

Journal Pre-proof

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PII: S0377-0427(19)30636-3
DOI: <https://doi.org/10.1016/j.cam.2019.112631>
Reference: CAM 112631

To appear in: *Journal of Computational and Applied Mathematics*

Received date : 17 July 2019
Revised date : 1 November 2019

Please cite this article as: F.-J. Hsu and S.-H. Chen, Does corporate social responsibility drive better performance by adopting IFRS? Evidence from emerging market, *Journal of Computational and Applied Mathematics* (2019), doi: <https://doi.org/10.1016/j.cam.2019.112631>.

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**Does Corporate Social Responsibility Drive Better Performance by
Adopting IFRS? Evidence from Emerging Market**

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November 2019

Does Corporate Social Responsibility Drive Better Performance by Adopting IFRS? Evidence from Emerging Market

Abstract

As switching from GAAP to IFRS causes changes to accounting quality, predictability, and crash risk, this paper empirically investigates whether firms involved in corporate social responsibility (CSR) performed better under IFRS adoption. Our sample is broken down into three sub-periods (2002-2005, 2010-2012, and 2013-2015) to meet the EU mandate IFRS in 2005 and Taiwan in 2013, respectively. We find mandatory IFRS adoption results in reducing earnings management, improving in forecast accuracy leading to enhanced earnings predictive ability, and mitigating crash risk. Furthermore, CSR firms behave responsibly in constraining earnings management and increasing financial reporting transparency through interaction with IFRS. Following IFRS adoption, crash risk is significantly improved in Over-The-Counter (OTC) companies and the enhanced transparency attracts increased foreign investment to the OTC market. Finally, the results on IFRS and CSR interaction provide reference for global capital markets, especially for major capital markets without mandatory IFRS adoption, e.g., the US and Japan.

Keywords: IFRS, accounting quality, crash risk, predictability, corporate social responsibility

JEL: M14, M41, M48

1. Introduction

In 2005, the European Union mandated adoption of the International Financial Reporting Standards (IFRS), and other countries have since followed suit. The switch from Taiwan Generally Accepted Accounting Principles (TGAAP) to IFRS is a major regulatory accounting reporting change in Taiwan. Previous studies have examined the effect of IFRS adoption on analyst forecasts (Byard et al., 2011; Garrido-Miralles and Sanabria-García, 2014; Pathirana and Jubb, 2018; Demmer et al., 2019), capital markets (Horton and Serafeim, 2010; Kim and Ryu, 2018; Franzen and Weißenberger, 2018; Castro and Santana, 2018; de Moura and Gupta, 2019; DeFond et al., 2019; Gu et al., 2019), financial reporting (Callao et al., 2007; Hung and Subramanyam, 2007; Trimble, 2018; Chen and Gong, 2019), cost of debt (Moscariello et al., 2014; Downes et al., 2018), earnings management (Amidu and Issahaku, 2019), and information comparability (Yip and Young, 2012; Mita et al., 2018; Liu et al., 2018)¹. Corporate social responsibility (CSR) has emerged as an increasingly important topic, and corporations are under mounting pressure to behave responsibly. Furthermore, CSR performance has been found to be related to financial performance (Lin et al., 2009; Surroca et al., 2010; Oyewumi et al., 2018; Lin et al., 2019; Jang et al., 2019; Bhattacharyya and Rahman, 2019; Chahine, et al., 2019; Kao et al., 2018), firm leverage (Sheikh, 2019), and firm market value (Lo and Sheu, 2007; Sheikh, 2018).

To gain a further understanding of the economic implications of current accounting processes and to compare the disclosures of CSR reporting, we consider the effects of mandatory IFRS adoption in terms of specific periods, comparing the impact of mandatory IFRS adoption and the interaction between IFRS and CSR commitment. Specifically, CSR disclosure is important because IFRS is purportedly a measure of fair value and allows for more precise allocation of revenues and expenses over time. First of all, the elimination of LIFO has a strong impact on the industry effect. Thus, we expect these transparency effects to be enhanced following IFRS adoption and to result in meaningful differences in terms of CSR activity and IFRS adoption. Secondly, IFRS promises more accurate, timely and comprehensive financial statement information that is relevant to GAAP. IFRS tends to be more comprehensible to investors, thus reducing risk for new or small investors, and reducing advantages to professional investors who are better equipped to understand complex financial statements. Based on this view, we then use two accounting based features (accrual quality and analysts forecast error), along with two market based earnings features (value relevance and predictability) to explore differences in

¹ However, previous studies on IFRS adoption have mostly focused on the implications for equity markets between different countries or within the same country, and have largely ignored firms' corporate governance and management incentives.

attribution between TGAAP and IFRS earnings. Finally, one of the advantages of IFRS is that it standardizes financial reporting which eventually improves the comparability of financial statements between major financial markets and countries. IFRS thus enhances access to foreign capital markets and removes trade barriers.

However, IFRS implementation can be quite complex and costly, especially for multinational companies and small and medium sized enterprises (SMEs) which may thus resist adopting IFRS. Nevertheless, empirical results suggest that increased transparency from IFRS reduces crash risk (DeFond et al., 2014; Hutton et al., 2009) and the transition period provides an opportunity to assess whether mandatory IFRS adoption affects crash risk. This paper looks at three research questions: 1) does IFRS adoption improve accounting quality and the relevance of financial information? 2) Do firms involved in CSR activity outperform others under IFRS? 3) Does IFRS adoption reduce crash risk? We build upon several prior studies in addressing these questions. With respect to the first research question, administrators personally benefit from manipulating earnings (e.g., via accruals) (Dechow and Dichev, 2002). Therefore, accruals quality is a crucial piece of evidence in determining differences between corporate performance under TGAAP and IFRS. The empirical results show that IFRS adoption provides a more significant improvement to accruals quality, not only in Public-Traded-Companies (PTC) but also in Over-The-Counter (OTC) companies. In addition, following Kothari et al. (2005) who added ROA to recalculate accruals, while implementation of IFRS also results in a significant improvement to accounting quality compared to pre-IFRS periods. To improve comprehensibility for investors and reduce investment risk, we use analyst forecast error (Dhaliwal et al., 2012) to determine whether IFRS implementation improves earnings estimation accuracy. Furthermore, following previous studies (Van der Meulen et al., 2007; Bartov et al., 2005; Lipe, 1990), earnings per share (EPS) is used to assess firm value relevance and predictive future performance².

The evolution of financial reporting is a useful comparative tool to analyze the potential growth and development of CSR disclosure (Tschopp and Huefner, 2015; Chen, Hung, and Wang, 2018) and several organizations³. Business management theory suggests that the evolution of accounting systems is influenced by cultural, political, legal, economic factors. This study investigates whether CSR firms behave differently from other firms under IFRS. Specifically, we question whether firms that engage in CSR also behave responsibly to constrain earnings management, thereby delivering more transparent and faithful financial information to investors. We then

² Empirical results show that IFRS significantly enhances value relevance and predictability of future firm performance.

³ Such as European Union (EU), IMF, World Bank are promoting, legitimizing, or mandating some level of CSR reporting (Tschopp et al., 2012a, b).

examine the link between CSR and IFRS to assess differences in accounting quality, value relevance, and predictability, and find that combined IFRS and CSR reduce earnings manipulation and increase earnings predictability. Finally, standardization and fair value accounting may encourage investors invest in riskier assets by increasing potential investment gains (Li, 2010), in particular for foreign investors (Cai et al., 2019)⁴.

We focus on accounting information measures for which estimates under IFRS are likely to differ considerably under TGAAP for publicly traded companies across 28 sectors in Taiwan (with the notable exception of the financial services industry). To compare the evolution of accounting reporting standards, the research sample is broken down into three sub-periods: non-IFRS (2002-2005), pre-IFRS (2010-2012), and post-adoption (2013-2015), thus accounting for forced IFRS adoption in the EU (2005) and Taiwan (2013). IFRS adoption produces mixed results in different countries (Lin et al., 2012; Landsman et al., 2012; Horton et al., 2013). The results are consistent with previous findings that switching to IFRS generally improves accruals quality (Barth et al., 2012; Moscarriello et al., 2014) and the quality of the financial information (Garrido-Miralles and Sanabria-García, 2014), while increasing analyst following (Landsman et al., 2012), and decreasing forecast errors (Horton et al., 2013). Moreover, IFRS adoption increases both information quality and accounting comparability when ROA is used as a robustness factor. Second, following mandatory IFRS adoption, CSR firms perform better in terms of (1) reduced earnings management through discretionary accruals (Kim et al., 2012; Choi and Pae, 2011) (2) improved earnings forecast accuracy (Dhaliwal et al., 2012; Choi and Pae, 2011), and (3) improved informativeness of earnings announcements (Iatridis, 2013; Ernstberger, 2008) as evidenced from increased comparability and improved information quality, thus improving predictability. Finally, and most importantly, we find that crash risk threat is reduced following IFRS implementation in 2013 (DeFond et al., 2014).

The next section discusses our research design including data collection, methods, and hypotheses development. Section 3 presents the empirical results and findings. Conclusions are drawn in Section 4.

2. Research Design

2.1 Data and sample selection

We collected 13,937 firm-year observations from companies listed on the Taiwan

⁴ Consistent with DeFond et al. (2014), IFRS adoption is seen to increase comparability and transparency of financial statements, thus reducing crash risk.

Stock Exchange (TWSE) from 2002 to 2005 and from 2010 to 2015 to capture differences in accounting quality in three periods: non-IFRS, prior to IFRS adoption, and following mandatory IFRS adoption. The sample is broken down into three sub-periods: non-IFRS (2002-2005), pre-IFRS (2010-2012), and post-IFRS (2013-2015) because of the European Union first mandated IFRS adoption in 2005, followed by Taiwan in 2013. Accounting data were obtained from the *Taiwan Economic Journal* (TEJ) database and financial sector firms were excluded from the sample. Stock returns, exchange rates, and index returns were obtained from the DataStream database. CSR related disclosures were obtained from Commonwealth Journal.

2.2 Methodology

This study uses financial data mining to estimate total discretionary accruals, analyst forecast error, value relevance, predictability, and crash risk.

Modified Jones model for total discretionary accruals

The measurement of total discretionary accruals (TDA) usually begins with total accruals (TA). This study considers a modified version of the Jones model (Dechow *et al.*, 1995) to measure discretionary accruals.

$$\frac{TA_{i,t}}{AT_{i,t-1}} = \beta_0 + \beta_1 \left(\frac{1}{AT_{i,t-1}} \right) + \beta_2 \left(\frac{\Delta REV_{i,t}}{AT_{i,t-1}} \right) + \beta_3 \left(\frac{PPE_{i,t}}{AT_{i,t-1}} \right) + \varepsilon_{i,t} \quad (1)$$

where i and t respectively denote firm i and year t , and $TA_{i,t} = NI_{i,t} - CFO_{i,t}$.

$TA_{i,t}$ = firm i 's annual total sum of accruals in year t

$NI_{i,t}$ = firm i 's annual recurrent surpluses in year t

$CFO_{i,t}$ = firm i 's operating cash flow in year t

$AT_{i,t-1}$ = firm i 's total assets in year $t-1$

$\Delta REV_{i,t}$ = change in revenue

$PPE_{i,t}$ = firm i 's property, plant and equipment in year t

$TA_{i,t}$ is used to estimate the firm-specific normal coefficients for sample firms through Eq. (1). After obtaining the estimated coefficients from Eq. (1) (i.e., $\hat{\beta}_0$, $\hat{\beta}_1$, $\hat{\beta}_2$, and $\hat{\beta}_3$), We reassign the coefficients into Eq. (2) to obtain nondiscretionary total accruals (NDTAC).

$$NDTAC_{i,t} = \hat{\beta}_0 + \hat{\beta}_1 \left(\frac{1}{AT_{i,t-1}} \right) + \hat{\beta}_2 \left(\frac{\Delta REV_{i,t} - \Delta AR_{i,t}}{AT_{i,t-1}} \right) + \hat{\beta}_3 \left(\frac{PPE_{i,t}}{AT_{i,t-1}} \right) \quad (2)$$

where $\Delta AR_{i,t}$ denotes a change in accounts receivable. Using each of the competing models, TDA are then estimated by subtracting the predicted level of nondiscretionary total accruals (NDTAC) from total accruals.

$$TDA = \frac{TA_{i,t}}{AT_{i,t-1}} - NDTAC_{i,t} \quad (3)$$

Performance-adjusted total discretionary accruals

Kothari *et al.* (2005) estimate an additional discretionary accrual measure and include the previous year's return on assets (ROA) in the Jones model regression. Their proposed performance-adjusted matched discretionary accrual measure is both more specific and powerful those previously proposed by Jones (1991) and subsequent modifications (Dechow *et al.*, 2002; Dechow *et al.*, 1995; Jones, 1991). This study uses the performance-adjusted matched discretionary accrual measure proposed by Kothari *et al.* (2005) to modify the Dechow *et al.* (1995) model based on the Jones model.

$$\frac{TA_{i,t}}{AT_{i,t-1}} = \beta_0 + \beta_1 \left(\frac{1}{AT_{i,t-1}} \right) + \beta_2 \left(\frac{\Delta REV_{i,t}}{AT_{i,t-1}} \right) + \beta_3 \left(\frac{PPE_{i,t}}{AT_{i,t-1}} \right) + \beta_4 (ROA_t) + \varepsilon_{i,t} \quad (4)$$

where ROA denotes the return on assets. After obtaining the estimated coefficients from Eq. (4) (i.e., $\hat{\beta}_0$, $\hat{\beta}_1$, $\hat{\beta}_2$, $\hat{\beta}_3$, and $\hat{\beta}_4$), We reassign the coefficients to Eq. (5) to obtain nondiscretionary total accruals under Kothari *et al.* (2005) (NDTAC_K).

$$NDTAC_K_{i,t} = \hat{\beta}_0 + \hat{\beta}_1 \left(\frac{1}{AT_{i,t-1}} \right) + \hat{\beta}_2 \left(\frac{\Delta REV_{i,t} - \Delta AR_{i,t}}{AT_{i,t-1}} \right) + \hat{\beta}_3 \left(\frac{PPE_{i,t}}{AT_{i,t-1}} \right) + \hat{\beta}_4 (ROA_t) \quad (5)$$

TDA_K (i.e., performance-adjusted matched discretionary accrual) are then estimated by subtracting the predicted level of nondiscretionary total accruals (NDTAC_K) by Eq. (6).

$$TDA_K = \frac{TA_{i,t}}{AT_{i,t-1}} - NDTAC_K_{i,t} \quad (6)$$

Analyst forecast error

One of the main purposes is to understand the impact of IFRS adoption and firm characteristic variables on the accuracy of analyst earnings forecasts for Taiwan firms. Dhaliwal *et al.* (2012) define earnings forecast error (F_error) as the average of the absolute errors of all earnings forecasts made in the year for the object firm's earnings and scaled by the stock price at the beginning of the year. Moreover, subscripts i , t , and n respectively denote firm i 's forecast n in year t . In this study, we distinguish between forecasts made for different years because the forecast error increases with the forecast horizon (De Bondt and Thaler, 1990). FC denotes that the analyst earnings forecast and $EPS_{i,t}$ denotes firm i 's earnings per share in year t , and $P_{i,t}$ denotes firm i 's stock price at the beginning of the year in year.

$$F_error_{i,t} = \frac{1}{N} \sum_{n=1}^N |FC_{i,t,n} - EPS_{i,t}| / P_{i,t} \quad (7)$$

Value relevance

According to Bartov *et al.* (2005), stock prices react differently to positive and negative earnings. Besides, Van der Meulen *et al.* (2007) measure value relevance in terms of the contemporaneous association between stock returns and earnings by using EPS, and distinguish between positive and negative earnings. We also run the price-earnings model, in which prices are regressed on both earnings and the book value of equity (Ohlson, 1995). We run the following regression:

$$P_{i,t} = \beta_0 + \beta_1 \cdot X_{i,t} + \beta_2 \cdot DX + \beta_3 X_{i,t} \cdot DX + \beta_4 \cdot BV_{i,t-1} \quad (8)$$

where $P_{i,t}$ is the stock price three months after the end of fiscal year t , $X_{i,t}$ is EPS, DX is the dummy variable equal to one if earnings are negative and zero otherwise, and $BV_{i,t-1}$ is the book value at the beginning of year t . Following Van der Meulen *et al.* (2007), the measure of value relevance is based on the model's explanatory power of Eq. (8) (R^2) which is separately estimated for IFRS adoption and the TGAAP sample.

Predictability

To test whether earnings under IFRS have different predictive ability than under TGAAP, We follow Van der Meulen *et al.* (2007) and Lipe (1990) in modeling the association between future, current, and past earnings per share to assess earnings predictability. The model estimates R^2 as follows:

$$X_{i,t+1} = \beta_0 + \beta_1 \cdot X_{i,t} + \beta_2 \cdot X_{i,t-1} \quad (9)$$

where, $X_{i,t+1}$, $X_{i,t}$, and $X_{i,t-1}$ respectively denote earnings per share for firm i in fiscal year $t+1$, t , and $t-1$. Again, the model's explanatory power of Eq. (9) (R^2) indicates better predictive ability with higher values.

2.2 Testable hypotheses

2.1 Comparability before and after IFRS adoption in accounting quality

The country-level impact on earnings quality of an evolutionary change in accounting standards (e.g., switching from local GAAP to IFRS) is an important issue. However, the current literature shows mandatory IFRS adoption has a mixed impact on earnings quality. To determine the causes of differences between the two accounting systems, based on prior studies (Dechow and Dichev, 2002; Barth *et al.*, 2012), we use total discretionary accrual (TDA) as a dependent variable to estimate earnings manipulation following mandatory IFRS implementation.

Empirical studies have shown mixed benefits for local GAAP versus IFRS. Lantto and Sahlström (2009) showed IFRS implementation enhanced key financial ratios, Gastón *et al.* (2010) found IFRS had a negative effect on the relevance of financial reporting, and Cairns *et al.* (2011) claimed IFRS provides significant advantages including increased transparency, improved comparability of financial information, and improved quality of financial reporting⁵. However, GAAP has been found to outperform IFRS in terms of quality of accounting information after controlling for different firm characteristics⁶ (Van der Meulen *et al.*, 2007).

Switching from TGAAP to IFRS offers an opportunity to assess associated changes in accounting quality. Therefore, this research proposes the following hypotheses:

H₁: *Ceteris paribus*, the adoption of IFRS will change accruals quality.

IFRS provides increased transparency, improved comparability of financial information, and improved quality of financial reporting⁷ (Daske *et al.*, 2013; Cairns

⁵ If the evolution of accounting practices provide actual benefits, then mandatory IFRS adoption should aid investors, regulators, and managers by providing increased transparency, improved protection of outside investor claims (Daske *et al.*, 2013), improved quality of earnings, and more extensive disclosure as compared to domestic accounting standards (Armstrong *et al.*, 2010).

⁶ Lin *et al.* (2012) found that IFRS adoption increased earnings management and reduced value relevance, while Jeanjean and Stolowy (2008) found that IFRS adoption did not reduce earnings management because of conflicts management incentives and national institutional factors (Jeanjean and Stolowy, 2008).

⁷ Moreover, strong enforcement of accounting standards has been found to be associated with reduced

et al., 2011). This study extends the above lines of research by investigating the effects of IFRS on firm earnings forecasts, and to assessing the effect of uniform, harmonized accounting standards on the utility of financial information to financial market participants.

H₂: *Ceteris paribus*, the implementation of IFRS will have an impact on the accuracy of analysts' earnings forecasts.

2.2 Value relevance and predictability before and after IFRS

Mandated and consistent application of uniform and harmonized accounting standards provides improved comparability and predictability. However, does IFRS provide better predictability than local GAAP standards? To investigate changes to predictability of explanatory power (i.e., R^2) following IFRS adoption, we use two market based earnings features: value relevance and predictability.

Prior studies have used positive and negative earnings and EPS to measure value relevance and earnings predictability in terms of contemporaneous associations with stock returns, past earnings, and present earnings (Bartov *et al.*, 2005; Lipe, 1990). Furthermore, financial ratios also contain significant information for predicting the cross-section of stock returns (Alexakis *et al.*, 2010). Besides, if financial statements are audited by the big four accounting firms, investors are able to better forecast future earnings (Hussainey, 2009). Since earnings volatility is negatively related to earnings predictability (Dichev and Tang, 2009), we use EPS as a predictive value because it is a summary measure of equity value, and changes to EPS reflect investor capital allocation decisions, and thus EPS is commonly used to capture a firm's underlying value. However, empirical studies have presented conflicting views on the impact of IFRS on earnings persistence⁸.

Based on the explanatory power of Eqs. (8) and (9), We expect to find that the enhanced transparency and comparability of financial information resulting from IFRS adoption will result in enhanced value relevance and predictability. Therefore, we propose the following hypotheses:

analyst forecast error (Hope, 2003; Tan *et al.*, 2011), and increased financial disclosures are positively associated with improved analyst forecast accuracy. We investigate whether IFRS compliance has an effect on financial analysts' ability to translate accounting information into forward looking information and whether the switch to IFRS has a positive impact on the accuracy of earnings forecasts.

⁸ According to Barth *et al.* (2008), IFRS adoption has been found to reduce earnings management, increases timely loss recognition, and increases value-relevance. However, other studies have found that IFRS adoption can result in increased earnings smoothing, less timely loss recognition, increased earnings management (Jeanjean and Stolowy, 2008; Chen *et al.*, 2010), and worse predictive ability (Van der Meulen *et al.*, 2007).

H3: *Ceteris paribus*, IFRS captures more value relevance information result thus improving the R-squared value.

H4: *Ceteris paribus*, IFRS captures more predictable ability information result thus improving the R-squared value.

2.3 Interaction between CSR engagement and IFRS adoption

Previous studies in several countries have reached inconclusive or conflicting results regarding the association between CSR and earnings quality. On the one hand, some results found a negative association due to CSR obscuring earnings management (Prior *et al.*, 2008), while others found a positive association with reduced earnings manipulation and real operating activities (Kim *et al.*, 2012; Choi and Pae, 2011). We try to reconcile these conflicting results and provide a possible explanation by comparing between the evolution of reporting and CSR which moderate the association between CSR and earnings quality⁹.

We argue that profitable CSR activities can increase firm transparency by reducing perceived risk of financial distress in several ways. First, CSR performance can improve the relationship between the firm and its stakeholders while also improving the firm's long-term sustainability (Akisik and Gal, 2011). Second, innovation is positively associated with CSR practices (Gallego-Álvarez *et al.*, 2011). Third, investors are sensitive to changes to the potential of a firm being hit with regulatory sanctions for irresponsible behavior (Shane and Spicer, 1983).

We seek to determine whether firms with positive CSR behavior will also constrain earnings management under IFRS, thereby delivering more transparent and reliable financial information to investors. We then examine whether the adoption of IFRS improves the financial reporting quality and posit that firms with a higher level of CSR commitment provide better quality financial reporting. Therefore, this research proposes the following hypotheses:

H5: *Ceteris paribus*, following mandatory IFRS adoption, firms engaged in CSR activities produce higher quality accounting information.

⁹ Prior studies in different countries have shown that the issuance of stand-alone CSR reports is associated with reduced analyst forecast error (Dhaliwal *et al.*, 2012) which is, in turn, associated with strong enforcement of accounting standards (Hope, 2003; Tan *et al.*, 2011) and improved financial disclosure.

3. Empirical results

3.1 Descriptive statistics

Table 1 shows the sample distribution by sector in 28 industries. The study includes 13,937 samples of firms listed in Taiwan from 2002 to 2005, 2010 to 2012, and 2013 to 2015. High-technology firms accounted for 54.05% of the sample, while the remaining 45.95% were traditional-industry firms. The most heavily represented industry is Electronic Parts/Components (14.03%), followed by Semiconductors (9.23%), and Optoelectronics (7.89%), proportional to public firms by industry in Taiwan. Furthermore, the Non-IFRS period, Pre-IFRS period, and Post-IFRS periods had similar levels of representation, respectively 34.8%, 32.3%, and 32.9% of firms in the sample. PTC and OTC respectively signify Public-Traded-Companies and Over-The-Counter companies. Panel B of Table 1 shows that the samples for PTC and OTC under Non-IFRS, Pre-IFRS, and Post-IFRS adoption are nearly identical, indicating that the sample is representative.

<Insert Table 1 about here>

Table 2 summarizes the descriptive statistics for all three sub-samples before and after IFRS adoption. Market value (MV), total assets, and operating cash flow all increase significantly over time with firm size. In addition, institutional holdings increase significantly post-IFRS accompanied by significantly reduced stock trading volume. This suggests that IFRS adoption attracts corporate investment and reduces trading volatility. Furthermore, firms leverage is negatively correlated with firm size. We observed lower leverage during the post-IFRS period, though the difference is insignificant. However, total sales fall significantly, with a larger standard deviation. Table 2 further examines the difference between mean and median in ROA and return on equity (ROE) to understand the differing impact of IFRS adoption. IFRS adoption is found to improve accounting transparency, resulting in increased institutional holdings (consistent with Florou and Pope, 2012), decreasing leverage opacity, and enhancing profitability capacity (consistent with Cairns *et al.*, 2011).

<Insert Table 2 about here>

3.2 IFRS and accounting quality

Table 3 presents accrual quality and analyst accuracy results following mandatory IFRS adoption, along with the accruals quality under the model proposed by Dechow *et al.* (1995). Accruals improve following mandatory IFRS adoption both in PTC and OTC firms, while the accruals difference between pre-IFRS and post-IFRS shrinks following IFRS adoption, thus supporting H1. In addition, under the model proposed by Dechow *et al.* (1995), IFRS adoption exhibits lower accrual management and a significant median difference. We used the ROA proposed by Kothari *et al.* (2005) as a factor to check robustness of accruals quality under IFRS. In the model proposed by Kothari *et al.* (2005), accruals quality improves significantly in median difference following IFRS adoption, thus supporting H1. Table 3 shows the improvement in accruals quality following IFRS adoption, which is not only consistent with prior findings (Barth *et al.*, 2012; Yip and Young, 2012; Moscariello *et al.*, 2014) but also indicates that IFRS adoption provides additional transparency for foreign investors in both PTC and OTC firms, thus providing benefits for both international and domestic investors.

Table 3 also presents analyst forecast accuracy under different accounting reporting conditions. The empirical results show that analyst forecast error is significantly reduced following IFRS adoption, suggesting that IFRS implementation improves accounting transparency and financial information quality (Garrido-Miralles and Sanabria-García, 2014), increases analyst following (Landsman *et al.*, 2012), and reduces forecast errors (Horton *et al.*, 2013). Thus, H2 is supported. Figure 1 clearly shows the improvement of accruals quality and analyst accuracy results following mandatory IFRS adoption.

<Insert Table 3 about here>

<Insert Figure 1 about here>

3.3 Value relevance and predictability with IFRS

With regard to value relevance and predictability, we assess the models' R^2 to explore attribute differences between the TGAAP and IFRS samples. The results are presented in Table 4.

First, running the stock price/earnings model, we obtain the explanatory power of the estimated model with an R^2 of 71.39% for the IFRS sample and 60.19% for the TGAAP sample, in line with prior value-relevance studies (Agostino *et al.*, 2011; Chalmers *et al.*, 2011). Applying the Chow test statistic, we find significant evidence that IFRS earnings not only capture much more value-relevance information than

TGAAP in whole sample but also in the PTC and OTC sub-samples. In sum, these results suggest that earnings become more value-relevant upon IFRS adoption while earnings become more persistent following IFRS adoption (consistent with Chalmers *et al.*, 2011) and book value becomes more transparent (consistent with Agostino *et al.*, 2011), thus supporting H3.

Following Van der Meulen *et al.* (2007) and Lipe (1990), predictability can be assessed by using an autoregressive model to estimate the model's R^2 . Table 4 shows the preferred explanatory power of financial earnings future prediction results under mandatory IFRS adoption (R^2 for post-IFRS to 36.06% versus R^2 for pre-IFRS to 8.59%). According to Chow's test statistic, the difference in R^2 is significant, supporting H4 in that the benefit from improved R^2 predictability increases significantly following mandatory IFRS adoption (consistent with Desoky and Mousa, 2014). That is to say, IFRS adoption has a direct effect on the information environment, and the improvement in forecast accuracy led to increased earning predictive ability under IFRS (Horton *et al.*, 2013) (see Fig. 2).

<Insert Table 4 about here>

<Insert Figure 2 about here>

3.4 CSR and IFRS interaction

IFRS implementation may encourage managers to provide voluntary CSR disclosure. Table 5 shows the interaction between voluntary CSR disclosures and mandatory IFRS adoption. Panel A of Table 5 shows firms engaged in CSR behavior show a significant improvement to accrual quality and reduced analyst forecast error, indicating that firms are behaving responsibly to constrain earnings management (Kim *et al.*, 2012) and that firms react to IFRS requirements and stakeholder pressure by providing additional corporate social disclosures (van der Laan Smith *et al.*, 2014). Panel B of Table 5 shows that CSR activity corresponds with higher R^2 in value relevance, though the difference is insignificant; however, the evidence shows a significant difference in terms of predictability under mandatory IFRS adoption and CSR. We find a positive association between reduced earnings manipulation and higher earnings predictability (consistent with Kim *et al.*, 2012; Choi and Pae, 2011) through the interaction of IFRS and CSR, thus supporting H5. Finally, the results emphasize the evolution of global financial reporting standards and the promotion of CSR, and the global recognition of CSR reporting (Tschopp and Huefner, 2015).

<Insert Table 5 about here>

3.5 Robustness tests

We seek to further understand how IFRS adoption affects accounting quality while controlling for certain firm characteristics (Cuijpers and Buijink, 2005). The observed attribute patterns are clearly due to the different accounting standards rather than underlying firm characteristics. Based on the models proposed by Dechow *et al.* (1995) and Kothari *et al.* (2005) for accruals quality, panels A through D in Table 6 show that 8 of 8 comparability mean differences significantly increased following IFRS adoption among firms with relatively high firm characteristic variables; Meanwhile, 3 of 4 exhibit improvements to analyst prediction accuracy. Furthermore, IFRS adoption leads to increased earning predictive ability for stock prices and future earnings. This indicates that, in general, IFRS improves accounting quality.

Panels A through D of Table 6 show that the accounting quality control for firm MV, assets, volume, and holdings improved following IFRS adoption, while earning predictive ability also increases with the change in accounting standards. These findings indicate that mandatory IFRS adoption decreases earnings management and increases transparency, leading to higher and more stable future EPS.

Consistent with prior studies, volume is a crucial factor for detecting changes in accounting standards (Chen and Sami, 2013), and institutional holdings have been found to increase following mandatory IFRS adoption where differences in institutional holdings between local GAAP and IFRS are relatively high (Florou and Pope, 2012).

<Insert Table 6 about here>

3.6 Additional robustness test

Discretionary accruals are a measure of opacity that show opaque firms are more prone to stock price crashes (Hutton *et al.*, 2009). Prior empirical results show that IFRS adoption reduces capital costs, increases liquidity, and improves financial reporting comparability (Byard *et al.*, 2011; DeFond *et al.*, 2014; Moscarriello *et al.*, 2014). In particular, increased transparency under IFRS decreases the chance of stock crashes via large negative stock returns especially when managers withhold firm-specific negative news (Jin and Myers, 2006).

Following DeFond *et al.* (2014), the crash risk measure is based on skewness which considers the second and third moment of the return distribution. Also, negative

skewness is most pronounced in stocks that have experienced stock-price bubbles and extreme negative stock returns (Chen *et al.*, 2001). To calculate crash risk, we use the model proposed by DeFond *et al.* (2014) as follows:

$$r_{i,t} = \beta_i + \alpha_{1,i}r_{m,j,t} + \alpha_{2,i}[r_{US,t} + EX_{j,t}] + \alpha_{3,i}r_{m,j,t-1} + \alpha_{4,i}[r_{US,t-1} + EX_{j,t-1}] + \alpha_{5,i}r_{m,j,t-2} + \alpha_{6,i}[r_{US,t-2} + EX_{j,t-2}] + \alpha_{7,i}r_{m,j,t+1} + \alpha_{8,i}[r_{US,t+1} + EX_{j,t+1}] + \alpha_{9,i}r_{m,j,t+2} + \alpha_{10,i}[r_{US,t+2} + EX_{j,t+2}] + \varepsilon_{i,t} \quad (10)$$

where $r_{i,t}$ is the stock return of firm i in week t in Taiwan; $r_{m,j,t}$ is the return of the MSCI country-specific weighted market index or DataStream Taiwan index in week t ; $r_{us,t}$ is the index return in US markets; and $EX_{j,t}$ is the change in the exchange rate between Taiwan dollar and the US dollar.

The model then estimates firm-specific weekly returns for firm i in week t as the natural logarithm of 1 plus the residual from Eq. (10). The crash risk measure, $NCSKEW_{i,t}$, takes the negative of the third moment of the firm's weekly return and divides it by the standard deviation as follows:

$$NCSKEW_{i,t} = - \left[N(N-1)^{\frac{3}{2}} * \Sigma W_{i,t}^3 \right] / [(N-1)(N-2) * (\Sigma W_{i,t}^2)^{\frac{3}{2}}] \quad (11)$$

Table 7 shows results for an additional robustness test evaluating crash risk following mandatory IFRS adoption. According to the results, IFRS adoption increases transparency and improves a firm's information environment by increasing analyst forecast accuracy (consistent with Byard *et al.*, 2011; Tan *et al.*, 2011), thus reducing the errors to the fair value estimates of riskier assets and reducing the frequency of extreme negative stock returns, thus reducing crash risk. This result makes it easier for international professional investors to understand the financial statements of emerging market. Therefore, international investors can more accurately assess the value of stocks, thereby reducing information asymmetry.

These results are consistent with DeFond *et al.* (2014) who suggest that firms experience a decrease in crash risk following mandatory IFRS adoption and expected crash risk decreases with financial statement comparability (Kim *et al.*, 2016). Interestingly, OTC firms show significantly decreased crash risk, while improved financial reporting comparability helps reduce systemic/national risk, thus helping domestic capital markets operating under international standards attract increased foreign investment. This is because OTC firms subject to stricter regulatory regimes under IFRS have higher market liquidity and price efficiency, along with reduced return skewness (Brüggemann *et al.*, 2013), thus reducing crash risk.

<Insert Table 7 about here>

3.7 Regression analysis

To further understand the interaction between IFRS adoption and CSR engagement, we investigate whether the use of the different accounting standards have an effect on accounting quality in terms of CSR activities. We use the crucial accounting and financial characteristics from Table 2 as dependent variables and analyst forecast error as the independent variable. Based on Beuselinck *et al.* (2010), mandatory adoption of IFRS had a significant and positive effect on information processing by financial analysts, and significantly improves analyst forecast accuracy for both public and private information (Cotter *et al.*, 2012). The empirical results show both CSR and IFRS respectively reduce the forecast error and IFRS adoption significantly increases forecast accuracy. Furthermore, the interaction between IFRS and CSR (i.e., CSR*IFRS) significantly decreases forecast errors, which suggests the adoption in IFRS significantly increases accounting quality as well as the interaction with CSR engagement (We find similar patterns were obtained using accruals quality as the independent variable, which is not included in the table).

<Insert Table 8 about here>

4. Conclusions

The mandatory shift from Taiwan Generally Accepted Accounting Principles (TGAAP) to IFRS represents a major regulatory financial reporting change, raising questions about the effect of IFRS on accounting quality, crash risk, and interaction with CSR. This study focuses on various accounting information measures for which estimates under IFRS are likely to differ considerably from those TGAAP: accrual quality, analysts forecast error, value relevance, predictability, and crash risk.

Our results first indicate that IFRS adoption significantly reduces accounting manipulation in accrual quality (consistent with Barth *et al.*, 2012; Yip and Young, 2012), decreases forecast error (consistent with Horton *et al.*, 2013), provides superior explanatory power of R^2 in value-relevance (consistent with Chalmers *et al.*, 2011) and predictability (consistent with Desoky and Mousa, 2014), and decreases crash risk (consistent with DeFond *et al.*, 2014) especially in OTC firms.

Second, the evolution of global financial reporting standards provides a useful perspective for analysing the potential growth and interaction of CSR disclosures.

Mandatory IFRS adoption is found to improve firms' information environment under CSR engagement, and the interaction between mandatory IFRS adoption and CSR significantly improves accrual quality (consistent with Kim *et al.*, 2012), forecast error (consistent with Dhaliwal *et al.*, 2012), and earning predictability (consistent with Choi and Pae, 2011). This suggests that the interaction of IFRS and CSR improves transparency and comparability of different financial information environments, providing market participants with benefits from improved financial information. Emerging markets strive for the attention of international professional investors must re-examine whether their accounting systems are consistent with the international accounting reporting standards.

Furthermore, Kim and Kim (2014) show CSR activities reduce agency costs by eliminating information asymmetry between internal and external stakeholders and reducing financial risk (Hsu and Chen, 2015). The results may provide useful insight into IFRS and CSR interaction for global capital markets, especially for major capital markets which have yet to mandate IFRS adoption, e.g., the US and Japan. This evidence also demonstrates the importance of requiring companies to implement CSR by government regulation.

Third, empirical results indicate IFRS adoption increases transparency, thus reducing fair value estimation errors, opacity for riskier assets and the frequency of extreme negative stock returns, thus reducing crash risk (consistent with DeFond *et al.*, 2014). Interestingly, empirical results show significantly reduced crash risk in the OTC market. In general, OTC markets have poorer transparency than exchange markets and are also subject to fewer regulations, and are thus more prone to financial stress. IFRS adoption enhances financial reporting comparability, thus contributing to reduced systemic/national risk, while unifying domestic capital market financial reporting standards with international norms and enhancing incentives for foreign investment into OTC markets. IFRS adoption enhances OTC firm regulation, thus increasing market liquidity and price efficiency, and reducing return skewness (Brüggemann *et al.*, 2013), thus reducing crash risk. However, in some countries, there are not exist two stock exchange markets that limit the comparison of similar studies.

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Table 1

Sample description: Distribution of observations by industry

The study includes 13,937 samples of Taiwan listed firms from 2002 to 2005, 2010 to 2012, and 2013 to 2015. High-technology firms accounted for 54.05% of the sample, while traditional-industry firms accounted for 45.95%. PTC and OTC respectively represent Public-Traded-Company and Over-The-Counter company.

Panel A: Composition by sector

Industry sector	Firm-year Obs.	% of Firm-year Obs.	% of cumul. obs.	Number of firms	% of Firms	% of cumulative firms
Cement	70	0.50	0.50	21	0.49	0.49
Food	256	1.84	2.34	78	1.80	2.29
Plastic	277	1.99	4.33	84	1.94	4.23
Textile	548	3.93	8.26	165	3.82	8.05
Electric Machinery	771	5.53	13.79	241	5.57	13.62
Iron and Steel	417	2.99	16.78	126	2.91	16.54
Electrical and Cable	162	1.16	17.95	49	1.13	17.67
Chemical	381	2.73	20.68	116	2.68	20.35
Biotechnology and Medical	736	5.28	25.96	236	5.46	25.81
Glass and Ceramic	46	0.33	26.29	14	0.32	26.13
Paper and Pulp	70	0.50	26.79	21	0.49	26.62
Rubber	115	0.83	27.62	35	0.81	27.43
Automobile	55	0.39	28.01	17	0.39	27.82
Electronic Parts/Components	1,956	14.03	42.05	603	13.95	41.77
Semiconductor	1,286	9.23	51.27	406	9.39	51.16
Other Electronic	694	4.98	56.25	217	5.02	56.17
Electronic Products Distribution	374	2.68	58.94	113	2.61	58.79
Computer and Peripheral Equipment	1,023	7.34	66.28	315	7.28	66.07
Optoelectronic	1,099	7.89	74.16	347	8.02	74.10
Communications and Internet	772	5.54	79.70	243	5.62	79.72
Building Material and Construction	680	4.88	84.58	206	4.76	84.48
Shipping and Transportation	243	1.74	86.32	75	1.73	86.22
Trading and Consumers Goods	266	1.91	88.23	82	1.90	88.11
Information Service	326	2.34	90.57	101	2.34	90.45
Tourism	225	1.61	92.19	72	1.67	92.11
Cultural and Creative	165	1.18	93.37	53	1.23	93.34
Oil, Gas and Electricity	120	0.86	94.23	36	0.83	94.17
Other Industry	804	5.77	100.00	252	5.83	100.00
Total	13,937	100.00	100.00	4,324	100.00	100.00

Panel B: Composition by year

year	Non-IFRS period (2002~2005)			Pre-IFRS period (2010~2012)			Post-IFRS period (2013~2015)		
	Firm-year Obs.	PTC	OTC	Firm-year Obs.	PTC	OTC	Firm-year Obs.	PTC	OTC
2002	1,178	689	489						
2003	1,195	696	499						
2004	1,226	708	518						
2005	1,258	723	535						
2010				1,470	804	666			
2011				1,504	821	683			
2012				1,524	831	693			
2013							1,525	834	691
2014							1,526	835	691
2015							1,531	838	693
Sub-total	4,857	2,816	2,041	4,498	2,456	2,042	4,582	2,507	2,075
% of Firm-year Obs.	34.8			32.3			32.9		

Notes: 1. Obs. denotes number of observations.

2. % denotes percentage industry proportion in total sample.

3. cumul. denotes cumulative industry proportion in total sample.

Table 2
Descriptive statistics: Descriptive statistics between Non-IFRS, Pre-IFRS, and Post-IFRS adoption.

The study includes 13,937 samples of Taiwan listed firms from 2002 to 2005, 2010 to 2012, and 2013 to 2015.

	Non-IFRS period 2002~2005(Period I)			Pre-IFRS period 2010~2012(Period II)			Post-IFRS period 2013~2015(Period III)		
	Mean	Median	Std.	Mean	Median	Std.	Mean	Median	Std.
ROA	0.0484	0.0485	0.1011	0.0381(4.04)***	0.0445(2.71)***	0.1208	0.0399(3.54)≠(-0.67)	0.0415(3.40)≠(1.91) ^a	0.0942
ROE	0.0269	0.0753	0.5914	0.0103(1.06)	0.0712(1.56)	0.7825	0.0361(-0.82) (-1.90) ^b	0.0651(3.17) ≠(1.66) ^a	0.2958
MV	21.6064	21.4643	1.4500	21.8790(-8.22)***	21.7178(-6.17)***	1.4518	22.0557(-12.76)≠(-5.09) ^c	21.9148(-10.29)≠(-4.29) ^c	1.4021
Assets	15.1629	14.9771	1.3274	15.3045(-4.43)***	15.1252(-3.52)***	1.4670	15.3435(-5.20)≠(-1.09)	15.1347(-3.81)≠(-0.29)	1.4647
Sales	14.8800	14.7302	1.4338	15.0306(-4.28)***	14.9141(-4.71)***	1.6419	14.9441(-1.65) ⁺ (2.13) ^b	14.8375(2.92)≠(1.32)	1.6786
Leverage	0.4403	0.4476	0.1742	0.4115(7.89)***	0.4091(8.83)***	0.1840	0.4069(8.18) ≠(1.08)	0.4043(7.75)≠(0.87)	0.1821
OCF	0.9602	0.1151	5.8827	1.4178(-2.88)***	0.1545(-5.52)***	9.1436	1.6670(-2.97)≠(-0.96)	0.1882(-8.08)≠(-3.75) ^c	12.3906
EPS	1.6697	1.2300	3.7999	2.2676(-2.32)**	1.3150(-1.72)*	17.0724	2.0389(-3.64)*** (0.86)	1.2200(0.12) (1.53)	4.8052
Volume	5.1109	5.1299	1.8325	4.9529(3.97)***	4.9836(3.14)***	1.6299	4.8284(6.81) ≠(3.23) ^c	4.8978(4.31)≠(1.62)	1.5501
Holdings				0.0881	0.0407	0.1267	0.1056(-5.26) ^c	0.0507(-4.46) ^c	0.1415

Notes: 1. ***, **, and * respectively indicate significance at 1%, 5%, and 10% between periods I and II.

2. ≠, ≠ and + respectively indicate significance at 1%, 5%, and 10% between periods I and III.

3. ^c, ^b and ^a respectively indicate significance at 1%, 5%, and 10% between periods II and III.

4. (.) denotes the difference test between two sub-periods.

5. ROA is return on assets; ROE is return on equity; MV is the natural logarithm of the market value; Assets is the natural logarithm of the total assets; Sales is the natural logarithm of the total sales at year *t*; Leverage is total debt divided by total assets; OCF is the natural logarithm of operating cash flow; EPS is earnings per share; Volume is the natural logarithm of stock trading volume; Holdings is institutional holdings.

6. Std. denotes standard deviation.

Table 3

Multiple comparability of IFRS and local GAAP accounting systems among Non-IFRS, Pre-IFRS, and Post-IFRS adoption.

Dechow denotes the total discretionary accruals estimated by the Dechow *et al.* (1995) model using $TDA = \frac{TA_{i,t}}{AT_{i,t-1}} - NDTAC_{i,t}$ and Kothari denotes the total discretionary accruals estimated by Kothari *et al.* (2005) model using $TDA_K = \frac{TA_{i,t}}{AT_{i,t-1}} - NDTAC_K_{i,t}$, respectively. Analyst forecast error is estimated using

$$F_error_{i,t} = \frac{1}{N} \sum_{n=1}^N |FC_{i,t,n} - EPS_{i,t}| / P_{i,t}.$$

Accrual quality and analyst forecast error

Time period	Sub-sample	Dechow model				Kothari model				Analysts forecast error			
		Mean	Median	Std.		Mean	Median	Std.		Mean	Median	Std.	
2002~2005 (Period I)	PTC	0.1296	0.0960	0.1965		0.1315	0.0984	0.1964		0.0752	0.0303	0.1485	
	OTC	0.2223	0.1027	2.4290		0.2268	0.1070	2.4372		0.0956	0.0379	0.1933	
	AG	0.1685	0.0982	1.5800		0.1715	0.1015	1.5858		0.0801	0.0324	0.1609	
2010~2012 (Period II)	PTC	0.0834	0.0588	0.1163		0.0776	0.0568	0.0937		0.0481	0.0204	0.0881	
	OTC	0.1370	0.0729	0.9218		0.1073	0.0668	0.2375		0.0523	0.0261	0.0690	
	AG	0.1077	0.0648	0.6265		0.0911	0.0603	0.1748		0.0491	0.0214	0.0846	
2013~2015 (Period III)	PTC	0.0805	0.0468	0.2557		0.0825	0.0505	0.2517		0.0296	0.0110	0.0673	
	OTC	0.1116	0.0626	0.3051		0.1115	0.0648	0.3023		0.0179	0.0089	0.0232	
	AG	0.0944	0.0536	0.2792		0.0956	0.0562	0.2761		0.0259	0.0101	0.0574	
PTC	I-II I-III II-III	Difference Mean				Difference Mean				Difference Mean			
		T-test				T-test				T-test			
		Median test				Median test				Median test			
	0.0461***				0.0372***				0.0416***				
	0.0491***				0.0492**				0.0479***				
	0.0029				0.0120				0.0063***				
OTC	I-II I-III II-III	Difference Mean				Difference Mean				Difference Mean			
		T-test				T-test				T-test			
		Median test				Median test				Median test			
0.0853				0.0298**				0.0402**					
0.1107**				0.0402*				0.0422***					
0.0254				0.0104*				0.0020***					
AG	I-II I-III II-III	Difference Mean				Difference Mean				Difference Mean			
		T-test				T-test				T-test			
		Median test				Median test				Median test			
0.0608**				0.0334***				0.0412***					
0.0741***				0.0447***				0.0453***					
0.0133				0.0113				0.0041***					

Note: I. ***, **, and * respectively indicate significance at 1%, 5%, and 10%.

2. Std. denotes standard deviation.

3. PTC, OTC, and AG respectively denote Public-Traded-Company sample, Over-The-Counter company sample, and aggregate samples.

Table 4

Value relevance and predictability

Value relevance is assessed as running price-earnings model $P_{i,t} = \beta_0 + \beta_1 \cdot X_{i,t} + \beta_2 \cdot DX + \beta_3 X_{i,t} \cdot DX + \beta_4 \cdot BV_{i,t-1}$ and predictability is assessed based on earnings predictability using $X_{i,t+1} = \beta_0 + \beta_1 \cdot X_{i,t} + \beta_2 \cdot DX + \beta_3 X_{i,t} \cdot DX + \beta_4 \cdot BV_{i,t-1}$.

Time period	Para-meter	PTC	OTC	AG	PTC	OTC	AG	
		$P_{i,t} = \beta_0 + \beta_1 \cdot X_{i,t} + \beta_2 \cdot DX + \beta_3 X_{i,t} \cdot DX + \beta_4 \cdot BV_{i,t-1}$				$X_{i,t+1} = \beta_0 + \beta_1 \cdot X_{i,t} + \beta_2 \cdot X_{i,t-1}$		
2002~2005 (Period I)	β_0	-1.2978 (-0.53)	41.3464 (3.37)***	12.3228 (3.05)***	0.2971 (0.93)	2.5154 (3.70)***	1.2959 (3.75)***	
	β_1	4.1954 (9.66)***	7.8673 (4.32)***	5.6966 (8.24)***	0.0769 (4.12)***	0.2225 (11.01)***	0.1672 (13.15)***	
	β_2	9.0651 (3.30)***	21.7883 (1.95)*	13.8157 (3.19)***	0.0534 (2.68)***	0.0775 (3.33)***	0.0348 (2.46)**	
	β_3	-8.9444 (-8.13)***	-15.09 (-3.85)***	-12.6661 (-7.74)***				
	β_4	0.5428 (3.21)***	-2.1049 (-2.44)**	-0.2939 (-1.05)				
	R^2	0.0910	0.0264	0.0331	0.0320	0.0612	0.0461	
2010~2012 (Period II)	β_0	-8.4083 (-6.63)***	4.8080 (2.88)***	-3.2005 (-3.22)***	0.2463 (1.32)	1.1927 (2.85)***	0.7081 (3.28)***	
	β_1	8.8192 (40.95)***	10.5865 (34.64)***	9.4547 (53.56)***	0.3191 (22.00)***	0.1799 (7.47)***	0.2301 (16.17)***	
	β_2	11.1172 (5.90)***	7.8196 (3.73)***	10.7241 (7.80)***	0.1466 (12.23)***	0.0891 (4.51)***	0.1039 (8.88)***	
	β_3	-9.0278 (-17.21)***	-12.8306 (-16.25)***	-10.2239 (-23.31)***				
	β_4	0.8117 (12.75)***	0.0995 (1.06)	0.5606 (10.71)***				
	R^2	0.6571	1.08407#	0.6019	0.2149	0.0498	0.0859	
2013~2015 (Period III)	β_0	-5.8461 (-4.11)***	-11.2672 (-3.24)***	-8.5943 (-4.51)***	0.3352 (3.49)***	1.0700 (2.32)**	0.7149 (3.31)***	
	β_1	17.3695 (78.91)***	21.6020 (37.02)***	17.9961 (67.52)***	0.4622 (8.49)***	0.4403 (20.30)***	0.4265 (29.04)***	
	β_2	20.8233 (5.44)***	24.6249 (5.22)**	20.9250 (6.89)***	-0.0170 (-1.46)	-0.1958 (-6.44)***	-0.1511 (-8.27)***	
	β_3	-18.7023 (-12.19)***	-28.3618 (-15.98)***	-22.1735 (-18.65)***				
	β_4	<0.0001 (-0.32)	0.1543 (0.84)	0.2320 (2.56)**				
	R^2	0.7960	1.589.59#	0.6066	0.0797	0.3806	0.3606	
		Chow test						
PTC	I/II		57.91#				44.72#	
	I/III		210.58#				0.80	
	II/III		155.55#				6.69#	
OTC	I/II		13.02#				1.33	
	I/III		28.64#				7.50#	
	II/III		99.26#				19.64#	
AG	I/II		41.33#				9.39#	
	I/III		125.09#				15.01#	
	II/III		219.87#				30.61#	

Note.: 1. ***, **, * and # respectively indicate significance at 1%, 5%, and 10%. 2. # and * respectively denote that the F statistic is significant at 1% and 5%.

Table 5
Adopting corporate social responsibility in IFRS

Panel A: Adopting CSR in accruals quality and analyst forecast error									
	Dechow model			Kothari model			Analysts forecast		
	Mean	Median	Std.	Mean	Median	Std.	Mean	Median	Std.
PTC	0.0817	0.0475	0.2598	0.0836	0.0514	0.2559	0.0308	0.0115	0.0689
OTC	0.1116	0.0626	0.3051	0.1115	0.0648	0.3023	0.0179	0.0089	0.0232
AG	0.0953	0.0540	0.2817	0.0965	0.0569	0.2786	0.0265	0.0103	0.0583
CSR	0.0448	0.0353	0.0405	0.0507	0.0415	0.0381	0.0079	0.0044	0.0096
	Diff.	Wilc.		Diff.	Wilc.		Diff.	Wilc.	
	Mean	Median		Mean	Median		Mean	Median	
PTC	0.0369***	0.0123***		0.0330***	0.0099*		0.0229***	0.0071***	
-CSR									
OTC	0.0667***	0.0273***		0.0608***	0.0234***		0.0100***	0.0045*	
-CSR									
AG	0.0505*	0.0187***		0.0458	0.0154***		0.0186*	0.0059***	
-CSR									

Panel B: Adopting CSR in value relevance and predictability										
$P_{i,t} = \beta_0 + \beta_1 \cdot X_{i,t} + \beta_2 \cdot DX + \beta_3 X_{i,t} \cdot DX + \beta_4 \cdot BV_{i,t-1}$										
	β_0	β_1	β_2	β_3	β_4	R^2	F-value	Chow test		
								PTC	OTC	AG
								CSR	CSR	CSR
PTC	-6.0100 (-4.11)***	17.3293 (77.96)***	20.9867 (5.45)***	-18.6621 (-12.19)***	<0.0001 (-0.30)	0.7966	1550.65 \neq			
OTC	-11.2672 (-3.24)***	21.6020 (37.02)***	24.6249 (5.22)***	-28.3618 (-15.98)***	0.1543 (0.84)	0.6066	506.06 \neq			
AG	-4.8860 (-3.88)***	18.3336 (83.78)***	19.7926 (6.54)***	-22.9434 (-19.93)***	<0.0001 (-0.59)	0.7124	1796.92 \neq	1.09	1.04	0.47
CSR	-12.5106 (-0.78)	21.7277 (10.17)***	0	0	-0.0887 (-0.14)	0.7554	66.41 \neq			

$X_{i,t+1} = \beta_0 + \beta_1 \cdot X_{i,t} + \beta_2 \cdot X_{i,t-1}$										
	β_0	β_1	β_2	β_3	β_4	R^2	F-value	Chow test		
								PTC	OTC	AG
								CSR	CSR	CSR
PTC	<0.0001 (3.47)***	0.4612 (8.34)***	-0.0171 (-1.44)			0.0792	34.81 \neq			
OTC	1.0700 (2.32)**	0.4403 (20.30)***	-0.1958 (-6.44)***			0.3806	211.03 \neq			
AG	0.7252 (3.30)***	0.4265 (28.81)***	-0.1511 (-8.20)***			0.3606	422.74 \neq	310.07 \neq	180.07 \neq	215.13 \neq
CSR	<0.0001 (-0.45)	1.1099 (7.46)***	0.0408 (0.30)			0.9946	1931.85 \neq			

Notes: 1. Diff. Mean and Wilc. Median respectively denote the difference mean test and Wilcoxon median test.
2. Std. denotes standard deviation.
3. ***, **, and * respectively indicate significance at 1%, 5%, and 10%.
4. \neq denotes that the F statistic is significant at 1%.

Table 6
Comparability of IFRS and TGAAP accounting standards, for sample partitions
Pre- and Post-IFRS adoption.

Panel A: Model average when controlled for firm Market Value						
	Period	Dechow	Kothari	Analyst	Price	EPS _(t+1)
Low MV	II(10~12)	0.1161	0.0938	0.0584	15.4579	0.1318
	III(13~15)	0.1198	0.1131	0.0387	18.8824	0.4094
High MV	II(10~12)	0.0748	0.0747	0.0414	47.0209	3.1149
	III(13~15)	0.0674	0.0727	0.0171	75.0977	4.0239
T-test	II(10~12)	0.0413***	0.0191***	0.0170**	-31.5630***	-2.9831***
	III(13~15)	0.0524***	0.0404***	0.0216***	-56.2153***	-3.6145***
Panel B: Model average when controlled for firm Assets						
	Period	Dechow	Kothari	Analyst	Price	EPS _(t+1)
Low Assets	II(10~12)	0.1315	0.1128	0.0381	24.2742	1.1612
	III(13~15)	0.1323	0.1315	0.0219	34.0237	1.3389
High Assets	II(10~12)	0.0744	0.0723	0.0494	35.5423	2.4276
	III(13~15)	0.0646	0.0669	0.0258	52.6523	3.0749
T-test	II(10~12)	0.0571***	0.0405***	-0.0113	-11.2681***	-1.2664***
	III(13~15)	0.0677***	0.0646***	-0.0039	-18.6286***	-1.7360***
Panel C: Model average when controlled for firm Volume						
	Period	Dechow	Kothari	Analyst	Price	EPS _(t+1)
Low Volume	II(10~12)	0.112	0.0969	0.0359	25.7980	1.3529
	III(13~15)	0.1163	0.1165	0.0244	39.5358	1.6637
High Volume	II(10~12)	0.0796	0.0741	0.0643	33.9869	1.8511
	III(13~15)	0.0662	0.0696	0.0267	43.3619	2.4728
T-test	II(10~12)	0.0324***	0.0228***	-0.0284***	-8.1889***	-0.4982***
	III(13~15)	0.0501***	0.0469***	-0.0023	-3.8261	-0.8091**
Panel D: Model average when controlled for firm Institutional Holdings						
	Period	Dechow	Kothari	Analyst	Price	EPS _(t+1)
Low Holdings	II(10~12)	0.1061	0.0918	0.0665	20.1135	0.7162
	III(13~15)	0.1211	0.1172	0.0341	25.586	1.0402
High Holdings	II(10~12)	0.0806	0.0789	0.0355	45.7546	3.1228
	III(13~15)	0.0738	0.0817	0.0162	73.4509	4.0068
T-test	II(10~12)	0.0255***	0.0129**	0.031***	-25.6411***	-2.4066***
	III(13~15)	0.0473***	0.0355**	0.0179***	-47.8649***	-2.9666***

Notes: ***, **, and * respectively indicate significance at 1%, 5%, and 10%.

Table 7
Additional robustness check: Different crash risk effect on three periods

Period	Sub-sample	Mean	Median	Std.
2002~2005 (Period I)	PTC	-1.3994	-1.3240	2.2420
	OTC	-1.5144	-1.0121	3.8150
	AG	-1.4432	-1.2032	2.9406
2010~2012 (Period II)	PTC	-1.5770	-1.4372	3.6128
	OTC	-2.4522	-1.3449	5.9469
	AG	-1.9596	-1.4164	4.7933
2013~2015 (Period III)	PTC	-1.6668	-1.2713	4.1735
	OTC	-2.6264	-1.8597	5.1846
	AG	-2.1031	-1.5537	4.6834
		Difference Mean Test	Wilcoxon Median Test	
PTC	I-II	0.1776	0.1132	
	I-III	0.2674	-0.0527	
	II-III	0.0898	-0.1659	
OTC	I-II	0.9378***	0.3328**	
	I-III	1.1120***	0.8475***	
	II-III	0.1742	0.5147***	
AG	I-II	0.5164***	0.2132**	
	I-III	0.6599***	0.3505***	
	II-III	0.1435	0.1373	

- Notes:** 1. *** and ** respectively indicate significance at 1% and 5%.
2. Std. denotes standard deviation.
3. PTC, OTC, and AG respectively denote Public-Traded-Company sample, Over-The-Counter company sample, and aggregate samples.

Table 8
Analyst forecast error and IFRS adoption

We investigate whether the interaction between corporate social responsibility and accounting standards affect accounting quality. The findings show that the change in accounting standards significantly increases accounting quality and produces a CSR effect.

Analysts forecast error as dependent variable					
	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	0.1186***	0.1127**	0.2120***	0.1151**	0.2053***
ROA	0.1358**	0.1341**	0.1182**	0.1335**	0.1160**
ROE	-0.3201***	-0.3188***	-0.3159***	-0.3190***	-0.3143***
MV	-0.0124***	-0.0121***	-0.0138***	-0.0121***	-0.0135***
Assets	0.0026	0.0024	0.0053	0.0026	0.0052
Sales	0.0021	0.0023	0.0003	0.0022	0.0005
Leverage	0.0423***	0.0420***	0.0428***	0.0418***	0.0424***
OCF	0.0001	0.0001	0.0001	0.0001	0.0001*
EPS	0.0004	0.0004	0.0005	0.0004	0.0004
Volume	0.0069***	0.0069***	0.0037**	0.0067***	0.0036*
Holdings	-0.0054	-0.0043	0.0006	-0.0042	0.0020
CSR		-0.0075			-0.0092
IFRS			-0.0238***		-0.0239***
CSR*IFRS				-0.0222*	
R^2	0.2543	0.2547	0.2776	0.2560	0.2783
\bar{R}^2	0.2491	0.2490	0.2720	0.2503	0.2722
F	48.63 \neq	44.28 \neq	49.79 \neq	44.58 \neq	45.76 \neq
N	1437	1437	1437	1437	1437

Notes: 1. ***, **, and * respectively indicate significance at 1%, 5%, and 10%.

2. \neq denotes the overall F-test is significant at 1%.

3. All variables are defined in Tables 2 and 3.

4. IFRS is the dummy variable equal to one if IFRS is adopted and zero otherwise.

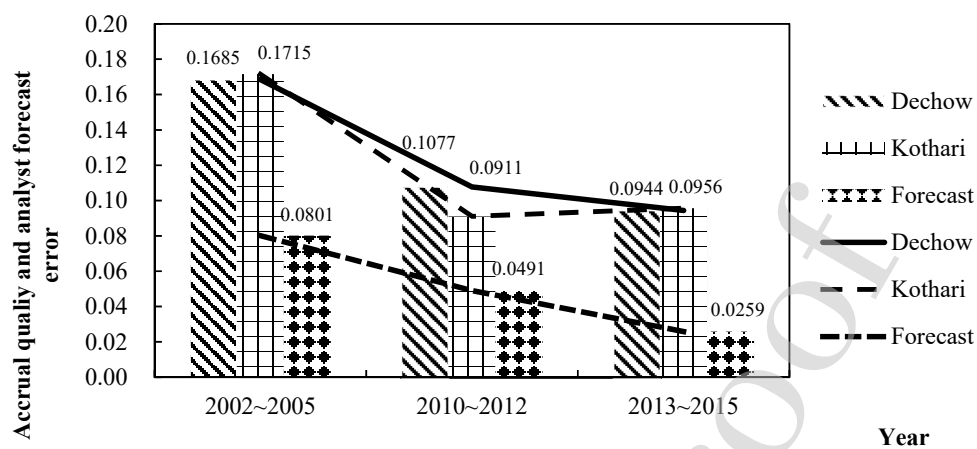


Figure 1
Accrual quality and analyst forecast error

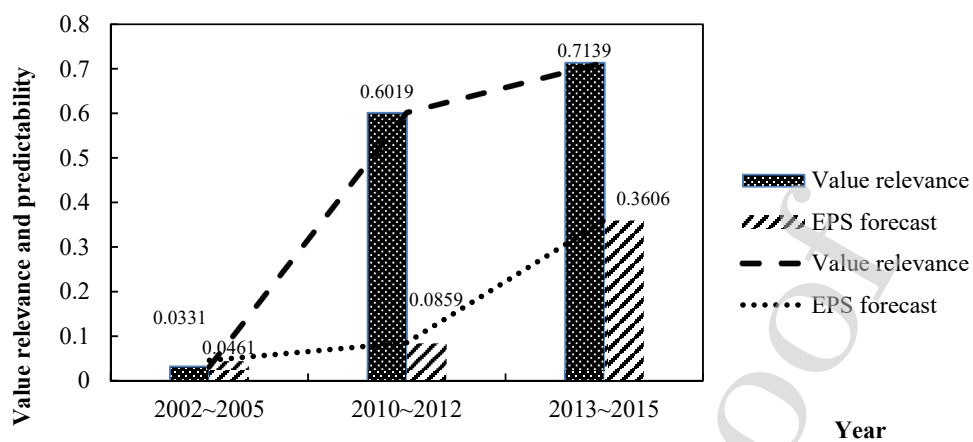


Figure 2
Value relevance and predictability