RESEARCH ARTICLE

WILEY Business Strategy and the Environment

Integrated reporting and capital markets in an international setting: The role of financial analysts

Eduardo Flores[1] | Marco Fasan[2] | Wesley Mendes-da-Silva[1]* | Joelson Oliveira Sampaio[3]

[1] São Paulo School of Management (EAESP), Department of Finance and Accounting, Getulio Vargas Foundation (FGV), São Paulo, Brazil

[2] Department of Management, Ca' Foscari University, Venice, Italy

[3] São Paulo School of Economics (EESP), Getulio Vargas Foundation (FGV), São Paulo, Brazil

Correspondence
Eduardo Flores, Building John F. Kennedy, Av. Nove de Julho, 2029 - 2° andar - Bela Vista, SP, 01313-902, Brasil.
Email: eduardoflores@usp.br

Abstract

This study investigates the interplay between integrated reporting (IR) and capital markets. In particular, building on voluntary disclosure and information processing theories, we hypothesize and empirically find that IR adoption improves analysts' ability to make accurate earnings forecasts. Whereas previous studies focus on the South African context, we rely on an international sample that also allows us to study the moderating effect of the corporate governance regime (shareholder or stakeholder oriented). The results suggest that IR improves analysts' ability to make accurate predictions to a larger extent in North America than in Europe, and we derive interesting insights on the much-debated nature of IR. This study offers valuable insights to policy makers interested in improving disclosure practices in the financial market.

KEYWORDS

financial analysts, integrated report, international setting, stakeholder engagement, sustainable development

1 | INTRODUCTION

Integrated reporting (IR)—defined as "a concise communication about how an organization's strategy, governance and prospects, in the context of its external environment, lead to the creation of value over the short, medium and long term" (The International Integrated Reporting Council [The IIRC], 2013)—is increasingly gaining momentum, and many companies worldwide are investing time and resources to create IR.[1] In addition, recent European Union legislation (Directive 2014/95/EU) requires large companies to disclose nonfinancial information following—among few others—the IR framework (The IIRC, 2013). As a consequence of this increase in the importance of IR for companies and regulators, one of the key research topics that the literature has been investigating in the last few years is the effectiveness of IR.

We focus on a specific notion of effectiveness: the usefulness of IR for one of its main intended users—investors (see Barth, Cahan, Chen, & Venter, 2017; Lai, Melloni, & Stacchezzini, 2016; The IIRC, 2013; Zhou, Simnett, & Green, 2017)—and those who advise them—financial analysts. More specifically, building on voluntary disclosure (Beyer, Cohen, Lys, & Walther, 2010) and information processing theory (Dhaliwal, Radhakrishnan, Tsang, & Yang, 2012), we study whether the ability of financial analysts to forecast future earnings improves after IR adoption.

This research question places IR at the crossroads of accounting and corporate governance. IR has the potential to allow financial analysts to make better forecasts. In turn, IR companies could benefit from analysts as an external corporate governance mechanism, thus enhancing their stock market liquidity and decreasing their cost of capital (Healy, Hutton, & Palepu, 1999). Aguilera, Desender, Bednar, and Lee (2015) recognize that corporate governance research has focused largely on internal corporate governance mechanisms, although an important part of the literature ignores the external mechanisms (the market for corporate control, external auditors, and rating organizations, for instance). We respond to their call for research by

[1]In 2017, more than 500 public companies published an IR according to the IIRC's framework (see <http://examples.integratedreporting.org/all_reporters>).

focusing on financial analysts.The key difference between our paper and previous studies is that, they address IR and its effects from the perspective of a single country (often South Africa, where listed companies have been required to adopt IR since 2010), whereas we employ an international setting, following the call for research by Rinaldi, Unerman, and de Villiers (2018), who suggest investigating IR effects in different environments. Indeed, it is well documented by previous studies that country-level cultural and institutional factors play a central role in capital markets (see Leuz, Nanda, & Wysocki, 2003) and corporate governance (see LaPorta, Lopez-de-Silanes, Shleifer, & Vishny, 1998; Roe, 2003). By including moderating country-level variables in the analysis, we can draw unique inferences on the nature of IR in the eyes of analysts and, more generally, of capital markets.

In particular, we build on the premises by Roe (2003) and Ball, Kothari, and Robin (2000), and we study whether IR has significant impact in improving analysts' forecasts in continental Europe (a stakeholder-based governance regime) or in North America (a shareholder-based governance regime). We exploit this result as an indication of the much-debated nature of IR (see Flower, 2015) as a shareholder- or stakeholder-oriented tool.

To answer our research questions, we conduct an empirical analysis on a sample, including 4,094 firm-year observations. The sample has 614 companies belonging to 19 different countries and covers the 2009–2016 period. We identify companies publishing an IR by relying on the definition and data provided by the International Integrated Reporting Council (IIRC), and then we create a control sample (matched by size and industry) of companies that did not issue any IR.

Our empirical evidence shows that IR publication is positively and statistically significantly related to analysts' ability to forecast future earnings and (consistently with Hope, 2003; Lys & Sohn, 1990) and to the number of analysts following the firm. We also find that IR improves analysts' ability to make accurate predictions to a larger extent in North America than in Europe. This evidence is in line with the idea of IR being considered by analysts as a shareholder-oriented rather than a stakeholder-oriented tool, consistent with the aim of the IIRC to create a tool useful primarily to providers of financial capital (Flower, 2015, criticizes this approach by the IIRC).

Our paper contributes to the growing stream of literature on IR and on the relevance of IR to capital markets (see, among others, Barth et al., 2017; Bernardi & Stark, 2018; Serafeim, 2015; Zhou et al., 2017). More specifically, some studies investigate the impact of IR on the ability of financial analysts to make accurate forecasts (Abhayawansa, Elijido-Ten, & Dumay, 2018; Bernardi & Stark, 2018; Zhou et al., 2017), but they reach different conclusions, and currently, it is not yet clear whether financial analysts who employ IR manage to make better forecasts.

Our analysis differs from these previous studies because it focuses on an international context rather than the South African context

(such as Bernardi & Stark, 2018; Zhou et al., 2017). This distinction is of paramount importance from both a methodological and a theoretical perspective. Methodologically, because IR is voluntary[2] in countries other than South Africa, we can compare IR adopters with IR nonadopters. In addition, our international setting allows us to test the role of some moderating country-level variables on the main relationship under analysis. This analysis provides some insight on the nature of IR for analysts.

Finally, this study contributes to the literature on capital markets and financial analysts (see, in particular, Boubakri & Bouslimi, 2016; Bowen, Chen, & Cheng, 2008; Lang, Lins, & Miller, 2004) and to the corporate governance field by focusing on an important external corporate governance mechanism (financial analysts) that previous studies have shown has positive impacts on firm performance (Lehavy, Li, & Merkley, 2011). Therefore, the choice of publishing an IR may indirectly lead to corporate governance and performance improvements in companies. This is a novel approach to the study of IR and corporate governance, as most studies focus on the corporate governance factors leading to IR publication rather than on the positive effects of IR on corporate governance (see, among others, Frias-Aceituno, Rodriguez-Ariza, & Garcia-Sanchez, 2013; García-Sánchez, Rodríguez-Ariza, & Frías-Aceituno, 2013).

The rest of this paper is organized into five sections. Section 2 provides a review of the literature and the development of the hypotheses. Section 3 details the research design, and Section 4 discusses the robustness tests conducted. In Section 5, we discuss the results, and finally, in Section 6, we present our conclusions and indicate directions for future research.

2 | BACKGROUND AND HYPOTHESES DEVELOPMENT

2.1 | IR

According to the IIRC (2013, p. 7), IR is "a concise communication about how an organization's strategy, governance, performance, and prospects, in the context of its external environment, lead to the creation of value over the short, medium and long-term." The IIRC was founded in 2010 and issued the final version of the IR framework in 2013, which provides guidance for organizations wishing to implement IR.

The backbone of IR is the IIRC's guiding principles and content elements.[3] Although the content elements aim mainly at providing additional information to investors (among others, business model, risks and opportunities, and strategy or resource allocation), the guiding principles aim at improving the way in which information is provided (among the others, materiality, connectivity, or future orientation).

---

[2]In the European Union, recent legislation (Directive 2014/95/EU) requires listed companies to provide mandatory nonfinancial disclosure. These companies can follow, among a few others, the IR framework. Nevertheless, in the other countries, IR is still voluntary, and our sample does not include post-EU legislation data, as it covers the 2009–2016 period.

[3]The IIRC framework is based on the guiding principles and on the content elements: strategic focus and future orientation, connectivity of information, stakeholder relationships, materiality, conciseness, reliability and completeness, consistency and comparability, organizational overview and external environment, governance, business model, risks and opportunities, strategy and resource allocation, performance, outlook, and basis of preparation and presentation.

Although all the guiding principles and content elements may improve analysts' ability to forecast earnings, we will focus on several IR features as examples.

According to the IR framework (The IIRC, 2013), organizations depend on several kinds of capital to create value (financial, manufactured, intellectual, human, social, and natural). Therefore, IR aims to provide information on this broad range of capital, which requires companies to disclose nonfinancial information beyond compulsory disclosure. Such information is also interestingly defined as "prefinancial" in the sense that it will translate into financial performance in the future. The framework also requires companies to disclose information on their external environment, governance, business model, risks and opportunities, and strategy and outlook. In summary, the content of an IR is broader than traditional financial reporting because it significantly increases nonfinancial information disclosure.

According to the materiality principle, an IR should be concise; therefore, it should only disclose material matters. According to The IIRC (2013), "a matter is material if it could substantively affect the organization's ability to create value in the short, medium or long-term" (The IIRC, 2013, p. 33). Because the definition of the material topics is very challenging (see de Villiers, Hsiao, & Maroun, 2017; Fasan & Mio, 2017; Stubbs, Higgins, & Love, 2014; Unerman & Zappettini, 2014), the IIRC requires companies to involve the highest governing body in the materiality determination process. Materiality is particularly relevant to analysts, as it may alleviate the information overload problem. Previous research (among the others, Li, 2008) found that longer and more textually complex reports are associated with less persistent earnings, consistent with the idea that people overloaded with information make worse decisions than they would if less information were made available to them.

Finally, the connectivity principle requires companies to show a holistic picture of the combination, interrelatedness, and dependencies between the factors that affect the organization's ability to create value over time (The IIRC, 2013). These factors (capital, performance, and company features) should not be viewed as "silos" but as integrated, and IR should disclose the interrelations between them (for instance, it should disclose how employee training influenced financial performance). The whole IR framework is based on the "integrated thinking" approach that is defined as "the active consideration by an organization of the relationships between its various operating and functional units and the capitals that the organization uses or affects. Integrated thinking leads to integrated decision-making and actions that consider the creation of value over the short, medium and long term" (see The IIRC, 2013, p. 2).

In summary, although IR requires companies to increase the broadness of information disclosed, it also provides guidance for the more concise (materiality principle) and integrated (connectivity principle) disclosure.

2.2 | Prior research on IR

Since the publication of the IR framework, many researchers from a variety of fields have investigated IR, its main features, and the

consequences for the companies implementing it (for a review, see de Villiers et al., 2017; Dumay, Bernardi, Guthrie, & Demartini, 2016; Mervelskemper & Streit, 2017). This literature can be broadly split into studies that focus on IR from the perspective of the external users (among others, Bernardi & Stark, 2018; Lai et al., 2016; Serafeim, 2015; Zhou et al., 2017) and those that do so from the perspective of the internal users—thus, from a management accounting and decision-making perspective (among others, Guthrie, Ricceri, Dumay, & Nielsen, 2017; Mio, Marco, & Pauluzzo, 2016; Steyn, 2014; Stubbs & Higgins, 2014). Interestingly, Barth et al. (2017) study IR both from an internal and an external perspective. They show that IR increases firm value, and they propose (and find empirical evidence of) two channels through which IR increases firm value: better decision making (real effect: internal) and improvement of the information environment (capital market effect: external).

We provide some background on the research focusing on the capital market (external) effects of IR, as our paper contributes mainly to this field of studies. The relevance of this topic is also supported by Serafeim (2015), who finds that long-term-oriented investors drive IR implementation.

One of the main results in the literature on the capital market effects of IR is that it increases firm value (see Barth et al., 2017; Lee & Yeo, 2016). Both studies motivate their findings with IR leading to better information environment. To the best of our knowledge, three studies focus on financial analysts, which represent one of the most important mechanisms connecting IR to a better information environment (Healy et al., 1999) and—therefore—to a lower cost of capital. These studies are particularly relevant for the purposes of the present study and therefore deserve a discussion.

Zhou et al. (2017) study the South African context and provide evidence that analysts' forecast error and dispersion decrease as a company's level of alignment with the IR framework increases. They also show that this phenomenon leads to a lower cost of capital. Bernardi and Stark (2018) also focus on South Africa and study the impact of the reporting regime changes on analyst forecast accuracy from 2008 to 2012 as a way to evaluate users' perceptions of the usefulness of IR. They find that implementing IR changes the relation between the extent of ESG disclosure and analyst forecast accuracy and that this association is greater for companies producing an IR. The evidence from both of these studies is in line with the idea that IR provides information that improves the information environment, reduces information risk, and enables more accurate and consistent forecasting by analysts. The study by Abhayawansa et al. (2018) focuses on the relevance of IR to analysts' practices and the reasons for the (ir)relevance and finds conflicting results compared with Zhou et al. (2017) and Bernardi and Stark (2018). The authors conduct 23 semistructured interviews with financial analysts who covered companies implementing an IR. They find that IR is not connected with analysts' practice of firm assessment because the reports do not provide the information required by analysts in sufficient detail or in the preferred format.

2.3 | Financial analysts and IR

Financial analysts play a central role in capital market functioning, and they are an important external corporate governance mechanism. According to Kelly and Ljungqvist (2012), they facilitate the pricing of stocks and serve as information intermediaries among firms and outsiders. One of the most relevant impacts of analyst activity is the reduction of the agency problems between managers and shareholders and of information asymmetry for investors (Boubakri & Bouslimi, 2016; Bowen et al., 2008; Lang et al., 2004). A key variable influencing analyst forecast accuracy is disclosure quality. Several authors (Hope, 2003; Plumlee, 2003) find that better disclosure quality improves forecast accuracy because it enhances analysts' understanding of the companies' performance and outlook. Better disclosure also helps to lower the cost of processing and interpreting information, again leading to improved earnings forecasts (Lehavy et al., 2011).

Previous studies find that voluntary disclosure enhances analysts' understanding of companies' prospects (see Beyer et al., 2010). According to Dhaliwal et al. (2012) and Nichols and Wieland (2009), analysts use nonfinancial information to reduce acquisition and processing costs and therefore reduce forecasts errors. The IR framework requires companies to broaden the scope of reporting, including information on companies' capital, governance, business model, and strategy.[4] It is therefore likely that analysts will find value-relevant information in IRs. For instance, a broader disclosure of the business model or the corporate governance is fundamental for analysts to understand the value creation process.

Due to the cognitive limitations of analysts in information processing (see Bradshaw, Miller, & Serafeim, 2009), the way in which information is presented also matters to analysts. Consistent with this idea, several studies (Hodge, 2001; Hodge, Hopkins, & Pratt, 2006; Kelton, Pennington, & Tuttle, 2010; Koonce & Mercer, 2005) find that informationally equivalent disclosures that vary only in their ease of processing can have differential effects on market prices. Two of the most important IR principles (connectivity and materiality, discussed above) are precisely aimed at presenting information in a concise and holistic way (Gerwanski, Kordsachia, & Velte, 2019). One of the aims of the connectivity principle is to allow the understanding of the impact of different capital on the financial performance of the company. IR aims to achieve this by linking (for instance) human capital information to financial capital, thereby identifying cause–effect relationships. Materiality requires companies to disclose only what really matters, thus limiting the risk of information overload by investors. Previous literature has shown that information overload is a central risk in capital markets (see Agnew & Szykman, 2005). Therefore, we argue that the guiding principles of IR (among others, materiality and connectivity) may improve the ease of information processing, again leading to better analyst forecasts.

---

[4]The content elements include organizational overview and external environment, governance, business model, risks and opportunities, strategy and resource allocation, performance, and outlook.

Although there are arguments supporting the existence of a positive relation between IR and analysts' forecast accuracy, one might also argue that no relation exists. IR is a new voluntary disclosure tool that is different from other preexisting frameworks, and therefore, previous empirical results may not apply to IR. In addition, IR supplements previous voluntary disclosure tools (such as sustainability reporting), and therefore, analysts may already have nonfinancial information disclosed in IR. Finally, the previous studies dealing with IR and financial analysts reviewed above (Abhayawansa et al., 2018; Bernardi & Stark, 2018; Zhou et al., 2017) do not reach consistent results.

We build on voluntary disclosure and information processing theories and propose our first hypothesis:

> H1a. IR is positively related to the accuracy of analyst forecasts.

The number of analysts following a company is tightly connected with analysts' ability to make reliable forecasts. Prior empirical evidence is consistent with analyst coverage being associated with less dispersion in analysts' forecast and disclosure quality (see Hope, 2003; Lys & Sohn, 1990). According to Lang and Lundholm (1996), analysts prefer to follow firms with more forthcoming disclosures as opposed to public disclosures in annual and quarterly reports to shareholders. Furthermore, Botosan and Harris (2000) find evidence consistent with this argument, as analyst following increases with firms' decisions to include information on segment activity as part of their quarterly (as opposed to only annual) reports.

Following this line of research, we hypothesize that, due to higher disclosure quality, the number of analysts following a company increases after the publication of an IR. Therefore,

> H1b. IR is positively related to analyst coverage.

2.4 | Financial analysts and IR in an international context

Pope (2003) suggests that the efficiency of analyst behavior is a function of the quality of information disclosed, the wider information environment (including accounting rules), and the available skills and incentives. In a similar vein, Roe (2003) argues that the quality of performance disclosure and the effectiveness of its use by stock market participants are influenced by a country's governance regime.

Although there are many ways to classify governance regimes, and two are well-documented (and relevant for the purposes of the present analysis): the stakeholder-based governance regime of continental Europe and the shareholder-based regime of North America (Ball et al., 2000). On the one hand, the stakeholder-based governance regime that is typical of continental European countries is characterized by a legal and regulatory framework that protects stakeholders rather than shareholders. On the other hand, the North American shareholder-based governance regime is characterized by a legal and regulatory framework that emphasizes the firm's obligations to its shareholders (Roe, 2003). The recent European directive on mandatory nonfinancial disclosure seems to confirm and reinforce this categorization, as such

a regulation is not implemented in the United States nor is currently under consideration.

On the basis of these premises and on previous studies, we expect the governance regime to moderate the relation between IR and analyst forecast accuracy.

More specifically, we expect this influence of the governance regime to depend on the way in which analysts interpret the nature of IR. On the one hand, analysts may view IR as a tool primarily addressed to better forecast the future financial performance of the company. This view is consistent with that proposed by the IIRC, according to which IR is primarily an instrument for the "providers of financial capital" (The IIRC, 2013; Mio, 2016). On the other hand, analysts may view IR as addressed primarily at disclosing information to stakeholders, similarly to sustainability reporting (Flower, 2015).By building on the framework by Roe (2003), who argues that the governance regime determines the use of performance disclosure by the stock market, we hypothesize that if IR is viewed by analysts as a tool to better forecast shareholder performance and is therefore more oriented toward shareholders, then it should have a more relevant impact in the North American context because the shareholder-oriented view of IR would be more consistent with the North American governance system. Conversely, if analysts view IR as a tool to disclose information primarily to stakeholders, we would expect it to have a higher impact in continental Europe, which is characterized by greater attention to stakeholders.

By following the investor-oriented view of IR proposed by the IIRC, we propose the following hypothesis:

> H2. IR has a lower impact on both analyst coverage and the accuracy of analyst forecasts in the European context and a greater impact in the North American context.

3 | RESEARCH DESIGN

3.1 | Data and variables

We build a hand-collected database including firms that issued an IR (thus voluntarily deciding to apply the IIRC framework) from 2013 or 2014 onwards. These companies are the treated sample.

To identify these companies, we employ the information provided by the official IIRC website, which lists companies issuing an IR that is compliant with the IR framework released by the IIRC and that have been recognized as leading practice by a reputable award process.[5] Often companies voluntarily issue some reports that are improperly called "integrated" but that do not really follow the IIRC framework. These reports may contain some nonfinancial information but without actually following the IR principles (for instance, connectivity and materiality, discussed above) that differentiate IR from other forms of voluntary reports. We exclude from our sample nonprofit

organizations because they are not listed and are not followed by financial analysts.

Following Armstrong, Jagolinzer, and Larcker (2010), we match treated to untreated firms using a propensity score matching (PSM) technique based on industry (two-digit sic-code), size (logarithm of total assets), and the year of the first IR issuance per company (2013 or 2014) with a caliper of 0.001 for the neighbor approach. We match every treated firm to a single nontreated firm, following Almeida, Campello, Laranjeira, and Weisbenner (2011); Hong, Paik, and Smith (2018); Franzen and Weißenberger (2018); and Fleischer, Goettsche, and Schauer (2017). This first procedure results in a total amount of 4,094 firm-observations over the 8 years (2009 to 2016). Our data sample can be defined as an unbalanced panel.

We also follow the recommendation of Roberts and Whited (2013) and use replacement in our matching procedure. After this second matching procedure, we are left with 324 firms, 162 treated firms, and 162 control firms, obtaining a total of 1,248 firm-year observations for the treated group and 1,248 firm-year observations for the control group.

3.2 | Identification strategy

Several studies in accounting and finance have employed difference-in-differences estimation (e.g., Cameron, Gelbach, & Miller, 2011; Petersen, 2009; Thompson, 2011). We intend to evaluate the potential impact created by one specific event on the dependent variable by considering a group exposed to the event (usually called the "treatment group") compared with another set of individuals who were not exposed to the event (named the "control group"); additionally, we consider at least two different periods: one before and the other after the event.

Angrist and Pischke (2009) mention that these two dimensions are labeled in the difference-in-differences setup as "state" and "time" because they are the archetypical examples in applied econometrics. Following this method, we structured a test in which the main variable of interest is the interaction between the effect of the IR adoption by the treated group (states—"Treated" variable) and the period after IR adoption (time—"Post" variable).

To test H1a, we employ the following equation[6]:

$$\text{Acc}_{ij} = \varphi + \beta_1 \text{Treated}_{ij} + \beta_2 \text{Post}_{ij} + \beta_3 \text{Treated}_{ij} * \text{Post}_{ij} + e, \quad (1)$$

In (1), Acc represents the accuracy of the analyst forecast for firm i in period j proxied according to Lang and Lundholm (1996) and employed by Hope (2003); thus,

$$\text{Acc} = \frac{-|\text{Actual EPS} - \text{Forecasted EPS}|}{\text{Beginning of fiscal year stock price}}. \quad (2)$$

The second variable Treated$_{it}$ represents a dummy with a value of one for companies that issued an IR (treated group) and zero otherwise (control group). Post$_{it}$ is a second binary term with a value of one for the period after the IR issuance (2013 or 2014) and zero

for previous years. The most relevant variable in the Equation 1 is $\text{Treated}_{it} * \text{Post}_{it}$, which represents the interaction isolating the specific effect of the IR release.

Furthermore, we employ fixed, time, and other specific controls, aiming to reduce the impact of spurious events that potentially affect the relationship under analysis (consistent with Bernardi & Stark, 2018; Glaum, Baetge, Grothe, & Oberdörster, 2013; Pope & McLeay, 2011).

Equation 3 is the full version of the regression model including control variables proposed by the previous literature (e.g., Bernardi & Stark, 2018; Serafeim, 2015) to reduce the effect of bias in the estimators.

$$\text{Acc}_{ij} = \varphi + \beta_1 \text{Treated}_{ij} + \beta_2 \text{Post}_{ij} + \beta_3 \text{Treated}_{ij} * \text{Post}_{ij}$$
$$+ \sum_{k=1}^{w} C_{kit} + \sum_{i=1}^{n} F_i + \sum_{j=1}^{s} T_j + e_{ij}. \quad (3)$$

C_{kit} denotes the control variable k for firm i over period t. The variables Global Reporting Initiative guidelines and management and discussion analysis were added to Equation 3 to control for other sources of voluntary information that can impact the analysts' evaluation (Serafeim, 2015).

The other k controls were the log of total assets; the book-to-market ratio, representing the markets' expectations regarding the firms' performance; the return on assets (ROA) as a proxy for firms' profitability, segregating negative values denoted by the LOSS variable; and financial leverage (LEV). These control variables have been used by previous studies in the field of IR (e.g., Ioannou & Serafeim, 2014; Qiu, Shaukat, & Tharyan, 2016; Serafeim, 2015), analyst accuracy (e.g., Boubakri & Bouslimi, 2016; Bowen et al., 2008; Lang et al., 2004), or both (e.g., Bernardi & Stark, 2018; Zhou et al., 2017).

The term F_i denotes firm fixed effects (industry and country). Lastly, T_j is the timelines added in Equation 3 from 2009 to 2016, to control for potential yearly effects such as the increase in the analysts' knowledge about one company or sector, potentially improving the accuracy.

To test Hypothesis H1b, we adopt Equation 3 with the number of analysts (NoA) as the dependent variable and Acc_{ij} as the independent variable, interacted with the dummies Adopters_{it} and Post_{it} as the main explanatory term.

$$\text{NoA}_{ij} = \varphi + \beta_1 \text{Acc}_{ij} + \beta_2 \text{Treated}_{ij} + \beta_3 \text{Post}_{ij}$$
$$+ \beta_4 \text{Acc}_{ij} * \text{Treated}_{ij} + \beta_5 \text{Acc}_{ij} * \text{Post}_{ij} + \beta_6 \text{Treated}_{ij} * \text{Post}_{ij}$$
$$\times + \beta_7 \text{Acc}_{ij} * \text{Treated}_{ij} * \text{Post}_{ij} + \sum_{k=1}^{w} C_{kit} + \sum_{i=1}^{n} F_i + \sum_{j=1}^{s} T_j + e_{ij}. \quad (4)$$

Model 4 can be considered as an extension of Model 3. It specifically aims at testing the relation between IR issuance and analysts' coverage and at showing how analysts' coverage can affect the accuracy in terms of EPS predictions.

To test Hypothesis H2, we segregate our sample into two subsets: Europe and North America. Due to our sample specificities, North America includes only U.S. observations. From these subsets, we employ Equation 3 to evaluate the particular effect of the IR release on analysts' accuracy in a context more oriented to shareholders

(North America) as well as in a context closer to the stakeholders' concerns (Europe), as proposed by Roe (2003).

3.3 | Robustness tests

To mitigate concerns about endogeneity and omitted variable bias, we conduct two placebo tests to reduce the effect of trends in the treated group. According to Athey and Imbens (2017), placebo tests can also be called falsification tests because they lag the timing variable (in general, the second difference from the diff-in-diff models), aiming to verify whether the results can be obtained in periods prior to the actual event date. In this paper, the event date is the first year of the IR publication, represented by the variable Post. We designed two placebo tests lagging the variable Post by 1 and 2 years. We obtained the two variables Post_Placebo_1 and Post_Placebo_2 (definitions provided in Appendix A).

Furthermore, we also implement a robustness test based on an alternative PSM in order to rule out concerns about matching misspecifications. Following Roberts and Whited (2013), we use the replacement of firms to compose the control group. After this second PSM, we are left with 324 firms, 162 treated firms, and 162 control firms, obtaining a total of 1,248 firm-year observations for the treated group and 1,248 firm-year observations for the control group.

Our third robustness test approach considers solely nonfinancial firms in Equations 3 and 4, as financial services companies are subject to specific regulations, which may bias our findings.

Last, we identified companies belonging in CSR-sensitive and non-CSR-sensitive industries. According to the prior literature (e.g., Cai, Jo, & Pan, 2012; Garcia, Mendes-Da-Silva, & Orsato, 2017; Lee & Faff, 2009; Richardson & Welker, 2001), sensitive industries are featured by social taboos, moral debates, and political pressure due to their activities and the potential externalities from these operations. Firms operating in sensitive industries might have more incentives to compile an IR to polish their image, and analysts might react differently. Therefore, following Richardson and Welker (2001), Lee and Faff (2009), and Garcia et al. (2017), we created a dummy variable CSR sensitive, which is equal to 1 if the company belongs to industries with high socio-environmental impact (such as energy, oil and gas, chemicals, paper and pulp, mining, and steel making).

4 | RESULTS

4.1 | Descriptive statistics

Table 1 lists the 614 firms and the 19 countries included in our analysis. Table 2 displays the descriptive statistics for the treated (Panel A) and control groups (Panel B). There are 1,248 observations in the treated group and 2,846 observations in the control group. The value for forecast accuracy is 0.235 (SD = 3.430) for companies publishing an IR and 0.599 (SD = 3.179) for the other companies. The definition of each variable is included in Appendix A.

TABLE 1 Sample composition

Country	Treated	%	Country	Control	%	Total	%
Japan	79	48.77%	Japan	153	33.85%	232	37.79%
Spain	14	8.64%	Spain	11	2.43%	25	4.07%
UK	12	7.41%	UK	15	3.32%	27	4.40%
Netherlands	10	6.17%	Netherlands	17	3.76%	27	4.40%
Brazil	8	4.94%	Brazil	17	3.76%	25	4.07%
Italy	7	4.32%	Italy	10	2.21%	17	2.77%
Sri Lanka	7	4.32%	Sri Lanka	5	1.11%	12	1.95%
Hong Kong	5	3.09%	Hong Kong	62	13.72%	67	10.91%
USA	5	3.09%	USA	127	28.10%	132	21.50%
France	3	1.85%	France	4	0.88%	7	1.14%
Germany	2	1.23%	Germany	3	0.66%	5	0.81%
Singapore	2	1.23%	Singapore	7	1.55%	9	1.47%
Switzerland	2	1.23%	Switzerland	3	0.66%	5	0.81%
Argentina	1	0.62%	Argentina	2	0.44%	3	0.49%
Denmark	1	0.62%	Denmark	2	0.44%	3	0.49%
Poland	1	0.62%	Poland	1	0.22%	2	0.33%
Russia	1	0.62%	Russia	4	0.88%	5	0.81%
South Korea	1	0.62%	South Korea	5	1.11%	6	0.98%
Sweden	1	0.62%	Sweden	4	0.88%	5	0.81%
Total	162	100%	Total	452	100%	614	100%

Table 3 presents the pairwise correlation between the main variables of interest. The accuracy of the analyst forecast is unconditionally positively and significantly related to ESG, LOSS, and LEV, whereas it is negatively and significantly related to MDA, NoA, LTA, BM, and ROA.

4.2 | Univariate analysis

Table 4 compares the mean values of financial analyst accuracy and the number of analysts between treated and control firms before IR adoption (Panel A) and, among treated firms, between pre- and post-IR adoption (Panel B). The mean of ACC before IR adoption for control companies (0.2158) and treated firms (0.1656) is not significantly different, which suggests that before our "treatment" (IR adoption), the financial analysts could predict with a similar level of accuracy the earnings of treated and control firms. Instead, the number of analysts is significantly higher (at the 1% level) for treated companies (14.303) than for control companies (9.981), which may be because treated companies most likely put a higher level of effort into disclosure even before IR adoption, thus increasing the number of analysts following. Nevertheless, analysts were not able to make better predictions ex ante, that is, before IR publication.

Panel B displays the means of analysts' accuracy for companies publishing an IR during the 2009–2016 period (treated firms) before and after the treatment, that is, before and after the actual publication of the IR. Analysts of companies publishing an IR experienced a significant improvement in their forecast accuracy after IR publication. The mean of the forecast accuracy increased from 0.1656 to 0.3945 (significant at the 5% level). In addition, the number of analysts following increased from 14.30 to 15.45 and the increase is statistically significant (significant at the 10% level).

Both of these results provide preliminary evidence supporting our first two hypotheses. However, given that the above comparison is univariate, we will turn to the multivariate regressions.

4.3 | Multivariate regressions

Table 5 displays the results for our main Hypothesis H1a, which investigates the relationship between IR adoption and the accuracy of analyst forecasts. All columns include year and country fixed effects to control for the heterogeneity in country-level analyst forecast accuracy in different years. Model 1 includes the main variables of interest: Treated, Post, and the interaction between the two. The results, which are robust to the inclusion of a battery of control variables (in Models 2 and 3), suggest that there is no significant difference in the accuracy of analyst forecasts between treated and control companies (the coefficient of the variable Treated is insignificant). This finding confirms the results of the univariate analysis (Table 4, Panel A) and mitigates the concern that our results are driven by omitted unobservable variables because if we consider the whole sample period independently from IR adoption, there is no significant difference between treated and control companies. The variable Post is

TABLE 2 Descriptive statistics

Panel A—Treated group. The number of observations (N) refers to firm-year observations			
Variable	Mean	SD	N
Acc	0.235	3.430	1,248
Investors Protection	62.494	6.577	1,248
ESG	51.635	32.219	1,248
GRI	0.619	0.486	1,248
MDA	0.133	0.340	1,248
NoA	14.901	10.105	1,248
LTA	4.878	5.310	1,248
BM	0.943	1.804	1,248
ROA	1.843	4.489	1,248
LOSS	−0.046	0.209	1,248
LEV	40.762	25.080	1,248
Panel B—Untreated group			
Acc	0.599	3.179	2,846
Investors Protection	64.703	6.309	2,846
ESG	23.150	28.500	2,846
GRI	0.191	0.393	2,846
MDA	0.052	0.222	2,846
NoA	9.779	8.456	2,846
LTA	7.776	4.421	2,846
BM	1.761	11.307	2,846
ROA	3.244	7.933	2,846
LOSS	0.086	0.281	2,846
LEV	38.541	30.590	2,846

significant and negative at the 1% level, as it is most likely picking up some time trend. Most (not all) of the firms adopted IR in 2013, the year in which the IIRC Framework was released; therefore, there may be some time effect in our results.

TABLE 4 Univariate analysis

		N	Acc	NoA
Panel A—Treated pre versus control pre				
TREATED PRE IR	(1)	646	0.1656	14.3039
CONTROL PRE IR	(2)	1,310	0.2158	9.981.
Difference	(1)–(2)		−0.0502	4.322
Two sided p value			0.357	0.0015
Panel B—Treated pre versus treated post				
TREATED PRE IR	(1)	646	0.1656	14.3039
TREATED POST IR	(2)	602	0.3945	15.4566
Difference	(1)–(2)		−0.2289	−1.152
Two sided p value			0.0041	0.0440

The variable of interest (Treated * Post) is positive and significant (at the 5% level in Model 3), meaning that after the year of the adoption of IR, the accuracy of forecasts improved significantly for companies that actually published an IR. This result indicates that, after the adoption of IR, the treated group presented an increase in analysts' accuracy, even when considering the number of analysts (NoA) that follow the performance of firms.

ESG measures the quality of nonfinancial information and is positively related to analyst forecast accuracy. This finding is consistent with previous studies regarding the usefulness of nonfinancial information for analysts (Dhaliwal et al., 2012; Nichols & Wieland, 2009), which also means that IR increases the ability of financial analysts to make forecasts above and beyond the mere presence of nonfinancial information. As discussed above, IR concerns not only the disclosure of more nonfinancial information but also the format of this disclosure.

Other control variables that are significantly related to ACC are LTA, BM, ROA, LOSS, and LEV. The sign and the significance of all these variables are consistent with previous studies (e.g., Bernardi & Stark, 2018).

Overall, the results displayed in Table 5 support our first Hypothesis H1a.

TABLE 3 Correlation matrix (N = 4,094)—Pearson (Spearman) correlations are presented below in the diagonal lines

	1	2	3	4	5	6	7	8	9	10	11
1—Acc	—	0.0208	0.0876*	0.0040	0.1235*	0.2701*	−0.0444*	−0.6949*	−0.2528*	0.1331*	0.0360*
2—Treated * Post	0.0125	—	0.2127*	0.2524*	0.0951*	0.1942*	−0.1097*	−0.0800*	−0.1510*	−0.0306*	0.0085
3—ESG	0.0871*	0.2171*	—	0.7735*	0.3019*	0.5719*	0.1454*	−0.0182	0.0364*	−0.0660*	0.1600*
4—GRI	0.0007	0.2527*	0.7826*	—	0.2644*	0.4645*	0.1161*	−0.0863*	0.0036	−0.0314*	0.1945*
5—MDA	−0.1261*	0.0943*	0.3038*	0.2633*	—	0.1998*	0.0242	0.0748*	0.0266*	−0.0562*	0.0666*
6—NoA	−0.2298*	0.1917*	0.5684*	0.4638*	0.2130*	—	0.3478*	0.2586*	0.2152*	0.0103	0.2548*
7—LTA	−0.0765*	−0.1693*	0.0448*	0.0347*	−0.0051	0.3093*	—	0.1642*	0.5164*	0.0907*	0.3255*
8—BM	−0.1293*	−0.0189	0.0005	−0.0145	0.0126	0.0520*	0.0577*	—	0.3845*	−0.0129	0.0920*
9—ROA	−0.1758*	−0.0753*	0.0526*	0.0137	0.0359*	0.1360*	0.2814*	0.0163	—	−0.4590*	0.0162
10—LOSS	0.1438*	−0.0247	−0.0593*	−0.0263*	−0.0568*	0.0130	0.1755*	0.0097	−0.3969*	—	0.1345*
11—LEV	0.0564*	0.0117	0.1434*	0.1705*	0.0520*	0.2016*	0.2873*	0.0395*	−0.0534*	0.1167*	—

*Significant at the 5% level.

TABLE 5 IR and analyst forecast accuracy (H1a)

Variable	(1) Acc	(2) Acc	(3) Acc
Treated	−0.088 (0.131)	−0.141 (0.154)	−0.019 (0.140)
Post	−0.219*** (0.090)	−0.328*** (0.060)	−0.287*** (0.062)
Treated * Post	0.094* (0.108)	0.97* (0.108)	0.217** (0.108)
NoA	0.173*** (0.081)	0.214*** (0.078)	0.196*** (0.084)
ESG		0.004** (0.002)	0.004*** (0.002)
GRI		−0.133 (0.115)	−0.158 (0.176)
MDA		−0.012 (0.135)	−0.335 (0.134)
LTA			−0.028* (0.015)
BM			−0.008*** (0.003)
ROA			−0.018*** (0.005)
LOSS			1.016*** (0.125)
LEV			0.008** (0.001)
Observations	4,094	4,094	4,085
R^2	.4151	.4364	.4583
Constant	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes

Note. All the regressions were estimated by OLS from a panel data perspective using the complete sample presented in Table 1. Standard errors are in parentheses.

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

The specifications in Table 6 are the same as those used in Table 5. The only difference is that Table 5 tests H1a, whereas Table 6 tests the relationship between IR and the number of analysts following (H1b). The results were ambiguous for this hypothesis. On one hand, the variable Treated revealed a positive and high significant coefficient (e.g., 6.821 significant at the 1% level for Model 3), which implies that the IR adopters have a large number of analysts compared with the nonadopters. The variable Post showed an increase in the number of analysts for both groups (e.g., 1.6373 significant at the level of 1% for Model 3). On the other hand, the interaction between Treated and Post revealed a negative coefficient with a low level of significance (e.g., −0.777; $p < .1$).

However, the triple interaction Acc * Treated * Post is positive and significant (the coefficient is 0.348 and is significant at the 5% level), which means that companies publishing an IR with increased forecast accuracy have a higher number of analysts following. This reinforces our main results displayed in Table 5, as according to previous studies, better disclosure leads to a higher number of analysts following (see Botosan & Harris, 2000; Lang & Lundholm, 1996). ESG and Global Reporting Initiative variables are positive and significant as well.

Table 7 displays the results for Hypothesis H2, which tests whether the relationship between IR and analyst forecast accuracy is stronger in Europe (a stakeholder-oriented governance system) or North America (a shareholder-oriented governance system). The relationship between IR and ACC holds in both the European (the coefficient of the interaction Post * Treatment is 0.009, significant at 5%

level) and the North American context ($\hat{\beta} = 0.961 < 0.1$). Nevertheless, the analysis of the economic significance of the coefficients indicates that the effect is much stronger in North America (0.961) than in Europe (0.009). Therefore, we can conclude that IR increases the ability of analysts to make accurate forecasts to a higher extent in North America than in Europe. LTA and LOSS have similar effects in both Europe and North America, whereas ROA and LEV influence the accuracy of analyst forecasts only in Europe.

4.4 | Robustness test

To further strengthen our results, we conduct a robustness placebo test by simulating an early IR adoption of 1 year by treated firms. Table 8 displays the results for all the observations. The total number of observations is 4,085, and the R^2 is .418. The interaction between Treated and Post_Placebo_1 is insignificant, which corroborates the idea that the actual adoption of IR is driving the association between the accuracy of financial analyst forecasts and IR. Indeed, companies that implemented their IR during the sample period do not have any significant impact on analyst forecasts in the year before the actual adoption. Untabulated results confirm the same result if we employ an early adoption of 2 years.

We run the same analysis for Hypothesis H1b on the number of analysts, and we find similar results. Table 9 demonstrates that the triple interaction Acc * Treated * Post_Placebo_1 is insignificant. We obtain similar results for the triple interaction with a placebo of 2 years.

TABLE 6 IR and analyst coverage (H1b)

Variable	(1) NoA	(2) NoA	(3) NoA
Acc	0.208*** (0.070)	0.202*** (0.073)	0.200*** (0.072)
Treated	7.383*** (0.819)	5.993*** (0.673)	6.821*** (0.674)
Post	1.872*** (0.260)	1.738*** (0.271)	1.673*** (0.270)
Acc * Treated	0.056 (0.082)	−0.017 (0.086)	−0.019 (0.085)
Acc * Post	0.279** (0.114)	0.270** (0.118)	0.260** (0.118)
Treated * Post	−0.901** (0.448)	−0.719 (0.467)	−0.777* (0.465)
Acc * Treated * Post	0.349** (0.136)	0.334** (0.141)	0.348** (0.141)
ESG		0.033*** (0.005)	0.032*** (0.005)
GRI		1.021*** (0.316)	1.086*** (0.314)
MDA		−0.660* (0.379)	−0.614 (0.377)
LTA			0.496*** (0.068)
BM			0.000 (0.007)
ROA			0.018 (0.014)
LOSS			−0.430 (0.318)
LEV			0.003 (0.004)
Observations	4,094	4,094	4,085
R^2	.283	.331	.417
Constant	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes

Note. All the regressions were estimated by OLS from a panel data perspective using the complete sample presented in Table 1. Standard errors are in parentheses.

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

Firms operating in sensitive industries might have more incentives to compile an IR to polish their image. Thus, analysts might react differently to firms that compile an IR depending on whether they belong to a sensitive industry or not. Table 10 indicates the results from the sample segregation between CSR-sensitive and nonsensitive industries. We did not find any statistical significance in the distinction between the two groups, which allows us to conclude that there is no apparent effect on analyst accuracy. Nontabulated tests did not show any difference in the number of analysts following sensitive and nonsensitive firms.

As further robustness tests, we ran our analysis on financial and nonfinancial firms and employed an alternative PSM (following Roberts & Whited, 2013). Nontabulated results show that our results hold in both tests.

5 | DISCUSSION

The aim of this article is to study whether the publication of an IR improves analysts' ability to forecast a firm's future earnings. The research question is timely (recent European Union legislation required large companies to disclose nonfinancial information following—among few others—the IR framework beginning in 2017) and contributes to the growing stream of literature on IR's relevance to capital markets. Among the studies focusing on the effectiveness of IR, Barth et al. (2017) find a positive relationship between IR quality and firm value and show the existence of two channels through which IR increases firm value: better decision making (real effect) and the improvement of the information environment (capital market effect).

One of the key mechanisms that may be playing a role in the capital market effect channel is financial analysts, who may benefit from this improved disclosure and therefore reduce information asymmetries and the cost of capital (see Healy et al., 1999). Previous empirical evidence on IR and financial analysts is mixed, with some studies finding an improvement in analyst forecasts after IR publication (Bernardi & Stark, 2018; Zhou et al., 2017) and other studies supporting the idea that IR is irrelevant to analysts (Abhayawansa et al., 2018).

The results of our analysis support the evidence found by Bernardi and Stark (2018) and Zhou et al. (2017) and suggest that these results may also be extended beyond South Africa to other contexts where IR is still voluntary. Our results confirm Hypothesis H1a, which, building on voluntary disclosure (Beyer et al., 2010) and information processing theory (Dhaliwal et al., 2012), predicts that IR improves financial analysts' accuracy. Both univariate (Table 4) and multivariate (Table 5) regressions show a positive and significant relationship between IR adoption and the accuracy of financial analysts.

TABLE 7 IR and the analyst forecast accuracy by region (H2)

Variable	Europe Acc	Northern America Acc
Treated	0.019* (0.132)	−1.548** (0.710)
Post	0.051 (0.081)	−0.472*** (0.117)
Treated * Post	0.009** (0.112)	0.961* (0.547)
NoA	0.036*** (0.003)	0.027*** (0.004)
ESG	0.002 (0.002)	−0.004** (0.002)
GRI	−0.131 (0.134)	0.062 (0.217)
MDA	0.052 (0.119)	−0.117 (0.305)
LTA	−0.067** (0.030)	−0.146* (0.080)
BM	0.004 (0.010)	−0.004 (0.003)
ROA	−0.017*** (0.010)	−0.009 (0.006)
LOSS	0.579*** (0.124)	1.116*** (0.195)
LEV	0.008*** (0.003)	0.002 (0.007)
Constant	Yes	Yes
Country FE	Yes	Yes
Industry FE	Yes	Yes
Observations	819	1,119
R^2	.4195	.3578

Note. All the regressions were estimated by OLS from a panel data perspective using the complete sample presented in Table 1. Standard errors are in parentheses.

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

TABLE 8 H1a: Robustness placebo rest—Simulating early IR adoption by the treated group in 1 year

Variable	All Countries Acc
Treated	−1.219** (0.575)
Post_Placebo_1	−0.302 (0.317)
Treated * Post_Placebo_1	0.556 (0.401)
Controls	Yes
Constant	Yes
Country FE	Yes
Industry FE	Yes
Observations	4,085
R^2	.418

Note. All the regressions were estimated by OLS from a panel data perspective using the complete sample presented in Table 1. Standard errors are in parentheses.

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

Our empirical setting provides data both on whether the company adopts IR in the sample period (captured by the variable "Treated") and on the year in which the company adopts the IR (measured through the variable "Post"). This approach allows our results to be stronger because we can compare both treated and control companies and

TABLE 9 H1b: Robustness placebo test, IR, and the NoA—Simulating early adoptions in 1 and 2 years

Variable	Placebo 1 year NoA	Placebo 2 years NoA
Acc	0.034*** (0.008)	0.037*** (0.010)
Treated	−0.255 (0.195)	−0.349* (0.209)
Post_Placebo_1	−0.005 (0.098)	
Post_Placebo_2		−0.455*** (0.108)
Acc * Treated	0.007 (0.011)	0.027** (0.013)
Acc * Post_Placebo_1	−0.017** (0.008)	
Acc * Post_Placebo_2		0.005 (0.009)
Treated * Post_Placebo_1	0.159 (0.196)	
Treated * Post_Placebo_2		0.109 (0.210)
Acc * Treated * Post_Placebo_1	0.016 (0.012)	
Acc * Treated * Post_Placebo_2		−0.002 (0.014)
Controls	Yes	Yes
Constant	Yes	Yes
Country FE	Yes	Yes
Industry FE	Yes	Yes
Observations	4,085	4,085
R^2	.377	.317

Note. All the regressions were estimated by OLS from a panel data perspective using the complete sample presented in Table 1. Standard errors are in parentheses.

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

treated companies before and after the treatment. In particular, we show that before IR adoption, there were no differences in analysts' forecast accuracy between treated and control companies. Our robustness tests further support our main evidence. Table 8 shows that if we simulate an earlier IR adoption of 1 year, our main variable of interest (the interaction between Treated and Post) is not significant.

We also verify (Table 6) the association between IR and the number of analysts following (H1b). This result reinforces the result regarding the association between IR and accuracy, as previous studies reveal that the number of analysts following a company is tightly connected to their ability to make reliable forecasts (Hope, 2003; Lang & Lundholm, 1996; Lys & Sohn, 1990). In addition, this evidence reinforces the idea that IR, by attracting analysts, improves firms' corporate governance.

When we move to the international context, we build on the work by Roe (2003) and Ball et al. (2000) and test whether IR has a stronger impact on forecast accuracy in the European or in the North American context. Our results (Table 7) illustrate that although the relationship is significant in both contexts, it is stronger in North America. This result provides useful insights on the nature of IR. Some authors (Flower, 2015) criticized the IIRC when it stated that the primary users of IR are the providers of financial capital (The IIRC, 2013). Although we refrain from any judgment on the nature

TABLE 10 Hypotheses H1a and H2 for CSR-sensitive industries

	H1a	H2	
Variable	Overall sample Acc	Europe Acc	North America Acc
CSR sensitive	0.014 (0.232)	−0.037 (0.165)	0.045 (0.159)
Treated	−0.021 (0.126)	0.027* (0.214)	−0.867* (0.613)
Post	−0.142** (0.062)	0.069 (0.091)	−0.472*** (0.117)
CSR Sensitive * Treated	0.009 (0.339)	0.019 (0.101)	0.051 (0.299)
CSR Sensitive * Post	0.012 (0.184)	−0.009 (0.042)	0.026 (0.094)
Treated * Post	0.194** (0.135)	0.014* (0.163)	0.891* (0.431)
CSR Sensitive * Treated * Post	0.023 (0.094)	0.009 (0.143)	0.017 (0.216)
Controls	Yes	Yes	Yes
Constant	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Observations	4,085	4,085	4,085
R^2	.3961	.4163	.3724

Note. All the regressions were estimated by OLS from a panel data perspective using the complete sample presented in Table 1. Standard errors are in parentheses.

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

that IR is supposed to have (shareholder or stakeholder oriented), our empirical evidence reveals that IR has a higher impact in North America, which is traditionally a shareholder-centric governance regime (see Roe, 2003). Therefore, it seems that IR is viewed by analysts as an investor-oriented tool. We believe this result can contribute to the debate on the nature of IR.

We implement a number of robustness tests. In addition to the placebo tests discussed above, we conduct our analysis on a subsample of CSR-sensitive and nonsensitive industries, we employ alternative PSM specifications and run our analysis on financial and nonfinancial firms. Our main results were robust to all these tests.

Our results contribute to the growing stream of literature on the relevance of IR to capital markets. In particular, they suggest that IR has a role in shaping the external corporate governance of firms, reinforcing the presence of financial analysts as an external corporate governance mechanism. Barth et al. (2017) find a positive relationship between IR quality and firm value: financial analyst coverage and accuracy is a mechanism explaining this broader relation.

Previous studies on IR often examine corporate governance characteristics that influence the probability of companies adopting IR (see Frias-Aceituno et al., 2013; García-Sánchez et al., 2013). We suggest the opposite causality, suggesting that IR, a new and growing corporate reporting tool, can affect corporate governance. Policy makers and standard setters may find our results useful in order to evaluate the effectiveness of IR. In particular, the European policy maker may be interested in understanding whether the investment in IR that companies have been required to make since 2017 (following Directive 2014/95/EU) actually leads to any tangible benefit for firms. Our results suggest that it does and, therefore, that IR

generates value for companies. The IIRC may also draw relevant elements about the nature of IR, which has a relevant effect in the traditionally investor-oriented North American context.

6 | CONCLUSIONS AND FUTURE RESEARCH

This article demonstrates that there is a significant and positive relationship between IR and analyst forecast accuracy in an international setting. It further shows that some country-level variables (stakeholder or shareholder-centric governance) moderate the relationship under analysis. Our study contributes to the corporate governance literature and to the research on the capital market relevance of IR, particularly on the role of IR for financial analysts. It also provides useful insights on the nature of IR.

Future researchers may further explore the channels through which IR impacts financial analysts' forecasts. By building on previous studies, we propose two mechanisms (IR content and IR principles), but we do not determine which of the two had the greater impact. More research is needed in order to assess the impact of IR content and the way in which information are presented. These studies may further build and extend voluntary disclosure (Beyer et al., 2010) and information processing theory (Dhaliwal et al., 2012). In addition, corporate governance scholars may want to further analyze the changes in corporate governance that may be determined by IR adoption. In particular, the European Union could be an interesting setting to be studied because, as of 2017, large listed companies in the EU are required to provide nonfinancial

information in their annual reports, following (among a few others) the IIRC framework.

ORCID

Eduardo Flores https://orcid.org/0000-0002-5284-5107
Marco Fasan https://orcid.org/0000-0002-9426-6090
Wesley Mendes-da-Silva https://orcid.org/0000-0002-5500-4872
Joelson Oliveira Sampaio https://orcid.org/0000-0001-6560-2481

REFERENCES

Abhayawansa, S., Elijido-Ten, E., & Dumay, J. (2018). A practice theoretical analysis of the irrelevance of integrated reporting to mainstream sell-side analysts. *Accounting and Finance*. https://doi.org/10.1111/acfi.12367

Agnew, J. R., & Szykman, L. R. (2005). Asset allocation and information overload: The influence of information display, asset choice, and investor experience. *Journal of Behavioral Finance*, 6(2), 57–70. https://doi.org/10.1207/s15427579jpfm0602_2

Aguilera, R. V., Desender, K., Bednar, M. K., & Lee, J. H. (2015). Connecting the dots: Bringing external corporate governance into the corporate governance puzzle. *The Academy of Management Annals*, 9, 483–573. https://doi.org/10.1080/19416520.2015.1024503

Almeida, H., Campello, M., Laranjeira, B., & Weisbenner, S. (2011). Corporate debt maturity and the real effects of the 2007 credit crisis. *Critical Financial Review*, 1, 3–58. https://doi.org/10.1561/104.00000001

Angrist, J. D., & Pischke, J. S. (2009). *Mostly harmless econometrics: An empiricist's companion*. Princeton, NJ: Princeton University Press. https://doi.org/10.1515/9781400829828

Armstrong, C. S., Jagolinzer, A. D., & Larcker, D. F. (2010). Chief executive officer equity incentives and accounting irregularities. *Journal of Accounting Research*, 48(2), 225–271. https://doi.org/10.1111/j.1475-679X.2009.00361.x

Athey, S., & Imbens, G. W. (2017). The state of applied econometrics: Causality and policy evaluation. *The Journal of Economic Perspectives*, 31(2), 3–32. https://doi.org/10.1257/jep.31.2.3

Ball, R., Kothari, S. P., & Robin, A. (2000). The effect of international institutional factors on properties of accounting earnings. *Journal of Accounting and Economics*, 29(1), 1–51. https://doi.org/10.1016/S0165-4101(00)00012-4

Barth, M. E., Cahan, S. F., Chen, L., & Venter, E. R. (2017). The economic consequences associated with integrated report quality: Capital market and real effects. *Accounting, Organizations and Society*, 62, 43–64. https://doi.org/10.1016/j.aos.2017.08.005

Bernardi, C., & Stark, A. W. (2018). Environmental, social and governance disclosure, integrated reporting, and the accuracy of analyst forecasts. *The British Accounting Review*, 50(1), 16–31. https://doi.org/10.1016/j.bar.2016.10.001

Beyer, A., Cohen, D. A., Lys, T. Z., & Walther, B. R. (2010). The financial reporting environment: Review of the recent literature. *Journal of Accounting and Economics*, 50, 296–343. https://doi.org/10.1016/j.jacceco.2010.10.003

Botosan, C. A., & Harris, M. S. (2000). Motivations for a change in disclosure frequency and its consequences: An examination of voluntary quarterly segment disclosures. *Journal of Accounting Research*, 38, 329–353. https://doi.org/10.2307/2672936

Boubakri, N., & Bouslimi, L. (2016). Directors' and officers' liability insurance and analyst forecast properties. *Finance Research Letters*, 19, 22–32. https://doi.org/10.1016/j.frl.2016.05.010

Bowen, R. M., Chen, X., & Cheng, Q. (2008). Analyst coverage and the cost of raising equity capital: Evidence from underpricing of seasoned equity offerings. *Contemporary Accounting Research*, 25, 657–700. https://doi.org/10.1506/car.25.3.1

Bradshaw, M., Miller, G., & Serafeim, G. (2009). *Accounting method heterogeneity and analysts' forecasts*. Unpublished paper, University of Chicago, University of Michigan, and Harvard University.

Cai, Y., Jo, H., & Pan, C. (2012). Doing well while doing bad? CSR in controversial industry sectors. *Journal of Business Ethics*, 108, 467–480. https://doi.org/10.1007/s10551-011-1103-7

Cameron, A. C., Gelbach, J. B., & Miller, D. L. (2011). Robust inference with multiway clustering. *Journal of Business & Economic Statistics*, 29(2), 238–249. https://doi.org/10.1198/jbes.2010.07136

de Villiers, C., Hsiao, P.-C. K., & Maroun, W. (2017). Developing a conceptual model of influences around integrated reporting, new insights and directions for future research. *Meditari Accountancy Research*, 25, 450–460. https://doi.org/10.1108/MEDAR-07-2017-0183

Dhaliwal, D. S., Radhakrishnan, S., Tsang, A., & Yang, Y. G. (2012). Nonfinancial disclosure and analyst forecast accuracy: International evidence on corporate social responsibility disclosure. *The Accounting Review*, 87, 723–759. https://doi.org/10.2308/accr-10218

Dumay, J., Bernardi, C., Guthrie, J., & Demartini, P. (2016). Integrated reporting: A structured literature review. *Accounting Forum*, 40(3), 166–185. https://doi.org/10.1016/j.accfor.2016.06.001

Fasan, M., & Mio, C. (2017). Fostering stakeholder engagement: The role of materiality disclosure in integrated reporting. *Business Strategy and the Environment*, 26, 288–305. https://doi.org/10.1002/bse.1917

Fleischer, R., Goettsche, M., & Schauer, M. (2017). The big 4 premium: Does it survive an auditor change? Evidence from europe. *Journal of International Accounting, Auditing and Taxation*, 29, 103–117. https://doi.org/10.1016/j.intaccaudtax.2017.10.002

Flower, J. (2015). The international integrated reporting council: A story of failure. *Critical Perspectives on Accounting*, 27, 1–17. https://doi.org/10.1016/j.cpa.2014.07.002

Franzen, N., & Weißenberger, B. E. (2018). Capital market effects of mandatory IFRS 8 adoption: An empirical analysis of German firms. *Journal of International Accounting, Auditing and Taxation*, 31, 1–19. https://doi.org/10.1016/j.intaccaudtax.2017.11.002

Frias-Aceituno, J. V., Rodriguez-Ariza, L., & Garcia-Sanchez, I. M. (2013). The role of the board in the dissemination of integrated corporate social reporting. *Corporate Social Responsibility and Environmental Management*, 20(4), 219–233. https://doi.org/10.1002/csr.1294

Garcia, A. S., Mendes-da-Silva, W., & Orsato, R. J. (2017). Sensitive industries produce better ESG performance: Evidence from emerging markets. *Journal of Cleaner Production*, 150, 135–147. https://doi.org/10.1016/j.jclepro.2017.02.180

García-Sánchez, I.-M., Rodríguez-Ariza, L., & Frías-Aceituno, J.-V. (2013). The cultural system and integrated reporting. *International Business Review*, 22, 828–838. https://doi.org/10.1016/j.ibusrev.2013.01.007

Gerwanski, J., Kordsachia, O., & Velte, P. (2019). Determinants of materiality disclosure quality in integrated reporting: Empirical evidence from an international setting. *Business Strategy and the Environment*, 28, 1–21. https://doi.org/10.1002/bse.2278

Glaum, M., Baetge, J., Grothe, A., & Oberdörster, T. (2013). Introduction of international accounting standards, disclosure quality and accuracy of analysts' earnings forecasts. *The European Accounting Review*, 22(1), 79–116. https://doi.org/10.1080/09638180.2011.558301

Guthrie, J., Ricceri, F., Dumay, J., & Nielsen, C. (2017). *Handbook of intellectual capital research*. Oxford, London: Routledge.

Healy, P. M., Hutton, A. P., & Palepu, K. G. (1999). Stock performance and intermediation changes surrounding sustained increases in disclosure. *Contemporary Accounting Research*, 16, 485–520. https://doi.org/10.1111/j.1911-3846.1999.tb00592.x

Hodge, F., Hopkins, P. E., & Pratt, J. (2006). Management reporting incentives and classification credibility: The effects of reporting discretion and reputation. *Accounting, Organizations and Society*, 31, 623–634. https://doi.org/10.1016/j.aos.2005.12.003

Hodge, F. D. (2001). Hyperlinking unaudited information to audited financial statements: Effects on investor judgments. *The Accounting Review*, 76, 675–691. https://doi.org/10.2308/accr.2001.76.4.675

Hong, P. K., Paik, D. G., & Smith, J. V. D. L. (2018). A study of long-lived asset impairment under U.S. GAAP and IFRS within the U.S. institutional environment. *Journal of International Accounting, Auditing and Taxation*, 31, 74–89. https://doi.org/10.1016/j.intaccaudtax.2018.05.001

Hope, O.-K. (2003). Disclosure practices, enforcement of accounting standards, and analysts' forecast accuracy: An international study. *Journal of Accounting Research*, 41(2), 235–272. https://doi.org/10.1111/1475-679X.00102

Ioannou, I., & Serafeim, G. (2014). The consequences of mandatory corporate sustainability reporting: Evidence from four countries. *Harvard Business Review*, 100, 1–49.

Kelly, B., & Ljungqvist, A. (2012). Testing asymmetric-information asset pricing models. *The Review of Financial Studies*, 25, 1366–1413. https://doi.org/10.1093/rfs/hhr134

Kelton, A. S., Pennington, R. R., & Tuttle, B. M. (2010). The effects of information presentation format on judgment and decision making: A review of the information systems research. *Journal of Information Systems*, 24(2), 79–105. https://doi.org/10.2308/jis.2010.24.2.79

Koonce, L., & Mercer, M. (2005). Using psychology theories in archival financial accounting research. *Journal of Accounting Literature*, 24(1), 175–214. https://doi.org/10.2139/ssrn.311105

Lai, A., Melloni, G., & Stacchezzini, R. (2016). Corporate sustainable development: Is 'integrated reporting' a legitimation strategy? *Business Strategy and the Environment*, 25(3), 165–177. https://doi.org/10.1002/bse.1863

Lang, M. H., Lins, K. V., & Miller, D. P. (2004). Concentrated control, analyst following, and valuation: Do analysts matter most when investors are protected least? *Journal of Accounting Research*, 42, 589–623. https://doi.org/10.1111/j.1475-679X.2004.t01-1-00142.x

Lang, M. H., & Lundholm, R. J. (1996). Corporate disclosure policy and analyst behavior. *The Accounting Review*, 71, 467–492.

LaPorta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (1998). Law and finance. *Journal of Political Economy*, 106, 1113–1155. https://doi.org/10.1086/250042

Lee, D. D., & Faff, R. W. (2009). Corporate sustainability performance and idiosyncratic risk: A global perspective. *Financial Review*, 44(2), 213–237. https://doi.org/10.1111/j.1540-6288.2009.00216.x

Lee, K.-W., & Yeo, G. H.-H. (2016). The association between integrated reporting and firm valuation. *Review of Quantitative Finance and Accounting*, 47, 1221–1250. https://doi.org/10.1007/s11156-015-0536-y

Lehavy, R., Li, F., & Merkley, K. (2011). The effect of annual report readability on analyst following and the properties of their earnings forecasts. *The Accounting Review*, 86, 1087–1115. https://doi.org/10.2308/accr.00000043

Leuz, C., Nanda, D., & Wysocki, P. D. (2003). Earnings management and investor protection: An international comparison. *Journal of Financial Economics*, 69, 505–527. https://doi.org/10.1016/S0304-405X(03)00121-1

Li, F. (2008). Annual report readability, current earnings, and earnings persistence. *Journal of Accounting and Economics*, 45(2), 221–247. https://doi.org/10.1016/j.jacceco.2008.02.003

Lys, T., & Sohn, S. (1990). The association between revisions of financial analysts' earnings forecasts and security-price changes. *Journal of Accounting and Economics*, 13, 341–363. https://doi.org/10.1016/0165-4101(90)90009-S

Mervelskemper, L., & Streit, D. (2017). Enhancing market valuation of ESG performance: Is integrated reporting keeping its promise? *Business Strategy and the Environment*, 26, 536–549. https://doi.org/10.1002/bse.1935

Mio, C. (2016). Integrated reporting: The IIRC framework. In C. Mio (Ed.), *Integrated reporting: A new accounting disclosure* (pp. 1–18). London, UK: Palgrave Macmillan UK. https://doi.org/10.1057/978-1-137-55149-8_1

Mio, C., Marco, F., & Pauluzzo, R. (2016). Internal application of IR principles: Generali's internal integrated reporting. *Journal of Cleaner Production*, 139, 204–218. https://doi.org/10.1016/j.jclepro.2016.07.149

Nichols, D. C., & Wieland, M. M. (2009). *Do firms' nonfinancial disclosures enhance the value of analyst services?* Retrieved from https://ssrn.com/abstract=1463005

Petersen, M. A. (2009). Estimating standard errors in finance panel data sets: Comparing approaches. *The Review of Financial Studies*, 22, 435–480. https://doi.org/10.1093/rfs/hhn053

Plumlee, M. A. (2003). The effect of information complexity on analysts' use of that information. *The Accounting Review*, 78, 275–296. https://doi.org/10.2308/accr.2003.78.1.275

Pope, P. F. (2003). Discussion of disclosure practices, enforcement of accounting standards, and analysts' forecast accuracy: An international study. *Journal of Accounting Research*, 41, 273–283. https://doi.org/10.1111/1475-679X.00103

Pope, P. F., & McLeay, S. J. (2011). The European IFRS experiment: Objectives, research challenges and some early evidence. *Accounting and Business Research*, 41(3), 233–266. https://doi.org/10.1080/00014788.2011.575002

Qiu, Y., Shaukat, A., & Tharyan, R. (2016). Environmental and social disclosures: Link with corporate financial performance. *The British Accounting Review*, 48(1), 102–116. https://doi.org/10.1016/j.bar.2014.10.007

Richardson, A. J., & Welker, M. (2001). Social disclosure, financial disclosure and the cost of equity capital. *Accounting, Organizations and Society*, 26, 597–616. https://doi.org/10.1016/S0361-3682(01)00025-3

Rinaldi, L., Unerman, J., & de Villiers, C. (2018). Evaluating the integrated reporting journey: Insights, gaps and agendas for future research. *Accounting, Auditing & Accountability Journal*, 31, 1294–1318. https://doi.org/10.1108/AAAJ-04-2018-3446

Roberts, M. R., & Whited, T. M. (2013). Endogeneity in empirical corporate finance. In G. M. Constantinides, M. Harris, & R. M. Stulz (Eds.), *Handbook of the economics of finance* (Vol. 2A) (pp. 493–572). Amsterdam, The Netherlands: Elsevier. https://doi.org/10.1016/B978-0-44-453594-8.00007-0

Roe, M. J. (2003). *Political determinants of corporate governance: Political context, corporate impact*. Oxford, UK: Oxford University Press.

Serafeim, G. (2015). Integrated reporting and investor clientele. *Journal of Applied Corporate Finance*, 27(2), 34–51. https://doi.org/10.1111/jacf.12116

Steyn, M. (2014). Organisational benefits and implementation challenges of mandatory integrated reporting: Perspectives of senior executives at South African listed companies. *Sustainability Accounting, Management and Policy Journal*, 5, 476–503. https://doi.org/10.1108/SAMPJ-11-2013-0052

Stubbs, W., & Higgins, C. (2014). Integrated reporting and internal mechanisms of change. *Accounting, Auditing & Accountability Journal*, *27*, 1068–1089. https://doi.org/10.1108/AAAJ-03-2013-1279

Stubbs, W., Higgins, C., & Love, T. (2014). Walking the talk(s): Organisational narratives of integrated reporting. *Accounting, Auditing & Accountability Journal*, *27*, 1090–1119. https://doi.org/10.1108/AAAJ-04-2013-1303

The International Integrated Reporting Council [The IIRC] (2013). *The international IR framework*. London, UK: The International Integrated Reporting Council.

Thompson, S. B. (2011). Simple formulas for standard errors that cluster by both firm and time. *Journal of Financial Economics*, *99*(1), 1–10. https://doi.org/10.1016/j.jfineco.2010.08.016

Unerman, J., & Zappettini, F. (2014). Incorporating materiality considerations into analyses of absence from sustainability reporting. *Social and Environmental Accountability Journal*, *34*(3), 172–186. https://doi.org/10.1080/0969160X.2014.965262

Zhou, S., Simnett, R., & Green, W. (2017). Does integrated reporting matter to the capital market? *Abacus*, *53*(1), 94–132. https://doi.org/10.1111/abac.12104

APPENDIX A

VARIABLE DEFINITIONS

Variables	Definition	Source
Acc	$$Acc = \frac{-|\text{Actual EPS} - \text{Forecasted EPS}|}{\text{Beginnig of fiscal year stock price}}$$	Information obtained from Thomson Reuters Eikon. Actual EPS according to release by companies over the time and forecasted EPS is equal to analysts' consensus for the same period (end of the fiscal year).
ESG	Is a quality score about nonfinancial information from 0 to 100 points.	Thomson Reuters Asset 4
GRI	Is equal 1 if a company adopts the Global Reporting Initiative guidelines, and 0 otherwise.	
MDA	Is equal to 1 if a company released a management and discussion analysis, and 0 otherwise.	
NoA	Is the number of analysts covering at least one company.	Thomson Reuters Eikon
BM	Is the ratio of the book value and the market value for each company over the time.	
ROA	Is the return on asset composed of the ratio of net income in period t to the total assets in period $t - 1$.	
LOSS	Has the same composition of ROA; however, it was only calculated when the net result was negative (loss).	
LTA	Is the log of total assets for each company over the time.	
LEV	Denotes the financial leverage computed using the sum of financial liabilities over the equity (net worth).	
Treated	Is equal to 1 if a company issued an integrated report according to the IIRC's framework from 2013 (or 2014) to 2016, and 0 otherwise.	Hand collected in the IIRC website, considering all the public companies that issue an integrated report.
Post	Is equal to 1 for the periods after 2013 (or 2014) for those firms that issued an IR from 2013 (or 2014), and 0 otherwise.	
Post_Placebo_1	This variable lag Post of 1 year.	
Post_Placebo_2	This variable lag Post of 2 years.	

(Continued)

Variables	Definition	Source
CSR Sensitive	Dummy variable being 1 for CSR-sensitive industries, and 0 otherwise.	CSR-sensitive industries are here defined as documented by Richardson and Welker (2001), Lee and Faff (2009), Cai et al. (2012), and Garcia et al. (2017), more specifically: major socio-environmental impact, energy, including oil and gas, chemicals, paper and pulp, mining and steel making fields.