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RESEARCH ARTICLE

Integrated reporting of environmental, social, and governance and financial data: Does the market value integrated reports?

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Abstract

The concept of reporting nonfinancial information within the annual report, so-called Integrated Reporting (IR) is a rising topic in reporting practice. Supporters claim that IR provides a better view regarding the value creation of a firm.

This study investigates the value relevance of IR and the influence of certain characteristics such as assurance. Thus, this paper contributes to the existing literature by examining the actual advantages for firms when adopting an IR approach.

The Ohlson model is applied for the market valuation of 50 companies of the STOXX Europe 50 between the years 2010 and 2016. The results of this study support the cost-concerned school by showing a negative influence on the market value. Nonetheless, the study suggests that the quality of the reports is relevant for market valuation, as the negative effect is mitigated by the quality of the reports.

KEYWORDS

assurance, ESG reporting, Integrated Reporting, Ohlson model, value-relevance

1 | INTRODUCTION

There is a recent movement of reporting financial information and nonfinancial information combined in one report. This so-called Integrated Reporting (IR) is mostly promoted by the International Integrated Reporting Council (IIRC), which is trying to develop a broadly accepted conceptual framework (Busco, 2013).¹

The IIRC defines IR as “a concise communication about how an organization’s strategy, governance, performance and prospects, in the context of its external environment, leads to the creation of value over the short, medium and long term” (IIRC, 2015, p. 7). Although most of the organizations that report on environmental, social, and governance (ESG) issues are still publishing a separate report, there is an increasing number of firms adopting an IR approach as KPMG shows with their Survey of Corporate Responsibility Reporting (KPMG, 2017). These organizations assume that this type of reporting

gives a deeper and broader view of a company’s corporate actions to shareholders than classical reporting (Owen, 2013).

The aim of IR is to present the value creation over time and thus give more insights into the firm’s business model to addressees than both regular financial and nonfinancial reporting (Busco, 2013). In order to investigate whether these goals hold true, this study examines the actual value relevance of IR.²

In contrast, recent research has focused on the potential and the determinants of adopting IR. Although several papers analyze the value relevance of separate ESG reports, there is a dearth of studies examining the value relevance of IR.³ With regard to the yet uncertain effects of disclosing this kind of reporting, it is incremental for investors and standard setters to gain more insights into the actual impact of IR. Important aspects are whether IR is value relevant, and if this holds true, whether IR has any influence, and furthermore whether the high implementation cost or the benefits predominate.

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Furthermore, many papers concerning IR claim an independent assurance to be essential for the successful rise of IR as a broadly accepted concept of reporting (Cheng, Green, Conradie, Konishi, & Romi, 2014; Eccles & Saltzman, 2011; Flower, 2015). Thus, the purpose of this paper is to provide insights of the value relevance of IR in general and the influence of assurance in particular.

Despite existing capital market studies analyzing the value relevance of IR using a South African sample (where IR is mandatory), this study fills a gap in the literature because it examines the actual value relevance of IR on a European sample (in a voluntary setting) and is the first that investigates the influence of assurance providers concerning IR.

Accordingly, the paper has four research questions. First, it examines whether the market values (positively or negatively) a company's reporting on ESG topics in an integrated form. Second, the difference between IR and separate ESG reports in terms of market valuation is examined. Third, it examines whether the type of assurance provider and further the applied ESG reporting standard has any influence on the perception of IRs. Fourth, it analyzes the effect of the reporting quality on the market valuation of IR. These objectives are addressed through Ohlson's accounting-based valuation model (Ohlson, 1995) as suggested by Hassel et al. (2005) and Mervelskemper and Streit (2017) in previous studies.

The remainder of this paper has the following structure: The next section provides a literature review of IR and assurance literature. Subsequently, we formulate hypotheses on the market valuation of IR and the influence of assurance before describing the research design. Then, we analyze the results of the model. Finally, we discuss the findings and possible limitations of the model, before stating implications and recommendations for future research.

2 | LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1 | IR: A short literature review

IR is a recent trend in nonfinancial reporting and is becoming a standard issue in the reporting practice of large companies. Hence, IR is a novel topic, and recent research on nonfinancial reporting has mostly focused on separate reports. Several papers analyze the impact of ESG disclosure on the market valuation of a firm such as Dhaliwal, Radhakrishnan, Tsang, and Yang (2012) and Malik (2015). In this context, this study aims to analyze IR regarding its value relevance. The next section provides a literature review on this topic.

Only a few papers analyze IR with regard to the capital market. Most of these studies using archival capital market data are focused on South Africa, because it is the only country where IR has become a mandatory requirement for public-listed companies (i. e., Johannesburg Stock Exchange; de Villiers, Venter, & Hsiao, 2016). In this context, Lee and Yeo (2016), Zhou, Simnett, and Green (2017), and Barth, Cahan, Chen, and Venter (2017) examine the link between IR and firm valuation. They find evidence for a higher firm valuation of

companies with high IR quality than companies that publish low IR quality reports.

Baboukardos and Rimmel (2016) examine the value relevance of IR by comparing the period before and after mandatory adoption in South Africa and find an increase of value relevance of the earnings valuation. Hence, existing literature shows first insights of the value relevance and a positive association between IR and firm valuation.

As far as we know, Mervelskemper and Streit's (2017) study is the only study examining this link by using a worldwide sample. They explore possible moderating effects of the perception of a company's ESG performance score. Their results indicate a stronger valuation of the score when a company publishes any kind of ESG report, regardless of the type of report.

Only a few papers take this market-based point of view (Baboukardos & Rimmel, 2016; Barth et al., 2017; Bernardi & Stark, 2018; Lee & Yeo, 2016; Maniora, 2017; Mervelskemper & Streit, 2017; Zhou et al., 2017); other papers examine the IIRC's pioneer work, such as papers evaluating the Consultation Draft of the IR Framework (Adams, 2015; Cheng et al., 2014; Flower, 2015).

Eccles and Saltzman (2011) state that IR is a crucial step to creating a more sustainable economic, social, and environmental society. They see three main benefits of IR: internal benefits, through improving resource allocation decisions and better stakeholder engagement; external benefits, due to meeting the needs of investors that request nonfinancial information; and reduction of regulatory risks, through being prepared early if regulators require extra information.

Other studies examine the determinants of the adoption of IR through empirical analysis (Frias-Aceituno, Rodríguez-Ariza, & García-Sánchez, 2014; Frías-Aceituno, Rodríguez-Ariza, & García-Sánchez, 2013; García-Sánchez, Martínez-Ferrero, & García-Benau, 2019; García-Sánchez, Rodríguez-Ariza, & Frías-Aceituno, 2013; Jensen & Berg, 2012; Lai, Melloni, & Stacchezzini, 2016; Sierra-García, Zorio-Grima, & García-Benau, 2015).

Studies such as those conducted by Frías-Aceituno et al. (2014) and Jensen and Berg (2012) find that companies that publish an IR have significantly different characteristics in comparison with other companies. They find that determinants such as company size and profitability have a positive influence on the decision to create an IR.

Lai et al. (2016) investigate whether the reason for adopting IR is part of a legitimation strategy in response to a low ESG performance score. Their study shows no evidence for low ESG performance scores to be a determinant of adopting IR and therefore suggests that reporting on ESG issues is not part of a legitimation strategy.

The paper of García-Sánchez, Martínez-Ferrero, and García-Benau (2019) explores managerial discretion as a determinant for disclosing an IR. They find that internal and external control mechanisms moderate this relationship.

A study by Sierra-García et al. (2015) finds a positive connection between the existence of an external assurance of the ESG report and the publishing of an IR. This determinant leads to one of the most recently discussed matters regarding IR: external third-party assurance.

Many studies in IR literature criticize the shortage of research regarding assurance of IR (de Villiers et al., 2016; Maroun, 2017; Simnett & Huggins, 2015; Velte & Stawinoga, 2016). The next section will provide a literature review on this issue.

2.2 | Assurance of nonfinancial reporting: A short literature review

According to Dando (2003), there is a credibility gap between the growing demand for ESG reports and public trust. To narrow this gap, a rising number of companies provide independent third-party assurance of their ESG report (Cohen & Simnett, 2015; O'Dwyer, 2011). Therefore, research in this area is highly relevant (Cohen & Simnett, 2015).

Several studies examine the field with regard to the conducted assurance practices (Dando, 2003; Gürtürk & Hahn, 2015; O'Dwyer, 2011; Smith, Haniffa, & Fairbrass, 2011). This is a topic of interest because currently there is no single recognized standard against which ESG reports in general and IR in particular could be assessed (Maroun, 2017; Smith et al., 2011).

Smith et al. (2011) develop a conceptual framework to the process of capture within ESG assurance. They describe the current environment of assurance as inconsistent due to the diversity of standards, methodologies, and practices. There are two broadly used standards: the ISAE3000 of the International Audit Assurance Standards Board and the AA1000AS of the nongovernmental organization AccountAbility. The characteristics of the standards differ greatly (Gürtürk & Hahn, 2015; Smith et al., 2011). However, none of these standards gives guidance on the assurance of an IR (Maroun, 2017).

Furthermore, the problem posed by this situation is the inconsistency in use of these standards. Companies use the standards interchangeably even during one and the same mandate (Smith et al., 2011). In accordance, Gürtürk and Hahn (2015) state that the current assurance practice limits its potential to create more credibility, transparency, and improved internal structures.

Several other studies realize experimental approaches, using questionnaire surveys to examine the effects on different addressees (e.g., Cheng, Green, & Ko, 2015; Hodge, Subramaniam, & Stewart, 2009; Pflugrath, Roebuck, & Simnett, 2011; Reimsbach & Hahn, 2015). Pflugrath et al. (2011) and Hodge et al. (2009) state that assured sustainability reports are perceived with a higher reliability than without assurance. Several studies establishing econometric models based on multivariate analysis support these findings (Cuadrado-Ballesteros, Martínez-Ferrero, & García-Sánchez, 2017; Martínez-Ferrero & García-Sánchez, 2017; García-Sánchez, Hussain, Martínez-Ferrero, & Ruiz-Barbadillo, 2019).

Furthermore, O'Dwyer (2011) examines the difficulties in creating a new assurance practice and sees a competition between the types of assurance providers: those with accounting and "non-accounting" backgrounds. Several studies analyze the impact of the assurance providers on the credibility of ESG reports and state assurance provided

by a professional accountant as more credible (Cuadrado-Ballesteros et al., 2017; García-Sánchez, Hussain, et al., 2019; Martínez-Ferrero & García-Sánchez, 2017; Simnett, Vanstraelen, & Chua, 2009).

Most of the reviewed studies investigate the assurance of ESG reports regarding their value relevance by testing whether the stock price estimates of investors have been influenced.

Coram, Monroe, and Woodliff (2009) find a positive influence of assurance regarding the value relevance, but only if the disclosed ESG indicators are positive. Furthermore, they show, in accordance to attribution theory, that reported negative indicators have a higher credibility for addressees than positive indicators so that assurance does not add extra value in this case. Furthermore Cheng et al. (2015) confirm a positive influence on investors' investment decisions whenever the company's strategy is highly determined by ESG topics.

Cuadrado-Ballesteros et al. (2017) and Fuhrmann, Ott, Looks, and Guenther (2017) find a reduced information asymmetry when ESG reports are assured, indicating the value relevance of assurance. Furthermore, Cuadrado-Ballesteros et al. (2017) find a moderating role of assurance providers depending on the institutional context, as their findings show that assurance is valued more in stakeholder-oriented countries. Other studies obtain indications for the value relevance of sustainability assurance by finding lower capital constraints for companies that disclose assured ESG reports (García-Sánchez, Hussain, et al., 2019; Martínez-Ferrero & García-Sánchez, 2017). Other experimental studies such as Brown-Liburd and Zamora (2015) and Reimsbach and Hahn (2015) analyze the relevance of assurance of certain ESG indicators instead of the whole ESG report.

To summarize the presented review of IR and assurance literature, there are several gaps in existing literature: In general, there is a dearth of studies dealing with the value relevance of IR. Furthermore, although there are several studies examining the value relevance of assurance as presented above (Cheng et al., 2015; Coram et al., 2009; García-Sánchez, Hussain, et al., 2019) and existing studies regarding the influence of the assurance practitioner (Cuadrado-Ballesteros et al., 2017; Hodge et al., 2009; Martínez-Ferrero & García-Sánchez, 2017; Pflugrath et al., 2011; Simnett et al., 2009), there is no study with regard to IR.

Therefore, to narrow these gaps, this paper extends the existing literature by examining the value relevance of IR and analyzes whether the type of assurer and the applied reporting standard is a potential driver of the perception of IR.

2.3 | Hypotheses development

As presented above, there is a lack of studies analyzing the value relevance of IR and the assurance of the respective reports. In regard to this comparatively unexplored topic, this paper contributes to the existing value relevance literature by examining IR.

Despite existing literature regarding the relation between financial performance and ESG performance disclosure, it is important to contemplate the general relation as kind of a preliminary work, before examining the influence of IR.

Companies that voluntarily disclose ESG issues whether in a stand-alone sustainability report or jointly in their annual reporting are producing costs. These are both direct costs for collecting and preparing the information (preparation costs) and indirect costs that may arise due to the information being disclosed (proprietary costs; Ott, Schiemann, & Günther, 2017). From the resource-based view, companies aim to be rewarded with internal or external benefits in turn for these costs (Lourenço, Branco, Curto, & Eugénio, 2012).

Patten and Zhao (2014) propose three possible rewards for companies disclosing ESG issues. First, companies attract customers (Schuler and Cording, 2006); second, enhance corporate reputation (Cho et al., 2012); and third, appeal to socially responsible investors (Dhaliwal et al., 2012). In line with this, other existing literature found ESG performance disclosure to be value relevant (Berthelot, Coulmont, & Serret, 2012; Ekwueme, Egbunike, & Onyali, 2013; Schadewitz & Niskala, 2010).

Thus, we expect the following hypothesis:

H1a. *The stock market values (positively/negatively) that a company publishes any kind of ESG report.*

Several papers, such as García-Sánchez and Noguera-Gámez (2018), García-Sánchez and Noguera-Gámez (2017b), and García-Sánchez and Noguera-Gámez (2017a), examine the voluntary disclosure of IR. Their results indicate a reduction of information asymmetry and therefore a reduction of adverse selection costs when a firm discloses an IR. In line with this, Baboukardos and Rimmel (2016) analyze the period before and after mandatory adoption in South Africa and find a higher a negative effect of IR disclosure on the cost of equity of a firm. Additionally, Hahn (2013) states that integrating ESG issues into the strategic management process could improve operational efficiency. As a consequence, disclosing an IR could create sustainable competitive advantages.

Adams and Simnett (2011) state that the challenge for IR as a reporting standard are the high costs for the systematic development of measurement and reporting as an integrated process throughout the organizations. Thus, implementing an IR is associated with high cost, whereas the benefits of disclosing this kind of reporting are yet undefined.

García-Sánchez and Noguera-Gámez (2017b) find that the impact of IR disclosure is more significant in countries with high investor protection. Therefore, as we established a European sample, we propose that the stock market values the publication of an IR in some way. However, the predicted sign is uncertain depending on whether costs or benefits of publication are higher.

Thus, we expect the following hypothesis:

H1b. *The stock market values (positively/negatively) that a company publishes an IR.*

After developing a hypothesis of the value relevance of IR in a rather general manner, the next step is to analyze the difference to standalone ESG reports, that is, separate reports. Regarding the

second research question this study aims to examine if the type of ESG reporting matters.

The purpose of IR announced by the IIRC's IR Framework is to create a "cycle of integrated thinking and reporting," which results in "efficient and productive capital allocation" and "will act as a force for financial stability and sustainability" (IIRC, 2015, p. 3). Many papers contribute to this point of view, that is, that combining financial with nonfinancial information in one report will lead to an increasing quality of reporting and provides addressees with more differentiated insights of the firm (Adams & Simnett, 2011; Eccles & Saltzman, 2011; Owen, 2013).

An IR should provide investors not only with information on how much value was added, but additionally how the value was generated (IIRC, 2015). We follow Reimsbach, Hahn, and Gürtürk (2017), who apply a cognitive-psychology approach that is based on Maines and McDaniel's (2000) model to assess investors' information processing. The model includes the concept of the cognitive costs that occur while processing information. Reimsbach et al. (2017) follow Hodge, Hopkins, and Wood (2010) who propose a link between the cognitive cost theory and the proximity compatibility principle. This principle indicates that information that is relevant for a certain task should be presented in an appropriate display proximity (Wickens & Carswell, 1995). The more information is required for solving a task, the greater is the need for high display proximity to solve a task. Thus, high display proximity is considered with low cognitive cost (Reimsbach et al., 2017).

Against this background, investors should generally perceive IR as positive, because their acquisition costs for receiving the required information are lower as more information about the respective firm is reported in one single report (Reimsbach et al., 2017).

Because of this, investors can obtain a more distinct picture of the firm and generally value the ESG report higher if financial and ESG-information are reported simultaneously. Thus, we expect the value relevance or IR with a positive sign and state the following hypothesis:

H2. *Firms that publish an IR have a higher market valuation than firms that publish a separate ESG report.*

In order to answer Research Question 3, the following part regards the effect of the type of assurance provider on the value relevance of IR.

Several studies present evidence for the value relevance of assurance regarding ESG indicators (Brown-Liburd & Zamora, 2015; Cheng et al., 2015; Cuadrado-Ballesteros et al., 2017; García-Sánchez, Hussain, et al., 2019; Gürtürk & Hahn, 2015; Pflugrath et al., 2011). In general, audited or assured information is perceived as more trustworthy than information without assurance (Hodge et al., 2009; Martínez-Ferrero & García-Sánchez, 2017; Pflugrath et al., 2011). In particular, regarding ESG indicators, investors perceive a higher credibility on disclosed ESG information when it has independent third party assurance (Cuadrado-Ballesteros et al., 2017; Pflugrath et al., 2011; Simnett et al., 2009). This indicates a higher value relevance of disclosing ESG

information for those companies that receive independent assurance of their ESG report no matter which type of report was applied.

Even though some studies examine an influence of assurance on the value relevance of ESG indicators, the impact is context specific (Coram et al., 2009).

The requirements of the auditing profession as defined by the International Federation of accountants in their International Accounting Standard 200 include inter alia professional judgment, professional skepticism, and ethical requirements and therefore aim to provide an adequate degree of credibility. Hence, we expect that an ESG report assured by a Big 4 audit firm creates a higher value relevance of a company's ESG report.

This study draws on Reimsbach et al. (2017) and employs signaling theory to discuss a possible market value-enhancing effect of assurance. Thus, the next hypothesis could be explained using signaling theory as defined by Connelly, Certo, Ireland, and Reutzel (2010): An information asymmetry exists between the sender (company) and the receiver (stakeholders, e.g., investors) regarding the company's financial performance and ESG impact.

Due to the additional information concerning the credibility of ESG topics issued through the assured IR, the respective company signals a stronger commitment to sustainability. Consequently, the stakeholders receive an IR assured by a professional auditing firm as more trustworthy. This is in line with Cormier, Ledoux, and Magnan (2012), who examined voluntary web-based disclosure on ESG topics as information asymmetry reducing.

We follow Cuadrado-Ballesteros et al. (2017) and draw on literature regarding financial auditing and expect assurance conducted by Big 4⁴ auditing firms to be of higher quality than of other assurance providers. Other assurance providers are sustainability consultants and engineering firms (Martínez-Ferrero & García-Sánchez, 2017).

In consequence, we expect IRs of companies that provide external assurance conducted by a Big 4 audit firm to be value relevant, as well as market value enhancing in comparison with other types of ESG reports regarding the expected positive sign. Therefore, we expect the following hypothesis:

H3. *Among those firms that provide an ESG report, firms that publish IRs with external assurance conducted by a Big 4 audit firm have a higher market value.*

As described for hypothesis H2, IR is seen as a tool for enhancing the quality of corporate reporting. However, integrating ESG information within the annual report could lead to intensifying the tremendous amount of provided disclosure while adding no further insights of the companies' actions (Adams & Simnett, 2011). Furthermore, Flower (2015) proposes that it is more complex for assurers to identify important matters of an ESG report than it is for financial reports. To overcome this issue, we propose that the quality of assurance and reporting quality in general for IR is even more important.

As described, assurance provided by a professional accountant is seen as more trustworthy (Martínez-Ferrero & García-Sánchez,

2017; Pflugrath et al., 2011; Simnett et al., 2009). As previously characterized, the reporting standard issued by the Global Reporting Initiative (GRI) is acting as the "de facto" standard in ESG reporting (Hahn & Kühnen, 2013). Correspondingly, the publication of an IR that is assured by a professional accountant and is applied according to the latest GRI reporting standards (i.e., G3.1 or G4) could be seen as a form of best practice concerning the reporting of ESG information.⁵

Berthelot et al. (2012) state that only high-quality reports are value relevant. Furthermore, Lee and Yeo's (2016) findings suggest a positive association between high IR quality reports and firm valuation.

Consequently, we expect that ESG reports of firms that use the best-practice approach in ESG reporting are value relevant and have a more positive association with the firm value than other types of ESG reporting. According to this, we expect the following hypothesis:

H4. *Among those firms that provide an ESG report, firms that publish IRs conducted according to G3.1 or G4 with external assurance conducted by a Big 4 audit firm have a higher market value.*

3 | METHODOLOGY

3.1 | Sample and data selection

The firms in the sample are taken from the STOXX Europe 50, a stock index that represents around 50% of the market capitalization of the European stock market and contains 50 blue-chip companies (Stoxx.com, 2019). This index was chosen because of three reasons: first, to obtain a manageable sample size and second to ensure the willingness of the companies to incur the costs of developing an IR. It should be noted that conducting an IR is a costly process that small and medium enterprises are most probably not able to procure (Berthelot et al., 2012; Frías-Aceituno et al., 2013). Furthermore, as Frías-Aceituno et al. (2014) and Jensen and Berg (2012) stated, company size as well as profitability are determinants of companies creating an IR. Finally, most of the capital market-oriented studies regarding IR are conducted in a mandatory setting. Accordingly, we wanted to examine a voluntary setting in Europe.

In a first step of data collection, Unilever plc. was excluded due to being a subsidiary of Unilever N. V as suggested by Fischer and Sawczyn (2013). The final sample comprises 49 companies. The study covers the period from 2010 to 2016 and consequently contains 343 firm year observations. Please note that the number of observations presented in the empirical regression (in the next section) may not equal 343, because of excluding outliers before conducting the regression analysis.

The considered firms are based in nine different countries with the majority of firms being based in the United Kingdom (15 firms [30.6%]). Most sectors are represented by one to three firms, except for the banking sector (9 firms [18.4%]) and the pharmaceutical sector (6 firms [12.2%]).

TABLE 1 Distribution of sample observations by kind of report (total dataset)

Report	In %	No. of observations
Integrated	32.1	110
No report	4.1	14
Separated	63.8	219

Within the total data sample, there are 32.1% of companies that publish an integrated report (Table 1). Although 63.8% disclose a separate ESG report, 4.1% do not report disclose any ESG report.

For further analysis, we use a subset that only includes firms that publish any ESG report (Subset B). Within the subset, 28.6% of the firms publish an IR with assurance of one of the Big 4 auditing firms for their ESG report as shown in Table 2.

The sample distribution for the best practice approach (Table 3) shows that only 16.9% of the firms publish an IR conducted according to G3.1 or G4 with external assurance conducted by a Big 4 auditing firm.

The financial data needed for conducting the Ohlson model were collected from Thomson Reuters Datastream. To control for potential omitted variables, the ESG performance scores for each firm and year were collected. The Thomson Reuters ESG Score was used as measurement for the ESG performance score.

The information whether a company publishes a separate ESG report or an IR was manually acquired from the GRI Sustainability Disclosure Database. In this database, companies self-declare their sustainability report to be integrated or separated. However, all information was double-checked with the reports available on the companies' websites. In case of errors, the categorization was corrected to obtain a consistent definition of IR. Whenever there was no report available in the GRI database, we also checked with the information published online to ensure the company did not report on ESG issues.

Currently, there is no broadly accepted governmentally enforced sustainability reporting standard, neither for separated nor integrated reports. Thus, there are difficulties in classifying the different types of reporting, that is, whether a company reports in an integrated or separated manner or does not conduct any ESG reporting. Additionally, companies may publish IRs in various ways: as an addendum to the

TABLE 2 Distribution of sample observations by kind of assurance (Subset B)

Report	In %	No. of observations
Assured	28.6	98
Not assured	67.3	231

TABLE 3 Distribution of sample observations by best practice approach (Subset B)

Report	In %	No. of observations
Best practice	16.9	58
Not best practice	79.0	271

annual report, as a so-called combined report, as an internet report, or as a part of a "report-family." This heterogeneous environment leads to difficulties in the classification of the respective companies in this study. This is a general problem within the data collection process, which needs to be mentioned and described further.

The scope of reporting on ESG issues to define an IR needs to be well-defined. The IR framework of the IIRC could deliver an assistance in defining, but in most of the cases, the framework is too vague for the purpose of this study.

The transition between the different kinds of reports is fluent so that a clear distinguishing remains challenging. In order to take the possible challenges into account and attempt to obtain a consistent definition of IR, this study uses a broad definition of IR. Therefore, combined reports as well as "report-families" and IR as defined by the IIRC are classified as IR in this paper (Kirchhoff Consult AG, 2015).

After the process of classification, one author of this study reclassified a random sample of the database to test and ensure a proper and consistent classification of the reports. Subsequently, any limiting cases of classification were tested as an alternative classification model as robustness check. Nevertheless, the presented situation causes limitations in this study.

3.2 | Valuation model

To examine the presented goals of this paper, the Ohlson (1995) model is used in an empirical version. We follow Hassel et al. (2005) and restate the original Ohlson (1995) model in terms of current period earnings and opening book value.⁶ Thus, the empirical version of the Ohlson model in this study is the following (Equation (1)):

$$MV_{i,t} + D_{i,t} = \beta_0 + \beta_1 BV_{i,t-1} + \beta_2 NI_{i,t} + \beta_3 v_{i,t} + \varepsilon_{i,t}. \tag{1}$$

$D_{i,t}$ is the dividend paid in year t for company i , and therefore, $MV_{i,t} + D_{i,t}$ represents the cum-dividend adjusted market value. The opening book value of each company equals $BV_{i,t-1}$; accordingly, the net income equals $NI_{i,t}$. Other information as defined by the Ohlson model is described by $v_{i,t}$. In addition, a disruptive factor $\varepsilon_{i,t}$ concludes the model.

In contrast to Hassel et al. (2005) the equation is not deflated by the opening book value to take size differences into account. The companies contained in the selected sample are, as already mentioned, the 50 largest companies in Europe. Due to this characteristic size differences do not seem to be problematic in this case. Nonetheless, we follow Schadewitz and Niskala (2010) by using the natural logarithm format to account for the high range between variables.

Thus, we propose the following regression model to test H1:

$$\ln(MV_{i,t} + D_{i,t}) = \beta_0 + \beta_1 \ln(BV_{i,t-1}) + \beta_2 \ln(NI_{i,t}) + \beta_3 REP_{i,t} + \sum_{i=1}^I \gamma_i CV_i + \varepsilon_{i,t}.$$

The market value $MV_{i,t}$ is measured six months after the fiscal year end of the respective company as data is not available to

investors before the publication of their annual report. This stands in contrast to Mervelskemper and Streit (2017) who suggest a test point of 3 months after the fiscal year-end, as some companies of the data sample did not publish their annual report within a 3-month period after their fiscal year-end.

$REP_{i,t}$ is used as a proxy for other information $\nu_{i,t}$ in the Ohlson model and is specified as a dummy variable set to 1 if a firm discloses an ESG report and is otherwise set to 0. The equation is applied for testing H1a whether the market values the publication of ESG disclosure in general.

Following Mervelskemper and Streit (2017), the dummy variable for other information is changed to $IR_{i,t}$ and is specified as a dummy variable set to 1 if a firm reports its ESG issues in an integrated manner and is otherwise set to 0. Due to this variable, it is possible to investigate whether the market values the publication of an IR hence whether the equation corresponds to H1b and H2.

Therefore, this equation is used for two empirical tests. One is conducted on the whole data sample including firms that do not create ESG reports concerning H1b whether IR has influence on market valuation. The other one exclusively observes companies that publish ESG reports (Subset B) and therefore regards H2 to distinguish between the different kinds of reports. Parameter β_3 needs to be significant to confirm the general effect of relevancy for market valuation (H1a/b), and in order to confirm a higher market valuation of IR in comparison with separate reports, it must be significantly positive (H2).

In order to explore the relation between IR and the market value more deeply, the next empirical analysis concerns the characteristics of the IR, that is, the type of assurance provider and the use of ESG reporting standard. Essentially, the previous equation is reused with other indicator variables. First with $ASSU_{i,t}$ which is set to 1 if the respective company publishes an IR that has external assurance of a professional accountant and 0 otherwise. For this indicator, the requirement was that at least a part of the sustainability report must be assured. Most of the companies only provide partial assurance on specified sections. Companies that only provide assurance on sections that are already included in the traditional annual report are not included in this indicator.

Second, regarding the remaining hypothesis H4, the indicator variable is changed to $BEST_{i,t}$. It represents an indicator variable set to 1 if the respective companies provide an IR with external assurance of a Big 4 audit firm and simultaneously applied the newest ESG reporting standard of the GRI, that is, G3.1 or G4 and otherwise to 0. In both cases, β_3 is expected to be significantly positive (H3 and H4).

According to previous studies using the Ohlson model, the ordinary least squares technique was applied on all regression models. Furthermore, all firm year observations are pooled cross-sectionally and over time. All models are regressed including industry, country and time fixed effects dummies represented by the control variables CV. Additionally, we added the ESG performance score of each company and each year to control for omitted variable bias. To account for possible problems with heteroscedasticity and nonnormality of the residuals into account, all t statistics are estimated using White's (1980) standard error. With these procedures, we follow again Hassel et al. (2005) and Mervelskemper and Streit (2017).

4 | RESULTS

4.1 | Descriptive statistics and correlations

Table 4 presents descriptive statistics of the dependent as well as the independent variables of this study. The shown statistics refer to the total sample before deleting outliers.

The average cum-dividend adjusted market value is €69.94 million and exceeds the average book value of €35.71 million.

Furthermore, the average net income was €4.28 million. This corresponds to a return on equity of 0.12; this finding is consistent with previous studies such as Lourenço et al. (2012; 0.12).

All variables are positively skewed, due to outliers at the higher end of the observations and the focus of the sample at the lower end. It should be mentioned that the range of the cum-dividend market value as well as the book value is large and outruns about €100 billion.⁷ To narrow this range, outliers were deleted before conducting the actual regression analysis.

Table 5 provides Pearson correlation coefficients between the continuous variables of the model (before deleting outliers). Not surprisingly, the net income has a significantly positive relation to book value (0.31).

TABLE 5 Pearson correlation coefficients

Variable	$BV_{i,t-1}$	$NI_{i,t}$
$BV_{i,t-1}$	1	
$NI_{i,t}$	0.31***	1

Note. The table presents the Pearson correlation coefficients for continuous variables on the total sample ($n = 343$). $BV_{i,t-1}$ is the opening book value of equity, $NI_{i,t}$ is the net income of firm i for year t . * $p < .1$. ** $p < .05$. *** $p < .01$.

TABLE 4 Descriptive Statistics (in thousands of EUR)

Variables	Mean	Median	SD	Minimum	Maximum	n	Skewness	Kurtosis
$MV_{i,t} + D_{i,t}$	69,936,774	57,885,950	41,165,317	11,041,540	244,245,752	343	1.52	2.72
$BV_{i,t-1}$	35,705,841	25,352,367	30,844,903	-2,970,686	158,167,498	343	1.39	1.98
$NI_{i,t}$	4,277,359	3,252,000	5,318,281	-8,783,000	71,675,338	343	6.51	76.45

TABLE 6 Regressions of market value on type of environmental, social, and governance report indicator variable (total dataset and Subset B excluding outliers)

Dependent variable:				
$\ln(MV_{i,t}+D_{i,t})$				
	(1)	(2)	(3)	(4)
$\ln(BV_{i,t-1})$	0.296*** (0.032)	0.308*** (0.032)	0.300*** (0.031)	0.304*** (0.031)
$\ln(NI_{i,t})$	0.178*** (0.036)	0.170*** (0.035)	0.173*** (0.036)	0.158*** (0.034)
$REP_{i,t}$		0.244** (0.079)		
$IR_{i,t}$			-0.110** (0.042)	-0.117*** (0.044)
Constant	10.724*** (0.625)	10.417*** (0.617)	10.638*** (0.614)	10.894*** (0.608)
Observations	322	322	322	308
R^2	0.849	0.855	0.853	0.857
Adjusted R^2	0.827	0.833	0.831	0.835
Residual Std. Error	0.230	0.226	0.228	0.221
F Statistic	39.369***	40.114***	39.549***	38.915***

Note. The table presents ordinary least squares estimation results on the total sample excluding outliers for regression of market value on accounting information only (Model 1) and in Model 2 adding an indicator variable $REP_{i,t}$ representing firms that publish any kind of environmental, social, and governance (ESG) report set to 1 and 0 otherwise. In Model 3, the indicator variable is changed with $IR_{i,t}$ representing firms that publish an integrated report set to 1 and 0 otherwise. $MV_{i,t}+D_{i,t}$ is the dependent variable of each model. $NI_{i,t}$ stands for the net income of a firm i for year t . $BV_{i,t-1}$ is the opening book value of equity. All models are estimated with industry, country and year fixed effects dummies and ESG performance score of each firm and year. Model 4 is the corresponding model estimated using subset B (including only firms that publish any ESG report).

* $p < .1$. ** $p < .05$. *** $p < .01$.

However, according to common rules of thumb, there was no substantial multicollinearity found as neither of the variables has a correlation coefficient that is above 0.7 nor do the respective variance inflation factors exceed 10.⁸

4.2 | Regression results

The next section presents the results of multivariate regression analyses regarding the objectives of this study. Table 6 shows the respective results of regression models based on Equation (1) on the total sample.⁹ Before starting with testing the proposed hypotheses, Column 1 shows the results of a regression model proving the explanatory power of the Ohlson model. The cum-dividend market value is regressed with book value and net income without including a dummy variable as other information.

The results are significant and in line with theory. The coefficients of net income as well as book value have the expected sign and thus are positively related to cum-dividend market value. The model explains

around 78.7% of the variance of the market capitalization of firms (adjusted R^2); in addition, the F test is highly significant. This finding is analogical to previous studies using the Ohlson model for market value regression (Hassel et al., 2005; Schadewitz & Niskala, 2010).

The next step, as preliminary work, is to explore the general relation between the market value and ESG reports. Column 2 shows that $REP_{i,t}$ as dummy variable shows a positive sign and is statistically significant. These findings are in line with existing studies of the value creation school (Lourenço et al., 2012; Patten & Zhao, 2014) showing that ESG disclosure can be value enhancing for companies.

Furthermore, to analyze the value relevance of IR concerning the first research question of this study, Column 2 shows the Ohlson model with $IR_{i,t}$ as an indicator variable acting as substitute for other information to test if the market values IR (H1b).

All variables are highly significant, supporting hypothesis H1b, that IR is value relevant. The sign of the mentioned dummy variable indicates a negative influence of IR on the market value. The findings support the cost-concerned school (Cohen & Simnett, 2015; Friedman, 1970; Hassel et al., 2005), which sees ESG practices as a cost-

producing element rather than a corporate advantage in business practice. It does not correspond with findings of other market-oriented studies (Barth et al., 2017; Lee & Yeo, 2016; Mervelskemper & Streit, 2017; Zhou et al., 2017). As most of the studies that find a positive influence of IR on the market valuation are examining a mandatory setting in South Africa, the finding can be interpreted in line with Ott et al. (2017) that find lower proprietary costs of disclosing ESG issues in countries with ESG regulations. As this sample examines a European and thus a voluntary setting, firms must deal with rather high proprietary costs.

So far, the presented regressions examined the total data sample to test the general effect. To analyze whether there is a difference between the types of ESG reporting, the already presented regression models are used again but applied to a subsample. This sample only includes firms that issue any type of ESG report. Column 3 provides the respective regression results.

In comparison with the regression applied to the total sample, only slight differences exist. The variables book value and net income stay significant in both models. Also, the adjusted R^2 and the F statistic are approximately the same as with the total sample applied. However, the indicator variable $IR_{i,t}$ is significantly different from 0 and thus shows the value relevance of IR. There is no evidence to support hypothesis (H2) that IR has a higher market valuation than separate ESG reports.

Table 7 provides the regression results examining the relevance of assurance and ESG reporting standards on the perception of IR. The model is based on Equation (1) substituting the indicator variable $IR_{i,t}$ with the variable $ASSU_{i,t}$. First, the effect of assurance is tested, and respective results are presented in Column 1.

ESG reports that have external assurance of a professional audit firm for their IR are expected to have a higher market valuation than ESG reports that are not assured by an accountant or issued in a separate form (H3).

However, the corresponding indicator variable $ASSU_{i,t}$ is empirically insignificant; thus, H3a cannot be confirmed. There is no evidence that companies that disclose an IR assured by a professional audit firm have higher market values than firms disclosing other ESG reports. In terms of signaling theory, these findings show no evidence that the type of assurance practitioner has any signaling effect.

Finally, Column 2 presents the regression results regarding a possible signaling effect of best-practice IRs, that is, IR that are externally assured by a Big 4 audit firm and simultaneously apply one of the latest versions of the GRI framework.

Results presented in Column 2 show the insignificance of the indicator variable $BEST_{i,t}$. This finding does not support hypothesis H4, which predicts a higher market value for firms that apply the described best-practice approach. In combination with the presented results before, these findings suggest that firms, which do not provide the highest quality of their ESG report, that is, IR applied according to the latest GRI framework (G3.1 or G4) with assurance of a Big 4 audit firm, are penalized by investors by means of lower market valuation of their equity. These findings correspond to Barth et al. (2017) that find a positive association between IR quality and firm valuation.

TABLE 7 Regressions of market value on type of assurance practitioner indicator variable and best-practice indicator variable (Subset B excluding outliers)

Value	Dependent variable	
	$\ln(MV_{i,t} + D_{i,t})$	
	(1)	(2)
$\ln(BV_{i,t-1})$	0.303*** (0.031)	0.305*** (0.034)
	0.163*** (0.034)	0.164*** (0.035)
$\ln(NI_{i,t})$		
$ASSU_{i,t}$	-0.066 (0.040)	
$BEST_{i,t}$		-0.063 (0.045)
Constant	10.912*** (0.622)	10.870*** (0.631)
Observations	308	308
R^2	0.854	0.853
Adjusted R^2	0.831	0.831
Residual Std. Error	0.224	0.224
F Statistic	37.801***	37.747***

Note. The table presents ordinary least squares estimation results on Subsample B excluding outliers for regression of market value including an indicator variable $ASSU_{i,t}$ representing firms that publish an integrated report that has assurance of a Big 4 audit firm set to 1 and 0 otherwise (Model 1). In Model 2, the indicator variable $BEST_{i,t}$ representing firms that publish an integrated report that has assurance of a Big 4 audit firm and apply either the G3.1 or G4 standard to their report is set to 1 and 0 otherwise. $MV_{i,t} + D_{i,t}$ is the dependent variable of each model. $NI_{i,t}$ stands for the net income of a firm i for year t . $BV_{i,t-1}$ is the opening book value of equity. All models are estimated with industry, country and year fixed effects dummies and ESG performance score of each firm and year. * $p < .1$ ** $p < .05$. *** $p < .01$.

To make a conclusion based on the presented statistical tests, there is little evidence for the advantages that the supporters of IR predicted. There is evidence that IR is of incremental value relevance for market valuation. However, the costs of publishing an IR extent the benefits. These conclusions will be discussed further in the final section of the study.

4.3 | Robustness tests

The next section deals with a selection of robustness tests to check the presented results for sensitivity, in order to identify possible

concerns regarding data sample selection or valuation model specification.

In a first step, in order to check the valuation model used, the regressions were repeated without using the natural logarithm format. However, although the main findings do not change and H3 cannot be supported either (0.12), the results do not indicate any negative influence on the market valuation of an IR with external assurance. Furthermore, unexpectedly the variable $Nl_{i,t}$ was not significant and thus does not show any influence on the market valuation.

Following Mervelskemper and Streit (2017), the regressions were tested again using the cum-dividend adjusted market value measured 3 months after the fiscal year-end. The results correspond to the findings of the 6-month model.

Existing studies regarding the market valuation of IR as Lee and Yeo (2016) use Tobin's Q as dependent variable for testing the relation. In consequence, we regressed all models again using Tobin's Q as the dependent variable. Tobin's Q is computed as market value of equity plus market value of liabilities divided by book value of equity plus book value of liabilities. The results confirm the findings of our model.

To address issues regarding outliers of the sample and test whether the regression results are sensitive to them, we follow Hoaglin's (1991) suggestions regarding statistical robustness. Hence, 10% of sample observations for all continuous variables were winsorized, that is, 5% of the top and bottom of the distribution is replaced with the most extreme retained values thus resulting in a statistically more efficient regression (Ruppert, 2004; Wilcox, 2005). After that, all regression models were estimated again. The new results support the main findings presented before.

In order to make benefit of the advantages of panel data in comparison to the applied cross-sectional data, the main model was tested again applying a fixed effects panel model. All regression models including the presented robustness tests were tested again. The findings support the presented results of the ordinary least squares model.

In addition, to provide further robustness, we used a different model specification to examine the association between IR and firm valuation. For this model, we again used Tobin's Q as proxy for firm valuation and employed a regression model comparable with Lee and Yeo (2016). All regression models were tested again; the results correspond to our findings.

Furthermore, to check for robustness of our findings, we applied an additional extension of the Ohlson model and tested the relation to IR by adding interaction variables. For testing the moderating effect of ESG reporting in general, we used $REP_{i,t}$ as in the main model. Additionally, we established the dummy variable $Big4_{i,t}$, that is set to 1 when a firm provides assurance on their ESG report from a Big 4 audit firm. We used this variable as an interaction variable with IR.

Table 8 provides results of the interactional model specification. The results support the main results of our paper, stating that IR cannot keep its promise to function as a value enhancing tool for reporting practice. Although, the $REP_{i,t}$ dummy stays significantly

TABLE 8 Regressions of market value on type of environmental, social, and governance report indicator variable including interaction variables (total dataset and subset B excluding outliers)

Value	Dependent variable	
	$\ln(MV_{i,t}+D_{i,t})$	
	(1)	(2)
$\ln(BV_{i,t-1})$	0.275*** (0.027)	0.278*** (0.029)
$\ln(Nl_{i,t})$	0.183*** (0.023)	0.164*** (0.024)
$IR_{i,t}$	-0.150 (0.163)	-0.272*** (0.094)
$REP_{i,t}$	0.165* (0.087)	
$IR_{i,t} \times REP_{i,t}$	0.004 (0.169)	
$Big4_{i,t}$		-0.055 (0.060)
$IR_{i,t} \times Big4_{i,t}$		0.181* (0.102)
Constant	10.298*** (0.514)	10.756*** (0.531)
Observations	322	308
R^2	0.823	0.815
Adjusted R^2	0.801	0.791
Residual Std. Error	0.247	0.249
F Statistic	37.873***	34.217***

Note. The table presents ordinary least squares estimation results on the total sample (Model 1) and on Subset B (Model 2) excluding outliers for regression of market value including an indicator variable $IR_{i,t}$ representing firms that publish an integrated report set to 0 and 1 otherwise; an indicator variable $REP_{i,t}$ representing firms that publish any kind of environmental, social, and governance report set to 1 and 0 otherwise and an interaction term $IR_{i,t} \times REP_{i,t}$ (Model 1). In Model 2, the indicator variable $REP_{i,t}$ is changed with $Big4_{i,t}$ representing firms that publish an integrated report that has assurance of a Big 4 auditing firm and apply either the G3.1 or G4 standard to their report set to 0 and 1 otherwise. $MV_{i,t}+D_{i,t}$ is the dependent variable of each model. $Nl_{i,t}$ stands for the net income of a firm i for year t . $BV_{i,t-1}$ is the opening book value of equity. All models are estimated with industry and year fixed effects dummies. * $p < .1$ ** $p < .05$. *** $p < .01$.

positive, the IR dummy is not significant. The negative sign of IR shows weak support for our findings.

Additionally, the results shown in Column 2 support our findings. The interaction variable is significant and shows a positive sign. Although the total effect is negative, this supports our findings by showing that the type of assurer mitigates the negative influence of the implementation cost of IR.

In order to take the mentioned challenges of classification of the reports into account, all regression models as well as presented

robustness checks were tested again with an alternative classification model inclusive of all limiting cases of classification. The results are in line with the presented findings of this study. To summarize the implemented robustness tests, the presented statistical findings of this paper seem to be quite robust.

5 | DISCUSSION AND CONCLUSION

Recent literature on IR, which has been conducted within a voluntary setting, has rather focused on the determinants of IR disclosure (Frias-Aceituno et al., 2013; García-Sánchez, Martínez-Ferrero, & García-Benau, 2019) and on the reduction of information asymmetry (Cuadrado-Ballesteros et al., 2017; García-Sánchez & Noguera-Gámez, 2017a, 2018). Most of the literature regarding value relevance of IR has explored a mandatory setting in South Africa. With regard to the existing literature concerning assurance, the studies rather focused on separate ESG reports than on IR (Martínez-Ferrero & García-Sánchez, 2017; Pflugrath et al., 2011). As far as we know, there is no study analyzing the influence of assurance providers for the perception of IR.

To fill this gap in literature, this study examines the actual value of IR and is the first regarding the influence of assurance providers concerning IR.

To investigate these objectives, the study applies an empirical regression analysis based on the Ohlson (1995) model on fifty European blue-chip companies. The cum-dividend market value was regressed with accounting-based variables, that is, book value of equity and net income and different indicator variables as a substitute for other information regarding the objectives of the study.

In consequence, we contribute to existing literature by finding that IR does play a role in the market valuation of a firm's equity. In line with studies of the cost-concerned school, the findings show a negative influence on market valuation unless firms provide an IR with the assurance of a Big 4 audit firm and conduct their report according to the newest GRI guidelines. An assured IR that does not follow the newest GRI guidelines is also penalized by a lower market valuation but to a lower extent.

Following Reimsbach, Hahn, and Gürtürk (2018), these findings can be interpreted in line with cognitive cost theory and the proximity compatibility principle. IRs often have a low display proximity, because ESG information is often subjective and written in text form as opposed to objective data. Therefore, we assume that investors perceive IRs as cognitive cost producing rather than acquisition costs saving. In other words, the cost for filtering the offered information is higher than the cost saved for receiving the required information.

Our findings cannot sustain literature that claims only high-quality ESG reports are significant for the market valuation of a firm. However, the findings go in the same direction, as the market does not penalize companies applying the best-practice approach.

Furthermore, this paper can be classified as supporting the cost-concerned school and shows IR as a rather cost-producing element

than a corporate advantage in reporting practice. In the context of assurance literature, the results support existing studies finding that the negative effect of assured IRs is lower than the effect of unassured IRs on the market valuation of a firm.

Overall, these results need to be interpreted carefully as several limitations exist. The analyzed sample size (~350 observations) is small, as well as the considered time period of 7 years being relatively short. The European sample setting as well as the blue-chip approach causes limitations to generalize the findings to other conditions.

Furthermore, due to the characteristics of IR as a new field of research and the lack of a broadly accepted definition of IR, the practice used to classify the type of ESG report is vague. As described, this study used a broad definition of IR including so-called combined ESG reports as well as internet reports, and this procedure may not comply with the definition of the IIRC Framework.

The latter limitation leads to the main conclusion of this study. As previously discussed, the aim of IR supporters is to establish IR as the new concept of corporate reporting, which should substitute the currently used ESG reporting and financial reporting practice (Adams, 2015; Eccles & Saltzman, 2011) and in consequence should be a governmentally enforced obligatory reporting practice.

If IR should ever be a broadly used reporting concept, there needs to be a clear definition of what integrated reporting is and what it is not. So far, the IIRC Framework does not offer a sufficient definition. If this condition remains, future research as well as reporting practitioners will have to deal with the same limitations as this paper and as a result the governmental enforcement of an obligatory standard become unlikely.

However, IR is still at an early stage, and future research could help to build a clear definition and in consequence lead to a reporting concept that goes beyond current reporting practice. Therefore, future research should focus on the one hand on content analysis research to contribute to the development of a consistent definition of IR. On the other hand, empirical research should focus on the value relevance of IR to deepen and broaden the findings of this study.

As this paper is one of the first papers examining the influence of certain characteristics of an IR (i.e., type of assurance provider and best-practice approach) on the same perception, future research should use different indicator variables to further analyze the study's findings and consequently find more insights of potential drivers of the value relevance of IR. Furthermore, future research should extend the analysis to a complete European sample to better generalize the results.

To make a conclusion, this paper contributes to existing IR literature by exploring the actual value of this new kind of reporting practice.

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ENDNOTES

- ¹ In this paper, we will use the term IR interchangeably for Integrated Reporting or Integrated Report.
- ² In this study, we use the definition of Hassel, Nilsson, and Nyquist (2005): The term "value relevance [means] the ability of accounting or nonaccounting measures to capture or summarize information that affects equity value."
- ³ Sustainability Reports have a variety of names like Corporate Social Responsibility Report, Environmental Report or Social Development Report (globalreporting.org, 2016). We will use the term ESG report throughout this study.
- ⁴ PricewaterhouseCoopers, KPMG, EY, Deloitte
- ⁵ IR conducted to the latest GRI Guidelines means the newest available version of the Guidelines. For the years 2010 to 2012, GRI G3.1 was the newest version and are determined as best practice. As the GRI G4 are introduced in 2013 from 2013 on the G4 are determined as best practice.
- ⁶ For derivation, see Appendix of Hassel et al. (2005).
- ⁷ The reason for the negative minimum book value of the sample is the massive loss of the BT Group produced in the other comprehensive income in 2010 and 2013. For example, in 2010, actuarial losses relating to retirement benefit obligations lead to GBP 3,661 million other comprehensive loss and therefore to a negative value of the common equity.
- ⁸ For the used common rules of thumb, see Camm, Cochran, Fry, Ohlmann, and Anderson (2014) and Hair (2010).
- ⁹ Please note that each regression model presented in Tables 3, 4 is summarized. A detailed presentation including industry and time fixed effects are available from the authors on request.

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