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IFRS and accounting quality: Additional evidence from Korea

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ABSTRACT

This study investigates accounting quality in South Korea after the country transitioned in 2011 from domestic accounting standards to International Financial Reporting Standards (IFRS). Several variables of earnings management and timely loss recognition proxy for accounting quality. Reports of Korea's IFRS adoption process indicate strong commitment to successful and transparent implementation, and we predict and find increased accounting quality after IFRS adoption. The results confirm and extend initial research showing that IFRS has had positive effects on Korea's capital markets and its accounting environment.

1. Introduction

This study investigates accounting quality in South Korea in the wake of its 2011 adoption of International Financial Accounting Standards (IFRS). We use several proxies for accounting quality, including measures of earnings management (EM) and timely loss recognition,[1] and investigate changes in these variables from the pre-IFRS years. We apply the methodology of Barth, Landsman, and Lang (2008), which compares the earnings-stock valuation relationship for the periods before and after firms moved to International Accounting Standards (IAS). Key and Kim (2017) analyze stock return and stock price models for Korea. Consistent with increased value relevance of earnings, they find that the earnings-stock price relationship increased after the adoption of IFRS. This paper extends that analysis and addresses the remaining measures from Barth et al. (2008), including the variability of net income and correlation between accruals and operating cash flows. We contribute to the research on IFRS adoption by addressing why the value relevance of earnings increased. Higher-quality accounting helps explains higher value relevance. In addition, the focus of this study on a single-country analysis is beneficial because it holds constant important institutional factors, which aids in isolating the accounting effects of IFRS adoption. It also contributes to efforts to examine the "second generation" of adopters and provides evidence from an economically significant country.[2]

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[1] We follow relevant prior research on accruals earnings management and use the term *earnings management* throughout our paper. We are not investigating "real" earnings management.

[2] Korea is viewed as a representative country among the second generation of adopters in that it is distinct from first generation adopters, primarily European countries or Australia, because it had been using rule-based accounting standards and there is a large gap between IFRS and Korean GAAP Jang et al. (2016).

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It is important to understand the implications of IFRS adoption in second-generation adopters whose institutional, economic, political, and accounting environments differ from those of the first-adopter, generally European, countries (Jang, Lee, Seo, & Cheung, 2016; Liu, Yao, Hu, & Liu, 2011). The 1997 financial crisis in Korea led to significant changes in the country's business and economic climate, and the Korean Accounting Standards Board (KASB) believes it was a major factor in the full adoption of IFRS to "improve the accounting transparency of Korean entities and to demonstrate Korea's strong will to take part in the international movement towards a single set of high-quality global accounting standards" (2012, p. 11). KASB reports that many parties were engaged in the process, which overall appears marked by a strong commitment to successful implementation. Better understanding the effects of IFRS on accounting quality should help international accounting standard setters evaluate whether they are accomplishing their objectives (Ahmed, Neel, & Wang, 2013; Barth et al., 2008). Other regulators and parties, including investors, should also be interested in the implications of IFRS for accounting measures.

Previous single-country analyses have shown mixed results. For example, Bartov, Goldberg, and Kim (2005) compare the value relevance of German firms reporting under German generally accepted accounting principles (GAAP), US GAAP, or IAS. They contrast German domestic standards developed prior to 2000, in a highly politicized environment, to serve several stakeholders with standards developed with a focus on financial reporting. Their results show that, for profitable firms, the value relevance of German GAAP was lower than for US GAAP or IAS. On the other hand, Paananen and Lin (2009) use the methodology of Barth et al. (2008) to examine German accounting quality over three periods and conclude that accounting quality generally worsened over time. Our study of Korean firms is based solely on the firms' adoption of IFRS by employing a clear pre- and post-IFRS approach, rather than on time periods.

Cussatt, Huang, and Pollard (2018) also study German firms and find mixed results when comparing those switching from US GAAP to mandatory IFRS with a control group of firms already reporting under IFRS. These three German studies (Bartov et al., 2005; Paananen & Lin, 2009; and Cussatt et al., 2018) show that the domestic accounting environment before the mandatory IFRS adoption in 2005 was complicated because firms could choose their accounting standards, which introduces self-selection issues that are not present in Korea.

A pre- and post-adoption framework is consistent with most prior research that views a change in the accounting regime as a major demarcation. For example, Liu et al. (2011) use measures from Barth et al. (2008) to compare accounting quality from 2007, when Chinese listed firms were required to report with IFRS-convergent accounting standards. They conclude that generally there is evidence of increased accounting quality. Using the same measures, Chua, Cheong, and Gould (2012) examine Australia's 2005 mandatory IFRS adoption and report increased accounting quality after firms moved away from domestic standards. Liu and Sun (2015) uses different measures and finds no change in accounting quality after IFRS adoption by Canada in 2011. The authors attribute their findings to the similarity of pre-adoption standards and IFRS. In contrast, Jang et al. (2016) conduct a literature review and take note of an initial gap between IFRS and Korean GAAP (KGAAP), as well as major differences between the accounting cultures of Korea and Commonwealth member countries.

Our study makes an additional contribution by answering a call by Jang et al. (2016) for more research on Korea using longer IFRS periods and with EM measures that differ from those in existing research.[3] These early studies tend to show less EM after IFRS adoption (Jang et al., 2016). Our investigation of accounting quality also complements research on capital markets and other effects of Korea's IFRS adoption.[4] In addition, because nearly all of the published research is printed in Korean, our study makes the country's accounting evidence more widely available.

This study offers two final contributions. First, we employ the same methodology as prior research, but report more extensive results. Second, our sensitivity analysis addresses potential statistical issues that could arise from clustered standard errors. The prior research reports almost no details of underlying analyses. For example, two of the EM variables derive from a change in the net income model, but prior research does not report regression results for that model. Petersen (2009) explains that panel data are susceptible to ordinary least squares (OLS) violations, but prior related research does not address this potential statistical problem. The sensitivity analysis can inform future research that relies on the same or similar measures and models.

Given the higher value relevance results in Key and Kim (2017), the initial evidence of reduced EM, and Korea's overarching goals and strong implementation strategy, we predict increased accounting quality under IFRS reporting, specifically: 1) more variability in the change in net income; 2) a higher ratio of the change of net income variability to the change in cash-flow variability; 3) a more positive correlation between accruals and cash flows; and 4) less frequent reporting of small positive earnings. Regarding timely loss recognition, we expect that a greater frequency of large losses will reflect higher accounting quality.

Our results show that three of four EM tests and both timely loss measures are consistent with higher accounting quality after Korea adopted IFRS. The results also help explain the value relevance results in Key and Kim (2017), and are consistent with the perception among market participants that higher accounting quality is relevant for stock valuation. Our study contributes to the body of research that Jang et al. (2016) notes has provided initial evidence of the positive role of IFRS adoption in Korea's capital markets and in its financial and accounting environments.

[3] Most prior research has two years of data and uses primarily discretionary accruals and/or real activity management for measurement.

[4] Jang et al. (2016) and KASB Research Report No. 41 (2016) provide literature reviews. Jang et al. (2016) classify the research into six areas: earnings quality, financial statement comparability, value relevance, analyst behavior, information asymmetry, and cost of capital and firm value.

The paper proceeds with the literature review, a description of the Korea setting, and a statement of hypotheses followed by methodology, sample information, results, and conclusion.

2. Literature review, Korea setting, and hypotheses

2.1. Prior research

Barth et al. (2008) explain that a goal of international accounting standard setters is to develop high-quality, principles-based standards (to replace rules-based standards) for financial reporting. This includes steps to remove allowable accounting alternatives and to require accounting measurements that better reflect a firm's economic position and performance. Their hypothesis holds that limiting accounting alternatives could reduce opportunistic discretion for managers to determine accounting amounts, and that the result should be more reflective of a firm's actual underlying economic circumstances.[5] Nonetheless, they acknowledge (p. 468) that the prediction may not be valid in cases where international standards are of lower quality than domestic standards, and because the "inherent flexibility in principles-based standards could provide great opportunity" for EM. For these reasons, they argue that the question of IFRS effects on accounting quality depends on empirical evidence (p. 475). They look at firms in 21 countries that adopted international accounting standards (mostly voluntarily) between 1994 and 2003, and compare them with a control group of firms using domestic standards. They conclude that firms in the test group generally show less EM and more timely loss recognition, which is consistent with higher-quality accounting information. Subsequent single- and multiple-country studies have adopted their methodology with mixed results.

To understand IFRS adoption in specific institutional settings, where political, economic, cultural, and other features are held constant, single-country studies are necessary (Hellman, 2011). A single-country study overcomes the possibility of spurious results if accounting changes can be attributed to factors that differ across countries. Single-country studies also frequently include more firms than do global databases, making the sample more representative of the country's particular population of firms. We discuss four single-country studies that employ the Barth et al. (2008) methodology, and one Canadian study that uses different measures.[6]

Paananen and Lin (2009) examine the effects of international accounting standards over *time* (their emphasis) on the accounting quality in Germany, where rules changes came in the era of IFRS adoption across the European Union. They hypothesize that IFRS standards will result in higher-quality accounting, specifically in terms of less EM and more timely loss recognition. They test their full sample for three periods: 2000–2002 (pre-IFRS), 2003–2004 (voluntary IFRS), and 2005–2006 (mandatory IFRS), and conclude that accounting quality in Germany worsened over time. However, when they examine a subsample of firms operating across all three periods (i.e., the voluntary adopters), their results are mixed, "neither providing evidence of an increase or decrease in accounting quality" (p. 49). Our study has the benefit of simpler periods; Korea had only one pre-IFRS accounting regime, which avoids self-selection issues.

Liu et al. (2011) examine accounting quality in China when new, substantially IFRS-convergent standards became mandatory for listed firms in 2007. They have only two years each of pre- and post-change data, and see less evidence of EM in the latter period; however, only two of their six measures are statistically significant. Chua et al. (2012) study Australia's mandatory IFRS adoption, effective in 2005 (there was no voluntary adoption period), and consistent with increased accounting quality find less smoothing and timelier loss recognition after IFRS adoption. Jang et al. (2016) suggest that this result is somewhat surprising because Australia had used principles-based accounting standards before it switched to IFRS.

Cussatt et al. (2018) examine German firms switching from US GAAP to mandatory IFRS with a control group of firms already using IFRS. They find both increased value relevance (consistent with higher accounting quality) and increased smoothing (consistent with lower accounting quality) in their test group. They find no evidence that the proxies for changes in accounting quality differ between the test and control groups, and conclude that the results for the test group are attributable to institutional features rather than the change in accounting regimes.

Liu and Sun (2015) use measures that differ from those in Barth et al. (2008) and examine Canada, which announced in 2006 that Canadian GAAP would be replaced by IFRS in 2011. The authors exclude voluntary early adopters and compare two periods, 2008–2010 and 2011–2014. They find no significant change in accounting quality (specifically, in timely loss recognition and discretionary accruals) after adoption and conclude that their results are not surprising because of the similarity between Canadian GAAP and IFRS.[7] Our study differs from theirs because we do not exclude voluntary adopters, and, based on Jang et al. (2016), we expect there are greater changes to Korea's accounting regime.

Information about country settings is important. For example, Hellman (2011) explains that by 2005, when the EU's mandatory adoption went into effect, Sweden had already adopted almost all the prevailing international standards into its

[5] Barth et al. (2008) cite Ashbaugh and Pincus (2001) and Ewert and Wagenhofer (2005) in their accounting quality discussion. Ahmed et al. (2013) define higher-quality standards as either reducing managerial discretion over accounting choices or inherently disallowing smoothing or overstatement of earnings. Zeghal, Chtourou, and Fourati, (2012) discuss expected benefits of IFRS adoption but state that the benefits are subject to debate.

[6] Key and Kim (2017) review studies in several other countries. Those studies have mixed results.

[7] Cormier and Magnan (2016) also provide some additional analyses that address what they call earnings quality. They find that two of three measures are consistent with less earnings management.

domestic standards. In contrast, Korean Accounting Standards Board (KASB) (2012) and Jang et al. (2016) describe Korea's adoption as a "Big Bang approach," with full adoption on a set date, and no phase-in or convergence. Thus, we expect to see relatively stronger pre- and post-IFRS differences in our study than in some prior research of other countries.

2.2. Korea setting and hypotheses

The 1997 financial crisis precipitated many changes in Korea's business, economic, and political environment, with eventual IFRS adoption an element of these broader changes. Korea relied heavily on foreign investment and, after the crisis, set out to improve the level of trust in accounting information through improved reporting standards (Jang et al., 2016). The Korean Accounting Institute (KAI) and KASB were established in 1999. In 2007 the government formed an IFRS Roadmap Implementation and Planning Task Force. IFRS adoption was voluntary in 2009 and 2010, and mandatory beginning in 2011. In 2012, KASB prepared a comprehensive report on lessons learned, explaining the numerous laws and regulations that were reformed or amended to facilitate IFRS implementation. Examples include a legal foundation regarding translation of IFRS from English to Korean, the timing of submission of business reports, and changes to corporate tax law. Enforcement decrees set out the scope of companies subject to IFRS. The Financial Supervisory Service (FSS) required these firms to disclose their preparation plans and the ongoing progress on those plans (e.g., staff education and overhauls to accounting systems), any changes in consolidation scope, and accounting treatment effects expected to have the greatest impacts. The FSS monitored the preparation processes of accounting firms as well.

Overall, institutional structures appear to have supported Korea's Big Bang approach, which also helps researchers delineate pre- and post-IFRS in a meaningful way. The Korean Accounting Standards Board (KASB) (2012) notes that while there were challenges and difficulties in adoption, the overall tenor was positive regarding the process and outcome. Korean Accounting Standards Board (KASB) (2012) also reported that transparency improved and that constituents were approaching accounting issues from a global perspective.[8]

IFRS adoption in Korea induced "huge" changes in accounting standards, as well as the economy, and that full adoption was important to improve the level of trust in accounting information (Jang et al., 2016, p. 1650). Unlike other countries, Korea did not allow modification or carve-outs, and it had a four-year preparatory period in advance of IFRS adoption. Jang et al. (2016) summarize four major differences between KGAAP and IFRS standards: First, KGAAP was rules-based, while IFRS are principles-based (with expectations of increased management discretion after adoption). Second, Korean firms would submit consolidated statements under IFRS rather than dual financial statements (with expectations of enhanced comparability and value relevance). Third, IFRS expands the scope of fair value accounting. Fourth, improvement was expected in the quality and quantity of footnote disclosures.[9] Table A1 in Appendix A provides details about specific accounting changes.

Some empirical studies do address the effects of Korea's IFRS adoption. Key and Kim (2017) find increased value relevance of earnings after IFRS adoption. We add to that evidence by examining the underlying earnings data (and other measures) that help answer *why* the value relevance of earnings increased. Choe and Son (2012) study the first year of IFRS adoption and find decreased discretionary accruals for comparative financial statements prepared under the final year of KGAAP and that first year of IFRS. Park, Lee, and Kang (2012) use only IFRS data and also find decreased discretionary accruals for the first year of adoption.[10] Kim and Choi (2014) examine non-listed voluntary IFRS adopters and do not find discretionary accrual differences. Other studies of accounting quality use cross-sectional analyses to examine a variety of research questions, including some on EM, related to Korea's IFRS adoption.[11] Jang et al. (2016) state that most studies examining the effects of IFRS adoption on earnings quality provide evidence of improved quality, which they say may be attributable to the extensive and systematic preparations by the Korean government. They recommend future research that uses different measures and longer periods, both of which our study contributes.

In summary, our study is motivated both by mixed results in prior research of changes in accounting quality after 2011 and by the limited evidence to date on EM. Further, it provides relatively strong and clean tests of the effect of changing accounting standards because the standards in place before IFRS adoption were strictly domestic. We also include more post-IFRS years. Based on the adoption and implementation process elaborated by the Korean Accounting Standards Board (KASB)

[8] We believe Korea can be described as a "serious" IFRS adoption rather than "adopting a label," terms used by Daske, Hail, Leuz, and Verdi, (2012).

[9] Increased management discretion could increase earnings management, which is the opposite of our predictions. Enhanced comparability and value relevance, and improvement in disclosures, are consistent with increased accounting quality. Fair value is intended to increase accounting quality, but we do not believe there is a clear expectation about its effect on earning management and timely loss recognition. Thus, there is tension in our research question.

[10] In the first year a firm reported under IFRS, the prior year had to be restated using IFRS.

[11] Jeong (2013) focuses on discretionary accrual differences for separate-company and consolidated reporting. The absolute value of discretionary accruals after IFRS adoption decreases for separate company statements but increases for consolidated statements. Jeong, Oh, and Park (2012) use FSS investigations to examine the relationship between faithfulness in mandatory disclosures to the FSS and reporting quality. They find that less faithful reporting is associated with more biased financial information and with upward earnings management behavior, measured with discretionary accruals. Ko and Cheon (2013) investigate whether the absolute value of discretionary accruals differs depending on experts engaged by firms to establish the IFRS reporting system. They conclude that auditor service providers did not hamper the quality of clients' financial reporting.

(2012), results in initial EM research, and the value relevance results in Key and Kim (2017), we expect higher accounting quality when Korean firms change from domestic standards to IFRS.[12] Specifically, we state the following hypotheses:

Hypothesis 1. Earnings management decreases when Korean firms change their accounting standards from domestic to IFRS.

Hypothesis 2. Timely loss recognition increases when Korean firms change their accounting standards from domestic to IFRS.

3. Methodology

We test H1 following Barth et al. (2008), using four EM measures. Prior research assumes that less EM indicates higher accounting quality. The measures, with corresponding EM predictions in parentheses, are as follows:

13 Variability of the change in net income (higher variance, less EM),[13]
14 Ratio of the variability of the change in net income to the variability of change in operating cash flows (higher ratio, less EM),
15 Correlation between accruals and cash flows (less negative, less EM),[14] and
16 Frequency of small positive net income (lower frequency, less EM).[15]

Changes to KGAAP likely to increase variability in net income include application of fair value, application of impairment test rules instead of amortized goodwill, and using actuarial assumptions to measure post-employment benefit plans rather than assuming that all plan employees retire at the financial reporting date. The first measure change in net income, ΔNI, is estimated with Model 1: the variance of the residuals from the regression is compared between pre-IFRS and IFRS years, using a two-tailed variance ratio F test. Several control variables are included in this model and the others in our study.[16] Model 1 is estimated as follows:

$$\Delta NI_{i,t} = \alpha_0 + \alpha_1 CFO_{i,t} + \alpha_2 LEV_{i,t} + \alpha_3 GROWTH_{i,t} + \alpha_4 EISSUE_{i,t} + \alpha_5 DISSUE_{i,t} + \alpha_6 TURN_{i,t} + \alpha_7 SIZE_{i,t} + \alpha_8 AUD_{i,t} + \alpha_9 NUMEX_{i,t} + \alpha_{10} XLIST_{i,t} + \alpha_{11} CHAEBOL_{i,t} + \varepsilon_{i,t} \quad (1)$$

See Table B1 in Appendix B for the definitions of variables in all models. *CHAELBOL* captures an important and unique aspect of Korean corporations and substitutes for the percentage of closely held shares in Barth et al. (2008). Chaebol are South Korean conglomerates that have large family ownership. CEO Score Daily (www.ceoscore.co.kr), which specializes in evaluating the 500 largest corporations in Korea, identifies the top 30 Chaebol.

The second measure, the ratio of the variability of ΔNI to the variability of the change in operating cash flows, is ΔCFO. The Wilcoxon rank sum test compares the ratios between the total firms' pre-IFRS and IFRS years. The ΔCFO model uses variables identical to Model 1. Model 2 is specified as follows:

$$\Delta CFO_{i,t} = \alpha_0 + \alpha_1 CFO_{i,t} + \alpha_2 LEV_{i,t} + \alpha_3 GROWTH_{i,t} + \alpha_4 EISSUE_{i,t} + \alpha_5 DISSUE_{i,t} + \alpha_6 TURN_{i,t} + \alpha_7 SIZE_{i,t} + \alpha_8 AUD_{i,t} + \alpha_9 NUMEX_{i,t} + \alpha_{10} XLIST_{i,t} + \alpha_{11} CHAEBOL_{i,t} + \varepsilon_{i,t} \quad (2)$$

The third measure of EM is the correlation between accruals, *ACC*, and operating cash flows, *CFO*, where accruals equal net income minus operating cash flows. The test statistic compares the correlation of the residuals from Model 3 and Model 4 between firms' pre-IFRS and IFRS years, using Fisher's (1921) method. The models are specified as follows:[17]

[12] Our research design assumes that firms' pre-IFRS and IFRS periods are separate and distinct. Korea had a four-year preparation period. It is possible in Korea and in other country studies that firms started to make changes toward IFRS within the boundaries of domestic standards. This sort of change biases against studies finding that accounting quality measures between domestic and IFRS periods are different. We include time dummy variables in our sensitivity analysis to help address this potential issue.

[13] Barth et al. (2008) assume that firms with less EM, specifically smoothing, exhibit more earnings variability. Thus, higher quality accounting quality should result in lower variability for the first two measures. They explain some reasons for opposite expectations.

[14] Barth et al. (2008) assume that firms with more EM, specifically smoothing, exhibit a more negative correlation between accruals and cash flows. A more negative correlation indicates that managers respond to poor cash flow outcomes by increasing accruals. Prior empirical research shows that higher earnings accounting quality reduces the negative correlation between accruals and current period cash flow.

[15] Barth et al. (2008) identifies positive earnings as a common target of earnings management.

[16] We follow Barth et al. (2008) in these models. They cite a few papers for their test variables and control variables: (Ashbaugh, 2001; Lang, Raedy, & Wilson, 2006; Lang, Raedy, & Yetman, 2003). Cussatt et al. (2018) use some of the same control variables and provide limited explanations other than "prior research." Pagano, Roell, and Zechner, (2002) examine changes in many financial statement measures before and after cross-listing, and their variables are adopted by subsequent researchers.

[17] The *CFO* control variable in Model 1 and Model 2 is omitted from these two regressions.

$$CFO_{i,t} = \alpha_0 + \alpha_1 LEV_{i,t} + \alpha_2 GROWTH_{i,t} + \alpha_3 EISSUE_{i,t} + \alpha_4 DISSUE_{i,t} + \alpha_5 TURN_{i,t} + \alpha_6 SIZE_{i,t} + \alpha_7 AUD_{i,t} + \alpha_8 NUMEX_{i,t} + \alpha_9 XLIST_{i,t} + \alpha_{10} CHAEBOL_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$ACC_{i,t} = \alpha_0 + \alpha_1 LEV_{i,t} + \alpha_2 GROWTH_{i,t} + \alpha_3 EISSUE_{i,t} + \alpha_4 DISSUE_{i,t} + \alpha_5 TURN_{i,t} + \alpha_6 SIZE_{i,t} + \alpha_7 AUD_{i,t} + \alpha_8 NUMEX_{i,t} + \alpha_9 XLIST_{i,t} + \alpha_{10} CHAEBOL_{i,t} + \varepsilon_{i,t} \quad (4)$$

The fourth measure to test H1 examines whether firms are more likely to manage toward positive earnings. The coefficient on small positive net income, *SMPOS*, is of interest. A positive coefficient on *SMPOS* indicates that in IFRS years, firms manage earnings toward small positive amounts less frequently than in pre-IFRS years.

Model 5 is specified as follows:

$$IFRS(0,1)_{i,t} = \alpha_0 + \alpha_1 SMPOS_{i,t} + \alpha_2 CFO_{i,t} + \alpha_3 LEV_{i,t} + \alpha_4 GROWTH_{i,t} + \alpha_5 EISSUE_{i,t} + \alpha_6 DISSUE_{i,t} + \alpha_7 TURN_{i,t} + \alpha_8 SIZE_{i,t} + \alpha_9 AUD_{i,t} + \alpha_{10} NUMEX_{i,t} + \alpha_{11} XLIST_{i,t} + \alpha_{12} CHAEBOL_{i,t} + \varepsilon_{i,t} \quad (5)$$

H2 addresses timely recognition of losses. We follow prior research, which assumes that more timely loss recognition reflects higher accounting quality because losses are recognized as they occur versus being deferred or smoothed (Barth et al., 2008). *LGNEG*, large negative earnings, is the variable of interest. A negative coefficient on *LGNEG* indicates that in IFRS years, firms recognize large losses more frequently than in pre-IFRS years. The model replaces SMPOS from Model 5 with *LGNEG* and is specified as follows:

$$IFRS(0,1)_{i,t} = \alpha_0 + \alpha_1 LGNEG_{i,t} + \alpha_2 CFO_{i,t} + \alpha_3 LEV_{i,t} + \alpha_4 GROWTH_{i,t} + \alpha_5 EISSUE_{i,t} + \alpha_6 DISSUE_{i,t} + \alpha_7 TURN_{i,t} + \alpha_8 SIZE_{i,t} + \alpha_9 AUD_{i,t} + \alpha_{10} NUMEX_{i,t} + \alpha_{11} XLIST_{i,t} + \alpha_{12} CHAEBOL_{i,t} + \varepsilon_{i,t} \quad (6)$$

We follow Paananen and Lin (2009), and to test H2 adopt Basu's (1997) reverse regressions of earnings as a second timely loss recognition measure. *EPS*, earnings per share, is regressed on *RETURN*, annual return, *BADNEWS*, an indicator variable that equals 1 if *RETURN* is negative, and an interaction term, *RETURN*BADNEWS*. See Table B1 in Appendix B for variable definitions.[18] Timelier loss recognition is expected to result in a larger coefficient on the interaction term in IFRS years, tested using a Z test based on Clogg, Petkova, and Haritou (1995).

4. Sample

The sample is from the KIS VALUE database for the ten-year period 2006–2015, five years before and after mandatory IFRS adoption.[19] Financial institutions and insurance companies are excluded, as are firms with year-ends other than December 31, and those without necessary data for all ten years i.e., we use a balanced panel of data. The initial sample includes 439 firms with 4390 firm-year observations. Twenty-two firms are early adopters, four beginning in 2009 and 18 in 2010. Our sample is divided by whether a firm has adopted IFRS. Thus, pre-IFRS and IFRS periods include 2169 and 2221 observations, respectively. We perform sensitivity analysis with respect to early adopters. To control for the effects of extreme observations in the data analysis, amounts are truncated at three standard deviations.[20] We employ SAS for our programming. Table 1 shows sample firms by 14 industry specializations.[21] Chemistry and construction have the highest representation, but each represents only slightly more than 10 percent of the sample.

5. Results

5.1. Descriptive statistics

Table 2 reports descriptive data for firms' pre-IFRS and IFRS accounting regimes. Variable definitions are summarized in Table B1 in Appendix B. Mean $\Delta NI = 0.004$ and -0.000 for pre-IFRS and IFRS periods, respectively. The range of this mean for related prior research is -0.009 to 0.033.[22] Mean ΔCFO (0.001 and 0.004) and *ACC* (-0.015 and -0.025) are also within prior

[18] The measure is criticized by Patatoukas and Thomas (2011) and others, but we include it in order to provide additional information in our analysis.

[19] KIS VALUE is the financial database for public firms, similar to COMPUSTAT in the US.

[20] If an observation for a variable is more than three standard deviations above or below the average for that variable, the value is set equal to the plus/minus three standard deviations amount. The results are not sensitive to mitigating the effects of outliers by winsorizing instead.

[21] Seven industries with less than 3 percent each of the sample are combined in "other."

[22] Throughout this section, references to the prior studies are Chua et al. (2012); Cussatt et al. (2018), and Liu et al. (2011), the studies with the same Barth et al. (2008) measures and two periods, pre-IFRS and IFRS.

Table 1
Sample by Industry.

	Number of firms	Percent
Apparel	23	5.2
Automotive	34	7.7
Chemistry	48	10.9
Construction	45	10.3
Drugs and Health Care	25	5.7
Electricals	15	3.4
Electronics	23	5.2
Financial and Management Consulting	34	7.7
Food	30	6.8
Machinery and Equipment	20	4.6
Metal Products	36	8.2
Miscellaneous	19	4.3
Papers	14	3.2
Transportation	15	3.4
Other	58	13.4
Total	439	100%

Table 2
Descriptive Statistics.

	Pre-IFRS			IFRS		
	n = 2,169			n = 2,221		
	Mean	Median	Standard Deviation	Mean	Median	Standard Deviation
ΔNI	0.004	0.003	0.140	−0.000	−0.002*	0.157
ΔCFO	0.001	0.024	0.130	0.004	0.003	0.081
CFO	0.044	0.046	0.104	0.044	0.041	0.073
ACC	−0.015	−0.011	0.101	−0.025*	−0.020*	0.118
SMPOS	0.081	0.000	0.273	0.110*	0.000*	0.313
LGNEG	0.017	0.000	0.128	0.023	0.000	0.151
LEV	0.998	0.764	1.653	1.091	0.701*	3.934
GROWTH	0.121	0.077	0.508	−0.012*	0.020*	2.774
EISSUE	0.043	0.000	0.431	0.025	0.000	0.215
DISSUE	0.140	0.071	0.426	0.136	0.011*	2.109
TURN	0.984	0.884	0.645	0.810*	0.823*	3.217
SIZE	19.648	19.346	1.500	19.981*	19.740*	1.540
AUD	0.656	1.000	0.475	0.661	1.000	0.474
NUMEX	0.048	0.000	0.355	0.052	0.000	0.365
XLIST	0.009	0.000	0.096	0.009	0.000	0.095
CHAEBOL	0.209	0.000	0.407	0.215	0.000	0.411

Notes: *Statistically different from the Pre-IFRS period ($p < 0.05$; 2-tailed tests). See Table B1 in Appendix B for variable definitions.

research ranges (0.0007to 0.026 for *ΔCFO* and −0.114 to −0.003 for *ACC*). Similar results are obtained for *SMPOS* sample means (0.081 and 0.110) and prior research range (0.040 to 0.161), as well as for *LGNEG* sample means (0.017 and 0.023) and prior research range (0.008 to 0.045). *SMPOS* and *LGNEG* are dummy variables, so the means are the percent of the sample equal to 1. It is important for robust statistical tests that there be some variance in the 0 and 1 coding.

Table 2 reports statistical differences for the pre-IFRS and IFRS periods. The median of *ΔNI* is significantly smaller for IFRS years at the 0.05 level. Mean and median accruals are both significantly more negative for IFRS years at the 0.05 level. Mean and median *CFO* and *ΔCFO* are not significantly different. Mean and median *SMPOS*, the indicator variable of small positive net income, is significantly greater in IFRS years at the 0.05 level. The *LGNEG* indicator variable shows no statistically significant differences.[23] Control variables with both mean and median differences show that for IFRS years, there was lower growth and asset turnover ratio, and firm size increased.

Table 3 reports correlation coefficients. The three correlations with respect to *ΔNI*, *ΔCFO*, and *CFO*, are all positive and statistically significant. *ACC* is positively correlated with *ΔNI* and negatively correlated with *ΔCFO* and *CFO*. These correlations, the signs, and their statistical significance, are consistent with results reported in Chua et al. (2012), the only prior study that reports correlations. Several correlations between *ACC* and other variables are statistically significant, which shows the importance of including those variables in Model 4, where the residuals from the regression are used in hypothesis testing. *LGNEG*, the dummy variable for firms with extreme negative net income scaled by ending total assets, is negatively corre-

[23] The insignificant difference on *LGNEG* helps rule out the possibility that firms were relatively more engaged in "big bath," income-decreasing behavior under one of the accounting regimes.

Table 3
Pearson (Upper and Right) and Spearman (Lower and Left) Correlation Coefficients.

	ΔNI	ΔCFO	CFO	ACC	SMPOS	LGNEG	LEV	GROW	EISS	DISS	TURN	SIZE	AUD	NUMEX	XLIST	CHAE
ΔNI		**0.40**	**0.33**	**0.53**	0.00	**−0.25**	0.01	0.02	0.00	−0.02	0.01	−0.01	−0.01	0.00	0.00	0.00
ΔCFO	**0.22**		**0.67**	**−0.21**	0.00	**−0.06**	0.00	0.00	0.03	0.00	0.00	0.02	0.00	0.00	0.00	0.01
CFO	**0.21**	**0.54**		**−0.17**	**−0.09**	**−0.25**	**−0.06**	0.00	−0.04	0.03	0.03	**0.14**	**0.11**	**0.10**	**0.07**	**0.08**
ACC	**0.17**	**−0.50**	**−0.56**		**0.01**	**−0.41**	−0.04	0.02	**−0.08**	0.00	0.00	0.03	0.04	−0.05	−0.05	0.00
SMPOS	−0.02	−0.01	**−0.13**	0.00		−0.04	0.03	0.00	−0.01	0.00	0.00	0.00	−0.01	−0.03	−0.02	−0.01
LGNEG	**−0.17**	0.00	**−0.14**	−0.04	**−0.21**		**0.06**	0.00	**0.14**	0.01	−0.01	**−0.11**	**−0.08**	−0.01	−0.01	−0.02
LEV	−0.03	0.01	**−0.17**	**−0.09**	**0.12**	0.03		0.00	**−0.09**	0.00	0.01	0.03	0.00	0.00	−0.01	0.04
GROWTH	**0.26**	0.05	**0.08**	**0.15**	−0.03	**−0.08**	**0.07**		0.02	0.02	**0.94**	0.01	0.02	0.00	0.00	0.00
EISSUE	0.00	0.01	−0.04	−0.02	−0.02	**0.11**	**−0.09**	0.05		0.02	−0.02	−0.03	−0.04	0.00	0.00	−0.02
DISSUE	−0.05	**−0.06**	**−0.09**	0.01	**0.11**	−0.03	**0.16**	**0.32**	0.02		−0.01	0.00	−0.02	0.00	0.00	0.00
TURN	**0.08**	0.03	**0.22**	**−0.06**	−0.05	**−0.09**	**0.30**	**0.20**	**−0.08**	0.00		0.00	0.02	0.00	−0.01	0.00
SIZE	−0.02	0.02	**0.13**	0.00	0.01	**−0.11**	**0.10**	0.06	0.02	**0.08**	**−0.09**		**0.43**	**0.34**	**0.26**	**0.59**
AUD	0.00	0.00	**0.13**	0.03	0.03	**−0.08**	−0.01	−0.04	−0.01	0.02	0.01	**0.46**		**0.10**	**0.07**	**0.28**
NUMEX	0.00	0.00	**0.14**	**−0.11**	−0.11	−0.01	0.01	0.02	0.03	0.02	0.01	**0.24**	**0.10**		**0.78**	**0.18**
XLIST	0.00	0.00	**0.11**	**−0.11**	−0.02	−0.01	−0.01	0.00	0.02	0.02	−0.03	**0.16**	**0.07**	**0.67**		**0.07**
CHAEBOL	0.00	0.01	**0.08**	−0.03	−0.01	−0.01	**0.09**	0.03	0.02	**0.04**	**−0.07**	**0.52**	**0.28**	**0.20**	**0.07**	

Notes: Statistically significant at p < 0.0001 (two-tailed tests) in bold. See Table B1 in Appendix B for variable definitions.

Table 4
Regression Results for Change in Net Income, Change in Cash Flow from Operations, Cash Flow from Operations, and Accruals.

Parameter estimates (t-statistics)				
	Change in Net Income (ΔNI)	Change in Cash Flow from Operations (ΔCFO)	Cash Flow from Operations (CFO)	Accruals (ACC)
Intercept	0.088**	0.065***	−0.088***	−0.085***
	(2.40)	(3.18)	(−3.88)	(−2.98)
CFO	0.581***	0.848***		
	(24.02)	(62.18)		
LEV	0.002***	0.002***	−0.002***	−0.002***
	(2.63)	(4.61)	(−5.11)	(−3.32)
GROWTH	0.018***	0.015***	−0.015***	0.013***
	(5.45)	(8.26)	(−7.37)	(5.10)
EISSUE	0.003	0.016***	−0.008*	−0.032***
	(0.54)	(4.42)	(−1.91)	(−6.22)
DISSUE	−0.002	0.000	−0.001	−0.000
	(−1.27)	(0.47)	(−1.04)	(−.31)
TURN	−0.015***	−0.013***	0.013***	−0.016**
	(−5.24)	(−8.38)	(7.62)	(−4.90)
SIZE	−0.005**	−0.004***	0.006***	0.004***
	(−2.52)	(−3.90)	(4.86)	(2.51)
AUD	−0.008*	−0.012***	0.013***	0.008***
	(−1.65)	(−4.38)	(4.07)	(2.10)
NUMEX	−0.008	−0.014**	0.018**	−0.016
	(−0.82)	(−4.38)	(2.90)	(−2.03)
XLIST	−0.001	0.020	−0.006	−0.027
	(−0.03)	(0.07)	(−0.28)	(−0.94)
CHAEBOL	0.003	0.004	−0.002	−0.008*
	(0.51)	(1.07)	(−0.50)	(−1.67)
n=	4390	4390	4390	4390
F statistic	53.48	352.62	21.51	10.03
Adjusted R^2	0.12	0.47	0.04	0.02

Notes: *, **,*** statistically significant at p < 0.10, p < 0.05, and p < 0.01, respectively (2-tailed tests). See Table B1 in Appendix B for variable definitions.

lated with *ΔNI*, *ΔCFO*, *CFO*, and *ACC*, consistent with generally poor financial performance for those firms. Not surprisingly, *CHAEBOL* is positively correlated with *SIZE*, *AUD* (more likely to use a Big 4 firm), and *XLIST* (cross-listed in on a US exchange).

5.2. Empirical results and discussion

Table 4 reports regression results for *ΔNI*, *ΔCFO*, *CFO*, and *ACC* for the full ten years of sample data. These results are for informational purposes. No prior studies tabulate the results of this step in their research. Hypothesis tests use residuals from these regressions. All models are statistically significant (F-statistics p-values < 0.01) but with different explanatory powers. The *ΔNI* and *ΔCFO* models have adjusted R^2 = 0.12 and 0.47, respectively. *CFO* and *ACC* model-adjusted R^2 statistics are much lower. Several variables are statistically significant in all the regressions, though not always of the same sign: *LEV*, *GROWTH*, *TURN*, *SIZE*, *CFO*, and *AUD*.

Table 5
Earnings Management Test of Frequency of Small Positive Net Income between Accounting Periods (Test of H1) and Timely Loss Recognition Test of Large Negative Net Income between Accounting Periods (Test of H2).

Parameter estimates (t statistics)		
Intercept	1.692***	1.737***
	(13.11)	(13.38)
SMPOS H1 prediction: +	−0.074	
	(−2.91)	
LGNEG H2 prediction: –		−0.157###
		(−2.81)
CFO	0.056	0.017
	(0.53)	(0.19)
LEV	−0.014	−0.001
	(−0.56)	(−0.46)
GROWTH	0.001	−0.000
	(0.06)	(−0.02)
EISSUE	0.036	0.045**
	(1.61)	(2.02)
DISSUE	0.000	0.001
	(0.06)	(0.09)
TURN	0.007	0.007
	(0.49)	(0.76)
SIZE	−0.063***	−0.066***
	(−9.33)	(−9.68)
NUMEX	0.027	0.032
	(0.76)	(0.92)
AUD	0.051**	0.051***
	(0.00)	(2.91)
XLIST	0.125	0.123
	(0.32)	(0.96)
CHAEBOL	0.107***	0.113***
	(4.70)	(4.93)
n=	4390	4390
F statistic	9.11***	9.05***
Adjusted R^2	0.02	0.02

Notes: ### statistically significant at p < 0.01 (1-tailed test). *, **, *** statistically significant at p < 0.10, p < 0.05, and p < 0.01, respectively (2-tailed tests). See Table B1 in Appendix B for Variable Definitions.

Table 6
Basu Regression Results for Timely Loss Recognition Test (Test of H2).

	Pre-IFRS n = 2,169	IFRS n = 2,221
Intercept	0.215***	−0.034
	(8.58)	(−0.61)
RETURN	−0.120***	0.093**
	(−8.21)	(2.36)
BADNEWS	−0.169***	0.223**
	(−3.30)	(2.25)
RETURN*BADNEWS	0.375***	1.221***
	(3.08)	(4.39)
n=	2169	2221
F statistic	31.72***	10.97***
Adjusted R^2	0.04	0.01
Z test of differences on RETURN*BADNEWS		−0.1833**

Notes: *, **, *** statistically significant at p < 0.10, p < 0.05, and p < 0.01, respectively. See Table B1 in Appendix B for Variable Definitions.

The three H1 EM tests are consistent with predictions (results not tabulated). The variability of ΔNI in firms' IFRS years, 0.024, is statistically greater than in pre-IFRS years, .014, consistent with EM decreasing in IFRS year.[24] For the test of the variability of ΔNI/variability of ΔCFO, the IFRS ratio, 5.062, is statistically greater than the pre-IFRS ratio, 1.927, consistent with H1.[25] Third, for the correlations of residuals from regression estimates of *CFO* and *ACC*, the IFRS correlation, −0.51, is statistically greater (less negative) than the pre-IFRS correlation, −0.61, consistent with H1.[26]

Table 5 reports regression results for the final EM test. The dependent variables are dummies representing the two accounting regimes. The model is statistically significant (F statistic p-value < 0.0001), and three control variables, *SIZE*,

[24] The range of the variability in the three prior related studies is 0.003–0.077.
[25] The range for this ratio in the three prior related studies is 0.42–4.234.
[26] The range of correlations in the three prior related studies is −0.202–0.4553.

CHAEBOL, and *AUD*, are statistically significant. The variable of interest, *SMPOS*, the frequency of small positive net income, is not positive, contrary to expectations based on H1. In summary, three of the four tests are consistent with less EM and higher accounting quality in IFRS compared to pre-IFRS years.

H2 addresses whether timely loss recognition increases when Korean firms change to IFRS. Table 5 reports regression results where the dependent variables are dummies representing the two accounting regimes. The model is statistically significant (F statistic p-value < 0.0001), and three control variables, *SIZE*, *CHAEBOL*, and *EISSUE*, (percentage change in book value of equity) are statistically significant. The variable of interest, *LGNEG*, is negative and statistically significant, consistent with H2. Table 6 reports the results for the Basu (1997) reverse regression method. The IFRS model *RETURN*BADNEWS* coefficient is greater than the pre-IFRS model coefficient. The Z test of the difference in the coefficients is statistically significant, consistent with H2.

5.3. Sensitivity analyses

We perform extensive sensitivity analyses. First, we remove early adopters and find that the results are consistent with our reported results.[27] The worldwide financial crisis years could affect net income and cash flows in a unique way, but adding a dummy variable to represent 2006, 2007, and 2008 does not change our reported results. The same results are obtained if only 2007 and 2008 are reflected in the dummy variable. Finally, sensitivity analyses shows the results are not affected by the following: including industry dummy variables, including time dummy variables for all years, using new variable *FREEFLOAT* as a substitute for *CHAEBOL* and as an additional variable in models, omitting the *CHAEBOL* dummy variable, and changing the size variable to market value of equity at year end.[28]

We also analyze our data using clustered standard errors for regressions reported in Tables 4, 6, 7, and 8. Petersen (2009) explains various ways to address possible biases in OLS regression standard errors. OLS standard errors are unbiased when residuals are independent and identically distributed, but panel datasets are susceptible to violating OLS assumptions because the data contain observations on multiple firms in multiple years. The best method for estimating standard errors in panel data depends on the source of the dependence, be it the firm, time, or both (Petersen, 2009). We do not have a theoretical or practical reason to suspect a particular dependence. Therefore, we conduct additional analyses two ways, first by firms and then by both firms and years. We necessarily exclude early adopters from the analysis because the years those firms adopted IFRS are different from the other firms. The results are consistent with the tabulated results, except that the Basu (1997) reverse regression does not show statistically significant results.

6. Conclusion

This study investigates changes in accounting quality when Korea's accounting standards changed from domestic to IFRS. The study adds to the existing literature on single-country IFRS adoption studies and answers a call for Korea-based research with longer IFRS periods (Jang et al., 2016). The results are largely consistent with less EM following IFRS adoption and more timely loss recognition, indicative of higher accounting quality. The higher accounting quality helps explain why Key and Kim (2017) find a stronger earnings-stock price relationship in Korea after IFRS. Our results are in line with prior research and initial observations that IFRS adoption played a positive role in Korea's capital markets, and that it led to accounting and financial reporting improvements (Jang et al., 2016).

We suggest extending this study by analyzing unique features of Korea's adoption setting. According to Korean Accounting Standards Board (KASB) (2012), the FSS required extensive reporting in advance of full IFRS adoption. Firms had to disclose, among other items, accounting treatments expected to have significant impacts, as well as the anticipated effects on financial position and performance. These materials are potentially a rich source of information that could expand our understanding of IFRS adoption. Future research could also examine the effects of specific accounting standards on stock valuation and accounting information. Future multi-country research could examine a variety of factors that affect IFRS adoption in Korea and other countries. For example, Henderson (2015) suggests culture played a positive role in Korea's IFRS adoption, and Jang et al. (2016) make a similar observation.

[27] We compare descriptive data for the early adopters and the rest of the sample (not tabulated). For both periods, mean and median *SIZE*, *NUMEX*, *AUD*, and *CHAEBOL* are statistically larger for the early adopters.

[28] Following Paananen and Lin (2009), *FREEFLOAT* is the average number of shares traded on the last day of December divided by the number of common shares outstanding that day.

Appendix A

Table A1
Examples of Major Differences between IFRS and Korean GAAP Pre-IFRS.

Item	IFRS	Korean GAAP Pre-IFRS
Fair Value Applications to Assets and Liabilities		
Tangible/Intangible Assets	Historical cost model or Fair value model	Historical cost model (allowed revaluation of tangible assets as of 2008)
Investment Real Estate	Historical cost model or Fair value model	Historical cost model
Financial Assets	Fair value model	None
Retirement Allowance	Measure using actuarial methods	Measure using liquidation value concept
Goodwill	Impairment loss	Amortized over 20 years using straight line method
Accounting Methods Reflecting Economic Substance		
Allowance for Doubtful Accounts	Recognized only under accrual basis (not acceptable to use expected losses)	Recognize based on reasonable/objective criteria including past experience and expected losses
Callable Preferred Stock	Classified as liabilities	Classified as capital
Consolidation Issues		
Major statements	Consolidated	Individual/separate
Consolidation – Percentage	Higher than 50% or substantial controlling interest	Higher than 50% or largest shareholder owns 30% or substantial controlling interest
Consolidation – Entities	Consolidate regardless of asset sizes and legal entities; includes special purpose entities	Excludes special purpose entities
Consolidation – Reporting Nonfinancial Items	Required	Not required

Appendix B

Table B1
Variable Definitions.

Variable	Definition	Data Source
ΔNI	Change in Net Income; change in annual earnings scaled by ending total assets	KIS Value Database
ΔCFO	Change in Operation Cash Flows; change in operating cash flows scaled by ending total assets	KIS Value Database
CFO	Cash Flow from Operations; cash flow from operating activities scaled by ending total assets	KIS Value Database
ACC	Accruals; net income minus operating cash flows	KIS Value Database
SMPOS	Small Positive Net Income; indicator variable where 1 if net income scaled by ending total assets is between 0 and 0.01, and = 0 otherwise	KIS Value Database
LGNEG	Large Negative Earnings; indicator variable where 1 if net income scaled by ending total assets is less than −0.2, and = 0 otherwise	KIS Value Database
LEV	Leverage; ending total liabilities divided by ending total book value of shareholders' equity	KIS Value Database
GROWTH	Sales Growth; percentage change in sales from prior year to current year	KIS Value Database
EISSUE	Change in Equity; percentage change in book value of common shareholders' equity from prior year to current year	KIS Value Database
DISSUE	Change in Liabilities; percentage change in total liabilities from prior year to current year	KIS Value Database
TURN	Turnover; sales divided by ending total assets	KIS Value Database
SIZE	Total Assets; natural log of ending total assets	KIS Value Database
AUD	Big 4 Auditor; indicator variable where equals 1 if the firm's auditor is PwC, KPMG, EY, or Deloitte, and = 0 otherwise	KIS Value Database
NUMEX	Stock Exchange Listings; number of stock exchanges on which firm's stock is listed	SAMIL PwC Overseas IPO Guide[a]
XLIST	US Listing; indicator variable where equals 1 if firm is listed on a US stock exchange (and the US is not the firm's primary exchange), and = 0 otherwise	SAMIL PwC Overseas IPO Guide
CHAEBOL	Chaebol; indicator variable where equals 1 if firm belongs to one of 30 largest Chaebol that have private owners (family owned conglomerates), and = 0 otherwise	CEO Score Daily (www.ceoscore.co.kr)
IFRS	Indicator variable = 1 for firm pre-IFRS years and = 0 for firm IFRS years	
EPS	Earnings per Share; earnings per share at year end	KIS Value Database
RETURN	Annual Return; (stock price 3 months after year-end minus stock price 9 months prior to year-end)/stock price 9 months prior to year-end	KIS Value Database
BADNEWS	Negative annual return; indicator variable = 1 if Annual Return is negative	

[a] https://www.pwc.com/kr/ko/publications/service/samilpwc_ipo-2015_kr.pdf.

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