IFRS Adoption in Korea: The Relation Between Earnings and Stock Prices and Returns

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This study examines the value relevance of earnings surrounding Korea's adoption of International Financial Reporting Standards (IFRS), which was mandatory beginning in 2011. The study is motivated by mixed results in prior research of other countries' IFRS adoption and by limited research on Korea's adoption. We analyze annual stock prices and stock returns for 487 firms in the 10-year period, 2006 to 2015. Results indicate that the earnings-stock price relation increased in the IFRS periods compared to earlier periods, consistent with increased value relevance. The relation between earnings and stock returns decreases in IFRS periods.

Keywords: IFRS Adoption, Korea, Value Relevance of Earnings

JEL Classification: M41

I. Introduction

This study examines the effect of International Financial Reporting Standards (IFRS) on Korean capital markets. Korea's adoption of IFRS was precipitated by a serious financial crisis in 1997. Following the crisis, there was a significant overhaul of the financial environment in Korea, including mandatory changes to domestic accounting standards culminating in full IFRS adoption effective for years after 2010. In this study, we examine the value relevance of accounting information for stock prices and stock returns before and after IFRS adoption. The overarching motivation for this research is that capital market benefits are the most important reason for a government voluntarily to initiate IFRS (Hope *et al*., 2006).

Previous single-country research on IFRS adoption and value relevance of earnings has produced mixed results; therefore, information on the Korean setting provides additional evidence that can inform questions of why there are differences in results across adopting jurisdictions. We use both price and returns models, unlike some prior research that uses only one or the other.[1] Institutional settings and cultural variables are potentially important in IFRS adoption and implementation. For example, Korea had a fairly lengthy transition period from purely domestic standards to full IFRS adoption, which could attenuate the contrast of pre- and post-IFRS adoption periods. We also consider the potential effects of leadership and direction provided by the Korean

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[1] Barth *et al*. (2008) include both measures. Paananen and Lin (2009) examine stock prices, and Costa dos Santos and Cavalcante (2014) examine stock returns. We believe stock prices are theoretically more appropriate because value relevance should capture a relation between two measures whereas returns models are more commonly employed for studying pricing effects of events.

Accounting Standards Board as well as cultural variables defined by Hofstede *et al*. (2010), most of which suggest IFRS would be well-implemented. These types of factors can be used to compare and contrast prior single-country research results and to inform IFRS adoption decisions in jurisdictions where IFRS are currently being considered. Our study extends initial research on Korea's IFRS adoption by using different models and including data for longer time periods compared to Choi (2013) and Kim and Kim (2015).[2]

The study uses data for 487 firms in the 10-year period surrounding IFRS adoption, 2006 to 2015. We use regression analysis to examine the relation between earnings and stock prices and stock returns. Results show the earnings and stock price relation in IFRS periods is positive and statistically significant. Both an IFRS dummy and IFRS interacted with EPS are positive. There is a negative and statistically significant relation between the interaction term and stock returns in the IFRS period. The price results are consistent with the view that value relevance increases when IFRS is adopted.[3] Price is more commonly employed as the dependent variable in prior research and, we believe, is more appropriate from a research design perspective. Nonetheless, including returns is consistent with some prior research that uses only returns and provides additional information regarding value relevance.

Our price results are different from the limited research to date on Korea's IFRS adoption, which finds unchanged or weakened value relevance. Compare to our study, their test periods are more limited [only 2010 data in Choi (2013) and only three years in the IFRS time period for Kim and Kim (2015)], and importantly, we use a different value relevance model than Kim and Kim (2015). Our longer time period addresses an observation made by Kim and Kim (2015) that the effect of IFRS may require some passage of time before it is fully manifested, if indeed the IFRS accounting data are more value relevant. They use the term "full settlement," which we believe suggests that both financial statement preparers and capital market participants have an adjustment process to IFRS.

While it is not possible to explain fully the results obtained, we believe that Korea's IFRS adoption was a culminating event in a fairly lengthy change to the overall business and economic climate that started in the early 2000s. Institutional structures were put in place to support IFRS adoption, and Korea's "Big Bang" approach appears to be a fairly meaningful demarcation of accounting periods as well as an effort that garnered wide support.[4] Cultural aspects are likely to have bolstered successful implementation, which Henderson (2015) discusses. A complete picture of the post-IFRS accounting information and capital market relations in Korea may take even more than five years, especially to get at deeper questions that compare and contrast firms on more characteristics than book value and earnings. Overall, our results add to the literature on single-country IFRS adoption, and future research that explores possible explanations for inconsistent results in this literature is warranted. The paper proceeds by reviewing prior literature and the Korean setting and formally stating the research question. Then the methodology and sample are described, results explained, and conclusions made.

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[2] Except for translated abstracts, those studies are published in Korean.

[3] Barth *et al*. (2008) find a positive relation for their stock price model and insignificant results for their returns model.

[4] The KASB (2012) report uses the term "Big Bang." We discuss the report in the next section of the paper.

II. Literature Review, Setting, and Research Question

Prior research assumes IFRS are of higher quality than domestic standards; thus, it is expected that the value-relevance of accounting information will increase. Nonetheless, IFRS adoption is subject to a wide range of business, economic, legal, and political influences, all of which potentially affect this relation. The literature review addresses both multiple- and single-country research settings and highlights trade-offs in these approaches. The section first reviews the prior research, then discusses the Korean setting of IFRS adoption and implementation, and, in conclusion, formally states the research question.

A. Prior Research

Barth *et al*. (2008), one of the most cited papers in this research stream, compare sample firms from 21 countries that apply international accounting standards (IAS) with a control group of firms applying domestic standards. They assume accounting amounts based on IAS are of higher quality than those based on domestic standards, which is the standard assumption in this area of research. They predict that firms with higher quality accounting will have a higher association between stock prices, earnings, and equity book value because higher quality earnings better reflect a firm's underlying economics. However, there are two reasons the prediction of higher quality accounting information may not be valid: IAS may be of lower quality than domestic standards, and other financial reporting system features can mitigate any improvement in accounting quality due to higher quality standards (Barth *et al*., 2008). These reasons likely help explain why prior single-country research has had mixed results. Also, in our discussion of the Korean setting below, there are setting features that we believe both increase and decrease the likelihood of finding an earnings-value relevance relation.

Barth *et al*. (2008) conclude that the value relevance of accounting information is greater for sample firms applying IAS than for matched firms applying domestic standards, but there is some inconsistency in the results. Stock price models show significant differences in explanatory power pre- and post-IAS, but the stock returns model does not. This result motivates our analysis of both stock price and stock return models. Further, although their research design carefully constructs a matched sample of adopting and control firms, a drawback of this sort of analysis is that adopting firms self-select as voluntary adopters. In addition, the sample must be constructed from data bases that have limited representation of a country's firms.[5] The mixed results and the research design limitations motivate separate-country analyses of IAS and IFRS settings in order to provide a more complete understanding of the effects of changing from domestic accounting standards to IFRS.

Several prior single-country studies investigate value relevance of accounting information after IFRS adoption. Some benefits of single-country analyses are that many possible explanatory variables are held constant and samples are representative of a country's full population of firms. In a single-country study, there is consistency in the IFRS adoption and implementation process (though there could be within-country firm differences if implementation dates differ for public and private firms, for example) and in institutional setting features such as economic, political, cultural, and the year of IFRS adoption. The mixed findings in this line of research are likely due in part to these setting differences. Second, method differences such as using annual or quarterly

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[5] For example, the Germany component of the sample in Barth *et al*. (2008) has 65 IAS firms while Paananen and Lin (2009) have from 107 to 448 firms for their various sample periods.

data, stock prices or returns, and the pre- and post-IFRS years included in a sample are also potential explanations for prior mixed research results.

Single-country studies that find an increase in value relevance of accounting information include Horton and Serafeim (2009) for the United Kingdom, Vieru and Schadewitz (2012) for Finland, Chua *et al.* (2012) for Australia, Alali and Foote (2012) for Abu Dhabi, and Costa dos Santos and Cavalcante (2014) for Brazil. Some studies find no change in the value relevance of earnings [e.g., Callao *et al.* (2007) for Spain and Tsalavoutas *et al.* (2012) for Greece]. Similarly, Paananen and Lin (2009) find that earnings are less value relevant in IFRS periods than in earlier periods. They conclude that accounting quality has not improved but worsened over time, making it harder for investors to base their decisions on IFRS reporting. Oliveira *et al.* (2010) also find a decline in value relevance in the Portuguese setting. Finally, a study by Devalle *et al.* (2010) of five European countries finds the gamut of possible results: increasing, decreasing, or no value relevance.

Two studies examine the recent Korean IFRS adoption. Choi (2013) compares information for firms that prepared 2010 financial statements with both domestic standards and IFRS, which occurred because the first year of IFRS reporting, 2011, necessitated prior year financial statement disclosures also based on IFRS. Results using an Ohlson (1995)-based model show no difference in value relevance of net income and book value between the two sets of statements and no incremental value relevance of IFRS over domestic standards. Kim and Kim (2015), like Choi (2013), compare domestic- and IFRS-based value relevance for 2010 and also compare the pre- and post-IFRS adoption periods, 2008 to 2010 and 2011 to 2013, respectively. They use a model based on Ye and Finn (1999) that models stock price based on book value, return on equity, leverage, and asset turnover ratio, which is quite different from models in most prior IFRS adoption research. Their results for 2010 are consistent with Choi (2013); they conclude there is no difference in value relevance for domestic standards and IFRS. For their pre- and post-IFRS sample, they find weakened relations between return on equity and other measures and stock prices in the IFRS period compared to the domestic period.[6] They suggest that more time may be required for value relevance differences to appear, if in fact they exist, which we address in our study by using more years of data.

We believe inconsistent findings in prior research and limited direct evidence from Korea warrant further investigation of Korea's IFRS adoption. We carefully consider the setting to offer reasons to expect value relevance to increase as well as reasons that work against finding a relation between earnings and stock prices and stock returns. Further, our use of both stock measures provides a more complete picture of capital market effects than using only one of them.

B. The Korean Setting

In 2012 the Korean Accounting Standards Board (KASB) prepared a report on the country's IFRS adoption and implementation process. The report's executive summary explains that mandatory application of IFRS for all listed companies was intended to improve investors' perceptions of financial statement transparency and to demonstrate Korea's "strong will" to take part in the international movement towards a single set of high-quality global accounting standards. The term "unwavering will" is used elsewhere in the summary. The KASB report also states that Korea chose a "Big Bang" approach in adopting full IFRS rather than a phased-in or

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[6] Return on equity includes earnings so is the closest theoretically to our study's use of earnings. The other measures that also have a weakened relationship post-IFRS are book value, leverage, and asset turnover.

convergence approach, and there was a multifaceted approach to aid the adoption process including committees of experts and education (KASB, 2012). The executive summary concludes that Korea expects to have improved perceptions of financial statement reliability and enhanced status in the international accounting community. These comments and setting features are consistent with expecting an increase in the post-IFRS earnings and stock price and return relations.

Nonetheless, there were challenges and difficulties in adopting the new standards because of the significant accounting paradigm shift; the report calls the adoption process a "bumpy ride." Further, although the "roadmap" towards adoption was announced in 2007, there were indications soon after the 1997 financial crisis that there would be changes in financial accounting standards, disclosures, and standards-setting organizations (Kim, 2000). Generally, there was to be less influence of political, economic, and social objectives, and the entire financial and legal systems were to become more market-oriented (Kim, 2000). The 2012 KASB report recognizes earlier changes to domestic standards such as requiring more professional judgment, more conformity to economic substance, and more footnote disclosures. Thus, there was reasonable expectation of increased accounting quality and a more transparent financial environment even before the roadmap was announced. With this transition view in mind, Kim and Key (2014) find that the ability of earnings to predict stock prices increased over the 30-year period from 1982 to 2011.[7] Thus, setting features and the results in Kim and Key (2014) suggest a gradual movement away from domestic and towards IFRS, which works against finding strict pre- and post-IFRS differences in the earnings and stock price and stock returns relations.

A final consideration is that culture can have a large effect on a country's accounting system (Henderson, 2015). She highlights Hofstede cultural variable measures that contributed to Korea's adoption of IFRS "without any major upheavals."[8] In particular, medium power distance suggests Korea's society is slightly hierarchical, and low individualism is consistent with a society where people agree to the power structure and believe that all people have their place in society. We believe these characteristics are likely to support effective IFRS implementation because of the implied respect for institutions. Further, Korea is one of the most pragmatic (focusing on long-term consequences) and restrained (emphasizing the importance of maintaining societal norms) countries according to the Hofstede Center (Henderson, 2015). Henderson (2015) concludes that pragmatic inclinations outweighed the desire to maintain societal norms (implying that the existing domestic standards were a societal norm).[9]A single-country study cannot exploit cultural as an explanatory variable, but we believe future work on IFRS adoption and capital market research questions could make use of the Hofstede variables.

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[7] They employ the methodology of Kim and Kross (2005), using adjusted R^2 from annual regressions of earnings on price as the dependent variable and a time variable that reflects differences from earliest to latest years. The time variable is positive and statistically significant, consistent with increasing explanatory power of earnings for stock prices from the earlier to the later years.

[8] Geert Hofstede developed the now well-known theory of cultural dimensions in the 1960s and published several books and studies since that time including a revised and expanded third edition (Hofstede *et al*., 2010). There is a Hofstede Cultural Centre (https://geert-hofstede.com/the-hofstede-centre.html), and Korea's rankings on all six dimensions can be found at https://geert-hofstede.com/south-korea.html. Henderson (2015) is the first study we are aware of that ties cultural variables to IFRS adoption.

[9] In contrast to Henderson (2015), we believe the restraining characteristic would support the "buy in" of IFRS adoption as a new societal norm.

C. Research Question

Based on mixed results in prior research, theoretical issues of whether IFRS are of higher quality than domestic standards, Korea IFRS adoption setting aspects that start shortly after the 1997 financial crisis, and cultural aspects, a directional hypothesis for the relation between earnings and stock measures is not clear. Thus, we investigate the following research question:

What is the difference, if any, in the earnings and stock price and stock returns relations before and after IFRS adoption in Korea?

III. Methodology and Sample

The following regression models based on Costa dos Santos and Cavalcante (2014) are specified to test the value relevance of earnings for stock returns:

(1) $\text{PRICE/RETURN}_{i,t} = \alpha_0 + \alpha_1 \text{ EPS}_{i,t} + \alpha_2 \text{ BVPS}_{i,t} + \varepsilon_{i,t}$

(2) $\text{PRICE/RETURN}_{i,t} = \alpha_0 + \alpha_1 \text{ EPS}_{i,t} + \alpha_2 \text{ BVPS}_{i,t} + \delta_1 \text{ IFRS}_{i,t} + \delta_2 \text{ EPS}_{i,t} *\text{IFRS}_{i,t} + \varepsilon_{i,t}$

(3) $\text{PRICE/RETURN}_{i,t} = \alpha_0 + \alpha_1 \text{ EPS}_{i,t} + \alpha_2 \text{ BVPS}_{i,t} + \sum_{\tau=1}^{5} \beta\tau \text{ } IFRS_{i,t}^{2010+\tau}$

$\quad + \sum_{\tau=1}^{5} [\gamma\tau \text{ } YEAR_{i,t}^{2010+\tau} \text{x EPS}_{i,t}] + \varepsilon_{i,t}$

where:
$\text{PRICE}_{i,t}$ = firm i's stock price at the end of March of Year_{t+1},
$\text{RETURN}_{i,t}$ = firm i's 15 month return at the end of March of Year_{t+1},
$\text{EPS}_{i,t}$ = earnings per share of firm i during year t,
$\text{BVPS}_{i,t}$ = firm i's book value per share at the end of Year t.
IFRS = 0 if IFRS was not adopted and IFRS = 1 if adopted.
$YEAR_{i,t}^{2010+\tau} = 1$ if in $2010 + \tau$, otherwise $YEAR_{i,t}^{2010+\tau} = 0$.[10]
$YEAR_{i,t}^{2010+\tau}$ controls for events other than the IFRS adoption in each year after 2010.

We use this model because the study is the most recent IFRS adoption study that we reference; it also facilitates comparison with that study of Brazil's IFRS adoption, which occurred close to Korea's adoption.[11] The models used in prior research are very similar, although in some cases researchers make predictions for book value coefficients. We follow Costa dos Santos and Cavalcante (2014) and employ book value as a control variable. Model 1 is estimated primarily for informational purposes with the value relevance of earnings tested by the coefficent on α_1. The regression is estimated for the ten-year full sample period, 2006 to 2015, and also three sub-periods: pre-IFRS (2006 to 2008), the transition period where voluntary adoption was allowed (2009 and 2010), and post-IFRS when adoption was mandatory (2011 to 2015).[12] The research question addresses the effect of IFRS on value-relevance of earnings, which is tested in the

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[10] The traditional specification of returns created multicollinearity issues, which is overcome by using the natural logarithm to compute stock returns. Costa dos Santos and Cavalcante (2014) state that they had the same issue and used the natural logarithm. Barth *et al.* (2008) also use the natural logarithm.

[11] Brazil announced in 2007 that IFRS would be mandatory in periods ending in 2010. Optional early adoption could be done in the 2007 to 2009 period. Korea's roadmap was announced in 2007 with mandatory adoption effective in 2011. The early optional period was 2009 and 2010. Like Korea, Brazil also adopted IFRS as an individual country (contrasted with the simultaneous country adoption in the European Union, for example).

[12] Costa dos Santos and Cavalcante (2014) also separate their analysis into the same three periods.

Model 2 coefficient on the IFRS-EPS interaction term, δ_2. We also test the IFRS-EPS relation with year-by-year interaction terms, represented by the Model 3 coefficients on γ_1 to γ_5, which represent years 2011 to 2015, respectively.

The sample is obtained from the KIS VALUE database for the ten-year period 2006 to 2015, five years before and after IFRS adoption.[13] Financial institutions and insurance companies are excluded as are firms with year-ends other than December 31 and without necessary data for all ten years of the sample period. The sample includes 487 firms with 4,870 firm-year observations. Twenty-six of the firms are early adopters, either 2009 or 2010, with the respective firm IFRS dummy variables in Model 2 coded =1. The early adopters are excluded in estimating Model 3 because the model includes the specific years, 2011 to 2015. To control for the effects of extreme observations, amounts are truncated at three standard deviations.[14]

IV. Results

Table 1 reports descriptive statistics for the full sample of 4,870 firm years. All amounts except returns are in Korean won.[15] The mean annual stock return is .0196. Table 2 reports correlations between stock price, stock returns, earnings per share, and book value. Not surprisingly, EPS and book value are positively correlated, and both are positively correlated with stock price, all with sizeable magnitudes. EPS is positively correlated with stock returns for the Spearman statistic (correlation coefficient = .11) but marginally negatively correlated for the Pearson statistic (*p*-value = .10). Book value is negatively correlated with returns. These correlations suggest the EPS and book value relations to stock prices and stock returns could also differ in multivariate tests, which helps motivate testing both stock measures.

Table 1: Descriptive Statistics

Variables	N =	Mean	Standard Deviation	Lower Quartile	Median	Upper Quartile
$EPS_{i,t}$	4,870	2,203	10,259	26	564	2,608
$BVPS_{i,t}$	4,870	40,790	84,217	4,264	13,161	40,627
$PRICE_{i,t}$	4,870	38,584	78,540	3,305	11,000	35,300
$RETURN_{i,t}$	4,870	0.0196	0.0847	-0.0222	0.0097	0.0486

EPS= earnings per share, BVPS= book value per share, PRICE= stock price at the end of March of $year_{t+1}$, RETURN = 15-month return at the end of March of $year_{t+1}$, i = firm, and t = year.

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[13] KIS VALUE is the name of the financial database for public firms, similar to COMPUSTAT in the United States.
[14] 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.
[15] The average yearly exchange rate from 2006 to 2015 was approximately 1,100 won = $1 US.

Table 2: Correlation Coefficients

Variables	Price	Return	EPS	Book Value
Price	1	-0.04	0.56	0.78
Return	0.08	1	-0.02*	-0.10
EPS	0.67	0.11	1	0.63
Book Value	0.87	-0.07	0.64	1

Upper right = Pearson correlation coefficients
Lower left = Spearman correlation coefficients
All correlations are statistically significant at p<.01 except * is p=.10.

For all regression models, panel data models are used because the null hypotheses that there are no fixed effects and no random effects are rejected in all cases. The F-tests for fixed effects and Breusch and Pagan (1980) Lagrange multiplier test for random effects are tabulated on tables 3, 4, and 5 for the respective models. We use the Hausman (1978) specification test to determine whether to use fixed or random effects models. The null hypothesis that the preferred model is random rather than fixed effects is rejected in all cases except for the Table 3 stock returns model for the transition period, 2009-2010. Therefore, in all but that case, we estimate fixed effects models. Unit root tests are also calculated (not tabulated). The hypothesis that a unit root is present in a time series sample is rejected for the sample data.[16]

Table 3 reports the results for Model 1 with the two dependent variables, price and returns, for the full ten-year period and for three sub-periods, pre-IFRS (2006 to 2008), transition (2009 and 2010), and post-IFRS (2011-2015). These results do not address the research question but are specified in order to assess the general relations in the sample between earnings and book value and stock returns in a multivariate model. F-tests (not tabulated) for all models are statistically significant, and adjusted R^2 amounts range from .85 to .92 for price models and from .03 to .47 for returns models.

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[16] The augmented Dickey-Fuller unit root test is used because it tests the null hypothesis that a unit root is present in a time series sample (Dickey and Fuller, 1979). Since the null hypothesis of the presence of unit root is rejected, the time series data are I(0).

Table 3: Regression Estimates of Model 1

Model 1: $PRICE_{i,t}/RETURN_{i,t} = \alpha_0 + \alpha_1 EPS_{i,t} + \alpha_2 BVPS_{i,t} + \varepsilon_{i,t}$
Panel regression models. Coefficient estimates and (*t*-statistics) are reported.

Variables	Full Period		Pre-IFRS		Transition Period		Post-IFRS	
	2006-2015		2006-2008		2009-20010		2011-2015	
	Price Model (fixed effect)	Return Model (fixed effect)	Price Model (fixed effect)	Return Model (fixed effect)	Price Model (fixed effect)	Return Model (random effect)	Price Model (fixed effect)	Return Model (fixed effect)
Intercept	139,435	3.28	39,629	-6.71	127,930	3.94	206,121	1.52
	(13.98)***	(1.31)	(4.63)***	(-1.43)	(8.01)***	(1.84)*	(17.39)***	(.50)
EPS	0.11	0.00007	.75	0.000017	.40	0.000163	-0.10	0.00008
	(1.65)*	(4.48)***	(6.18)***	(.26)	(2.12)**	(4.64)***	(-1.34)	(3.93)**
BVPS	0.37	-0.000003	-.01	0.00004	0.01	-0.00003	0.19	0.000004
	(22.24)***	(-0.80)	(-.40)	(2.55)**	(.25)	(-5.76)***	(6.20)***	(.45)
N	4,870	4,870	1,461	1,461	974	974	2,435	2,435
Adj. R^2	.85	.23	.92	.47	.90	.03	.92	.42
F test	14.96***	2.55***	9.69***	1.76***	7.83***	2.86***	18.61***	2.75***
LM test	5,665***	14,792***	410***	11,607***	192.98***	1,020***	2,362***	880***
Hausman test	211.2***	20.72***	513.18***	11.69***	268.25***	4.23	272.75***	16.87***

*, **, *** denote *p*-values < .05, .01, and .0001, respectively.
EPS = earnings per share, BVPS = book value per share, PRICE = stock price at the end of March of year$_{t+1}$, RETURN = 15-month return at the end of March of year$_{t+1}$, i = firm, and t = year.

   The relation between EPS and stock price is positive and statistically significant except for the post-IFRS period. For stock returns, the relation is positive and statistically significant except for the pre-IFRS period. Thus, the full period results are driven by the two sub-periods with statistically significant positive relations. For BVPS, the coefficients are less consistent across time periods. In the price models, BVPS coefficients are positive and statistically significant in the full period and the sub-period, post-IFRS. In the returns models, the full period coefficient is not statistically significant, and in the three sub-periods there are mixed results: one period is not statistically insignificant, one is positive, and one is negative. Overall, these results generally show expected positive relations between earnings and stock returns and stock price, the main relation of interest in this study, but the lack of complete consistency suggests there could be some differences that manifest themselves in our tests that employ the IFRS and EPS interaction terms.

Table 4: Regression Estimates of Model 2

Model 2: $PRICE_{i,t} / RETURN_{i,t} = \alpha_0 + \alpha_1 EPS_{i,t} + \alpha_2 BVPS_{i,t} + \delta_1 IFRS_{i,t} + \delta_2 EPS_{i,t} * IFRS_{i,t} + \varepsilon_{i,t}$
Panel Regression Models. Coefficient estimates and (*t*-statistics) are reported.

Variables	Price Model (fixed effect)	Return Model (fixed effect)
Intercept	106,247 (9.13)***	2.37 (.80)
EPS	-.45 (-4.79)***	0.00013 ((5.27)***
BVPS	0.33 (18.67)***	0.0000016 (.35)
IFRS	33,511 (5.49)***	0.839 (.54)
EPS*IFRS	0.88 (8.42)***	-0.00008 (-2.99)***
N	4,870	4,870
Adjusted R^2	.85	.24
F test	15.28***	2.52***
LM test	5,537***	13,499***
Hausman test	287.32***	31.25***

*, **, *** denote *p*-values < .05, .01, and .0001, respectively.
EPS = earnings per share, BVPS = book value per share, PRICE = stock price at the end of March
of year$_{t+1}$, RETURN = 15-month return at the end of March of year$_{t+1}$, IFRS = 1 if year = 2011 to
2015 or if early adopter in 2010, i = firm, and t = year.

Table 4 reports results for Model 2, where an IFRS dummy variable and EPS*IFRS interaction term are added to the baseline model, and the full panel of data are tested in one regression. For the price model, IFRS is positive and statistically significant, indicating higher stock prices in IFRS periods. IFRS is not statistically significant in the returns model. Of course, the variable captures elements of that period other than IFRS adoption. The interaction term tests the research question: What is the difference, if any, in the earnings and stock price and stock returns relations before and after IFRS adoption in Korea? The coefficient on EPS*IFRS is positive and statistically significant for the price model, indicating that in IFRS adoption years, higher (lower) EPS is associated with higher (lower) stock prices. The opposite result obtains for the returns model: the EPS*IFRS coefficient is negative and statistically significant. The Costa dos Santos and Cavalcante (2014) results, where the dependent variable is returns, show statistically significant coefficients for the IFRS dummy (negative) and for the interaction term (positive), quite different from the Korea results. Our stock price results are different from Choi (2013) and Kim and Kim (2015), both of which report no difference in value relevance for domestic versus IFRS standards. Our model specifications are more consistent with prior research than Kim and

Kim (2015), but regardless, our study shows the importance of considering alternative models and having additional years of data.

Table 5 reports the results for Model 3, which follows Model 2 except that it specifies the IFRS dummy and IFRS*EPS interaction terms by separate IFRS years, 2011 to 2015, creating five dummies and five interaction variables. The results for the price model show that the IFRS dummy is positive and statistically significant in 2012 to 2015, consistent with the statistically positive coefficient on the [single] IFRS dummy in Table 4. For the returns model, the 2014 and 2015 IFRS dummies are positive and statistically significant (the Table 4 results show insignificant results for the dummy). The variables of interest for the research question, the five interaction terms, are different for the price and returns models in the same manner as Table 4. For the price model, four of the five years have positive and statistically significant coefficients on IFRS*EPS, all but 2013. For the returns model, coefficients in three of the five years are statistically negative, 2012, 2013, and 2014. [17] Again, the overall conclusion is that the price models are consistent with the view that value relevance of earnings increases when IFRS is adopted, but the returns models have the opposite conclusion. Our conclusions for stock prices differ from Kim and Kim (2015), although direct comparisons cannot be made because their model is different from ours. Their data included 2011 to 2013, and they found weakened relations between stock prices and several measures in the IFRS period compared to pre-IFRS, with return on equity the measure that includes earnings.

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[17] Costa dos Santos and Cavalcante (2014) have yearly results that parallel their combined results for three of six interaction terms, the latter three years, and for five of six IFRS dummies.

Table 5: Regression Estimates of Model 3

Model 3: $\text{PRICE}_{i,t} / \text{RETURN}_{i,t} = \alpha_0 + \alpha_1 \, \text{EPS}_{i,t} + \alpha_2 \, \text{BVPS}_{i,t} + \sum_{\tau=1}^{5} \beta\tau \, IFRS_{i,t}^{2010+\tau}$
$+ \sum_{\tau=1}^{5} [\gamma\tau \, YEAR_{i,t}^{2010+\tau} \times \text{EPS}_{i,t}] + \varepsilon_{i,t}$

Panel regression models. Coefficient estimates and (*t*-statistics) are reported.

Variables	Price Model (Fixed Effect)	Return Model (Fixed Effect)
Intercept	121625.9 (13.49)***	-0.44742 (-0.17)
EPS	-0.15937 (-1.76)*	0.00015 (5.68)***
BVPS	0.37632 (20.18)***	0.000008 (1.54)
$IFRS_{i,t}^{2011}$	1532.791 (1.02)	-0.57242 (-1.3)
$IFRS_{i,t}^{2012}$	2811.082 (1.89)*	0.40003 (0.92)
$IFRS_{i,t}^{2013}$	7866.296 (5.33)***	0.53556 (1.24)
$IFRS_{i,t}^{2014}$	11130.69 (7.51)***	2.53890 (5.84)***
$IFRS_{i,t}^{2015}$	6999.457 (4.63)***	3.32864 (7.5)***
$IFRS_{i,t}^{2011} * EPS$	0.69213 (4.82)***	-0.00005 (-1.08)
$IFRS_{i,t}^{2012} * EPS$	0.69542 (4.7)***	-0.00015 (-3.43)***
$IFRS_{i,t}^{2013} * EPS$	-0.09668 (-0.76)	-0.00013 (-3.54)***
$IFRS_{i,t}^{2014} * EPS$	1.48852 (8.06)***	-0.00015 (-2.82)***
$IFRS_{i,t}^{2015} * EPS$	3.86467 (17.39)***	-0.00005 (-0.7)
N	4,610	4,610
Adjusted R^2	0.8722	0.147
F test	13.42***	1.19***
LM test	4,935***	3.21*
Hausman	5,398.76***	41.84***

*, **, *** denote *p*-values < .05, .01, and .0001, respectively.
EPS = earnings per share, BVPS = book value per share, PRICE = stock price at the end of March of year_{t+1}, RETURN = 15-month return at the end of March of year_{t+1}, IFRS = 1 if year = 2011 to 2015 or if early adopter in 2010, i = firm, and t = year.

V. Conclusion

This study addresses the question: "What difference is there, if any, in the earnings and stock price and stock returns relations before and after IFRS adoption in Korea?" Results indicate that there is a positive and statistically significant relation between stock prices and IFRS and the interaction of EPS and IFRS. The stock return and IFRS*EPS interaction shows a statistically negative relation. We believe the stock price results are more appropriate for addressing the research question. However, we believe it is informative to present more than one measure, especially because some prior research uses stock returns. The results give some support to the view that compared to domestic-based earnings, IFRS earnings are more value relevant, and, implicitly, of higher quality than pre-IFRS domestic standards. The results for stock prices differ from preliminary research on Korea's IFRS adoption by Choi (2013) and Kim and Kim (2015). The stock returns results are consistent with Kim and Kim (2015) but differ from Choi (2013), who found no difference for 2010 domestic versus IFRS-based financial statements. The two prior Korean studies and our study add to results in the existing literature on single-country studies of IFRS adoption and value relevance of earnings.

We assert that several aspects of IFRS adoption settings affect the capital market effects of adoption. We recommend future research that incorporates more than one country's adoption with measurements such as length of time between expected and actual IFRS adoption, transition periods, and cultural variables. Such research would necessitate using world-wide databases or joint efforts between researchers because it is nearly impossible for a researcher to have access to numerous single-country data sets.

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