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# Accounting quality and stock price informativeness: a cross-country study

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## ABSTRACT

This study investigates how accounting quality impacts the incorporation of firm-specific information into stock prices. Using data from 18 developed countries that apply IFRS, during the period 2004–2015, we find strong evidence that supports the hypothesis that accounting quality determines stock price informativeness. The results yield important policy implications because stock prices are a valuable source of information for many users, especially for the management of the listed companies. The study reveals accounting quality's direct influence over the stock price informativeness, in the way that along with the improvement of accounting quality also increases the amount of firm-specific information embedded into stock prices.

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M41; G14; G15

## 1. Introduction and motivation

The Global Financial Crisis and various corporate scandals (Enron, WorldCom, Tyco) underline the relevance of international accounting and financial reporting standards (IFRS), which help to prevent frauds and to avoid management mistakes (Uyar, Gungormus, & Kuzey, 2017). Moreover, transparency is one of the core principles of good corporate governance, promoting the report of material facts in real time to the stakeholders and by this contributing to more confidence in the management. Concerning the financial aspects of a business, transparency can be maintained using IFRS (WEF, GCR 2014–2015). That is why we choose to include in our sample only countries that report accordingly to IFRS. Also, companies adopting IFRS have less earnings management, more timely loss recognition and more value relevance of earnings, all of which can be interpreted as evidence of higher accounting quality. Barth, Landsman, and Lang (2008) and Ball (2006) argue that a key benefit of IFRS to investors is a better-quality accounting. In line with these facts, our paper

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examines the role that accounting quality has on the type of information that incorporates into stock prices across a sample of developed markets.

The final product of accounting is represented by the financial reports, and for this reason, the accounting quality is considered in this paper interchangeable with financial reporting quality. The non-existence of a generally accepted definition or measurement method for financial reporting quality encourages researchers to study, propose and validate in different contexts a variety of indicators.

We use four indicators of financial reporting quality which are found in *The Global Competitiveness Report (GCR) 2014–2015*: the strength of auditing and reporting standards; the strength of investor protection; the efficacy of corporate boards and the protection of minority shareholders' interests. Recently, papers such as Boolaky (2012), Boolaky and Cooper (2015) and Nurunnabi (2017) have used these indicators. *The GCR 2014–2015* issued by the World Economic Forum provides a comparative qualitative picture of the economic and business environments of 144 individual countries. The report measures a great variety of indicators grouped in 12 pillars which form the Global Competitiveness Index (GCI). The survey questions are assessed on a 7-point Likert scale, where 1 is the lowest possible and 7 the highest possible. Moreover, these four variables compound the aggregate indicator named *Accountability* which was also used as a proxy for accounting quality.

Information about fundamentals of a firm is capitalised into stock prices in two ways: through a general revaluation of stock values following the release of public information and through the trading activity of risk arbitrageurs who gather and possess private information (Durnev, Morck, Yeung, & Zarowin, 2003). Research shows that financial markets impact the real economy through the information that real-decision makers learn from stock prices and use it to guide their decisions and actions (Bond, Edmans, & Goldstein, 2012). The real-decision makers in case of companies are the management teams. Managers can learn from market prices because even if they are the most informed agents about a specific firm, they can still miss some information which could be in possession of outsiders. That is why, stock price informativeness is of high interest for the management. In our study, we have used the most popular measures of stock price informativeness: stock price synchronicity and idiosyncratic volatility. The reason for using both measures is that stock price synchronicity and idiosyncratic volatility are not equivalent in measuring the incorporation of firm-specific information into the stock prices. As Li, Rajgopal, and Venkatachalam (2014) demonstrate, these measures may lead to contradictory inferences, especially if there is a correlation between the systematic risk and the variable of interest (e.g., earning quality or governance quality). Therefore, stock price synchronicity and idiosyncratic volatility should not be viewed as interchangeable measures.

Our findings exhibit a negative connection between accounting quality and stock price synchronicity. Also, our results show that accounting quality is positively correlated to idiosyncratic volatility. These are consistent with Morck, Yeung, and Yu (2000) and Cheong and Zurbruegg (2016). Morck et al. (2000) show that among developed stock markets, higher firm-specific returns variation is associated with stronger public investor property rights and accounting standards are negatively correlated with

synchronicity. Cheong and Zurbruegg (2016) find that less firm-level information reaches the market if the enforcement of the accounting standards is weak.

This study contributes to the literature by using a set of markets that have adopted the same disclosure rules and it highlights the importance of the compliance and enforcement of regime. Also, our paper fills the gap regarding the connection between accounting quality and stock price informativeness in the case of IFRS adopters in the recent years.

The remainder of the paper is organised as follows. [Section 2](#) offers a view of the current state of the literature regarding the analysed subject. [Section 3](#) describes the data and the methodology of research. The results are provided in [Section 4](#) and [Section 5](#) contains concluding remarks and observations on possible future research.

## 2. Literature review

### 2.1. Country-level determinants of accounting quality

Recent empirical work shows that country-level accounting quality is relevant to users of financial information. The increased trend in the globalisation of business and financial markets demands higher-quality financial information produced under strong auditing and reporting standards (Boolaky, Krishnamurti, & Hogue, 2013). Several studies have examined the impact of firm-level factors upon the quality of accounting information. Anyway, the research in this field states that country-level factors are much more significant in explaining cross-country variations in earnings quality (Davis-Friday, 2010).

Chen, Tang, Jiang, and Lin (2010) examine the relationship between accounting quality and International Financial Reporting Standards (IFRS) in Europe and suggest that accounting standards play a role in improving the quality of reporting. The IFRS standards are a set of high-quality accounting standards which aim to improve the financial reporting quality for the adopters and enhance the quality of public disclosure. They are expected to give significant benefits to the capital market, which in turn, to allow more firm-specific information to incorporate into stock prices. If regulations are weak, firms may choose not to disclose information or to manipulate it (Boolaky, Krishnamurti, & Hogue, 2013). More than 140 countries currently permit or require IFRS. Since the announcement of IFRS adoption, national accounting differences have decreased, and the present international accounting setting provides an opportunity to examine why there are differences in earnings quality (Houqe, van Zijl, Dunstan, & Karim, 2012).

Research suggests that the IFRS standards improve the comparability of firms across markets, increase the efficiency of capital allocation (Armstrong, Barth, Jagolinzer, & Riedl, 2010; Covrig, Defond, & Hung, 2007), provide greater disclosure and enhance transparency (Barth et al., 2008; Daske, Hail, Leuz, & Verdi, 2008). Boolaky et al. (2013) view the strength of auditing and reporting standards as an integral component of institutional transparency that is relevant for businesses, investors and governments. Good accounting and audit regulations improve transparency through better disclosure of information and easier cross-firm comparisons.

Investors typically obtain certain rights or powers that are protected by the enforcement of regulations and laws. For example, disclosure and accounting rules provide investors with the information they need to exercise their rights (La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 2000). Houque et al. (2012) notice that strong investor protection, strong legal enforcement and a common law legal system are fundamental determinants of high-quality financial statement numbers. There is an exhaustive research that sustains these ideas (Ball, Kothari, & Robin, 2000; Ball, Robin, & Wu, 2003; Daske, Hail, Leuz, & Verdi, 2008; Francis & Wang, 2008; La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 1997, 1998, La Porta et al., 2000; Leuz, Nanda, & Wysocki, 2003).

Investor protection encourages the development of financial markets. La Porta et al. (1997) argue that countries that protect shareholders have more valuable stock markets, larger numbers of listed securities per capita, and a higher rate of initial public offering (IPO) activity than do have the unprotective countries.

Greater financial disclosure, higher-quality earnings, and greater information dissemination are associated with more informative stock prices. Additional tests indicate that on average stock price informativeness is greater in countries with strong investor protection (Haw, Hu, Lee, & Wu, 2012). Durnev et al. (2003) believe that more informative stock prices lead to efficient allocation of capital because they reflect greater firm-specific information and capture more closely the firm's fundamental value.

Regarding the relationship between investor protection and accounting quality, Houque et al. (2012) demonstrate that earnings quality increases for mandatory IFRS adoption when a country's investor protection regime provides stronger protection. Improvement of accounting quality depends on at least two factors: high-quality accounting standards and a country's overall investor protection (Soderstrom & Sun, 2007). Leuz, Nanda, and Wysocki (2003) examine the relationship between investor protection and earnings management across 31 countries and they found that strong investor protection at the country level reduces earnings management practices and thus leads to higher accounting quality. There is research (Bhattacharya, Daouk, & Welker, 2003; Bushman, Piotroski, & Smith, 2004) which states that in countries with strong investor protection regimes there are greater financial transparency and less earnings management, these countries having higher accounting quality. Ball et al. (2003) argue that adopting high-quality accounting standards is a necessary condition for acquiring high-quality information, without being a sufficient one without a proper country-level investor protection.

The importance of corporate boards has been viewed as a key element in monitoring the actions of management and serving the interests of shareholders (Doirye, 2012). The level of board effectiveness and efficacy in scrutinising managers depend on the size and composition of the board. Doirye (2012) considers that corporate boards are more effective when outsiders dominate. Cheng and Courtenay (2006) suggest that board efficacy increases the level of voluntary disclosure.

Protection of minority shareholders' interests measures the strength of minority shareholders protections against misuse of corporate assets by directors for their personal gain, as well as shareholders rights, governance safeguards and corporate transparency requirements that reduce the risk of abuse. Investor protection matter for the

ability of companies to raise the capital needed to grow, innovate, diversify and compete. Economies that have dynamic capital markets tend to effectively protect investors. In these economies, investors receive the financial information they can trust, they participate in major decisions of the companies, and directors are accountable for their managerial decisions (Dahya, Dimitrov, & McConnell, 2008).

## **2.2. Stock price informativeness and accounting data**

Price efficiency is defined as the extent to which market prices are informative about the value of traded assets. Stock price informativeness shows the amount of information about future earnings that is capitalised into the price (Durnev et al., 2003). A popular measure to distinguish between the amount of firm-specific and market-wide information that is impounded into stock prices can be found in the paper of Roll (1988), who uses the  $R^2$  from a market model regression as an indicator of stock return synchronicity. A low  $R^2$  indicates that more firm-specific information is impounded into the stock price and thus the stock price is more informative (Todea & Buglea, 2017). The higher the  $R^2$ , the greater the stock is synchronous with general market movements (Cheong & Zurbruegg, 2016). Stock returns reflect new market-level and firm-level specific information. Roll (1988) makes clear that the extent to which stocks move together depends on the relative amounts of firm-level and market-level information capitalised into stock prices.

Following the methodology elaborated by Roll (1988), Morck et al. (2000) find that stock prices move together more in poor economies than in the richer ones and that accounting standards are negatively correlated with synchronicity. They state that, if accounting data is more useful, then more firm-specific information is available to all investors. Consequently, we might observe more firm-specific price variation in countries with better accounting standards.

Further on, Durnev et al. (2003) find that greater firm-specific stock return variation is associated with more informative stock prices, where stock price informativeness is defined as how much information stock prices contain about future earnings. Using stock returns from 40 stock markets from 1990 to 2001, Jin and Myers (2006) show that the lack of transparency increases  $R^2$  by shifting firm-specific risk to managers. They consider that imperfect protection of investors does not affect synchronicity if the firm is entirely transparent, some degree of opaqueness being desirable. Others, like Cheong and Zurbruegg (2016) analyse the role that audit quality has on the type of information analysts impound into stock prices across a sample of developed and emerging markets. They examine the amount of firm-specific information versus market-wide information that incorporates into stock prices using stock return synchronicity. They conclude that irrespective of the disclosure regime in place, less firm-level information reaches the market if the enforcement of the accounting standards is weak.

## **2.3. The real effects of the financial markets**

Some researchers consider that one of the most important topics in financial economics is whether financial markets affect the real economy (Bond et al., 2012). They

design their research starting from a few questions: 'Is the stock-market just a side-show or does it affect real economic activity? How can one explain the attention devoted to secondary financial markets? Why do managers constantly track the performance of their firms' stocks? Why does the press so frequently report the developments in the stock-markets?' They consider that treating secondary market prices as a side-show is a mistake because real-decision makers learn new information from these prices and use it to guide their real decisions. Also, Hayek (1945) argued that prices are a useful source of information. Prices aggregate various pieces of information which real-decision makers use in taking actions.

Moreover, decision makers can pay a lot of attention to market prices even if they do not learn from these when they are party to contracts that are contingent on stock prices. Another possibility, preferred by proponents of behavioural finance, is that secondary-market prices have a real effect on economic activity because real-decision makers irrationally follow the price and use it as an anchor (Bond et al., 2012).

According to Fama and Miller (1972), an efficient market 'has a very desirable feature. In particular, at any point in time market prices of securities provide accurate signals for resource allocation; that is, firms can make production-investment decisions'. Bond et al. (2012) consider that this idea is quite natural, because if prices are efficient and aggregate information from various sources, then decision makers in the real sector, who are likely to be only partially informed, will wish to learn from these market prices.

### 3. Data and research methodology

#### 3.1. Accounting quality

Following the paper aim, to capture the way through which accounting quality influences the incorporation of firm-specific information into the stock prices, the study assesses the accounting quality by using the below four individual indicators an aggregate indicator *Accountability* which is the equally weighted average of all the four variables stated previously. All these variables are extracted from The Global Competitiveness Report 2014–2015.

1. *The strength of auditing and reporting standards (SARS)* is computed using a survey that asks the leading business executives from 144 countries the following question: 'In your country, how strong are financial auditing and reporting standards?' The answer is based on a Likert scale, with one implying a negative answer to the question, and seven a very positive one. SARS is a measure of financial reporting quality and auditing strength based on the perception of the business executives from the selected countries. Also, SARS is a proxy for institutional transparency which is expected to have a major bearing on the quality of financial information produced by companies in each country (WEF, GCR 2009–2010).
2. *The strength of investor protection* variable is a combination of the Extent of disclosure index (transparency of transactions), the Extent of director liability index (liability for self-dealing), and the Ease of shareholder suit index (shareholders' ability to sue officers and directors for misconduct).

3. *The efficacy of corporate boards* is based on the answers provided by business executives to the following question: 'In your country, how would you characterise corporate governance by investors and boards of directors?' The answer is based on a Likert scale, with one implying management has little accountability to investors and boards, and seven implying management is highly accountable to investors and boards.
4. *Protection of minority shareholders' interests* is computed starting from the questions: 'In your country, to what extent are the interests of minority shareholders protected by the legal system?' The answer is also based on a Likert scale, with one suggesting that these are not at all protected, and seven implying full protection.

We expect a positive relationship between all these indicators of accounting quality and stock price informativeness. The stronger are the auditing and reporting standards, the investor protection, the efficacy of corporate boards and the protection of minority shareholders' rights, the more firm-specific information incorporates into the stock prices. The descriptive statistics of the accounting quality variables for each country from the sample are displayed in [Table 1](#).

### 3.2. Stock price informativeness

We assess stock price informativeness through the use of two alternative measures: stock price synchronicity ( $\Psi_j$ ) and idiosyncratic volatility ( $\log(\sigma_{\mu,j}^2)$ ).

We follow Morck et al. (2000) and we estimate annually the two-factor international model:

$$r_{i,j,t} = \alpha_{i,j} + \beta_{1,i}r_{L,j,t} + \beta_{2,i}r_{W,t} + \mu_{i,j,t} \quad (1)$$

where  $r_{i,j,t}$  is the weekly return of stock  $i$  of country  $j$  in week  $t$  of a year,  $r_{L,j,t}$  is the weekly market return of country  $j$  in week  $t$ , and  $r_{W,t}$  is the world global market return in week  $t$ . To analyse the relationship between the indicators of accounting quality and firm-specific information in our sample we use the coefficient of determination  $R^2$  which is a measure of stock price synchronicity. According to Morck et al. (2000), a lower value of  $R^2$  indicates that more firm-specific information is impounded into the stock price and, this way, the stock price is more informative.

Given the cross-country nature of this analysis, we use an equally weighted average of the coefficients of determination of the individual stocks in the country  $j$  and apply a logistic transformation to these variables:

$$\Psi_j = \log\left(\frac{R_j^2}{1 - R_j^2}\right) \quad (2)$$

Morck et al. (2000) show that  $\Psi_j$  can be decomposed into market-wide variation ( $\log(\sigma_{M,j}^2)$ ) and firm-specific variation ( $\log(\sigma_{\mu,j}^2)$ ):



**Table 1.** Descriptive statistics of the accounting quality variables.

| Country     | Accountability |         |       | Strength of investor protection |       |       | SARS  |       |       | Efficacy of corporate boards |       |       | Protection of minority shareholders' interests |       |       |
|-------------|----------------|---------|-------|---------------------------------|-------|-------|-------|-------|-------|------------------------------|-------|-------|--|-------|-------|
|             | Mean           | Minim   | Maxim | Mean                            | Minim | Maxim | Mean  | Minim | Maxim | Mean                         | Minim | Maxim | Mean   | Minim | Maxim |
| Australia   | 5.589          | 5.18354 | 6.009 | 5.7                             | 5.7   | 5.764 | 6.053 | 5.764 | 6.302 | 5.709                        | 5.534 | 5.814 | 5.423  | 4.941 | 5.919 |
| Austria     | 5.297          | 4.713   | 5.907 | 4.258                           | 3.7   | 5     | 5.897 | 5.658 | 6.241 | 5.279                        | 4.971 | 5.633 | 5.283  | 4.778 | 5.863 |
| Belgium     | 5.383          | 5.174   | 5.676 | 7                               | 7     | 7     | 5.687 | 5.414 | 6.013 | 5.285                        | 4.992 | 5.536 | 5.192  | 4.788 | 5.607 |
| Canada      | 5.787          | 5.691   | 5.881 | 8.433                           | 8.3   | 8.7   | 6.108 | 6.017 | 6.232 | 5.575                        | 5.328 | 5.702 | 5.531  | 5.196 | 5.694 |
| Denmark     | 5.541          | 4.945   | 6.043 | 6.3                             | 6.3   | 6.3   | 5.809 | 5.154 | 6.292 | 5.473                        | 5.217 | 5.718 | 5.517  | 4.629 | 6.123 |
| Finland     | 5.791          | 5.489   | 6.013 | 5.7                             | 5.7   | 5.7   | 6.271 | 6.101 | 6.427 | 5.694                        | 5.427 | 5.963 | 6.008  | 5.793 | 6.209 |
| France      | 5.164          | 4.806   | 5.596 | 5.3                             | 5.3   | 5.3   | 5.747 | 5.252 | 6.218 | 5.231                        | 4.962 | 5.371 | 4.843  | 4.357 | 5.218 |
| Germany     | 5.402          | 4.855   | 6.058 | 5                               | 5     | 5     | 5.846 | 5.346 | 6.343 | 5.417                        | 5.169 | 5.703 | 5.394  | 4.677 | 6.141 |
| Hong Kong   | 6.604          | 5.232   | 5.874 | 8.95                            | 8.7   | 9     | 6.091 | 5.928 | 6.257 | 5.091                        | 4.712 | 5.359 | 5.291  | 4.855 | 5.651 |
| Israel      | 4.056          | 3.748   | 4.251 | 5.625                           | 5     | 6     | 4.222 | 3.952 | 4.463 | 4.069                        | 3.769 | 4.431 | 3.609  | 3.255 | 3.968 |
| Italy       | 5.409          | 4.988   | 5.738 | 4.7                             | 4.7   | 4.7   | 5.976 | 5.763 | 6.089 | 5.528                        | 5.256 | 5.725 | 5.379  | 5.112 | 5.575 |
| Netherlands | 5.733          | 5.551   | 5.844 | 6.7                             | 6.7   | 6.7   | 6.091 | 5.929 | 6.261 | 5.635                        | 5.451 | 6.021 | 5.803  | 5.718 | 5.908 |
| Norway      | 4.785          | 4.493   | 5.145 | 6                               | 6     | 6     | 5.121 | 4.796 | 5.478 | 4.487                        | 4.109 | 4.774 | 4.73   | 4.239 | 5.183 |
| Portugal    | 4.575          | 4.184   | 5.067 | 5                               | 5     | 5     | 4.916 | 4.441 | 5.323 | 4.635                        | 4.178 | 5.066 | 4.298  | 3.746 | 4.813 |
| Spain       | 5.787          | 5.421   | 6.26  | 5.767                           | 4.3   | 6.3   | 6.098 | 5.867 | 6.317 | 5.768                        | 5.551 | 6.093 | 5.902  | 5.488 | 6.371 |
| Sweden      | 5.059          | 4.573   | 5.626 | 3                               | 3     | 3     | 5.807 | 5.544 | 6.127 | 5.353                        | 5.209 | 5.527 | 4.933  | 4.541 | 5.458 |
| Switzerland | 5.738          | 5.288   | 6.232 | 8                               | 8     | 8     | 6.02  | 5.622 | 6.532 | 5.535                        | 5.116 | 6.041 | 5.521  | 5.119 | 6.123 |
| UK          | 5.281          | 4.98    | 5.517 | 8.3                             | 8.3   | 8.3   | 5.633 | 5.243 | 5.939 | 4.803                        | 4.303 | 5.227 | 5.019  | 4.531 | 5.526 |

**Table 2.** Summary statistics of the sample. The  $R^2$  and  $\sigma_{\mu,j}^2$  are averages of annual measures of synchronicity and idiosyncratic volatility.

| No. | Country     | Stock index | Number of stocks | $R^2$ | $\sigma_{\mu,j}^2$ |
|-----|-------------|-------------|------------------|-------|--------------------|
| 1   | Australia   | ASX50       | 41               | 0.314 | 0.00116            |
| 2   | Austria     | ATX         | 18               | 0.398 | 0.00149            |
| 3   | Belgium     | BEL20       | 15               | 0.387 | 0.00093            |
| 4   | Canada      | TSX60       | 57               | 0.299 | 0.00138            |
| 5   | Denmark     | OMXC20      | 16               | 0.335 | 0.00133            |
| 6   | Finland     | OMXH25      | 21               | 0.448 | 0.00119            |
| 7   | France      | CAC40       | 33               | 0.484 | 0.00088            |
| 8   | Germany     | DAX         | 27               | 0.471 | 0.00105            |
| 9   | Hong Kong   | HIS         | 44               | 0.412 | 0.00137            |
| 10  | Israel      | TA35        | 26               | 0.311 | 0.00138            |
| 11  | Italy       | FTSE MIB    | 30               | 0.460 | 0.00136            |
| 12  | Netherlands | AEX         | 19               | 0.449 | 0.00095            |
| 13  | Norway      | OBX         | 21               | 0.367 | 0.00253            |
| 14  | Portugal    | PSI20       | 15               | 0.335 | 0.00122            |
| 15  | Spain       | IBEX35      | 23               | 0.525 | 0.00090            |
| 16  | Sweden      | OMXS30      | 28               | 0.467 | 0.00099            |
| 17  | Switzerland | SMI         | 20               | 0.485 | 0.00082            |
| 18  | UK          | FTSE100     | 82               | 0.361 | 0.00125            |

$$\Psi_j = \log\left(\frac{\sigma_{M,j}^2}{\sigma_{\mu,j}^2}\right) = \log(\sigma_{M,j}^2) - \log(\sigma_{\mu,j}^2) \quad (3)$$

The variable  $\log(\sigma_{\mu,j}^2)$  is the logarithm of the average explained sum of squares from Eq. (1). A higher value of  $\log(\sigma_{\mu,j}^2)$  indicates that more firm-specific information is incorporated into the stock price.

### 3.3. Data and control variables

This study is conducted on a balanced panel of 18 developed countries during the period January 2004 – December 2015. We follow the approach of Cheong and Zurbruegg (2016) and include in the sample only countries that at the date of the analysis have adopted International Financial Reporting Standards. The reason for selecting only countries that apply IFRS is to ensure that the accounting standards regime is, as much as possible, the same across our sample, so that any differences in reporting quality would be a result of institutional features of the market, independent of the disclosure standards. Moreover, to maintain the results unaltered by large cross-section differences, we restricted the sample to developed markets only due to their low synchronicity compared to emerging markets and low firm-specific and market-wide variations.

The sample includes only constituents of the stock market indexes that were continuously traded during the period of the study, because as Kelly (2014) states, even in the case of these markets, low- $R^2$  stocks are small, young and covered by few analysts. Weekly equity prices for each local stock market index and for the world global market index are denominated in dollars and are extracted from Thomson Reuters Eikon Database. The world global market index is represented by the MSCI World Index, which is a broad global equity index that represents large and mid-cap equity performance of 23 developed market countries. It describes the performance of the world's stock market and does not offer exposure to emerging markets. The summary statistics of our sample are displayed in Table 2.

Prior research (Fernandes & Ferreira, 2009; Jin & Myers, 2006; Morck et al., 2000) suggest that countries' characteristics have an influence on stock return synchronicity and the incorporation of information into stock prices. To control for these factors and also for robustness purposes, we include in our paper eight country-level control variables: diversity; government effectiveness and control of corruption; GDP per capita; GDP growth volatility; number of stocks; country size; industry Herfindahl index and firm Herfindahl index. Most of the variables are extracted from the World Bank Database and Thomson Reuters Eikon Database, except the Herfindahl indexes, which are determined based on all the stocks listed on the sample markets.

- a. *Diversity* is constructed following Jin and Myers (2006). This variable represents the standard deviation of analysts' forecasts of the firm's earnings in the following year, normalised by the mean forecast and divided by the square root of the number of analysts following that firm. A high level of *Diversity* implies greater opaqueness:

$$\text{Diversity} = \frac{\hat{\sigma}_s / \hat{\mu}_s}{\sqrt{N}}$$

- b. *Government effectiveness and control of corruption* (Gov\_Corr) is an aggregate indicator, computed by using the data provided in The Worldwide Governance Indicators (WGI) project. Government effectiveness reflects perceptions of the quality of public services; the quality of the civil service and the degree of its independence from political pressures; the quality of policy formulation and implementation; and the credibility of the government's commitment to such policies. Control of corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty cash and grand forms of corruption, as well as "capture" of the state by elites and private interests (Kraay, Kaufmann, & Mastruzzi, 2010).
- c. *GDP per capita*. Stock prices in economies with high per capita GDP move in a relatively unsynchronised manner, while stock prices in low per capita GDP economies tend to move up or down together. GDP per capita is a measure of economic development, and by using it, we control for differences between countries in their economic welfare.
- d. *GDP growth volatility*. The variance of per capita GDP serves to control for macroeconomic instability.
- e. *The number of stocks*. In a market with few securities, each security is a more important part of the market index. Thus, higher synchronicity could simply reflect fewer traded stocks. To control for these effects, we use the logarithm of the number of listed stocks from each market.
- f. *Country size*. Country size could matter in at least two ways. First, economic activity in a small country could be geographically localised, so that the nearby events might have market-wide effects that would not be as evident in a larger country. Second, Bernstein and Weinstein (2002) observe the economic specialisation predicted by standard international trade theory across geographical units

of similar size, but not across countries. This finding implies that larger states have factor endowments that exhibit less uniformity, which, in turn, suggests that the stocks in large countries might move more independently than those in small countries. Consequently, we use the logarithm of geographical size, in square kilometres, for each country, to capture any relation between country size and synchronicity in stock returns.

- g. *Industry Herfindahl Index* and h) *Firm Herfindahl Index*. Economic specialisation might appear in the economies where listed firms are concentrated in a few industries. In consequence, these firms could have highly correlated fundamentals and highly synchronous stock prices. Undiversified economies should, therefore, exhibit higher stock price synchronicity than the diversified ones. Alternatively, some economies may be dominated by a few very large firms. If most other listed firms are suppliers or customers of these dominant companies, a high degree of stock price synchronicity could arise. Problems that would be firm-specific in a larger economy can potentially impact the entire economy.

To control for these economic specialisation effects, we construct an industry Herfindahl index and a firm Herfindahl index for each country from the sample. We define the industry Herfindahl index of country  $j$  as below:

$$H_j = \sum_k h_{k,j}^2,$$

where  $h_{k,j}$  is the combined value of the sales of all country  $j$  firms in industry  $k$  as a percentage of those of all country  $j$  firms.

The firm Herfindahl index of country  $j$  is defined as below:

$$\hat{H}_j = \sum_i h_{i,j}^2,$$

where  $\hat{h}_{i,j}$  is the sales of firm  $i$  as a percentage of the total sales of all country  $j$  firms.

High values of the industry and firm Herfindahl indexes imply respectively, a lack of industry diversity and the dominance of a few large firms. Roll (1988) finds that high industry or high firm concentration, as captured by Herfindahl indexes, partly explains the high volatility of some stock market indices.

#### 4. Results and discussion

The OLS estimation results for several regressions in which the endogenous variable is stock price synchronicity ( $\Psi_j$ ) are presented in Table 3.

In model (1) the coefficient of investor protection variable is negative and significant at the 1% level. This result suggests that stock price synchronicity is lower when investors are better protected. In other words, stock prices contain more firm-specific information when investor protection is higher. Model (2) presents a negative coefficient of the strength of auditing and reporting standards variable which is significant at the 1% level. This implies that stock price synchronicity is lower when the strength of auditing and reporting standards is higher. Consequently, auditing and financial

**Table 3.** Regression results – dependent variable stock price synchronicity.

| Dependent variable                           | $\Psi_j$             |                      |                      |                      |                      |
|--|----------------------|----------------------|----------------------|----------------------|----------------------|
|  | (1)                  | (2)                  | (3)                  | (4)                  | (5)                  |
| Strength of investor protection              | -0.133***<br>(-5.45) | -                    | -                    | -                    | -                    |
| Strength of auditing and reporting standards | -                    | -0.434***<br>(-3.19) | -                    | -                    | -                    |
| Efficacy of corporate boards                 | -                    | -                    | -0.456***<br>(-2.66) | -                    | -                    |
| Protection of minority shareholders          | -                    | -                    | -                    | -0.321***<br>(-3.53) | -                    |
| Accountability                               | -                    | -                    | -                    | -                    | -0.555***<br>(-5.48) |
| Diversity                                    | 0.002<br>(0.02)      | -0.100<br>(-0.81)    | -0.99*<br>(-0.63)    | -0.087<br>(-0.65)    | -0.093<br>(-1.06)    |
| Gov_Corr                                     | -1.599***<br>(-3.69) | 0.423<br>(0.49)      | 0.051<br>(0.06)      | 0.148<br>(0.21)      | 0.928<br>(1.34)      |
| Gdp per capita                               | 0.515***<br>(3.99)   | 0.503***<br>(3.63)   | 0.646***<br>(5.06)   | 0.478***<br>(3.38)   | 0.386***<br>(2.76)   |
| Gdp growth volatility                        | -4.351<br>(-0.53)    | -9.169<br>(-1.07)    | -9.294<br>(-1.06)    | -8.654<br>(-1.00)    | -13.284<br>(-1.54)   |
| Number of stocks                             | 0.099***<br>(2.80)   | 0.065*<br>(1.89)     | 0.058<br>(1.62)      | 0.029<br>(0.93)      | 0.087***<br>(2.69)   |
| Country size                                 | -0.066***<br>(-2.86) | -0.019<br>(-0.76)    | 0.005<br>(0.19)      | -0.010<br>(-0.40)    | 0.002<br>(0.09)      |
| Industry Herfindahl Index (Ihhi)             | 0.085<br>(0.17)      | 0.435<br>(0.88)      | 0.859<br>(1.58)      | 0.422<br>(0.87)      | 0.690<br>(1.50)      |
| Firm Herfindahl Index (Fhhi)                 | -0.020<br>(-0.03)    | -0.758<br>(-1.12)    | -1.054<br>(-1.46)    | -0.641<br>(-0.96)    | -1.197*<br>(-1.95)   |
| Sample volume                                | 207                  | 207                  | 207                  | 207                  | 207                  |
| R <sup>2</sup> adjusted                      | 0.243                | 0.178                | 0.1619               | 0.1770               | 0.2478               |
| F  | 7.86                 | 5.12                 | 4.44                 | 5.26                 | 8.30                 |

Note: In brackets are robust t-statistic values of the regression coefficients. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5% and 1% levels.

reporting standards have a strong impact on the incorporation of firm-specific information into stock prices. High-quality accounting standards determine more efficiency in the inclusion of firm-specific information into stock prices. In model (3) the coefficient of the efficacy of corporate boards' variable is negative and significant at the 1% level. This result suggests that stock price synchronicity is lower when the efficacy of corporate boards is higher. The efficacy of corporate boards determines the amount of firm-specific information that impounds into stock prices. Model (4) displays the relation between stock price synchronicity and the protection of minority shareholders' rights. The coefficient of protection of minority shareholders' rights variable is negative and significant at the 1% level. In consequence, when minority shareholders' rights are better protected, stock price synchronicity is lower, which means that more firm-specific information impounds into stock prices.

To synthesise, all the coefficients of the independent variables used as proxies for accounting quality from the regressions tested below are negative and significant at the 1% level, meaning that accounting quality has an impact on stock price synchronicity and the incorporation of firm-specific information into stock prices. The better accounting quality is, the lower is the stock price synchronicity. The better accounting quality is, the more firm-specific information impounds into stock prices. In model

**Table 4.** Regression results – dependent variable idiosyncratic volatility.

| Dependent variable                           | $\log(\sigma_{\mu,i}^2)$ |                      |                     |                     |                      |
|--|--------------------------|----------------------|---------------------|---------------------|----------------------|
|  | (1)                      | (2)                  | (3)                 | (4)                 | (5)                  |
| Strength of investor protection              | 0.137***<br>(8.64)       | –                    | –                   | –                   | –                    |
| Strength of auditing and reporting standards | –                        | 0.326***<br>(3.55)   | –                   | –                   | –                    |
| Efficacy of corporate boards                 | –                        | –                    | 0.195<br>(1.57)     | –                   | –                    |
| Protection of minority shareholders          | –                        | –                    | –                   | 0.359***<br>(5.44)  | –                    |
| Accountability                               | –                        | –                    | –                   | –                   | 0.505***<br>(7.66)   |
| Diversity                                    | –0.011<br>(–0.11)        | 0.103<br>(0.62)      | 0.114<br>(0.59)     | 0.075<br>(0.48)     | 0.909<br>(0.61)      |
| Gov_Corr                                     | 0.805***<br>(3.26)       | –0.670<br>(–1.20)    | 0.195<br>(0.34)     | –1.159**<br>(–2.40) | –1.476***<br>(–3.40) |
| Gdp per capita                               | –0.112<br>(–1.49)        | –0.139<br>(–1.41)    | –0.247**<br>(–2.56) | –0.058<br>(–0.62)   | –0.009<br>(–0.11)    |
| Gdp growth volatility                        | –7.003<br>(–1.27)        | –2.710<br>(–0.43)    | –3.426<br>(–0.51)   | –2.415<br>(–0.40)   | 1.414<br>(0.24)      |
| Number of stocks                             | –0.122***<br>(–5.26)     | –0.072***<br>(–2.83) | –0.052*<br>(–1.90)  | –0.052**<br>(–2.33) | –0.101***<br>(–4.29) |
| Country size                                 | 0.053***<br>(3.75)       | 0.010<br>(0.57)      | 0.006<br>(0.27)     | –0.007<br>(–0.39)   | –0.012<br>(–0.72)    |
| Industry Herfindahl Index(Ihhi)              | –0.409<br>(–1.18)        | –0.698*<br>(–1.94)   | –0.797*<br>(–1.88)  | –0.778**<br>(–2.30) | –0.972***<br>(–3.26) |
| Firm Herfindahl Index (Fhhi)                 | 0.474<br>(1.19)          | 1.013**<br>(2.09)    | 0.882<br>(1.54)     | 1.173***<br>(2.63)  | 1.539***<br>(3.85)   |
| Sample volume                                | 207                      | 207                  | 207                 | 207                 | 207                  |
| R <sup>2</sup> adjusted                      | 0.3245                   | 0.1272               | 0.0804              | 0.1954              | 0.2766               |
| F  | 13                       | 3.60                 | 0.0201              | 5.49                | 9.89                 |

Note: In brackets are robust t-statistic values of the regression coefficients. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5% and 1% levels.

(5) the coefficient of *Accountability* is negative and significant at the 1% level. *Accountability* is the aggregate indicator of financial reporting quality and impounds the former variables tested before. The result suggests that stock price synchronicity is lower when accounting quality is higher. In other words, accounting quality determines the incorporation of firm-specific information into stock prices, in the way that along with the improvement of accounting quality also increases the amount of firm-specific information embedded into stock prices.

Next, we analyse the relationship between accounting quality and idiosyncratic volatility (Table 4). We predict a positive relationship because we expect the variables used as proxies for accounting quality to have a direct positive impact on the incorporation of firm-specific information into stock prices. The higher accounting quality is, the more firm-specific information impounds into stock prices. The results exhibit that our hypothesis is correct, all the coefficients of the interest variables are positive and significant at 1% level, with one exception. The coefficient of the efficacy of corporate boards' variable is positive, but not significant. These results imply that the higher are the strength of investor protection, the strength of auditing and reporting standards and the protection of minority shareholders, the more firm-specific information is impounded into stock prices. We obtain the same result from the

**Table 5.** Regression results of the models containing the dummy variable for the Global Economic Crisis – dependent variable synchronicity.

| Dependent variable                           |                      |                      |                      |                      |                      |
|--|----------------------|----------------------|----------------------|----------------------|----------------------|
| $\Psi_j$                                     |                      |                      |                      |                      |                      |
|  | (1)                  | (2)                  | (3)                  | (4)                  | (5)                  |
| Strength of investor protection              | -0.134***<br>(-5.57) | -                    | -                    | -                    | -                    |
| Strength of auditing and reporting standards | -                    | -0.531***<br>(-3.70) | -                    | -                    | -                    |
| Efficacy of corporate boards                 | -                    | -                    | -0.582***<br>(-3.34) | -                    | -                    |
| Protection of minority shareholders          | -                    | -                    | -                    | -0.465***<br>(-4.66) | -                    |
| Accountability                               | -                    | -                    | -                    | -                    | -0.716***<br>(-6.65) |
| Diversity                                    | -0.057<br>(-0.38)    | -0.188<br>(-1.08)    | -0.180<br>(-0.82)    | -0.190<br>(-0.99)    | -0.223*<br>(-1.81)   |
| Gov_Corr                                     | -1.608***<br>(-3.69) | 0.894<br>(1.00)      | 0.534<br>(0.67)      | 0.980<br>(1.30)      | 1.682**<br>(2.35)    |
| Gdp per capita                               | 0.490***<br>(3.79)   | 0.431***<br>(3.10)   | 0.607***<br>(4.74)   | 0.350**<br>(2.45)    | 0.251*<br>(1.81)     |
| Gdp growth volatility                        | 2.600<br>(0.30)      | 1.317<br>(0.15)      | 0.579<br>(0.06)      | 4.952<br>(0.56)      | 1.243<br>(0.14)      |
| Number of stocks                             | 0.097***<br>(2.77)   | 0.073**<br>(2.16)    | 0.066*<br>(1.89)     | 0.031<br>(1.07)      | 0.102***<br>(3.36)   |
| Country size                                 | -0.074***<br>(-3.26) | -0.027<br>(-1.13)    | 0.005<br>(0.18)      | -0.014<br>(-0.59)    | -0.005<br>(-0.22)    |
| Industry Herfindahl Index(Ihhi)              | 0.031<br>(0.06)      | 0.409<br>(0.84)      | 0.968*<br>(1.78)     | 0.422<br>(0.90)      | 0.715<br>(1.62)      |
| Firm Herfindahl Index (Fhhi)                 | 0.060<br>(0.10)      | -0.807<br>(-1.20)    | -1.232*<br>(-1.71)   | -0.776<br>(-1.19)    | -1.364**<br>(-2.32)  |
| Dummy Crisis0708                             | 0.179***<br>(2.56)   | 0.284***<br>(3.75)   | 0.273***<br>(3.54)   | 0.373***<br>(4.63)   | 0.424***<br>(5.43)   |
| Sample volume                                | 207                  | 207                  | 207                  | 207                  | 207                  |
| R <sup>2</sup> adjusted                      | 0.2567               | 0.2093               | 0.1899               | 0.2244               | 0.3116               |
| F  | 8.44                 | 5.75                 | 5.25                 | 6.38                 | 9.60                 |

Note: In brackets are robust t-statistic values of the regression coefficients. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5% and 1% levels.

regression containing the aggregate indicator *Accountability*. The coefficient of the *Accountability* variable from the model is positive and significant at 1% level. This suggests that when accounting quality is at high standards, stock prices contain more firm-specific information.

The exogenous variable of interest (the strength of investor protection; the strength of auditing and reporting standards; the efficacy of corporate boards; protection of minority shareholders' interests; accountability) does not vary in time, unless in very few cases. That is why its inclusion in the model is equivalent to the introduction of fixed effects in cross-section. This is the principal argument for using OLS in order to obtain the estimators.

Regarding the endogenous variable, we notice there is a pattern that repeats over time during the Global Crisis, synchronicity and idiosyncratic volatility are much greater during this period. For this reason, we additionally estimate the model containing the dummy variable for the Global Crisis of 2007-2008. According to Wooldridge (2012, Chapter 15), for models estimated with OLS, we should often

**Table 6.** Regression results of the models containing the dummy variable for the Global Economic Crisis – dependent variable idiosyncratic volatility.

| Dependent variable                           |                      |                      |                      |                     |                      |
|--|----------------------|----------------------|----------------------|---------------------|----------------------|
| $\log(\sigma_{\mu,i}^2)$                     |                      |                      |                      |                     |                      |
|  | (1)                  | (2)                  | (3)                  | (4)                 | (5)                  |
| Strength of investor protection              | 0.136***<br>(8.66)   | –                    | –                    | –                   | –                    |
| Strength of auditing and reporting standards | –                    | 0.290***<br>(3.12)   | –                    | –                   | –                    |
| Efficacy of corporate boards                 | –                    | –                    | 0.127<br>(1.00)      | –                   | –                    |
| Protection of minority shareholders          | –                    | –                    | –                    | 0.353***<br>(4.78)  | –                    |
| Accountability                               | –                    | –                    | –                    | –                   | 0.510***<br>(6.99)   |
| Diversity                                    | –0.064<br>(–0.65)    | 0.070<br>(0.45)      | 0.070<br>(0.41)      | 0.071<br>(0.45)     | 0.094<br>(0.63)      |
| Gov_Corr                                     | 0.797***<br>(3.19)   | –0.495<br>(–0.88)    | 0.455<br>(0.79)      | –1.129**<br>(–2.17) | –1.499***<br>(–3.29) |
| Gdp per capita                               | –0.134*<br>(–1.79)   | –0.166<br>(–1.64)    | –0.268***<br>(–2.75) | –0.063<br>(–0.64)   | –0.005<br>(–0.06)    |
| Gdp growth volatility                        | –0.865<br>(–0.14)    | 1.187<br>(0.16)      | 1.876<br>(0.25)      | –1.918<br>(–0.28)   | 0.972<br>(0.15)      |
| Number of stocks                             | –0.124***<br>(–5.47) | –0.069***<br>(–2.74) | –0.047*<br>(–1.75)   | –0.052**<br>(–2.32) | –0.101***<br>(–4.18) |
| Country size                                 | 0.046***<br>(3.24)   | 0.007<br>(0.39)      | 0.005<br>(0.27)      | –0.006<br>(–0.39)   | –0.011<br>(–0.70)    |
| Industry Herfindahl Index(Ihhi)              | –0.456<br>(–1.36)    | –0.708**<br>(–2.00)  | –0.738*<br>(–1.76)   | –0.778**<br>(–2.30) | –0.973***<br>(–3.25) |
| Firm Herfindahl Index (Fhhi)                 | 0.546<br>(1.42)      | 0.994**<br>(2.08)    | 0.786<br>(1.39)      | 1.168**<br>(2.60)   | 1.544***<br>(3.82)   |
| Dummy Crisis0708                             | 0.158***<br>(3.10)   | 0.105*<br>(1.67)     | 0.146**<br>(2.24)    | 0.013<br>(0.21)     | –0.012<br>(–0.20)    |
| Sample volume                                | 207                  | 207                  | 207                  | 207                 | 207                  |
| R <sup>2</sup> adjusted                      | 0.3461               | 0.1362               | 0.0975               | 0.1956              | 0.2767               |
| F  | 12.65                | 3.68                 | 2.70                 | 5.14                | 8.94                 |

Note: In brackets are robust t-statistic values of the regression coefficients. \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5% and 1% levels.

include time period dummy variables to allow for aggregate time effects. These dummy variables are exogenous and they act as their own instruments. Tables 5 and 6 display the results of this model, depending on the endogenous variable. These estimations also check the robustness of our core findings.

The coefficients of all the variables of interest are significant at 1% level, with one exception. The coefficient of the efficacy of corporate boards is not significant in relation to idiosyncratic volatility. In Table 5 the dependent variable is stock price synchronicity. In this case, all the models tested exhibit negative coefficients of the variables used as proxies for accounting quality. Consequently, our initial results are sustained as we find a negative relation between accounting quality and stock price synchronicity. Moreover, we notice that the dummy variable has positive coefficients significant at 1% level. Therefore, we can state that the Global Economic Crisis had a strong impact upon stock price synchronicity. The stock prices move together more during the Global Crisis, the firm-specific information being impounded into stock prices slower.



Table 6 contains the results of the models in which idiosyncratic volatility is the endogenous variable. In these cases, all the coefficients of the variables of interest are positive. The coefficients of all the variables of interest are significant at 1% level, with one exception: the coefficient of the efficacy of corporate boards, which is not significant. These results suggest that there is a direct positive relationship between accounting quality and idiosyncratic volatility even under the effects of the Global Crisis. When accounting quality is at high levels, the degree of firm-specific information impounded into stock prices is greater. As for the dummy variable for the Global Crisis, the results are mixed. The coefficients of the dummy variable appear to be significant only in the first three models, at different levels of significance. When testing the relationship between idiosyncratic volatility and *Accountability*, the coefficient of the dummy variable is not significant, meaning that, in this case, the Global Crisis does not impact the incorporation of firm-specific information into stock prices.

## 5. Conclusions

This paper extends the empirical literature on financial reporting quality by exploring its relationship to stock-price informativeness. Our proxies for financial accounting quality are the strength of auditing and reporting standards; the strength of investor protection; the efficacy of corporate boards; and the protection of minority shareholders' interests. We also use *Accountability* as an aggregate indicator of accounting quality. We use stock price synchronicity and idiosyncratic volatility as proxies for stock price informativeness.

Using data from 18 developed national stock markets, our results show robust evidence supporting the hypothesis that financial reporting quality influences the movements of the shares listed on the capital market and the incorporation of firm-specific information into stock prices. The higher is the accounting quality, the more firm-specific information can be found in the stock prices. The higher is the accounting quality, the lower is stock price synchronicity.

The existence and direction of causality between financial reporting quality and stock price informativeness have implications for several users of financial information, as policy setters and the management of the companies. The policy setters may learn from the effects of the accounting quality on the stock market and thus make efforts for applying and maintaining International Financial Reporting Standards and International Auditing Standards, as these standards assure a certain level of reporting quality in a country. The real effects of financial markets determine the management to pay great attention to the movements from the capital markets and to learn from the stock prices. The new information they obtain from stock prices can be used in their decision-making process and could guide their actions.

The fact that financial markets have a real effect through the transmission of information does not imply that real-decision makers are less informed than traders, but only that they do not have perfect information about every decision-relevant factor. This information can be in possession of outsiders. Thus, real-decision makers, such as the management teams, may be the most informed agents in the economy about

the firm, but there are still aspects about which they can learn from the outsiders (Bond et al., 2012).

We have included in our sample only developed countries, but the tested relationships are obviously an empirical question also on the emerging markets. We leave this aspect for future research.

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