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Corporate Social Responsibility and Environmental Management

Provided in Cooperation with:
John Wiley & Sons

Suggested Citation: Leukhardt, Luca; Charifzadeh, Michel; Diefenbach, Fabian (2022) : Does integrated reporting quality matter to capital markets? Empirical evidence from voluntary adopters, Corporate Social Responsibility and Environmental Management, ISSN 1535-3966, John Wiley & Sons, Inc., Chichester, UK, Vol. 29, Iss. 5, pp. 1482-1494, https://doi.org/10.1002/csr.2285

Received: 20 September 2021 | Revised: 27 March 2022 | Accepted: 9 April 2022

DOI: 10.1002/csr.2285

RESEARCH ARTICLE

Corporate Social Responsibility and Environmental Management

WILEY

Does integrated reporting quality matter to capital markets? Empirical evidence from voluntary adopters

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Abstract

This study examines the relevance of integrated reporting quality (IRQ) to capital markets. We investigate whether IRQ benefits capital market participants by improving a firm's information environment, using analyst earnings forecast accuracy as a proxy. Our study focuses specifically on companies that publish integrated reports on a voluntary basis. Based on a scoring model, we assess IRQ and its effects with data from 2015 to 2019 of 101 companies. The results indicate no significant relationship between IRQ and analyst earnings forecast accuracy. Thus, IRQ does not appear to improve a firm's information environment, at least not currently in a voluntary setting. Drawing on previous literature in the field, this study further concludes that integrated reporting (IR) in general has not yet reached its full potential in benefitting capital markets. Potential implications of our results are that the standard setters should work to improve the specificity and rigor of their guidelines, and analysts should become more involved in developing IR guidelines to make them more relevant to their information needs. IR seems to unfold its benefits better in mandatory settings, which could call for regulators to make IR mandatory.

KEYWORDS
forecast accuracy, forecast error, information environment, integrated reporting, integrated reporting quality, sustainability reporting, voluntary disclosure

JEL CLASSIFICATION
M41, G14, Q56

1 | INTRODUCTION AND BACKGROUND INFORMATION ON INTEGRATED REPORTING

Organizations worldwide have been confronted with increasing public pressure to conduct their business activities in compliance with environmental, social, and governance criteria (Kolk & van Tulder, 2010). Sustainability reports have become essential to provide the expected transparency (Velte & Stawinoga, 2017). Issuing a standalone sustainability report in addition to the annual report has thus evolved into a mainstream business practice (KPMG, 2013).

However, standalone sustainability reports have displayed several shortcomings. For instance, they often include a wealth of information on individual subjects such as a company's social and environmental impacts, practices, and policies. This can cause information overload and makes it difficult for readers to systematically link information across the components (De Villiers et al., 2014). Furthermore, such reports are criticized for being disconnected from financial information and a firm's annual report (Hartmann, 2021). As a result, it is not clear to the reader how the non-financial information relates to a firm's financial performance (Mio & Fasan, 2016).

Such limitations and concerns have led to the emergence of a reporting approach called integrated reporting (IR). The International Integrated Reporting Council (IIRC), founded in 2010, has become the dominant global body concerning the development of policies and practices in the realm of IR (De Villiers et al., 2014). In 2021, the IIRC merged with the SASB and is now called the Value Reporting Foundation (VRF) (VRF, 2021). Essentially, an integrated report promotes a concise, cohesive, and efficient approach to corporate reporting (Eccles & Serafeim, 2015). It includes both financial and non-financial information and intends to show clearly the linkages between the two. Moreover, an integrated report aims to report on all resources and relationships (denoted by the IIRC as the "6 capitals"[1]), that materially impact the value creation activities of a company over time (Cohen & Simnett, 2015). Hence, an integrated report focuses on the long-term value creation of a company (Wahl et al., 2020).

In addition to the abovementioned general IR characteristics, the International Integrated Reporting Framework (<IR> Framework) provides additional guidance. The <IR> Framework was published by the IIRC in 2013 and represents the globally most relevant codification effort regarding IR (Eccles et al., 2015). It discusses seven guiding principles, eight content elements, and two fundamental concepts that should be part of an integrated report.

Currently, at least 500 companies worldwide publish an integrated report in line with the <IR> Framework (IIRC, 2021). Furthermore, IR continues to gain momentum on a global scale (Barth et al., 2017).

One of IR's main objectives is to improve "the quality of information available to providers of financial capital" (IIRC, 2013, p. 2). Shareholders and investors are considered the primary audience of IR (IIRC, 2013; Lai et al., 2016). The benefits they are expected to draw from emerging IR practices include a reduced information risk (Healy & Palepu, 2001), more accurate and consistent forecasting by analysts, and the efficient, productive allocation of capital (Lee & Yeo, 2016). Moreover, financial analysts, as investors' advisors, are also primary users of IR (Abhayawansa et al., 2019).

Due to the emerging nature of IR, there is still ambiguous evidence regarding its benefits (Muttakin et al., 2020; Zhou et al., 2017). This is also true for the above mentioned central IR target of providing better information to capital market participants.[2] While some previous studies have provided empirical evidence in this regard, the majority of them focus on only one country, South Africa (Hsiao et al., 2021).

South Africa is the only country to date where IR is de facto mandatory. Since March 2010, South Africa has required all firms listed on the Johannesburg Stock Exchange (JSE) to publish an integrated report or to explain why they do not (Rimmel, 2021; Setia et al., 2015). In March 2014, the Integrated Reporting Committee of South Africa endorsed the <IR> framework (De Villiers et al., 2014).

All companies outside South Africa publishing an IR do so voluntarily. These companies have not yet been studied as intensively. Doing so is important, however, as IR publications may have different informational effects to capital markets in settings of voluntary adoption. More precisely, it may be that those companies that voluntarily adopt IR are already relatively transparent, which could limit the incremental benefit of IR publications (Wahl et al., 2020).

In fact, previous research provides some evidence that voluntary IR publications may not improve a firm's information environment, thus indicating a limited relevance of such publications to capital markets (Hsiao et al., 2021; Wahl et al., 2020). However, existing studies mainly focus on the mere existence of an integrated report rather than examining its content or quality. Only few studies to date have considered the effect of integrated reports' quality on information asymmetry, and they either have a different research focus or do not employ a purely voluntary sample. It thus is relevant to investigate whether the seemingly limited IR effect in voluntary settings is caused partly by low-report quality. This study aims to provide an answer to this question.

To do so, this study uses a sample of 101 voluntary IR adopters to analyze whether there is a statistically significant relationship between integrated reporting quality (IRQ) and a firm's information environment proxied by analyst earnings forecast accuracy. The independent variable IRQ was obtained by evaluating the 2015 and 2016 integrated reports of each company in the sample (202 firm-year observations) based on Pistoni et al.'s (2018) IRQ scoring model. Moreover, the use of analyst forecast accuracy as a proxy for a firm's information environment has been widely used in previous studies (e.g., Lang et al., 2003). The rationale behind this is that one of the main business practices of financial analysts is to regularly forecast the future earnings of firms. The higher the quality of information available about the respective firm, the more accurate should be the analyst forecast (e.g., Dhaliwal et al., 2012; Hope, 2003).

Our findings do not provide evidence for a significant relationship between IRQ and analyst earnings forecast accuracy. Thus, IRQ does not seem to have an effect on a firm's information environment, at least not currently in a voluntary setting. Our findings extend the existing literature, which predominantly examines IR adoption but not the quality of the reports. The insignificant results could be explained by the fact that voluntary adopters of IR may tend to be quite transparent already (Frias-Aceituno et al., 2014). Nonetheless, the results suggest limited relevance of IR at present to capital markets, because even high-quality integrated reports do not appear to improve a firm's information environment.

Hence, the findings have important practical implications. A key lever for the impact of IR on the information environment seems to be a high IR adoption rate. Positive effects of IR have been observed mainly in mandatory settings (Bernardi & Stark, 2018; Zhou et al., 2017). Obviously, IR can unfold its benefits better if it is applied on a broad basis, thus also including companies with low transparency. Consequently, policy makers could consider making IR mandatory. Moreover, a higher adoption rate and more consistent reports could also increase the acceptance of IR by capital market participants.

[1]The six capitals are financial capital, manufactured capital, intellectual capital, human capital, social and relationship capital, and natural capital.

[2]This study focuses on IR relevance to shareholders, investors and financial analysts. The terms "capital market participants" and "capital markets" are both used as synonyms. By doing so, this study follows Zhou et al. (2017).

The remainder of this study is organized as follows. Section 2 presents the theoretical background of the study and develops the research hypothesis. Section 3 explains the research design and the statistical model applied. Section 4 provides the empirical results, whereas Section 5 follows up with a discussion of the main research findings. Section 6 concludes and deals primarily with the practical implications of this study.

2 | LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1 | Related research

Several studies review the emerging body of IR literature (e.g., Dumay et al., 2016; Kannenberg & Schreck, 2019; Rinaldi & Unerman, 2018; Vitolla, Raimo, & Rubino, 2019). Moreover, Minutiello and Tettamanzi (2022) provide a review of current studies on IRQ, while Lueg and Lueg (2021) provide a taxonomy for critical assessment of IR types.

In general, previous IR research has dealt primarily with conceptual issues, such as appreciations and criticisms of IR, with normative advice on the implementation of IR practice (Veltri & Silvestri, 2020), or alternatively, with the approaches and internal mechanisms that early adopters use to implement IR (Hosoda, 2021). By contrast, empirical studies in the field are still relatively scarce (Veltri & Silvestri, 2020).

This study focuses on whether IR benefits capital markets by providing them with better information. Therefore, this section summarizes previous research that has provided empirical evidence in this regard.

In general, it is a common approach to use analyst earnings forecast accuracy as a proxy for a firm's information environment (e.g., Dhaliwal et al., 2012; Hope, 2003). Most previous studies on IR in this field have focused on the South African setting of mandatory IR adoption.

For instance, Bernardi and Stark (2018) provide evidence that the adoption of mandatory IR in South Africa has a positive effect on analyst forecast accuracy. They report a statistically significant relationship between a firm's environmental, social and governance disclosure levels and analyst forecast accuracy after IR became mandatory. By contrast, no significant relationship was found in the pre-mandatory period. Hence, the authors argue that IR can potentially help better understand how environmental, social and governance performance and financial performance interact.

Zhou et al. (2017) also study South African firms and find a higher forecast accuracy for companies that follow the <IR> Framework more closely. Their findings also show that improvements in forecast accuracy subsequently decrease a firm's cost of equity. In a similar study, Zúñiga et al. (2020) find that IRQ is positively associated with analyst forecast accuracy. The authors study 111 JSE-listed companies during 2013–2015 and apply the Sustainability Disclosure Transparency Index (SDTI) as a proxy for IRQ. They conclude that IR benefits investors and financial analysts by providing more comprehensive information, which allows for more accurate decision-making and resource allocation.

In addition to the three studies discussed above, a focus on the South African setting is also present in other studies that examine IR's capital market benefits (e.g., Barth et al., 2017; Lee & Yeo, 2016). This is attributable to the ease of gathering data about firms that mandatorily engage in IR (Wahl et al., 2020). However, the findings of South African studies are not generalizable to other jurisdictions (Zúñiga et al., 2020). Therefore, it is important to examine the IR potential also outside the South African mandatory regime. Although there is substantial evidence that IR has positive effects in South Africa, it also needs to be examined whether IR is keeping its promises in settings of voluntary adoption.

Only recently, some researchers have begun to focus on companies outside of South Africa, that is, companies that voluntarily adopt IR. For instance, Rossignoli et al. (2021) suggest a positive effect of IR on forecast accuracy, however, they find this effect only in particular institutional settings. Flores et al. (2019) examine an international sample of 614 companies to determine whether there is a significant relationship between voluntary IR adoption and analyst forecast accuracy. Their results indicate a positive effect of IR on forecast accuracy. The authors show that this effect is stronger in North America than in Europe, which they attribute to the North American shareholder-based governance regime.

However, Wahl et al. (2020), and likewise Hsiao et al. (2021), do not identify a significant link between voluntary IR adoption and analyst forecast accuracy. An important feature of Wahl et al.'s (2020) study is that it uses 2-years-ahead analyst forecasts in contrast to the current year analyst forecasts used by Flores et al. (2019). This measurement reflects IR's intention to foster a firm's long-term value creation rather than short term financial focus. Wahl et al. (2020) argue that voluntary IR adopters might already have a relatively high level of transparency, which leads to an absent incremental effect of IR disclosure. However, their study has not analyzed the effect of IRQ, but has just measured the mere existence of an IR.

The existing research stream on voluntary IR adopters (e.g., Flores et al., 2019; Gerwanski, 2020; Hsiao et al., 2021; Rossignoli et al., 2021; Wahl et al., 2020) predominantly researches the effects of the binary decision to adopt IR. Only few studies to date have considered IRQ in a voluntary setting. Raimo et al. (2021) report a slightly negative effect of IRQ on the cost of debt for European firms. By focussing on debt capital markets and borrowing conditions of voluntary IR adopters, however, they do not analyze the information environment particularly relevant for equity investors.

The distinction between IR adoption and IRQ is important as previous studies yield mixed results on whether voluntary IR publications provide better information to capital markets (Flores et al., 2019; Wahl et al., 2020). Indeed, it might be that only high-quality integrated reports provide an effective mechanism in voluntary settings. Latest research results indicate that IRQ is the more meaningful variable (Raimo et al., 2021). Hence, the current study examines the informational effects of IRQ in a setting of voluntary adoption.

It is also worth noting that there is already some research available on the determinants of IRQ (Vitolla, Raimo, Marrone, et al., 2020; Vitolla, Raimo, & Rubino, 2020; Vitolla, Raimo, Rubino, & Garzoni, 2019), while publications on the effects of IRQ are relatively scarce.

Concerning the chosen sample, only Vitolla, Salvi, et al. (2020) have investigated the informational effects of IRQ beyond the South African mandatory setting. The authors examine the effect of IRQ on the cost of equity. They identify a negative relationship, which is "probably indirect and … connected to the ability of this tool [IRQ] to reduce information asymmetries and attract new long-term investors" (Vitolla, Salvi, et al., 2020, p. 525). However, the sample includes mandatory IR adopters and thus cannot be considered truly voluntary.[3]

In contrast to Vitolla, Salvi, et al. (2020), our study strictly excludes all South African firms and thus examines IR potential in a purely voluntary setting. Analyzing IRQ requires in depth analysis of reports, which is why most studies in this field employ rather small samples. In our study, we use a substantially larger sample of 202 versus 116 firm-year observations in the above-mentioned work. In addition, this study uses analyst forecast accuracy as the dependent variable, whereas Vitolla, Salvi, et al. (2020) use the cost of equity. This study is thus less dependent on measuring an indirect effect.

To conclude, our work tries to shed light on the still controversial question of whether IR is capable of reducing information asymmetries and thus enabling capital market participants to make more accurate forecasts. Our research contributes to the still limited empirical evidence in the field but differs in the following key aspects. First, most of the existing studies focus on the mere existence of an integrated report rather than examining its content or quality. We follow Wahl et al.'s (2020) findings that the mere adoption of IR does not show significant positive effects on the information environment. Our research explores, whether the quality of the integrated reports (IRQ), which varies between reports (Pistoni et al., 2018), is a better explanatory variable for IR effectiveness.

Secondly, there is scant literature on voluntary IR, as the majority of the studies use a South African sample (where IR is mandatory). However, since no other country has mandated IR yet, it is important to investigate whether the promise of IR also holds true for voluntary adopters outside the South African disclosure regime. The few studies analyzing a voluntary setting show mixed results regarding improvements of information quality. While some studies found evidence that IR can reduce information asymmetries (e.g., Flores et al., 2019), other studies do not find such an effect (e.g., Hsiao et al., 2021; Wahl et al., 2020). Again, these studies predominantly research the effects of the binary decision to adopt IR, but they do not consider IRQ.

So far, the very few studies that analyze IRQ have a different focus and they do not use samples with only voluntary adopters (Vitolla, Salvi, et al., 2020).

[3]Vitolla, Salvi, et al. (2020) only state the relative frequency of *African* firms in their sample, which is given as 28%. Almost all African companies included in the "<IR> Example database," which is the sample source of Vitolla, Salvi, et al. (2020), are South African.

2.2 | Theory and research hypothesis

Two main problems impede the efficient allocation of resources in a capital market economy (Healy & Palepu, 2001). The first problem is the so-called "information problem" arising from incomplete information on a specific product. If buyers cannot assess the quality of a product in full, they are not willing to pay an adequate price for a given product. They do so to account for potential low-quality products ("lemons"; Akerlof, 1970). In capital markets, such incomplete information prevents investors from efficiently investing their capital into business ventures: investors may undervalue "better quality investments" and overvalue "lower quality investments". The second problem is the so-called "agency problem," which means that corporate insiders—such as managers—have an incentive to expropriate investors' funds after an investment decision is made (Jensen & Meckling, 1976). For instance, managers might use the funds to pay excessive salaries or make operating decisions that are contrary to the interests of outside investors (La Porta et al., 2000).

An important mechanism to mitigate both the "information problem" and the "agency problem" are corporate disclosures (Healy & Palepu, 2001), as these reduce information asymmetries and increase a firm's transparency to outsiders. Typical examples of corporate disclosures include regulated financial reports, press releases, conference calls and management forecasts. In addition to the aforementioned disclosure mechanisms, the novel approach of IR may help to complement a firm's reporting landscape (Veltri & Silvestri, 2020). The following paragraphs discuss how IR may add informational value for the capital market community over and above a firm's current reporting suite.

First, the incorporation of both financial and non-financial information is a central characteristic of an integrated report. Numerous previous studies show that a relationship exists between financial disclosure and a reduction in information asymmetries (e.g., Hope, 2003; Lang & Lundholm, 1996). However, also non-financial information is relevant for improving a company's information environment (Dhaliwal et al., 2012; Nichols & Wieland, 2009). Integrated reports include more non-financial information than usual financial reports.

In addition, an integrated report may be of value due to several innovative reporting principles and content elements. More precisely, an integrated report may provide the reader with additional insight into matters such as an organization's strategy, its business model, or its ability to create value over time (Lee & Yeo, 2016). Moreover, an integrated report has a specific focus on forward-looking information. Therefore, it may provide the reader with more and better information about a company's future activities, risks, challenges, and opportunities (Zúñiga et al., 2020).

Particularly helpful to investors may also be the IR feature of identifying cause-effect relationships between non-financial information and financial performance (Flores et al., 2019). For instance, an integrated report may indicate the implications for expected revenue growth of research and development policies (IIRC, 2013). Proponents of IR argue that presenting such linkages is a useful and promising approach, claiming that non-financial information (rather than financial

information) is a leading indicator for a firm's future financial performance (Serafeim, 2015).

The above arguments indicate that IR may be able to provide capital markets with additional relevant information. At the same time, capital market participants, like all humans, are limited in their ability to process information (Hirshleifer & Teoh, 2003). They face an information overload problem when being confronted with too much information. An integrated report aims to address such cognitive limitations through its two guiding principles of "materiality" and "connectivity". The materiality principle requires the respective report to include only information that affects a firm's ability to create value. In addition, the connectivity principle requires the report to articulate clearly the connections between its content elements. Thus, both the materiality and the connectivity principle may help to ease the readers' information analyzing processes (Zhou et al., 2017).

When discussing and evaluating the potential benefits of IR in practice, one should consider that the <IR> Framework, which provides IR implementation guidelines, is entirely principles-based. It thus allows for some degree of managerial discretion on how to interpret the guidelines (Gerwanski et al., 2019; Lai et al., 2017). The IIRC's basic idea behind this principles-based approach is to balance flexibility and prescriptions, in order to recognize the wide variation in individual circumstances of different organizations and industries (Fasan, 2013). Consequently, however, integrated reports vary considerably in their extent, level of specificity, and preciseness of the information (Lee & Yeo, 2016).

Based on the above argument, it seems reasonable to assume that different integrated reports exhibit different levels of effectiveness in communicating information to capital markets. Consequently, the capital market community may derive greater informational benefit from high-quality integrated reports.

This leads to the following research hypothesis:

> **Hypothesis 1.** *There is a positive relationship between IRQ and analyst earnings forecast accuracy (as a proxy for a firm's information environment).*

3 | RESEARCH METHODOLOGY

3.1 | Data and sample

The sample for this study is sourced from the "<IR> Example database," which is an online database provided by the IIRC (IIRC, 2021). It contains only companies that publish integrated reports in accordance with the <IR> Framework. All companies examined in this study were sourced in January 2021 from the database and had to fulfill the following criteria to be included in the final sample: (1) the company is listed on an exchange, as this study investigates whether IRQ is of relevance to capital market participants including shareholders; (2) it is not listed on the JSE, because of this study's focus on voluntary IR adopters; (3) the 2015 and 2016 integrated reports of the company are available; (4) a reference to the IIRC or the <IR> Framework is included in the company's 2015 and 2016 integrated reports to ensure compliance with the IIRC guidelines; (5) all information required to calculate analyst earnings forecast accuracy and several other variables is available in the financial data provider FactSet; (6) the company's fiscal year end does not change during the sample period. These filters reduced the original list from 522 to 101 firms in our sample.

At the time our study was conducted, the latest reports possible to be included in the analysis were used. Due to the 2-year time lag of the dependent variable, FERROR, which will be explained in more detail in Section 3.3, and the time delay between the reporting year and the report release, the latest integrated reports that could be included in the analysis were the integrated reports for 2015 and 2016.

3.2 | Research approach

This study applies panel data analysis and a linear regression model to statistically test the research hypothesis (H1). The following subsections provide further information on the dependent variable, the main independent variable, the control variables, and the final regression model used in this study.

3.3 | Dependent variable: Analyst earnings forecast accuracy

Regarding the dependent variable, this study follows the methodology of Dhaliwal et al. (2012). The variable analyst forecast error (FERROR) is used to measure analyst earnings forecast accuracy inversely. FERROR is defined as the average of the absolute errors of all consensus forecasts made in a certain year for earnings per share (EPS), scaled by the actual EPS (absolute value):

$$FERROR_{i,t} = \frac{1}{N}\sum_{j=1}^{N}\frac{\left|FC_{i,t,j} - EPS_{i,t}\right|}{EPS_{i,t-1}}, \quad (1)$$

where the subscripts i, t, and j denote firm i, year t, and forecast j, respectively.

Following Wahl et al. (2020), this study does not apply current year forecasts but 2-years-ahead forecasts due to the IR focus on long-term value creation (Mio et al., 2020). N is the total amount of consensus 2-years-ahead forecasts made in fiscal year t. The FC term represents the consensus 2-years-ahead forecast of month j for EPS at the end of the fiscal year $t + 2$. From this, the actual EPS at the end of the fiscal year $t + 2$ is subtracted. Finally, the EPS term in the denominator represents the actual EPS (absolute value) at the end of the fiscal year $t - 1$.

The forecast horizon is limited to 2 years, as most analysts do not provide forecasts beyond the second year.

TABLE 1 IRQ scoring model (adopted from Pistoni et al., 2018, p. 496)

(1) Background	(2) Contents
x = 0; ✓ = 1 • Goal of the report • Motivation for adopting IR • Person in charge of the IR process • CEO letter demonstrating sustainability commitment • Document's beneficiaries/ recipients • Consistency with generally applied disclosure standards • Title: integrated report Maximum score: 7	x = 0; ✓ = 5 • Organizational overview & external environment • Business model • Risks & opportunities • Strategy & resource allocation • Governance • Performance • Outlook • Basis of presentation • Capitals • Value creation process Maximum score: 50
(3) Assurance and reliability	**(4) Form**
x = 0; ✓ = 1 • Internal audit of the report • Third-party verification of the report • Awards for the report Maximum score: 3	x = 0; ✓ = 5 • Readability and clarity • Conciseness • Accessibility Maximum score: 15

Abbreviation: IR, integrated reporting.

3.4 | Independent variable: Integrated reporting quality

For the calculation of the main independent variable, IRQ, this study follows preceding literature (e.g., Raimo et al., 2020) and applies the IRQ scoring model by Pistoni et al. (2018). Pistoni et al. (2018) developed this sophisticated model in the context of a study on the state of IRQ in companies worldwide.

The scoring model is based on visual content analysis. It comprises four areas of assessment: (1) background; (2) contents; (3) assurance and reliability; and (4) form. The background area and the assurance and reliability area evaluate only the absence or presence of different elements, using a score of either 0 or 1. By contrast, the contents area and the form area apply assessment scales ranging from 0 (absence) to 5 (very high quality). Table 1 offers a detailed overview of the evaluation categories and scoring mechanisms.

Regarding the contents area, which is the area with the highest weighting, the scoring system works as follows. Score 0 is assigned when the respective content element under examination is absent. Score 1 is assigned, when the respective content element is present, but poorly described, with only scarce reference to the IR guiding principles. Score 2 is assigned, when the respective content element is present, and its description is based on some quantitative information and on a few IR guiding principles. Score 3 is assigned, when the respective content element is present, with a balanced description of contents, and an average quantity of information that refer to IR guiding principles. Score 4 is assigned, when the respective content element is present, and when that particular content element is described well and in detail, with many IR guiding principles being considered. Finally, score 5 is assigned, when the respective content element is present, and the description of that particular content element is excellent, with quite all IR guiding principles being used.

Regarding the form area, the scoring model also ranges from 0 to 5 and assesses first, the readability and clarity of the document (presence of an index, graphs, tables, glossary, references to various sections of the document, and hyperlink to external sources, firm website or other documents); second, the conciseness of the document (number of pages of the document); and third, the accessibility of the document (hard-copy documents versus website accessibility).

The maximum attainable score of an integrated report within the scope of the applied scoring model is 75 (Pistoni et al., 2018). For this study, one author scored all IR publications to ensure scoring consistency across the sample. To ensure data reliability, the other two authors also each scored a sample of 10 randomly selected reports. The comparison of the scoring results confirmed the common understanding of the scoring model.

3.5 | Control variables

This study applies a set of control variables selected in accordance with previous literature (e.g., Dhaliwal et al., 2012; Hope, 2003; Wahl et al., 2020). They can be grouped into firm-level and country-level control variables. The firm-level control variables are firm size (SIZE), earnings volatility (VAREARN), debt (DEBT), negative earnings (LOSS), number of analysts following (ANANO), and number of major stock exchanges listed (STKEXCH). The country-level control variables are mandatory adoption of IFRS (MDIFRS) and legal and public enforcement (ENFORCE).

3.6 | Regression model

First, Hausman's (1978) specification test was conducted to determine whether to use a fixed effects (FE) model or a random effects (RE) model. The latter was then chosen. A Breusch and Pagan Lagrangian multiplier test (Breusch and Pagan, 1980) was also conducted, to determine whether the RE model is more appropriate than a simple ordinary least squares (OLS) regression. The results indicate that the RE model is to be used. Moreover, a year dummy variable was added to control for time-specific effects. This results in the following regression equation:

$$\begin{aligned} FERROR_{i,t} = {} & \beta_0 + \beta_1 IRQ_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 VAREARN_{i,t} + \beta_4 DEBT_{i,t} \\ & + \beta_5 LOSS_{i,t} + \beta_6 ANANO_{i,t} + \beta_7 STKEXCH_{i,t} + \beta_8 MDIFRS_{i,t} \\ & + \beta_9 ENFORCE_{i,t} + YEAR + \varepsilon_{i,t}, \end{aligned} \tag{2}$$

where the subscripts i and t denote firm i and year t, respectively.

Finally, the model applies robust standard errors to account for potential heteroscedasticity in the data.

TABLE 2 Descriptive statistics H1 testing

Variable	N	Mean	SD	Min	p25	Median	p75	Max
FERROR	202	0.929	1.946	0	0.143	0.382	0.875	14.096
IRQ	202	39.681	8.006	17	34	39.5	45	61
SIZE	202	9.721	1.728	5.232	8.673	9.607	10.634	14.359
VAREARN	202	−0.292	1.180	−2.215	−1.174	−0.520	0.479	5.405
DEBT	202	0.191	0.140	0	0.094	0.166	0.28	0.61
LOSS	202	0.084	0.278	0	0	0	0	1
ANANO	202	2.530	0.666	0	2.225	2.603	2.958	3.604
STKEXCH	202	0.851	0.516	0	1	1	1	2
MDIFRS	202	0.515	0.501	0	0	1	1	1
ENFORCE	202	8.252	3.018	2.5	6.5	6.5	11	17

TABLE 3 IRQ score by year, region, and sector

IRQ score	N	Mean
Panel A: Year		
2016	101	38.9
2017	101	40.5
Total	202	39.7
Panel B: Region		
America	18	42.0
Asia	112	35.8
Europe	66	45.1
Oceania	6	45.5
Total	202	39.7
Panel C: Sector		
Communications	12	44.7
Energy	26	41.6
Consumer discretionary	14	36.5
Consumer staples	24	40.9
Financials	26	42.2
Health care	16	36.5
Industrials	36	38.8
Materials	20	39.1
Real estate	14	37.9
Technology	14	36.8
Total	202	39.7

Abbreviation: IRQ, integrated reporting quality.

4 | RESULTS

4.1 | Descriptive statistics

Table 2 presents the descriptive statistics for the data. The mean IRQ score is 39.7, which is in line with the results reported by the study of Pistoni et al. (2018), who report a mean IRQ score of 41.2 in a sample of 116 integrated reports from the years 2013 and 2014.

The range of the IRQ scores in the current study is relatively large (17–61), but most of the scores are concentrated around the mean value. With only about 40 out of 75 maximum attainable points, the overall IRQ in the sample is relatively low (Pistoni et al., 2018).

Furthermore, the dependent variable FERROR ranges from 0 to 14.1 and has a mean of 0.93. The control variable MDIFRS has a mean value of 0.51, which indicates that more than half of the companies in the sample are based in countries where IFRS is mandatory.

Table 3 provides further insights into the breakdown of the IRQ score by year, region, and industry sector. The sectors were retrieved from Bloomberg (2020) and MarketWatch (2020). Table 3 shows that IRQ increases slightly over time; furthermore, companies in Asia exhibit lower IRQ scores than firms in other regions. Regarding the breakdown by sector, companies in the communications sector display the highest IRQ scores, whereas IRQ is lowest in the customer discretionary and the health care sectors.

4.2 | Regression results

The regression results of this study are listed in Table 4.

The results show that there is no statistically significant relationship between IRQ and FERROR ($t = -0.44$, $p = 0.659$). Thus, the results do not provide evidence in favor of the research hypothesis H1 that IRQ is associated with analyst forecast accuracy and improvements in a firm's information environment.

The only variables significantly related with the dependent variable FERROR are SIZE and LOSS. Table 4 shows a negative relationship between SIZE and FERROR indicating that larger firms receive more accurate analyst forecasts, which is in line with the firms' expected better overall information environment (Atiase, 1985). The positive relationship between FERROR and LOSS signals that the financial results of loss-making companies are more difficult to predict, which is consistent with Dhaliwal et al. (2012).

Some variables used in our model show significant correlations among each other (Table 5). In particular, two variable pairs indicate a relatively strong correlation, with a correlation coefficient of >0.5: Companies operating in contexts where IFRS is mandatory (MDIFRS) have a higher IR quality (IRQ). The overall high reporting standards and the good level of transparency required by IFRS could explain this association. Furthermore, large firms (SIZE) are more likely to be followed by a large number of analysts (ANANO) than small firms are.

TABLE 4 Regression results H1 testing

	Coefficient	SE	T	P > |t|	95% conf. Interval	
IRQ	**−0.012**	**0.027**	**−0.44**	**0.659**	**−0.065**	**0.041**
SIZE	−0.138**	0.068	−2.04	0.042	−0.270	−0.005
VAREARN	0.192	0.124	1.54	0.124	−0.052	0.435
DEBT	−0.582	1.096	−0.53	0.596	−2.731	1.567
LOSS	1.806*	1.055	1.71	0.087	−0.261	3.873
ANANO	0.101	0.160	0.63	0.526	−0.212	0.414
STKEXCH	−0.287	0.435	−0.66	0.509	−1.139	0.565
MDIFRS	0.282	0.306	0.92	0.358	−0.319	0.882
ENFORCE	0.040	0.044	0.92	0.356	−0.045	0.126
N	202					
R^2 between	0.126					

Note: Dependent Variable: FERROR.
*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

TABLE 5 Correlation matrix H1 testing

	FERROR	IRQ	SIZE	VAR.	DEBT	LOSS	ANANO
FERROR	1.000						
IRQ	−0.008	1.000					
SIZE	−0.081	0.159[a]	1.000				
VAREARN	0.139[a]	−0.066	0.218[b]	1.000			
DEBT	0.013	0.153[a]	0.027	−0.053	1.000		
LOSS	0.273[b]	−0.078	0.072	0.213[b]	0.181[a]	1.000	
ANANO	−0.025	0.384[b]	0.575[b]	−0.004	0.128	0.023	1.000
STKEXCH	−0.084	−0.136	0.245[b]	0.218[b]	−0.190[b]	0.053	0.093
MDIFRS	0.085	0.588[b]	0.048	−0.152[a]	0.351[b]	0.045	0.292[b]
ENFORCE	0.060	0.304[b]	0.042	0.016	0.008	−0.117	0.191[b]
	STKEX.	**MDIFRS**	**ENF.**				
STKEXCH	1.000						
MDIFRS	−0.396[b]	1.000					
ENFORCE	−0.100	0.440[b]	1.000				

[a]Correlation is significant at the 0.05 level (2-tailed).
[b]Correlation is significant at the 0.01 level (2-tailed).

4.3 | Robustness tests

Three robustness tests were conducted in this study to examine whether our findings are driven by the specifics of individual industries, countries, or financial analysts. First, it was examined whether the results of this study are driven by companies from the industrial sector, as most firms in the sample operate in this sector. To do so, a dummy variable was added to the model. This did not significantly change the previously obtained regression results.

Second, it was checked whether the fact that most companies in the sample are based in Japan (45) affects the results. Again, a dummy variable approach was used. However, no evidence was found that the insignificant relationship between IRQ and analyst forecast accuracy is attributable to the Japanese firms.

TABLE 6 Transparency effects for mandatory and voluntary IR adopters

	Mandatory IR adopters	Current voluntary IR adopters
Transparency of firms before IR publication	Low, medium, and high (all firms)	Mostly high
Effect of IR adoption on transparency	↑ (e.g., Bernardi & Stark, 2018)	None (Hsiao et al., 2021; Wahl et al., 2020)
Effect of high-quality IR on transparency	↑ (e.g., Zúñiga et al., 2020)	None (current study)

Abbreviation: IR, integrated reporting.

Lastly, all companies that were followed on average by less than seven analysts during any of the 2 years examined were dropped from the model, and the linear regression was run again (with the remaining 150 firm-year observations). Consistent with Zúñiga et al. (2020), this allows to examine whether the regression results are driven by firms followed by only few financial analysts, and by the potential peculiarity of these analysts. The results of this robustness test did not provide any indication that this is the case.

5 | DISCUSSION OF RESULTS

The results of this study do not provide support that voluntary IR adopters publishing high-quality integrated reports improve the information environment for capital markets. Our results extend those obtained by Wahl et al. (2020) who researched the relationship between a firm's binary decision to adopt IR and its information environment. They did not find evidence for a relationship between IR adoption and forecast accuracy. The results of our study support these findings by showing the same lack of relevance also for the quality of reports.

According to voluntary disclosure theory, companies provide voluntary disclosures only if the benefits cover their costs (Demartini & Trucco, 2017). Consequently, it might particularly be those companies already displaying a relatively high level of transparency, which decide to publish an integrated report voluntarily. In such cases the incremental cost of an IR preparation and publication are rather low. For instance, highly transparent firms may already have a wealth of information available in their company's information systems, which makes producing an integrated report relatively cost-efficient. This argument is in line with Hsiao et al. (2021) who believe that the reporting practices of firms who have adopted IR may not substantially differ from prior year reports, and further, it may not differ from non-IR firms with similar reporting practices. Consequently, this presumably already high level of transparency of many voluntary IR adopters may at the same time limit the incremental benefits of IR disclosure.

In fact, various empirical elements support the interpretation that already highly transparent firms are more likely to publish integrated reports. Frias-Aceituno et al. (2014) find such a relationship for very early adopters of integrated reports[4]: "companies with a strong tradition in the production of sustainability information (…) are more likely to integrate the different corporate reports" (p. 67). In addition, our results of the significant impact of firm size on forecast accuracy can be interpreted in a similar way. Firm size can be seen as a proxy for a company's overall information environment (Atiase, 1985; Dhaliwal et al., 2012; Hope, 2003).

Studies in a mandatory setting have produced different results. In contrast to our findings, empirical studies of South African firms (i.e., mandatory IR adopters) largely indicate that IR is a useful tool to improve a firm's transparency. Moreover, these studies demonstrate that not only the IR publication itself is beneficial (Bernardi & Stark, 2018), but that there is an additional effect of high-quality integrated reports on a firm's transparency (e.g., Zúñiga et al., 2020).

The higher effectiveness of IR in the South African mandatory setting may be explained as follows. In contrast to a voluntary setting, where it is potentially only the transparent firms that adopt IR, in a mandatory setting all firms (also the less transparent ones) have to adopt the new reporting approach. This leads to a stronger impact of IR and IRQ in mandatory versus voluntary settings, as evidenced by previous studies. These effects are summarized in Table 6. It can be concluded that the effect of IR (and IRQ) on transparency should be strongest for low-transparency companies.

Independent of the previous discussion on the presumably already high transparency of voluntary adopters, this study's findings cast certain doubt on promises of IR regarding capital markets: even high-quality integrated reports do not appear to improve a firm's information environment during the timespan studied. Substantiating this argument, there are indeed several studies providing evidence that IR is—at least so far—of limited usefulness to the capital market community (Abhayawansa et al., 2019; Hsiao & Kelly, 2018; Slack & Tsalavoutas, 2018). These studies conduct interviews with investors and financial analysts and identify barriers that may currently hinder IR from unfolding its full potential in capital markets.

One concern raised by capital market participants is that the principles-based nature of the <IR> Framework limits the comparability of information across time and firms (Abhayawansa et al., 2019; Rowbottom & Locke, 2016; Slack & Tsalavoutas, 2018). As previously discussed, a firm's management has some discretion in preparing an integrated report. For instance, they can decide which performance metrics to disclose in the report. Furthermore, the <IR> Framework does not prescribe specific measurement methods or the inclusion of individual matters (IIRC, 2013). Therefore, the reports vary in terms of what they disclose and how they disclose it (Zhou et al., 2017). This diversity reduces their usefulness to capital market participants. The <IR> Framework aims to address the comparability issue through its "consistency and comparability" principle. According to this principle, the information in an integrated report should be presented on a basis that is consistent over time and in a way that enables comparison with other organizations. However, this effort does not appear to have resulted in sufficient comparability among individual reports to date (Abhayawansa et al., 2019; Rimmel, 2021).

Furthermore, the considerable wealth of additional qualitative information provided by IR appears to be of limited value to capital markets. In this regard, Abhayawansa et al. (2019) learn from analysts that these are hindered in their firm assessment practices by certain "rules" that allow only limited use of qualitative IR information. This is because handling qualitative information (e.g., disclosures about intellectual capital) and quantifying such data invariably leads to subjectivity, a behavior not acceptable within the analyst community. Slack and Tsalavoutas (2018) also find that qualitative IR information has limited relevance to capital markets. They conduct interviews with fund managers and equity market analysts. Fund managers' opinions include: "if you can't actually put a financial figure on, why is it relevant to me?"

[4]Frias-Aceituno et al. (2014) conducted their study with data from before the publication of the IIRC framework. They investigated factors for integrating sustainability and financial reports. The cited significant variable measures GRI application at different levels.

(p. 192). The statements of analysts include: "for my job, I need hard measurable data, that is verifiable and I can use in models for future value" (p. 192).

Moreover, the usefulness of IR may be limited due to the prevailing tendency of modern capital markets to adopt a short-term view. Previous research indicates that the investment community has a systematic preference for near-term cash flows at the expense of longer-term cash flows (e.g., Davies et al., 2014; Haldane, 2016). In this environment, the relevance of the IR concept is limited because it involves a "focus on forward-looking information to provide a long-term vision about the value creation process over time" (Zúñiga et al., 2020, p. 639). On the contrary, IR may rather be helpful when investor thinking is more long-term oriented. In this regard, Serafeim (2015) shows that the investor base of IR publishers consists of substantially fewer transient investors and more "dedicated" holders.

However, the still low IR adoption rate outside South Africa may discourage capital market participants from investing time to process integrated reports at all. For instance, a large part of capital market participants may not yet be sufficiently aware of the IR concepts – and thus not process IR publications. The about 500 IR adopters displayed by the IIRC (2021) make up a mere 1% of the world's almost 48,000 listed firms (World Federation of Exchanges, 2021). Market participants' awareness might increase in the future as IR continues to gain momentum.

The current study partially questions the capital market benefits of IR—at least for presumably high-transparency voluntary IR adopters and during the timespan studied. However, this research is subject to several limitations. First, our sample of 202 firm-year observations is limited because of (i) the relatively small number of voluntary IR adopters, (ii) the relatively few years of available data due to IR's novelty and our 2-years-ahead forecast data requirement (and the labor-intensive task of carefully reading and evaluating each integrated report in the sample). Moreover, the underlying research design involves IRQ assessments based on visual content analysis, which includes a degree of subjectivity by the researcher. Despite our measures to limit such subjectivity by cross-checking the results, other researchers could have obtained different results in applying Pistoni et al.'s (2018) model or even apply a different scoring model altogether. Furthermore, we have not controlled for a firm's overall transparency level independent of the IR. Lastly, there could potentially be differences among individual countries regarding the effects of IRQ, which may only be identified in a substantially larger global sample.

Beyond the limitations specific to our research question and design, alternative theoretical approaches to the topic of IR and its effects are possible. We have applied agency theory with its assumed conflict of interest between shareholders and internal managers (Akerlof, 1970; Jensen & Meckling, 1976) and have focused on integrated reports' effect on information asymmetry. Particularly stewardship theory offers a complementing view not based on the notion of self-interested managers acting as a form of homo economicus (Davis et al., 1997). Instead, intrinsically motivated actors striving for benefits of the organization, its stakeholders and wider society are the key element of stewardship theory (Camilleri, 2018; Donaldson & Davis, 1991). Stewardship, which is explicitly mentioned by the IIRC (2013), can accordingly help explain motivations for managers to act socially and environmentally responsibly—and write about these activities in integrated reports (Adams et al., 2016). There are consequently more cases for voluntarily publishing an integrated report than covered in our paper.

6 | CONCLUSION

We believe that the research field of sustainability reporting, in which our work is located, is highly relevant for the future development of corporate reporting. Especially Integrated Reporting shows a dynamic development and could be the way many more companies report on their activities in a few years' perspective (Rimmel, 2021). By complementing financial information with information about social and environmental corporate activities, it contributes to stakeholders' information resources. However, new forms of corporate reporting are only useful if they are able to improve the quality of information. Therefore, we believe that it is very important that the effects of IR and especially the quality of IR are carefully studied.

This study contributes to this by examining whether IRQ is of relevance to capital markets by statistically analyzing the relationship between IRQ and a firm's information environment, measured through analyst earnings forecast accuracy. Specifically, it focuses on voluntary IR adopters and investigates an international sample of 101 firms with 202 integrated reports. By doing so, this study may be of interest to both academics and practitioners. It may provide them with a better understanding of the potential of IR and IRQ.

Our findings provide novel evidence for the association between IRQ and analyst forecast accuracy in a voluntary setting. Our results indicate no significant relationship between the two. Therefore, high-quality integrated reports currently do not appear to improve a firm's information environment and do not provide additional relevant information to capital markets in a voluntary setting. As Hsiao et al. (2021) find that it is mainly companies with established sustainability practices that adopt IR, we assume that the absent effect of IRQ on forecast accuracy is partly due to a pre-existing high level of transparency among these companies.

These conclusions have important practical implications. First, they may help current and possible future voluntary IR adopters to evaluate the benefits of publishing high-quality integrated reports. Following the results of our study, these benefits do not lie in improved information quality. This study does not provide evidence that IRQ improves the quality of information available to capital markets in the current state of the framework. Thus, the focus of IR publishers might shift to other potential IR benefits. For instance, they may develop an integrated thinking in their firm and address the information needs of other stakeholders (IIRC, 2019). In addition, they may attract "socially responsible investors," because high-quality IR demonstrates a firm's commitment to pursuing objectives that are not

solely financial (Vitolla, Salvi, Raimo, et al., 2020). Such potentials may be further evaluated by future studies on IRQ.

This study's findings also have implications for policy-makers. Several policy-making bodies and states around the world have recently become interested in IR, such as the European Commission and Japan (Gibassier et al., 2019; Wahl et al., 2020). The findings provide them with new insight regarding the informational effects of high-quality IR practices. Our findings indicate an absent effect of IRQ in voluntary settings. This extends previous research that already demonstrates a low IR effectiveness in environments of voluntary adoption (Hsiao et al., 2021; Wahl et al., 2020). By contrast, studies examining the South African mandatory setting, where all companies adopt IR (rather than companies releasing integrated reports voluntarily), demonstrate a higher IR and IRQ effectiveness (Zúñiga et al., 2020). Therefore, policy-makers could consider making IR mandatory instead of promoting its adoption on a voluntary basis. A regulatory requirement for IR would also oblige companies with previously low transparency to make relevant information available to investors and other stakeholders. Alternatively, they could provide incentives that accelerate the adoption of IR—even among low-transparency firms.

The main focus of the current study is to examine the effects of IRQ on analyst forecast accuracy. In addition, this study also presents an argument that IR in general may be hindered by different barriers from unfolding its full potential in capital markets. To change this, the VRF (formerly the IIRC) in particular, but also capital market participants, could take action.

Regarding the VRF, it could align its practices and policies more closely with the needs of the capital market community. As previous researchers have argued (Abhayawansa et al., 2019; Slack & Tsalavoutas, 2018), it would be important to better incorporate the needs of capital market participants, such as investors and analysts into the <IR> Framework. For instance, the bemoaned low comparability and measurability of IR information across time and firms could be addressed by increasing the specificity and rigor of the guidelines. Moreover, the VRF could initiate new and continue ongoing dialogs with the capital market community on how IR can best meet their information needs, and adapt the <IR> Framework accordingly. The implementation of framework modifications may imply a change of focus for the VRF (Slack & Tsalavoutas, 2018). Without such modifications, the IR potential may not fully materialize in capital markets.

Furthermore, capital market participants can also contribute to improving IR and leveraging its potential. They could become more receptive to IR and carefully examine how they can benefit from information provided by IR. Moreover, they should actively approach the VRF and voice their concerns about the current state of the <IR> Framework. This way, they may initiate improvements themselves, which further increase the IR momentum in capital markets.

The current study is among the first researches to provide empirical evidence regarding the capital market benefits of IRQ in a setting of voluntary adoption. The study's findings and the limitations discussed in the previous chapter provide avenues for future research. For example, researchers could examine the incremental capital market benefits of IRQ by controlling for pre-IR publication firm transparency. Relatedly, additional studies investigating determining factors for the adoption of IR would be interesting—such as Girella et al. (2019), but with the addition of overall transparency. Also, future research could use a different scoring model to evaluate IRQ in order to verify the current findings. Furthermore, it would be interesting to study how exactly analysts process (IR) information, which could be helpful to the VRF in improving its guidelines. Beyond the capital market, it may be interesting to examine how IR practices benefit different stakeholders, such as suppliers, competitors, or society at large (Omran et al., 2020). Finally, the effect of voluntary IR adoption may change over time as IR becomes more widely applied. A higher overall adoption rate might positively affect IRQ's benefits for the capital markets. This would justify a replication of this study—possibly already in the foreseeable future?!

ACKNOWLEDGMENTS

Open Access funding enabled and organized by Projekt DEAL.

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How to cite this article: Leukhardt, L., Charifzadeh, M., & Diefenbach, F. (2022). Does integrated reporting quality matter to capital markets? Empirical evidence from voluntary adopters. *Corporate Social Responsibility and Environmental Management*, *29*(5), 1482–1494. https://doi.org/10.1002/csr.2285