of Hypothesis 2 and 2-1

[Model 2] $RETURN_{it} = \alpha_0 + \alpha_1 YEAR_t + \alpha_2 EARN_{it} + \alpha_3 YEAREARN_{it} + \alpha_4 LOSS_{it} + \alpha_5 LOSSEARN_{it} + \alpha_6 YEARLOSSEARN_{it} + \alpha_7 MV_{it} + e_{it}$

	Study period	α_0	α_1	α_2	α_3	α_4	α_5	α_6	α_7	Fvalue	R ²
Coefficient (t-statistics)	Adopters 1993~2006 (N= 2,223)	-1.927 (-14.5 ^{***})	-0.337 (-4.36 ^{***})	1.461 (22.4 ^{***})	1.241 (2.54 ^{**})	0.044 (0.52)	-1.852 (-14.5 ^{***})	-3.452 (-1.09)	0.166 (14.3 ^{***})	104.28 ^{***}	0.24
	Non-adopters 1993~2006 (N= 1,585)	-2.150 (-11.2 ^{***})	-0.234 (-2.50 ^{**})	1.583 (19.1 ^{***})	0.001 (0.00)	0.071 (0.72)	-1.737 (-4.04 ^{***})	-0.920 (-0.51)	0.201 (11.0 ^{***})	72.16 ^{***}	0.24

***: significant at the 1% level, **: significant at the 5% level, *: significant at the 10%

V. CONCLUSION

This paper investigates the effectiveness of enforcing the IACS Standards in Korea in 2006 by analyzing changes in earnings management (EM) and the informativeness of accounting numbers. There are only a few studies dealing with the effectiveness of the IACS in Korea, and they covered the early period of the IACS implementation when the general concept of the IACS was simply imported from the U.S.A. and the Standards were not yet established. We examine the effects of enforcing the IACS Standards and extend our analysis to capital markets to more directly examine the informativeness of accounting numbers. We try to infer the effectiveness of the IACS Standards from the analysis of changes in EM and in accounting informativeness.

We decompose our sample into two groups, adopters of the IACS Standards in 2006 (2,970 firm-year observations) and non-adopters (2,134 firm-year observations). The absolute value of discretionary accruals estimated from three models; (1) the Modified Jones model, (2) the Performance matched model, and (3) the Forward looking model is used as proxies for EM. We examine whether there are significant changes in EM before and after the enforcement of the IACS Standards in [Model 1]. We also test whether there are changes in accounting informativeness after the enforcement of the IACS Standards using ERC.

Our results show a significant decrease of discretionary accruals for adopters after the enforcement of the IACS Standards whereas no changes are detected for non-adopters. We conclude that manager's ability to manage earnings is effectively restricted by the enforcement of the IACS Standards in 2006. The coefficients of other control variables are consistent with prior literature. Accounting informativeness is improved after the enforcement of the IACS Standards for adopters whereas no changes are observed for non-adopters. We can conclude that these results enforcing the IACS Standards to large corporations in 2006 turned out to be effective. We believe that these results indicate that the IACS contributed to improvements in reliability and transparency of accounting numbers. These results are potentially useful to researchers and regulators as well as standard setters engaged in developing and implementing the IACS.

Our results are early evidence on the effectiveness of the IACS and it is expected to get more meaningful results by expanding samples to non listed firms in the further studies.

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