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# Assessing the value relevance of accounting data after IFRS introduction in Europe

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## Abstract

European listed companies are required to prepare their consolidated financial statements in accordance to IFRS since 1<sup>st</sup> January 2005. IFRS are supposed lead to better accounting quality and to a closer association between market-based and accounting-based performance, or value relevance. We examine whether value relevance has improved after the compulsory adoption of IFRS using a sample of 3,721 companies listed on five European stock exchanges: Frankfurt, Madrid, Paris, London and Milan. We find little evidence of an improvement in value relevance. However, earnings are found to influence share price to a greater extent than prior to IFRS adoption, while the influence of the book value of equity is found to have decreased.

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## **1. Introduction**

The recent financial has shown that a lack of transparency in the financial markets may result in a widespread fall in investors' confidence. Eventually, this phenomenon may lead to liquidity shortages and stock market crashes (OECD Observer, 2009). Opaque stock markets exacerbate the problem of informational asymmetries between insiders (primary shareholders and directors) and outsiders (common shareholders and creditors).

Transparency in the financial markets is a crucial issue for society as a whole. Over the last decades, an increasingly large number of individuals have poured money into domestic and foreign stock markets through pension and mutual funds (Pilbeam, 2005). Thus, transparent company accounts are beneficial to individual investors as well as institutional investors, and their comparability should be ensured at both national and international level. For this reason, the definition and enforcement of internationally-recognised financial reporting standards is considered of paramount importance by standard setters. Moreover, a lively debate is under way among academics as to whether it is possible to achieve international harmonisation of financial reporting standards. Harmonisation should facilitate cross-border investments, leading to better market liquidity and lower cost of capital.

In an effort to achieve transparency and harmonisation of financial reporting standards, and to reinforce the integration of European capital markets, the European Union (EU) requires listed companies to prepare their consolidated financial statement in compliance with the International Financial Reporting Standards (IFRS) for fiscal years starting after 1 January 2005 (1606/2002 European Commission Regulation).

If the premise that IFRS have led to greater transparency and cross-border comparability of company accounts is true, we expect: first, that informational asymmetries have decreased after the adoption of IFRS, and therefore there is a closer relation between accounting measures and market data; second, that the foregoing relation should not present significant discrepancies across European countries.

The present paper aims to investigate whether the relationship between accounting measures and market data, or value relevance, has strengthened as a consequence of the adoption of IFRS. We examine companies listed on five European stock exchanges (Frankfurt, Madrid, Paris, Milan, and London). An investigation of the effects of IFRS on accounting systems throughout the world is important for two reasons: first, to understand whether the harmonisation process, strongly encouraged by standard setters throughout the world, is effective in improving cross-border

comparability of accounting information; second, to provide useful information regarding the potential consequences of a voluntary adoption of IFRS in the US and above all for the possibility of a compulsory adoption in 2014 (Securities and Exchange Commission, 2008)<sup>1</sup>. However, most of the extant literature examines the effects of IFRS either on a single country, or on many countries as a whole, neglecting the potential impact of different cultural and legal backgrounds on the effectiveness of the new regulatory framework. In this study, we examine the effects of IFRS on five countries that are believed to differ in terms of legal system and size of capital markets. While the UK has a shareholder-driven type of accounting framework, accounting systems in Continental European countries are believed to put less emphasis on the protection of outsiders against expropriation from insiders (La Porta *et al.*, 1997).

Using panel-data regression analysis and a Chow test for structural breaks we find that the reaction to IFRS in terms of value relevance differs according to the stock exchange considered. To our knowledge, this is the first paper that uses panel-data modelling for testing value relevance. The use of a Chow test is also an innovation: studies that compare value relevance in different countries or periods rely on the comparison of the explanatory power of the models without testing for a structural break in the coefficients. The lack of a structural break due to the implementation of IFRS suggests that changes in value relevance might have been due to factors other than the implementation of IFRS. To increase the robustness of the results, we use two models that are commonly employed for testing value relevance, as well as models that test for earnings smoothing and timely loss recognition. Value relevance, earnings smoothing, and timely loss recognition are part of the more general concept of accounting quality (Barth *et al.*, 2008).

Our main findings show that there has been an overall improvement in value relevance when the whole sample is examined. This finding is consistent with Barth *et al.* (2008). However, structural breaks in the coefficients of a price regression model occur for Germany, Spain, and France but not for Italy and the UK. Moreover, if the overall explanatory power of the regression is considered as a proxy for value relevance, value relevance has decreased in Germany and Spain. Therefore, value relevance has increased due to IFRS adoption for companies listed on the French stock market only. However, when changes in the magnitude of coefficients for the book value of equity and earnings per share are examined, increased value relevance is found for earnings in Germany and France, while value relevance of book value of

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<sup>1</sup> In the document ‘Roadmap for the Potential Use of Financial Statements Prepared in Accordance with International Financial Reporting Standards by U.S. Issuers’, the SEC states (p. 10):

“The Commission in 2011 would determine whether to proceed with rulemaking to require that U.S. issuers use IFRS beginning in 2014 if it is in the public interest and for the protection of investors to do so.”

equity decreased in Germany, Spain and France. When returns rather than prices are used as dependent variable, no structural breaks are found as a result of the implementation of IFRS. The results for other measures of accounting quality, earnings variability and timely loss recognition, do not suggest that accounting quality has improved after the implementation of IFRS.

The remainder of this paper is organised as follows. Section 2 reviews the literature. Section 3 describes the methodology and data. Section 4 reports the results. Section 5 reports robustness tests based on measures of accounting quality other than value relevance. Section 6 concludes.

## **2. Literature review**

### *2.1 Comparison of international accounting standards*

Differences among local accounting standards have been widely studied in the past, and the possible source of these differences has been investigated. A branch of the literature groups accounting systems on the basis of their legal system: an Anglo-Saxon (or Anglo-American) cluster and a Continental European cluster (Joos and Lang, 1994; Ali and Hwang, 2000; Delvaille *et al.*, 2005). D'Arcy (2001) argues this taxonomy might be too simple to encompass the variety of national accounting systems around the world.

A more sophisticated categorisation is developed by La Porta *et al.* (1997), who posit a link between the legal system of a country and the quality of protection for outsiders (both common shareholders and creditors). Differences in the level of protection for outsiders are ascribed to the type of legal system: a common law system is associated with better legal protection for outsiders, while a civil law system (also code law system) is associated with worse legal protection for outsiders. In turn, the quality of investors' protection impinges on the characteristics of capital markets. Countries where potential financiers are protected against expropriation from insiders have larger capital markets and better quality of enforcement. Four groups can be identified on the basis of the degree of protection for outsiders from expropriation from insiders: English, French, German and Scandinavian. Countries belonging to the French-origin group are found to have the poorest legal protection for outsiders and the least developed capital markets. On the contrary, countries assigned to the English-origin cluster present the best legal protection for outsiders and more advanced capital markets. Countries belonging to the German or Scandinavian cluster are believed to sit in the middle in terms of both quality of legal protection for outsiders and size of capital markets.

In the accounting literature, many studies refer to the Anglo-Saxon model when they examine countries that belong to the English-origin group. Countries in the

German-origin and French-origin group, such as Spain and Italy, are considered part of the Continental European cluster (Nobes and Parker, 2008). However, significant differences are believed to exist for countries belonging to the Continental European cluster. These variations, consistent with the methodology followed by La Porta *et al.* (1997), are believed to be due to differences in the national legal system (Nobes and Parker, 2000). In particular, the French and Italian accounting systems are influenced by tax law, while the German accounting system is influenced by commercial law. However, Delvaile *et al.* (2005) argue that a different level of internationalisation of the companies listed on the domestic stock exchange may also be part of the cause (Delvaile *et al.* 2005). For instance, a higher number of multinational enterprises are based in France and Germany than in Italy and Spain.

Financial statements prepared under the Continental European model are likely to display more conservative profits than those prepared under the Anglo-Saxon model (Demaria and Dufour 2008). The main valuation principle is that of historical cost. Prudence suggests that only gains that are certain be recorded, while appropriate provisions should be set aside for possible losses. As a result, the historical cost can be reduced if the value of the asset is believed to have decreased significantly, but it cannot be increased unless a specific event occur, or if indicated by a specific law. In Anglo-Saxon accounting systems, historical cost is frequently modified on the basis of revaluations to reflect the ‘fair value’ of the assets on the balance sheet. Fair value is defined as “[...] the amount for which an asset could be exchanged, or a liability settled, between knowledgeable, willing parties in an arm’s length transaction” (IAS 39).

IFRS have been heavily influenced by the shareholder-based orientation typical of the Anglo-Saxon system (Flower and Ebbers, 2002; and Hung and Subramanyam, 2007), for which the principle of ‘fair value’ is very important, although not exclusive (Cairns, 2006). The use of fair value impinges mostly on the book value of equity, which could become more volatile (Devalle, 2008). IFRS have been introduced to increase the cross-border comparability of financial statements, which should lead to greater cross-border investment and higher allocational efficiency (Beneish *et al.* 2009). Evidence has been found of better market liquidity for adopters of IFRS around the world. No evidence has been reported of better Tobin’s  $q$  (ratio of market to book value of equity) and cost of capital of adopters (Daske *et al.*, 2008). Some literature has investigated the effects of the adoption of IAS/IFRS on value relevance (see section 2.2).

Table 1 summarises the main differences in the accounting systems of the five countries considered in the sample (France, Germany, United Kingdom, Spain, Italy). Table 1 a) shows the main general features of each accounting system, and presents a comparison with IFRS. The comparison is carried out across the following categories:

type of legal system, primary readers of financial reports, prevalent accounting principle and valuation criteria, and the documents that comprise the set of financial statements. Table 1 b) examines differences in asset valuation criteria. We report the criteria allowed by Local GAAP as well as IFRS. Further, based on information reported in Jaafar and McLeay (2007), we show for each criterion the percentage of companies that used it in the years 1991, 1995, and 1999. The categories of assets considered are: inventories, goodwill on consolidation, and fixed assets.

[insert table 1 here]

## *2.2 International Financial Reporting Standards and value relevance*

The introduction of IFRS represents a profound change in many European accounting models and it is expected to have an impact on the relation between accounting data and stock prices. European managers and investors, in particular those accustomed to a Continental European accounting system, need to assess the implications of IFRS adoption (Hung and Subramanyam, 2007). These implications encompass a number of issues. We focus on the implications on accounting quality, and in particular on value relevance. Value relevance can be simply described as “[...] the ability of financial statement information to capture or summarise information that affects share values” (Hellström, 2006, p325). Research in this area commenced as a result of the feeling amongst professionals and academicians that historical cost accounting was no longer a reliable indicator of the value of a firm. The movement from an industry-oriented to a service-oriented economy is believed to be at the root of this problem (Collins et al, 1997). Of late, doubts regarding the validity of value relevance studies (Holthausen and Watts, 2001) have been rebutted by Hellström (2006).

Initially, empirical studies report an increase in value relevance over time (Collins, 1997; Francis and Schipper, 1999; Ely and Waymire, 1999; and Lev and Zarowin, 1999). However, scale effects might have caused a spurious increase in the metrics used for value relevance (Brown *et al*, 1999), as explained more in detail in section 3. An anomalous negative relation between price and negative earnings (Collins *et al.*, 1999; and Papadaki and Siougle; 2007) has been ascribed to the transitory nature of losses, which impairs their informativeness (Hayn, 1995).

Several studies assess the degree of value relevance in developed and emerging economies. Value relevance of the German GAAP has been compared to that of the US GAAP or IFRS (Harris *et al*, 1994; Bartov *et al*, 2005; Schiebel, 2006; Hung and Subramanyam, 2007), with mixed findings. Controversy also exists as to whether the US GAAP are more value relevant than IFRS (Harris and Muller, 1999; Van der Meulen *et al*, 2007). In a multi-country study, Ali and Hwang (2000) find that value relevance is lower in countries pertaining to the Continental European cluster than in

those included in the Anglo-Saxon cluster. IFRS do not appear to be more value relevant than the national GAAP in Finland (Niskanen *et al*, 2000) and Switzerland (Babalyan, 2001). With respect to emerging economies, Jermakowicz and Gornik-Tomaszewski (2001) establish that value relevance in Poland is similar to that of more developed economies, whereas Lin and Chen (2005) find that the Chinese GAAP are more relevant than IFRS.

The impact of regulation on value relevance has also been investigated. Joos and Lang (1994) establish that value relevance has improved in France, Germany and the United Kingdom as a result of the EU fourth and seventh directives. Changes in national accounting regulation are found to have improved value relevance in the Czech Republic (Hellström, 2006), Tunisia (Naceur and Nachi, 2007), Poland (Dobija and Klimczak, 2007), and Norway (Gjerde *et al*, 2008). The impact of IFRS on value relevance has been investigated for the United Kingdom (Horton and Serafeim, 2008), Spain (Callao *et al*, 2007), and Germany (Jermakowicz *et al.*, 2007), providing conflicting results.

Table 2 reports the main features of the studies that have assessed value relevance of different accounting standards. The first column reports the name of the author(s) and year of publication, the second column reports the sample period, the third column reports the objective of the study<sup>2</sup>, and finally the fourth column reports the main findings.

[insert table 2 here]

### **3. Methodology and data**

In order to assess the value relevance of a certain set of accounting measures one can choose between two perspectives (Hellström, 2006): the ‘measurement perspective’ evaluates the degree of association between accounting and market data; the ‘signalling perspective’ investigates changes in market value due to announcement of accounting information. This study uses the former approach to investigate whether the introduction of IFRS has enhanced value relevance in Europe.

Most of the studies using the ‘measurement perspective’ rely on Ohlson’s (1995) Linear Information Model (LIM). According to Ohlson (1995), firm value is a function of book value of equity and expected future residual (or abnormal) earnings<sup>3</sup>. This relation is based on the assumption of clean surplus accounting: changes in

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<sup>2</sup> Some of the studies have multiple objectives aside from that regarding value relevance. For simplicity and consistency with the aim of this paper, we limit the analysis to the investigation of value relevance.

<sup>3</sup> Residual earnings are defined as current earnings minus expected earnings, where the expected earnings are the product of the previous book value of equity and the cost of capital.



shareholders' net equity that do not consist of transactions with shareholders (dividends, share repurchases or offerings) should appear in the income statement. In other words, current book value of equity should be equal to book value of equity of the previous year, minus current dividends or share repurchases (plus in the case of share offerings), plus earnings.

### 3.1 The price regression model

Following Barth *et al.* (2008), our first metric for value relevance is the explanatory power of a regression of share price of company  $i$  ( $i = 1, \dots, N$ ) in year  $t$  ( $t = 1, \dots, T$ ), denoted  $P_{it}$ , on book value of equity per share, denoted  $B_{it}$ , and earnings per share, denoted  $E_{it}$ . This model is commonly referred to as price regression model, or PRM, and derives from Ohlson's (1995) LIM. In order to allow for changes in price that are due to mean differences across industries or to cross-listing,  $P_{it}$  is pre-regressed on industry and cross-listing fixed effects. The residuals of this regression,  $P_{it}^*$ , are regressed on  $B_{it}$  and  $E_{it}$ .<sup>4</sup>

Because of multiple observations,  $t$ , for each company,  $i$ , individual effects might arise that cause values of  $P_{it}^*$  for the same  $i$  to cluster together. This type of intra-group correlation can be tackled using panel-data models. These models split the error term of the regression of  $P_{it}^*$  on  $B_{it}$  and  $E_{it}$  into two components: an individual (or fixed) effect, allowing for unobservable characteristics of  $i$  that do not vary over time,  $\eta_i$ ; and a time-varying random term,  $\varepsilon_{it}$ .

Random Effects Model (REM) assumes that  $\eta_i$  is distributed randomly across companies, and that there is no correlation between the covariates ( $B_{it}$  and  $E_{it}$ ) and  $\eta_i$  (orthogonality assumption). REM uses Generalised Least Square estimation to obtain efficient estimates of the coefficients for  $B_{it}$  and  $E_{it}$ . However, if the orthogonality assumption does not hold, the estimates are inconsistent. In such cases, Fixed Effect Model (FEM) can be used in place of REM. FEM does not assume that  $\eta_i$  is distributed randomly across units. FEM disposes of the individual effects by subtracting the within-group average of the dependent variable ( $\bar{P}_i^*$ ) and of the covariates ( $\bar{B}_i$  and  $\bar{E}_i$ ) from each observation. For this reason, FEM is also called

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<sup>4</sup> Barth *et al.* (2008) pre-regress  $P_{it}$  on industry and country effects (p. 486, *op. cit.*). We examine country effects using equation (2) for each country as well as for the whole sample. Industry effects are examined using the Industry Classification Benchmark index. Cross-listing effects are examined using the number of stock exchanges on which a company is listed.

within-group estimator. Because  $\eta_i$  is constant for each  $i$ , differencing eliminates the individual effects:

$$P_{it}^* - \bar{P}_i^* = \beta_1(B_{it} - \bar{B}_i) + \beta_2(E_{it} - \bar{E}_i) + u_{it} - \bar{u}_i \quad (1)$$

where  $u_{it} = \varepsilon_{it} + \eta_i$ , and  $u_{it} - \bar{u}_i = \varepsilon_{it} - \bar{\varepsilon}_i = \varphi \sim N(0, \sigma^2)$

We have decided to use the within-group estimator to analyse the relationship between share price and accounting data because it enable us to tackle the problem of intra-group correlation as well as possible scale effects that might impair the comparison of the explanatory power of the model (that is the coefficient of determination,  $R^2$ ) in the period before and after the implementation of IFRS. Scale effects refer to the influence of size on both accounting measures and share price: companies with higher (lower) share price are likely to have larger (smaller) book value of equity and larger (smaller) earnings per share. Scale effects may produce spurious correlation between the dependent variable and the regressors of equation (1), and hinder the comparability of the explanatory power between two or more sub-samples (Brown *et al.*, 1999; Gu, 2001; Ota, 2001). Subtracting the within-group mean from each observation for the dependent and independent variables eliminates any potential scale effects from the analysis. This technique is preferred to adjusting for scale effects via deflation of all variables by some factor. A debate is still ongoing as to what variable should be used as a deflator (Dedman *et al.*, 2009)<sup>5</sup>. Some studies use the previous share price (Lang *et al.*, 2006)<sup>6</sup>. In our opinion, deflating all variables of the PRM by the previous share price does not solve the problem of scale effects, because the term  $\eta_i$  will not be eliminated from the error term<sup>7</sup>.

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<sup>5</sup> Hellström (2006) attempts to mitigate scale effects by deflating all variables by the book value of equity of the previous year, or by using a logarithmic transformation of all variables.

<sup>6</sup> Other studies that use market value (rather than share price) as dependent variable employ a range of deflators: market value at the beginning of the year, book value of equity, number of shares, sales (Dedman *et al.*, 2009). However, an optimal deflator has yet to be found (Akbar and Stark, 2003).

<sup>7</sup> In an OLS regression of  $P_{it}$  on  $B_{it}$  and  $E_{it}$ , that is the PRM, dividing all variables by  $P_{it-1} = B_{it-1} + E_{it-1} + u_{it-1}$ , where  $u_{it-1} = \eta_i + \varepsilon_{it-1}$  will produce  $\frac{P_{it}}{P_{it-1}} = \frac{B_{it}}{P_{it-1}} + \frac{E_{it}}{P_{it-1}} + \frac{u_{it}}{P_{it-1}}$ . The deflation of the error term  $u_{it}$  by

$P_{it-1}$  will transform  $u_{it}$  as follows:  $\frac{u_{it}}{P_{it-1}} = \frac{\eta_i + \varepsilon_{it}}{B_{it-1} + E_{it-1} + \eta_i + \varepsilon_{it-1}}$ . Although both the numerator and

denominator contain the individual effects  $\eta_i$ , the impact of  $\eta_i$  on the numerator is larger than on the denominator. This will produce an upward bias for the error term  $\frac{u_{it}}{P_{it-1}}$  in the case  $\eta_i$  is positive and a

downward bias if  $\eta_i$  is negative.

Following Barth *et al.* (2005) we allow for the influence of variables other than accounting information on share price by including an additional independent variable in (1),  $v_{it} = P_{it}^* - \hat{P}_{it-1}^*$ , where  $\hat{P}_{it-1}^*$  is the fitted value of  $P_{it-1}^*$  according to (1):

$$P_{it}^* - \bar{P}_i^* = \beta_1 (B_{it} - \bar{B}_i) + \beta_2 (E_{it} - \bar{E}_i) + v_{it} - \bar{v}_i + u_{it} - \bar{u}_i \quad (2)$$

In order to establish if the switch to IFRS has caused a structural break in the relationship between share price and accounting data, we run a Chow test:

$$CHOW = \frac{[RSS - (RSS_1 + RSS_2)]/k}{(RSS_1 + RSS_2)/(n_1 + n_2 - 2k)} \quad (3)$$

where:

RSS is the residual sum of squares of equation (2) for the whole sample period;

RSS<sub>1</sub> is the residual sum of squares of equation (2) for the pre-IFRS period;

RSS<sub>2</sub> is the residual sum of squares equation (2) for the IFRS period;

n<sub>1</sub> is the number of observations of equation (2) for the pre-IFRS period;

n<sub>2</sub> is the number of observations of equation (2) for the IFRS period;

k is the number of estimated parameters (including the constant) of equation (2).

CHOW follows an F-distribution with degrees of freedom k and (N-2k), where N = n<sub>1</sub>+n<sub>2</sub>. The null hypothesis of the Chow test asserts that the coefficients on E<sub>it</sub> and B<sub>it</sub> do not vary in the two periods:

$$H_0: \beta_{1,1} = \beta_{1,2} \quad \text{and} \quad \beta_{2,1} = \beta_{2,2}$$

$$H_1: \beta_{1,1} \neq \beta_{1,2} \quad \text{or} \quad \beta_{2,1} \neq \beta_{2,2}$$

where  $\beta_{1,1}$  is  $\beta_1$  for equation (2) for the pre-IFRS period,  $\beta_{1,2}$  is  $\beta_1$  for equation (2) for the IFRS period,  $\beta_{2,1}$  is  $\beta_2$  for equation (2) for the pre-IFRS period, and  $\beta_{2,2}$  is  $\beta_2$  for equation (2) for the IFRS period.

If  $H_0$  is rejected, equation (2) does not adequately account for the relationship between the dependent and the independent variables when the whole sample period is examined. As a result of a structural break, the coefficients  $\beta_1$  and  $\beta_2$  have changed, and the model for the whole sample period is misspecified. The explanatory power of two regressions run separately for the pre-IFRS and IFRS period is higher than that of a regression run for the whole sample period.

### 3.2 The return regression model

Commonly, a second derivation from Ohlson's (1995) is used in the literature to test the robustness of the results obtained using the PRM. Taking first differences of share price, book value of equity per share, and earnings per share yields:

$$P_{it} - P_{it-1} = B_{it} - B_{it-1} + E_{it} - E_{it-1} \quad (4)$$

Using the clean surplus relation:

$$B_{it} = B_{it-1} + E_{it} - D_{it} \quad (5)$$

where  $D_{it}$  denotes dividends or share repurchases (in the case of share offerings,  $D_{it}$  is negative in equation (5)), the following relationship holds:

$$P_{it} - P_{it-1} = (B_{it-1} + E_{it} - D_{it}) - B_{it-1} + E_{it} - E_{it-1} \quad (6)$$

After simple algebraic transformations, equation (6) becomes:

$$R_{it} = E_{it} + \Delta E_{it} \quad (7)$$

where  $R_{it} = P_{it} - P_{it-1} + D_{it}$  (cum-dividend return) and  $\Delta E_{it} = E_{it} - E_{it-1}$ .

While the PRM explains the relation between share price and accounting data, a regression based on equation (7) explains the relation between changes in share price (adjusted for dividends) and accounting data. Commonly, both members of equation (7) are deflated by  $P_{it-1}$  to adjust for scale effects. The resulting model is referred to as return regression model (RRM). However, for analogy with equation (2), we prefer

using the following within-group (FEM) specification for panel-data:

$$R_{it}^* - \bar{R}_i^* = \beta_1(E_{it} - \bar{E}_i) + \beta_2(\Delta E_{it} - \Delta \bar{E}_i) + u_{it} - \bar{u}_i \quad (8)$$

where  $R_{it}^*$  are the residuals of a regression of  $R_{it}$  on industry and cross-listing fixed effects and, similar to equation (1),  $u_{it} = \varepsilon_{it} + \eta_i$ . In order to mitigate the problem of transitory earnings (Ota, 2001), we use Earnings Before Interest, Taxes, Depreciation and Amortisation (EBITDA) per share instead of earnings per share, and consider only observations for which the earnings per share are positive<sup>8</sup>. A Chow test similar to that of equation (3) is employed to verify whether the relationship between market data and accounting measures has undergone a radical change after the implementation of the IFRS. In order to avoid introducing noise, we exclude observations for which the current period,  $t$ , refers to the year 2005. Failing to exclude these observations would cause the calculation of  $R_{it}^*$  and  $\Delta E_{it}$  to be based on data pertaining to both the pre-IFRS period ( $t-1 = 2004$ ) and the IFRS period ( $t = 2005$ ).

### 3.3 Data

The two regression models described in sections 3.1 and 3.2 above are applied to consolidated accounts data and share prices collected from the database *Thomson Analytics*, for the period 2002-2007. Share prices are collected three months after the closing year date (as in Hellström, 2006; King and Langli, 1998; Van der Meulen *et al.* 2007; and Kimberly, 2002).

Table 3 reports the sample selection process, showing for each step the number of observations eliminated from the sample as well as those remaining. Only companies reporting under Local GAAP before the mandatory switch to IFRS in 2005 are included in the sample<sup>9</sup>. Companies reporting under US GAAP or any other

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<sup>8</sup> Transitory earnings refer to expenses or revenues that are unlikely to recur frequently, such as extraordinary items. Using profitability measures that are not affected by extraordinary items (such as EBITDA) helps reduce the problem. Losses are also considered to be transitory, because of a liquidation option for shareholders (Hayn, 1995). Studies based on the RRM may also suffer from accounting recognition lag: prices may reflect information quicker than accounting measures. Generally, accounting recognition lag can be tackled using larger ‘windows’ for the calculation of returns. However, due to the limited number of years available for our analysis and the lack of quarterly data for earnings, we cannot employ this approach.

<sup>9</sup> Voluntary adoption of IFRS has been found to lead to better accounting quality. This might be because voluntary adopters have incentives to comply with IFRS rules. If there were no incentives,

accounting principles are excluded. Observations for which the book value of equity is zero or negative are excluded, because of possible interference with local regulations regarding financial distress. The foregoing selection criteria leave us with a total number of observations of 13,904. Other observations are excluded for the following reasons: book value of equity exceeds the assets; the number of shares outstanding is missing; the price-to-earnings ratio is either smaller than the 0.01 percentile or greater than the 0.99 percentile. With respect to the latter criterion, used in order to reduce the impact of price volatility on our results, the 0.01 and 0.99 percentile of the price-to-earnings ratio are calculated using observations for the country under investigation when the analysis is carried out on a per-country basis. When the overall sample is examined, the selection criteria applied to the original sample leave us with 13,849 observations for 3,721 companies.

[insert table 3 here]

## **4. Results**

### *4.1 Preliminary analysis*

Table 4 reports descriptive statistics for share price, P, book value of equity per share, BVPS, earnings per share, EPS, cum-dividend return, R, EBITDA per share, ER, and changes in EBITDA per share, CR, separately for each country. We examine statistically significant differences for the sample averages of each variable between the pre-IFRS and IFRS periods using t-tests with unequal variances. We find that the average P for the pre-IFRS period is significantly lower than for the IFRS period for all countries except Germany. The average BVPS is significantly larger for the IFRS period for France and the UK. The average EPS is significantly larger for the IFRS period for all countries except Germany. For the UK the average EPS for the pre-IFRS period is negative. The average R and CR do not differ significantly between the pre-IFRS and IFRS period. The average ER is significantly larger for the IFRS period for France and the UK. These preliminary results suggest that in the IFRS period there has been a significant change in the average value of some of the variables used in the PRM and RRM. However, these results say nothing about changes in the explanatory power of the PRM and RRM; nor do they provide information as to whether the relationship between P or R (measures of market performance) and BVPS, EPS, ER, and CR (measures of accounting performance) has changed as a result of IFRS adoption.

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there would have been no reason to adopt IFRS voluntarily. When the adoption of IFRS becomes compulsory, there might not be incentives to comply with IFRS rules. Compulsory adoption of IFRS has not improved accounting quality (Christensen et al., 2008). We thank an anonymous referee for this remark.

We examine statistically significant differences for the sample averages of each variable across countries, for either the pre-IFRS or the IFRS period, using a One-Way Analysis Of Variance tests. Statistically significant differences for the sample medians are examined using Kruskal-Wallis tests. With the exception of CR, we find that the average sample means of all variables differ across countries for both the pre-IFRS and IFRS period. The average sample medians of all variables differ across countries for both the pre-IFRS and IFRS period. These preliminary results suggest that the analysis be carried out on a per-country basis rather than for the whole sample, as it has been done in some of the extant literature (for instance, Barth *et al.*, 2008).

[insert table 4 here]

#### 4.2 Results for the price regression model

Table 5 reports the results for equation (2), or the within-group estimation of the PRM, for all five countries taken as a whole, and separately for each country.

For the whole sample the Chow test is significant at the 1% level, suggesting that a structural break in the relationship between market data and accounting data took place after the switch to IFRS. The restricted (pooled) model for equation (2) does not adequately describe the relationship between accounting measures and stock price, and should be discarded. The explanatory power (represented by the  $R^2$  of the within-group estimation) increases from 51.04% for the pre-IFRS period to 57.70% for the IFRS period. The coefficient on  $B_{it}$  decreases after the switch, while the coefficient on  $E_{it}$  increases. Therefore, there is a higher (lower) value relevance of earnings (book value of equity) after the implementation of IFRS. A negative coefficient on  $E_{it}$  is found for the pooled model, which according to the Chow test is inherently misspecified. A negative coefficient on  $v_{it}$  is found for the IFRS period. Because  $v_{it}$  proxies for residual effects of non-accounting variables, this result is not inconsistent with theory. The results for the overall explanatory power of the model and changes in the coefficients of the regressors suggest that value relevance increased after IFRS were implemented due to a higher value relevance of earnings.

For Germany the Chow test is significant at the 1% level. The explanatory power decreases from 95.15% for the pre-IFRS period to 51.55% for the IFRS period. Similar to what found for the whole sample, the coefficient on  $E_{it}$  increases after the switch, while the coefficient on  $B_{it}$  decreases. Therefore, there is a higher (lower) value relevance of earnings (book value of equity) after the implementation of IFRS. The coefficient on  $v_{it}$  is not significant for the pre-IFRS period. However, this does not impair our analysis, as we are interested in the explanatory power of the accounting measures only.

For Spain the Chow test is significant at the 1% level. The explanatory power decreases from 40.52% for the pre-IFRS period to 7.33% for the IFRS period. The coefficient on  $E_{it}$  is negative in the pre-IFRS period. Negative correlation between price and earnings is counterintuitive, although already verified for firms that report losses, as reported in section 2. For the pre-IFRS period 8% of the observations is related to negative earnings, and the largest loss is -4,451,000€. For the IFRS period the percentage drops to 5%, and the largest loss is -215,000€. Therefore, a negative correlation between  $E_{it}$  and  $P_{it}^*$  for the pre-IFRS period might be due to many large losses. The coefficient on  $B_{it}$  decreases after the switch to IFRS. Both the coefficient on  $B_{it}$  and that on  $E_{it}$  are positive but not significant at the 5% level for the IFRS period. If the significance of the coefficient is considered as an indicator of value relevance, independent of the magnitude of the coefficients (Hellström, 2006), earnings are less value relevant after the introduction of IFRS. The coefficient on  $v_{it}$  is not significant for the IFRS period.

For France the Chow test is significant at the 5% level. The explanatory power increases from 14.99% for the pre-IFRS period to 80.55% for the IFRS period. Consistent with what found for the whole sample and Germany, the coefficient on  $E_{it}$  increases after the switch, while the coefficient on  $B_{it}$  decreases. Therefore, there is a higher (lower) value relevance of earnings (book value of equity) after the implementation of IFRS. The coefficient on  $v_{it}$  is not significant for the IFRS period.

For Italy, contrary to what found so far, the Chow test is not significant. The restricted (pooled) model for equation (2) is preferred to the unrestricted model to describe the relationship between share price and accounting measures. The coefficients on  $E_{it}$  and  $B_{it}$  are lower for the IFRS period than for the pre-IFRS period.

For the UK, similar to what found for Italy, the Chow test is not significant. However, the explanatory power increases from 69.88% for the pre-IFRS period to 84.87% for the IFRS period. The coefficients on  $E_{it}$  and  $B_{it}$  are considerably higher for the IFRS period than for the pre-IFRS period. The coefficient on  $E_{it}$  is negative for the pre-IFRS period. However, the results of the Chow test already suggested that the unrestricted model is misspecified.

To summarise, IFRS appear to have produced a structural break in the relationship between market data and accounting measures only for Germany, Spain, and France. Moreover, the impact of IFRS on the explanatory power of a regression of price on book value of equity per share and earnings per share differs according to the country. While for Germany and Spain the explanatory power decreases after the switch to IFRS, suggesting value relevance has worsened, for France there has been an increase, suggesting value relevance has improved. Changes in the explanatory power of for Italy and the UK might not be due to the adoption of IFRS according to



the results for the Chow test. The results for the coefficients on the explanatory variables show that value relevance of earnings has increased after the implementation of IFRS in all three countries for which the Chow test is significant. Conversely, value relevance of book value of equity has decreased in all three countries for which the Chow test is significant. In our opinion, the lower coefficient on book value of equity might be due to the adoption of fair value accounting. If book value of equity is closer to the actual market capitalisation of the firm, the book to market ratio, equal to the slope coefficient on book value, is lower<sup>10</sup>.

[insert table 5 here]

#### 4.3 Results for the return regression model

Table 6 reports the results for equation (8), or the within-group estimation of the RRM, for all five countries taken as a whole, and separately for each country.

For the whole sample the Chow test is negative and not significant, suggesting IFRS did not bring about any structural break in the relationship between market data and accounting measures. However, the explanatory power increases from 21.38% for the pre-IFRS period to 58.54% for the IFRS period. The coefficient on  $E_{it}$  (which in this case represents EBITDA per share, not earnings per share) is negative for the pre-IFRS period and positive for the IFRS period. For the pooled (restricted) model the coefficient on  $E_{it}$  is negative. The coefficient on  $\Delta E_{it}$  is positive for all three regressions. For the IFRS period, the coefficient on  $E_{it}$  is (in absolute value terms) larger for the IFRS period than for the pre-IFRS period. On the contrary, the coefficient on  $\Delta E_{it}$  for the IFRS period is smaller than for the pre-IFRS period.

For Germany the Chow test is significantly (1%) negative, suggesting the pooled (restricted) model is preferred to the unrestricted model. As before, it does not seem that the IFRS have brought about a significant change in the relationship between market data and accounting measures. However, the explanatory power decreases from 90.99% for the pre-IFRS period to 26.26% for the IFRS period. The coefficient on  $E_{it}$  is negative for both the pooled model and the IFRS period. Consistent with what reported for the whole sample, the coefficient on  $\Delta E_{it}$  for the IFRS period is smaller than for the pre-IFRS period.

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<sup>10</sup> For instance, let  $B_{HC}$  be book value of equity under historical cost accounting,  $B_{FV}$  book value of equity under fair value accounting, and  $MV$  market value of equity (the same regardless of the type of accounting used). Assume a positive difference between fair value and historical cost of assets recorded in the financial statements, that is  $B_{HC} < B_{FV}$ . In a regression of the type:  $MV = \beta B$ , where  $B$  is either  $B_{HC}$  or on  $B_{FV}$ ,  $\beta = MV/B$ .  $B_{HC} < B_{FV}$  implies  $MV/B_{HC} > MV/B_{FV}$ , and therefore, a change in  $B_{HC}$  will result in a larger slope coefficient,  $\beta$ , for  $MV$  than if  $B_{FV}$  is used.

For Spain the Chow test (negative and significant at the 5%) suggests that the pooled model is preferred to the unrestricted model, refuting the hypothesis that IFRS have produced a significant change in the relationship between market data and accounting measures. However, the explanatory power soars from 2.23% for the pre-IFRS period to 65.81% for the IFRS period. It is worth mentioning that for the IFRS period fixed effects are calculated for 110 companies, while the number of observations is 142. Therefore, the number of residual degrees of freedom is 32 (while that for the pre-IFRS period is 99). The surge in the explanatory power for the IFRS period may be due to scarcity of residual degrees of freedom for the IFRS period. The coefficient on  $\Delta E_{it}$  is not significant for the pooled model, nor is it significant for either the pre-IFRS or the IFRS period. The coefficient on  $E_{it}$  is significantly positive for the pooled model, not significant for the pre-IFRS period and significantly negative for the IFRS period.

For France the Chow test is not significant, suggesting the pooled model describes adequately the relationship between market data and accounting measures, and therefore IFRS have not had a significant impact on this relationship. However, the explanatory power soars from 7.03% for the pre-IFRS period to 67.45% for the IFRS period. Unlike for Spain, this surge does not appear to be due to scarcity of residual degrees of freedom for the IFRS period (there are 447 company fixed effects and 638 observations). The coefficient on  $E_{it}$  is significantly negative for the pooled model and not significant for either period of the unrestricted model. The coefficient on  $\Delta E_{it}$  is positive and significant for the pooled model and either period of the unrestricted model, but increases after the switch to IFRS.

For Italy the Chow test is not significant, suggesting that the pooled model describes adequately the relationship between market data and accounting measures and therefore IFRS have not had a significant impact on this relationship. However, the explanatory power increases from 14.89% for the pre-IFRS period to 30.79% for the IFRS period. Similar to what found for Spain, the increase in the explanatory power for the IFRS period may be due to a much smaller number of residual degrees of freedom than for the pre-IFRS period: for the former 71 residual degrees of freedom are available, while for the latter 105. The coefficient on  $E_{it}$  for the pooled model is negative and significant, while that on  $\Delta E_{it}$  is positive and significant. Similar to what found for the pooled model, for the IFRS period the coefficient on  $E_{it}$  is negative and significant, while that on  $\Delta E_{it}$  is positive and significant. On the contrary, for the pre-IFRS period the coefficient on  $E_{it}$  is positive and significant, while that on  $\Delta E_{it}$  is negative and significant.

For the UK the Chow test is negative and significant at the 10% level. The pooled model is preferred to the unrestricted model, and IFRS do not appear to have had a significant impact on the relationship between market data and accounting

measures. However, the explanatory power increases from 27.71% for the pre-IFRS period to 92.23% for the IFRS period. The coefficient on  $E_{it}$  is positive and significant for the pooled model. For the unrestricted model, the coefficient on  $E_{it}$  is positive and significant for the IFRS period, but negative and significant for the pre-IFRS period. The coefficient on  $\Delta E_{it}$  is positive and significant at the 10% level for the pooled model. For the unrestricted model the coefficient on  $\Delta E_{it}$  is negative, and it is significant at the 1% level for the IFRS period, but not significant for the pre-IFRS period.

To summarise, when a RRM is used rather than a PRM, IFRS appear not to have produced a structural break in the relationship between market data and accounting measures in any of the countries examined. Therefore, changes in value relevance, as expressed by the explanatory power of the RRM before and after the implementation of IFRS, might have occurred for reasons other than the introduction of IFRS. However, the explanatory power of the RRM when all five countries are examined is larger for the IFRS period than for the pre-IFRS period. This result is consistent with what found using the PRM. Consistent with the results for the PRM are also the results for the explanatory power of the RRM for Germany and the UK: value relevance appears to be lower for the IFRS period than for the IFRS period. The results for Spain, France, and Italy indicate that value relevance has increased during the IFRS period, contrary to what found for the PRM.

The possible causes of the inconsistency between the results for the PRM and those for the RRM are manifold. The RRM does not consider the effect of book value of equity per share on stock returns but only the effect of earnings per share. Observations for which earnings are negative are excluded when the RRM is used, and EBITDA per share replaces earnings per share. The exclusion of negative earnings and the use of EBITDA per share rather than earnings per share is to allow for the problems of transitory earnings, of which the RRM appears to be affected. For the RRM many observations are excluded that refer to 2005, and equation (8) does not include the effects of variables other than accounting information. Adjustments could be made to make the RRM more consistent with the PRM. However, some of these adjustments are not possible. Including a proxy for variables other than accounting information would cause a serious drop in the number of observations, preventing us from running the RRM for the unrestricted model. Using even observations for 2005 would introduce noise in the analysis. Finally, even if adjustments were made to make the analysis more consistent with the PRM, the problem of accounting recognition lag could not be addressed, due to the lack of a sample period of sufficient length.

[insert table 6 here]

## 5. Other measures of accounting quality

Other measures of accounting quality that may be used to assess the effects of IFRS are earnings smoothing and timely loss recognition (Barth *et al.*, 2008). The former variable can be proxied by earnings variability: the lower the variance of earnings, the more likely is that earnings smoothing practices are used (Lang, Raedy and Wilson, 2006). IFRS should discourage the application of earnings smoothing practices, because they limit management's discretion (Barth *et al.*, 2008) and thus earnings smoothing should have decreased after the implementation of IFRS. The latter can be proxied by the frequency of large losses. If earnings management occurs, large losses should be less frequent than in the case of no earnings management. IFRS prohibits the creation of hidden reserves that can be used to conceal large losses.

### 5.1 Earnings smoothing and International Financial Reporting Standards

Our metric for earnings smoothing is the variability of annual change in net income scaled by total assets (Lang, Raedy and Wilson, 2006),  $\Delta I_{it}$ . In order to allow for variables other than management discretion that could affect earnings variability, a two-stage process is followed:  $\Delta I_{it}$  is first regressed on variables that are believed to affect earnings variability; the standard deviation of the residuals of the first regression,  $\Delta I_{it}^*$ , is used to understand whether IFRS have reduce earnings smoothing. Following Barth *et al.* (2008), the first regression is:

$$\begin{aligned} \Delta I_{it} = & \beta_0 + \beta_1 \text{SIZE}_{it} + \beta_2 \text{GROW}_{it} + \beta_3 \text{EISSUE} + \beta_4 \text{LEV}_{it} + \beta_5 \text{DISSUE}_{it} \\ & + \beta_6 \text{TURN}_{it} + \beta_7 \text{CF}_{it} + \beta_8 \text{AUD}_i + \beta_9 \text{NUMEX}_i + \beta_{10} \text{CLOSE}_{it} + \beta_{11} \text{XLIST}_i \\ & + \beta_{12} \text{SEC}_i + \varepsilon_{it} \end{aligned} \quad (9)$$

where:

$\text{SIZE}_{it}$  is the natural logarithm of market value of equity;

$\text{GROW}_{it}$  is annual change in sales;

$\text{EISSUE}_{it}$  is annual change in common stock;

$\text{LEV}_{it}$  is total liabilities divided by book value of equity;

$\text{DISSUE}_{it}$  is change in total liabilities;

$\text{TURN}_{it}$  is sales divided total assets;

$\text{CF}_{it}$  is annual net cash flow from operating activities divided by

	total assets;
AUD <sub>i</sub>	is 1 if the firm's auditor is PwC, KPMG, Arthur Andersen, Ernst and Young, or Deloitte and Touche, and 0 otherwise;
NUMEX <sub>i</sub>	is the number of exchanges on which a company's shares are listed;
CLOSE <sub>it</sub>	is the percentage of closely held shares of the company as reported by WorldScope;
XLIST <sub>i</sub>	is 1 if the company is cross-listed on a US stock exchange (which is not the main stock exchange) and 0 otherwise
SEC1 <sub>i</sub> -SEC10 <sub>i</sub>	is a set of binary variables indicating to which industry the company belongs to (Industry Classification Benchmark index)
$\varepsilon_{it}$	is a random and Normally-distributed error term.

We calculate clustered standard errors for the coefficients on the independent variables in order to allow for intra-group correlation that might cause downward-biased standard errors. For consistency with the analysis of value relevance, observations for which the price-to-earnings ratio is either smaller than the 0.01 percentile or greater than the 0.99 percentile are excluded.

The residuals from regression (9),  $\varepsilon_{it} = \Delta I_{it}^*$ , are examined using an F-test to verify whether IFRS have produced a significant change in the standard deviation of  $\Delta I_{it}^*$ . The null and alternative hypothesis is:

$$H_0: \sigma_1 = \sigma_2 \quad \text{and}$$

$$H_1: \sigma_1 \neq \sigma_2$$

where  $\sigma_1$  is the standard deviation of  $\Delta I_{it}^*$  for the pre-IFRS period and  $\sigma_2$  is the

standard deviation of  $\Delta I_{it}^*$  for the IFRS period.

### 5.2 Timely loss recognition and International Financial Reporting Standards

The second measure of accounting quality we examine is timely loss recognition. The metric we use is the frequency of large negative net income,  $LNEG_{it}$ , which we use as an independent variable in the probit regression (Barth *et al.*, 2008):

$$\begin{aligned} IFRS_{it} = & \beta_0 + \beta_1 SIZE_{it} + \beta_2 GROW_{it} + \beta_3 EISSUE + \beta_4 LEV_{it} + \beta_5 DISSUE_{it} \\ & + \beta_6 TURN_{it} + \beta_7 CF_{it} + \beta_8 AUD_i + \beta_9 NUMEX_i + \beta_{10} CLOSE_{it} \\ & + \beta_{11} XLIST_i + \beta_{12} SEC_i + \beta_{12} LNEG_{it} + \varepsilon_{it} \end{aligned} \quad (10)$$

where:

$IFRS_{it}$  is 1 for observations pertaining to the IFRS period and 0 otherwise;

$LNEG_{it}$  is 1 if  $I_{it} < -0.20$  and 0 otherwise;

and the other variables are defined as for equation (9). Similar to what we did for the estimation of equation (9), we calculate clustered standard errors for the coefficients on the independent variables in order to allow for intra-group correlation that might cause downward-biased standard errors. Further, for consistency with the analysis of value relevance and earnings smoothing, observations for which the price-to-earnings ratio is either smaller than the 0.01 percentile or greater than the 0.99 percentile are excluded.

A positive (and significant) coefficient on  $LNEG_{it}$  indicates a more frequent recognition of losses for the IFRS period than for the pre-IFRS period. Accordingly, a positive coefficient on  $LNEG_{it}$  suggests accounting quality has improved after the switch to IFRS.

### 5.3 Results for earnings smoothing and timely loss recognition

Table 7 reports the results for equations (9) and (10). With respect to earnings smoothing, we do not find evidence that the switch to IFRS has increased the variability of earnings, for any of the five countries examined. Therefore, earnings smoothing does not appear to be less frequent after the introduction of IFRS. The same conclusion can be drawn with respect to timely loss recognition. The coefficient on  $LNEG_{it}$  is negative and significant for France, Italy, and the UK. For Germany it is negative but not significant. For Spain, no coefficient was calculated by Stata, due to a

problem of perfect collinearity between the dependent variable and  $LNEG_{it}$ . However, all observations for which  $LNEG_{it}$  is 1 occurred in the pre-IFRS period. This result is supportive of *less* timely loss recognition for the IFRS period.

[insert table 7 here]

## 6. Conclusions

This paper presents an analysis of the effects of the compulsory adoption of IFRS for European listed companies, occurred in 2005. We examine the extent to which accounting measures are reflected in share price and cum-dividend returns, or value relevance, before and after this event. To this end, we apply panel-data modelling to data for 3,721 companies listed on five European stock markets, for the period 2002-2007. A Chow test is employed to identify potential structural breaks in the regression coefficients in correspondence of 2005.

Our main findings are as follows. In a regression of share price on book value of equity per share and earnings per share, for all companies in the sample, IFRS are found to have increased value relevance of earnings, while value relevance of book value of equity has decreased. The explanatory power of the regression has increased. For individual countries, the effects (if any) of IFRS are mixed. For Germany, similar to what found for the whole sample, value relevance of earnings has increased after the introduction of IFRS, while that of book value of equity has decreased. However, the explanatory power of the regression has decreased. For Spain, value relevance of book value of equity and earnings is lower for the IFRS period than for the pre-IFRS period. For France, consistent to what found for the whole sample, the explanatory power of the regression has increased. Value relevance of earnings has also increased. For Italy and the United Kingdom, IFRS have not brought about any structural break in the relationship between share price and accounting measures.

In a regression of cum-dividend return on EBITDA per share and changes in EBITDA per share, no structural breaks are found as a result of the implementation of IFRS. Tests on earnings smoothing and timely loss recognition, which are commonly used along with value relevance to assess accounting quality, have not found evidence of an improvement in accounting quality after the switch to IFRS.

Overall, our results suggest that the main aim of IFRS, that is to achieve better cross-border comparability of financial statements via harmonisation of accounting standards, may still not have been achieved. Differences across accounting systems in Europe are still significant. IFRS introduction has had a heterogeneous impact on European accounting systems. Further research should investigate whether IFRS have been implemented in a consistent manner throughout Europe, and if its enforcement

has somehow been hindered by national factors associated with either culture or legal system, or both. Therefore, we expect future studies to investigate to what extent accounting harmonisation is taking place, and the factors that are inhibiting its progress.



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**Table 1: Differences among European accounting systems.**

a)

	<i>Germany</i>	<i>France</i>	<i>Spain</i>	<i>Italy</i>	<i>United Kingdom</i>	<i>European Countries under IFRS</i>
<i>Legal System</i>	Code Law	Code Law	Code Law	Code Law	Common law	Common Law
<i>Primary readers of financial reports</i>	Lenders and Tax	Lenders and Tax	Lenders and Tax	Lenders and Tax	Investors	Investors
<i>Prevalent accounting principle</i>	Prudence	Prudence	Prudence	Prudence	True and Fair View	Accrual basis
<i>Prevalent valuation criterion</i>	Historical cost	Historical cost	Historical cost	Historical cost	Historical cost and modified historical cost (revaluations allowed)	Fair Value
<i>Financial Statement documents</i>	Income Statement, Balance Sheet, Notes	Income Statement, Balance Sheet, Cash Flow Statement (advised), Notes	Income Statement, Balance Sheet, Notes	Income Statement, Balance Sheet, Notes	Income Statement, Balance Sheet, Cash Flow Statement, Statement of Changes in Equity, Notes	Income Statement, Balance Sheet, Cash Flow Statement, Statement of Changes in Equity, Notes

**Table 1 continued**

b)

<i>Valuation criterion</i>		<i>United Kingdom</i>	<i>Germany</i>	<i>France</i>	<i>Spain</i>	<i>Italy</i>
<i>Inventory costing method</i>	<i>Allowed by accounting standards</i>	AC, FIFO and LIFO	AC, FIFO and LIFO	AC, FIFO and LIFO (for consolidate accounts only)	AC, FIFO and LIFO	AC, FIFO and LIFO
	<i>Used by companies^</i>	AC (11%); FIFO (73%); LIFO (0%); mixed including LIFO (3%)	AC (46%); FIFO (2%); LIFO (13%); mixed including LIFO (30%)	AC (43%); FIFO (29%); LIFO (2%); mixed including LIFO (5%)	AC (82%); FIFO (7%); LIFO (0%); mixed including LIFO (3%)	AC (39%); FIFO (13%); LIFO (15%); mixed including LIFO (22%)
	<i>Allowed by IFRS</i>	AC, FIFO				
<i>Goodwill on consolidation</i>	<i>Allowed by accounting standards</i>	IWO and A	IWO and A	IWO and A	IWO and A	IWO and A
	<i>Used by companies^</i>	IWO (58%); A (33%); PC (1%); mixed including A(8%)	IWO (47%); A (51%); PC (0%); mixed including A(2%)	IWO (0%); A (98%); PC (1%); mixed including A(1%)	IWO (2%); A (98%); PC (0%); mixed including A(0%)	IWO (21%); A (72%); PC (0%); mixed including A(7%)
	<i>Allowed by IFRS</i>	Impairment test				

**Table 1 b) continued**

<i>Valuation criterion</i>		<i>United Kingdom</i>	<i>Germany</i>	<i>France</i>	<i>Spain</i>	<i>Italy</i>
<i>Valuation of fixed assets</i>	<i>Allowed by accounting standards</i>	Valuation: HC and MHC Depreciation: SL, DB and UP	Valuation: HC Depreciation: SL, DB and UP	Valuation: HC Depreciation: SL, DB and UP	Valuation: HC Depreciation: SL, DB and UP	Valuation: HC Depreciation: SL, DB and UP
	<i>Used by companies^</i>	SL (93%); DB (1%); SL+DB (3%); SL + UP (3%)	SL (20%); DB (2%); mixed (73%) SL+DB (77%); SL + UP (0%)	SL (69%); DB (2%); SL+DB (29%); SL + UP (0%)	SL (97%); DB (0%); SL+DB (3%); SL + UP (0%)	SL (97%); DB (0%); SL+DB (0%); SL + UP (3%)
	<i>Allowed by IFRS</i>	Intangibles: cost or revaluation model Properties, Plant and Equipment: cost or revaluation model Investment properties: cost or fair value Depreciation: SL, DB and UP				

Notes to table 1 b):

^ The percentages do not add to 100% because criteria that are not relevant for comparison with IFRS have not been reported. Some companies have been found to use valuation criteria that are not allowed by Local GAAP. The reason for the departure from Local GAAP is the reporting under other GAAP (for instance, US GAAP), as explained in the notes to the financial statements.

LIFO = last in first out; FIFO = first in first out; AC = average cost; IWO = immediate write off; A= amortization; PC= permanent capitalization; SL = straight line; DB = declining balance; UP = unit of production; HC = historical cost; MHC = modified historical cost.

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**Table 2: Literature review on the use of value relevance models.**

<i>Paper</i>	<i>Sample period</i>	<i>Topic</i>	<i>Results</i>
Harris et al. (1994)	1982-1991	Comparison of value relevance German GAAP and US GAAP.	Significant association between accounting data provided under German GAAP and stock prices and returns. Explanatory power of earnings for returns in Germany comparable to that in the US. Explanatory power of book value of equity for price significantly lower in Germany than in the US. Little evidence of improved value relevance after Accounting Directives Law (1985).
Joos and Lang (1994)	1982-1990	Investigation of effects of EU directives on value relevance in the UK, Germany and France.	Improved value relevance in all countries after the EU directives.
Harris and Muller (1999)	1992-1996	Comparison of value relevance US GAAP and IAS.	Better value relevance for IAS when stock price is considered. Better value relevance for US GAAP when stock return is considered.
Ali and Hwang (2000)	1986-1995	Comparison of value relevance Continental model and Anglo-Saxon model	Lower value relevance for Continental model.
Niskanen et al. (2000)	1984-1992	Evaluation of incremental value relevance of reconciliation from Finnish Local Accounting Standards (LAS) to IAS.	No evidence of value relevance for reconciliation of Finnish LAS to IAS at an aggregate level. Significant value relevance for reconciling adjustments of untaxed reserves and consolidation differences.
Babalyan (2001)	1997-1999	Comparison of value relevance according Swiss GAAP, US GAAP and IAS.	US GAAP are more value relevant than IAS and Swiss GAAP. Firm size effect discovered and ascribed to greater demand for information for larger firms.
Bartov et al. (2005)	1998-2000	Comparison of value relevance German GAAP, US GAAP and IAS.	US GAAP are more value relevant than IAS, which are in turn more value relevant than German GAAP.
Lin and Chen (2005)	1995-2000	Evaluation of incremental value relevance of reconciliation from Chinese Accounting Standards (CAS) to IAS.	Evidence of little value relevance for reconciliation of CAS to IAS, mainly for stock prices of B-type shares <sup>11</sup> .

<sup>11</sup> In the Chinese stock market, A-type shares are those available only to domestic investors whereas B-type shares are available to both foreign and domestic investors (since 2001).

**Table 2 (continued)**

<i>Paper</i>	<i>Sample period</i>	<i>Topic</i>	<i>Results</i>
Schiebel (2006)	2000-2004	Comparison of value relevance German GAAP and IFRS.	German GAAP are more value relevant than IFRS.
Hellström (2006)	1994-2001	Investigation of changes in value relevance in Czech Republic (transitional economy).	Improved value relevance over time.
Callao et al. (2007)	2004-2005	Investigation of effects of IFRS adoption on value relevance in Spain.	Worse value relevance when IFRS are applied.
Dobija (2007)	1997-2006	Investigation of changes in value relevance in Poland (transitional economy).	Better value relevance of accounting earnings.
Hung and Subramanyam (2007)	1998-2002	Investigation of effects of IAS adoption on value relevance in Germany.	No evidence of better value relevance of IAS over German GAAP.
Naceur and Nachi (2007)	1992-2001	Investigation of effects of changes in Tunisian GAAP (in particular, 1997 accounting reform) on value relevance.	Better value relevance after the 1997 accounting reform. No evidence of firm size effect.
Van der Meulen et al. (2007)	2000-2002	Comparison of value relevance US GAAP and IFRS earnings.	No evidence of different value relevance between US GAAP and IFRS earnings.
Jermakowicz et al. (2007)	1995-2004	Comparison of the value relevance of accounting income reported under German HGB, IFRS and US GAAP	Better value relevance adopting IFRS or US GAAP
Gjerde et al.(2008)	1965-2004	Investigation of changes in value relevance in Norwegian GAAP over time (transition from Continental to Anglo-Saxon model).	Better value relevance over time.
Horton and Serafeim (2008)	2005	Evaluation of incremental value relevance of reconciliation from UK GAAP to IFRS.	Reconciliation of UK GAAP to IFRS is value relevant.
Dedman et al. (2009)	1991-2006	Evaluation of value relevance of R&D expenditure in the UK	R&D expenditure is value relevant.

**Table 3 Construction of the sample.**

<i>Selection process: steps</i>	<i>Number of observations excluded</i>	<i>Number of observations left</i>
Worldscope 2002-2003-2004-2005-2006-2007		32,076
Observations excluded because of accounting standards <sup>^</sup>	-14,716	17,360
Observations excluded because of missing values for share price, book value of equity and earnings	-2,858	14,502
Observations excluded because of a zero or negative book value of equity	-598	13,904
Observations excluded because of a book value of equity larger than the total assets	-36	13,868
Observations excluded because of missing data on the total number of outstanding shares	-11	13,857
Observations excluded because of a price to earnings ratio above (below) the 0.99 (0.01) percentile	-8	13,849

Notes to table 3:

<sup>^</sup> These companies were either voluntary adopters of IFRS before IFRS became compulsory or they published their financial statements according to a standards different from their Local GAAP.

**Table 4 Descriptive statistics (by country).**

<i>Variable</i>	<i>Country</i>	<i>N1</i>	<i>N2</i>	<i>Mean1</i>	<i>Mean2</i>	<i>Median1</i>	<i>Median2</i>	<i>FQ1</i>	<i>FQ2</i>	<i>TQ1</i>	<i>TQ2</i>
P <sup>##</sup>	Germany	725	1454	64.24	45.68	7.30	12.72	2.73	4.82	19.80	32.05
	Spain	408	343	15.8 <sup>^</sup>	24.03 <sup>^</sup>	8.83	16.40	4.20	8.70	15.83	28.39
	France	1646	1316	55.64 <sup>^</sup>	83.33 <sup>^</sup>	17.69	29.90	6.76	12.45	42.10	62.99
	Italy	564	545	6.67 <sup>^</sup>	10.19 <sup>^</sup>	3.81	6.47	1.77	2.99	8.71	12.32
	UK	1729	2067	4.07 <sup>^</sup>	9.16 <sup>^</sup>	1.95	3.03	0.97	1.49	3.60	6.18
BVPS <sup>##</sup>	Germany	722	1454	43.51	25.92	6.00	6.00	2.00	2.00	13.00	15.00
	Spain	408	343	9.67	9.15	4.05	5.00	2.30	3.00	8.90	9.00
	France	1645	1315	41.4 <sup>^</sup>	59.44 <sup>^</sup>	11.00	14.00	4.00	5.00	30.00	36.00
	Italy	563	543	4.32	5.01	2.14	3.00	1.00	2.00	6.00	6.00
	UK	1727	2065	2.82 <sup>^</sup>	4.09 <sup>^</sup>	1.00	1.00	1.00	1.00	2.00	3.00
EPS <sup>##</sup>	Germany	725	1454	7.19	4.13	0.22	0.60	-0.20	0.12	1.24	1.80
	Spain	408	343	0.68 <sup>^</sup>	1.51 <sup>^</sup>	0.55	0.79	0.18	0.33	1.16	1.59
	France	1646	1316	2.2 <sup>^</sup>	5.36 <sup>^</sup>	0.79	1.51	0.05	0.35	2.49	3.93
	Italy	564	545	0.11 <sup>^</sup>	0.46 <sup>^</sup>	0.13	0.28	0.01	0.08	0.34	0.64
	UK	1729	2067	-0.21 <sup>^</sup>	0.42 <sup>^</sup>	0.07	0.15	0.01	0.04	0.20	0.36

**Table 4 continued**

<i>Variable</i>	<i>Country</i>	<i>N1</i>	<i>N2</i>	<i>Mean1</i>	<i>Mean2</i>	<i>Median1</i>	<i>Median2</i>	<i>FQ1</i>	<i>FQ2</i>	<i>TQ1</i>	<i>TQ2</i>
R <sup>+#</sup>	Germany	426	1027	12.39	7.68	1.43	0.42	-0.02	-1.76	5.70	4.92
	Spain	262	249	5.18	5.74	2.42	3.05	0.87	0.31	5.04	7.54
	France	1044	1197	13.81	15.85	4.72	2.57	0.90	-1.58	12.40	11.21
	Italy	359	485	1.53	1.19	0.79	0.37	0.21	-0.48	2.00	2.07
	UK	923	1828	0.48	1.93	0.46	0.36	0.13	-0.11	1.02	1.18
ER <sup>+#</sup>	Germany	676	1420	10.1	7.64	1.70	1.68	0.18	0.50	5.22	4.70
	Spain	380	340	3.37	3.38	1.40	1.90	0.65	0.86	3.09	3.69
	France	1510	1282	9.78 <sup>^</sup>	14.03 <sup>^</sup>	3.06	4.01	0.87	1.15	8.41	10.00
	Italy	527	532	1.2	1.54	0.64	0.80	0.27	0.41	1.42	1.87
	UK	1665	2033	0.24 <sup>^</sup>	1.06 <sup>^</sup>	0.20	0.31	0.03	0.11	0.46	0.71
CR <sup>+</sup>	Germany	393	1048	-0.92	1.36	0.08	0.22	-0.53	-0.17	0.81	0.96
	Spain	241	311	-0.12	0.71	0.11	0.26	-0.12	0.02	0.42	0.71
	France	940	1190	-0.09	1.87	0.16	0.29	-0.59	-0.29	1.02	1.24
	Italy	335	478	0.17	0.12	0.05	0.08	-0.09	-0.07	0.26	0.32
	UK	883	1815	0.15	0.12	0.02	0.03	-0.01	-0.02	0.09	0.13

Notes to table 4: P is share price, BVPS is book value of equity per share, EPS is earnings per share, R is the cum-dividend annual return per share, ER is the EBITDA per share, and CR are annual changes of ER. The numbers 1 and 2 indicate whether the statistics refer to the pre-IFRS period (before 2005) or the IFRS period (2005-2007): 1 refers to the statistics for the pre-IFRS period; and 2 refers to the statistics for the IFRS period. N denotes the number of observations. Mean denotes the average. Median denotes the 50<sup>th</sup> percentile. FQ denotes the 25<sup>th</sup> percentile. TQ denotes the 75<sup>th</sup> percentile. All the values represent thousands of Euros for Germany, Spain, France and Italy, and thousands of Pound Sterling for the UK.

For each country, ^ indicates that the mean for the pre-IFRS period is different from the mean for the IFRS at the 5% level of significance (or higher). Across countries, + indicates that the means are significantly different at the 5% level of significance (or higher), according to One-Way Analysis Of Variance, while # indicates that the medians are significantly different at the 5% level of significance (or higher), according to a Kruskal-Wallis test.

**Table 5 Price regression model: within-group estimation results.**

<i>Variables</i>	<i>ALL COUNTRIES</i>			<i>GERMANY</i>			<i>SPAIN</i>		
	<i>Pooled</i>	<i>GAAP</i>	<i>IFRS</i>	<i>Pooled</i>	<i>GAAP</i>	<i>IFRS</i>	<i>Pooled</i>	<i>GAAP</i>	<i>IFRS</i>
$B_{it}$	0.9011*** (0.0088)	2.4235*** (0.1146)	0.2798*** (0.0236)	1.2724*** (0.0314)	3.1261*** (0.1231)	0.2416*** (0.0592)	2.3103*** (0.1276)	2.6377*** (0.6877)	0.6526* (0.3411)
$E_{it}$	-0.2050*** (0.0191)	0.2455*** (0.0213)	2.4420*** (0.0944)	0.3350*** (0.0607)	0.3408*** (0.0189)	0.4521** (0.1947)	-1.4322*** (0.3223)	-1.4198** (0.6159)	0.9194* (0.4746)
$v_{it}$	0.5349*** (0.0134)	0.1693*** (0.0486)	-0.1520*** (0.0192)	-0.1852*** (0.0647)	0.0563 (0.0512)	-0.0911** (0.037)	0.4349*** (0.0532)	0.3524** (0.1354)	-0.0567 (0.0709)
N	8049	3015	5034	1512	426	1086	588	263	325
R <sup>2</sup> (within)	0.7685	0.5104	0.577	0.8648	0.9515	0.51546	0.539	0.4052	0.0733
CHOW	4.9781***			80.5832***			2.2164***		

**Table 5 continued**

<i>Variables</i>	<i>FRANCE</i>			<i>ITALY</i>			<i>UK</i>		
	<i>Pooled</i>	<i>GAAP</i>	<i>IFRS</i>	<i>Pooled</i>	<i>GAAP</i>	<i>IFRS</i>	<i>Pooled</i>	<i>GAAP</i>	<i>IFRS</i>
$B_{it}$	0.5596*** (0.0184)	1.3255*** (0.2473)	0.5938*** (0.0321)	1.0170*** (0.0886)	1.5680*** (0.2906)	0.6789*** (0.2585)	1.9557*** (0.1572)	0.6148*** (0.1560)	1.5977*** (0.2532)
$E_{it}$	1.9260*** (0.1059)	0.3776 (0.2980)	2.2489*** (0.1141)	1.3552*** (0.2630)	1.3596*** (0.3930)	0.8483* (0.4407)	9.1317*** (0.3254)	-1.7607*** (0.1460)	12.9734*** (0.5465)
$v_{it}$	0.6759*** (0.0195)	-0.5310*** (0.0805)	0.0379 (0.0259)	0.1096** (0.0456)	-0.1851*** (0.0671)	-0.3017*** (0.0717)	-1.2697*** (0.0535)	0.3912*** (0.0421)	-0.7122*** (0.0384)
N	2314	1050	1264	858	355	503	2777	921	1856
$R^2$ (within)	0.7689	0.1499	0.8055	0.2963	0.2119	0.0938	0.7416	0.6988	0.8487
CHOW	3.5482**			1.6577			1.3395		



Notes to table 5: The dependent variable is  $P_{it}^*$  as defined for equation (2).  $B_{it}$  is the book value of equity per share.  $E_{it}$  is the earnings per share. Standard errors of the coefficients are shown in brackets. The second column reports the results for the whole sample period. The third and fourth column reports the results for the pre-IFRS period and IFRS period, respectively.  $N$  denotes the number of observations.  $R^2$  (within) denotes the coefficient of determination of the within-group estimator. CHOW denotes the estimated F-test statistic for the Chow test calculated according to equation (3), where fixed effects are allowed to vary in the two periods. Observations for which the ratio equity on total assets is either negative or zero are discarded. Moreover, in order to limit the influence of price volatility, observations for which the price-to-earnings ratio is either smaller than the 0.01 percentile or greater than the 0.99 percentile are excluded. Variation in share price due to mean differences across industries or to cross-listing has been eliminated by regressing share price on binary variables representing the industry and the number of stock exchanges on which a company is listed prior to using equation (2).

- \*\*\* Denotes rejection of the null hypothesis at the 1% level.
- \*\* Denotes rejection of the null hypothesis at the 5% level.
- \* Denotes rejection of the null hypothesis at the 10% level.

**Table 6 Return regression model: within-group estimation results.**

<i>Variables</i>	<i>ALL COUNTRIES</i>			<i>GERMANY</i>			<i>SPAIN</i>		
	<i>Pooled</i>	<i>GAAP</i>	<i>IFRS</i>	<i>Pooled</i>	<i>GAAP</i>	<i>IFRS</i>	<i>Pooled</i>	<i>GAAP</i>	<i>IFRS</i>
$B_{it}$	-1.1436*** (0.0304)	-0.8631*** (0.1982)	3.6643*** (0.4872)	-1.0782*** (0.0343)	0.1973 (0.3454)	-4.5732*** (0.5367)	0.5371** (0.2656)	0.2006 (0.3628)	-7.8964*** (1.0083)
$E_{it}$	1.6928*** (0.0330)	1.4232*** (0.1128)	0.4886*** (0.1374)	1.2467*** (0.0873)	2.9461*** (0.2324)	1.0735*** (0.2246)	-0.1322 (0.1293)	-0.163 (0.1142)	-0.5742 (1.2541)
N	4923	2192	2731	949	272	677	365	223	142
R <sup>2</sup> (within)	0.4971	0.2138	0.5854	0.7806	0.9099	0.2626	0.0186	0.0223	0.6581
CHOW	-0.4366			-3.7671***			-2.9095**		

**Table 6 continued**

<i>Variables</i>	<i>ALL COUNTRIES</i>			<i>GERMANY</i>			<i>SPAIN</i>		
	<i>Pooled</i>	<i>GAAP</i>	<i>IFRS</i>	<i>Pooled</i>	<i>GAAP</i>	<i>IFRS</i>	<i>Pooled</i>	<i>GAAP</i>	<i>IFRS</i>
$B_{it}$	-0.8211*** (0.1256)	0.3488 (0.4233)	-2.4314 (1.5915)	-0.7566*** (0.2119)	2.9992*** (0.7170)	-6.7960*** (1.5109)	8.3391*** (0.3111)	-1.6657** (0.7977)	12.9799*** (0.4050)
$E_{it}$	1.5850*** (0.0719)	0.9526*** (0.2245)	2.1369*** (0.4296)	1.3569*** (0.2675)	-1.0853** (0.4471)	4.3172*** (0.8175)	1.1615* (0.6394)	-0.1148 (0.4339)	-6.8769*** (0.8298)
N	1358	720	638	497	252	245	1754	725	1029
R <sup>2</sup> (within)	0.5148	0.0703	0.6745	0.0865	0.1489	0.3079	0.8052	0.2771	0.9223
CHOW	-0.34492			-1.7043			-2.2072*		

Notes to table 6: The dependent variable is  $R_{it}^*$  as defined for equation (8).  $E_{it}$  is the EBITDA per share.  $\Delta E_{it}$  is the annual change in EBITDA per share. Standard errors of the coefficients are shown in brackets. The second column reports the results for the whole sample period. The third and fourth column reports the results for the pre-IFRS period and IFRS period, respectively.  $N$  denotes the number of observations.  $R^2$  (within) denotes the coefficient of determination of the within-group estimator. CHOW denotes the estimated F-test statistic for the Chow test calculated according to equation (3), where fixed effects are allowed to vary in the two periods. Observations for which the ratio equity on total assets is either negative or zero are discarded. To reduce the problem of transitory earnings, observations for which the earnings per share are negative have been excluded. Moreover, in order to limit the influence of price volatility, observations for which the price-to-earnings ratio is either smaller than the 0.01 percentile or greater than the 0.99 percentile are excluded. Variation in share price due to mean differences across industries or to cross-listing has been eliminated by regressing share price on binary variables representing the industry and the number of stock exchanges on which a company is listed prior to using equation (8).

\*\*\* Denotes rejection of the null hypothesis at the 1% level.

\*\* Denotes rejection of the null hypothesis at the 5% level.

\* Denotes rejection of the null hypothesis at the 10% level.

**Table 7 Results for earnings smoothing and timely loss recognition.**

	<i>GERMANY</i>	<i>SPAIN</i>	<i>FRANCE</i>	<i>ITALY</i>	<i>UK</i>
(SD1)	N = 188 0.1025	N = 31 0.0398	N = 717 0.0902	N = 240 0.0490	N = 1489 0.2149
(SD2)	N = 498 0.1064	N = 189 0.0297	N = 650 0.0597	N = 274 0.0396	N = 1616 0.1601
SD1/SD2	0.9631	1.3399**	1.5099***	1.2385***	1.3428***
Less earnings smoothing?	NO	NO	NO	NO	NO
LNEG <sub>it</sub>	N = 880 -0.0072	N = 278 ^	N = 1650 -1.2324***	N = 634 -1.3054**	N = 2946 -0.6394***
More timely loss recognition?	NO	NO	NO	NO	NO

Notes to table 7: SD1 is the standard deviation of  $\Delta I_{it}^*$  for the pre-IFRS period, while SD2 is the standard deviation of  $\Delta I_{it}^*$  for the IFRS period. SD1/SD2 is the ratio of the standard deviation of  $\Delta I_{it}^*$  for the pre-IFRS period to the standard deviation of  $\Delta I_{it}^*$  for the IFRS period. N is the number of observations. LNEG<sub>it</sub> is the coefficient on the variable LNEG<sub>it</sub> defined in equation (10).

\*\*\* Denotes rejection of the null hypothesis at the 1% level.

\*\* Denotes rejection of the null hypothesis at the 5% level.

\* Denotes rejection of the null hypothesis at the 10% level.

^ Indicates that for Spain the coefficient on LNEG<sub>it</sub> was not reported by Stata, because of perfect collinearity between LNEG<sub>it</sub> and the dependent variable, IFRS<sub>it</sub>. In particular, all cases for which LNEG<sub>it</sub> = 1 occur during the pre-IFRS period. Therefore, these results are not supportive of more timely loss recognition.