

Integrated reporting and analyst behaviour in diverse institutional settings

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Francesca Rossignoli, Riccardo Stacchezzini and Alessandro Lai
Department of Business Administration, University of Verona, Verona, Italy

819

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Abstract

Purpose – Given the limited studies that have started to focus on contexts where integrated reporting (IR) is voluntarily adopted, this paper aims to explore the moderating role of institutional characteristics on the association between voluntary report release and analyst forecast accuracy.

Design/methodology/approach – This study uses a quantitative empirical research method grounded on voluntary disclosure theory to provide empirical evidence on an international sample of companies choosing to release integrated reports. Preliminarily, a cluster analysis is used to group countries according to institutional patterns. Multivariate analyses detect the associations between report release choice and analysts' forecast accuracy across clusters. Multiple econometric approaches are used to address the endogeneity concerns.

Findings – IR release is not informative for the market unless considering systematic variations across different institutional settings. Analysts' forecast is more accurate for IR adopters located in strong institutional enforcement settings than for all the other companies. In the strong institutional setting that is also characterized by a pluralistic society, IR release benefits for the market are conditioned by the fact that the choice to release IR depends on environmental, governance and social disclosure-based managers remuneration and disclosure requirements. In weak institutional settings, IR release is not beneficial for the forecast accuracy.

Research limitations/implications – Academics and practitioners can gain understanding of the usefulness of voluntary IR across different institutional settings.

Originality/value – The study advances the understanding of the IR's informativeness, overcoming the common dichotomous distinctions between strong and weak institutional settings.

Keywords Voluntary disclosure, Integrated reporting, Analyst forecast, Institutional setting, International sample

Paper type Research paper

1. Introduction

Integrated reporting (IR) represents a prominent initiative in the context of corporate reporting, receiving increasing attention by accounting scholars and practitioners (de Villiers *et al.*, 2014, 2020; Rinaldi *et al.*, 2018). IR goes beyond traditional financial reporting

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in its explicit attention to non-traditional capitals (e.g. human capital, and social and relationship capital), strategy and business models and its emphasis on forward-looking information (Eccles and Krzus, 2014; de Villiers and Sharma, 2020). By combining financial and nonfinancial information in a single document, IR is intended to benefit a wide range of stakeholders (de Villiers and Maroun, 2017). However, financial stakeholders (e.g. investors and analysts) are expected to be the primary recipients of IR disclosure, as explicitly stated by the International Integrated Reporting Council (IIRC) in its framework (International Integrated Reporting Council, 2013; Flower, 2015; Rowbottom and Locke, 2016), and confirmed by report preparers, who underline the report's usefulness for equity and debt investors, analysts and rating agencies (Higgins *et al.*, 2014; Lai *et al.*, 2017, 2018). Some scholars are more sceptical and question the report's usefulness, even for financial stakeholders (Humphrey *et al.*, 2017; Hsiao and Kelly, 2018; Slack and Tsalavoutas, 2018).

In line with the need for further research on IR "impacts" (Rinaldi *et al.*, 2018), a number of studies have started exploring whether and how IR influences investors and other financial stakeholders, with a predominance of studies focused on the context where IR is mandatorily adopted (i.e. South Africa). These studies unambiguously demonstrate a positive impact of mandatory IR on financial stakeholders in terms of analysts' behaviour, and value relevance of IR disclosure (Barth, 2017; Zhou *et al.*, 2017; Bernardi and Stark, 2018; Wang *et al.*, 2020; Caglio *et al.*, 2020). In contrast, the less numerous studies that have focused on contexts where IR is voluntarily released show sparse results. While Kim *et al.* (2017) find that IR adoption decreases the post-level of forecast dispersion compared with the pre-level of forecast dispersion, and Flores *et al.* (2019) show that IR adoption improves analysts' ability to make accurate earnings forecasts, Wahl *et al.* (2020) find no significant effect of IR publication on analyst earnings forecast accuracy. These results suggest further exploration within voluntary contexts, also considering that such contexts are not necessarily homogeneous in terms of country-level institutional characteristics, which are expected to affect determinants and consequences of nonfinancial disclosures (de Villiers and Marques, 2016).

To shed some light on the impact of voluntary release of integrated reports on financial stakeholders in diverse institutional settings, we explore the association between report release and analyst forecasts by considering the moderating role of country-level institutional characteristics, in line with the general argument that the disclosure's usefulness for the capital market is mediated by cross-country differences (Hope, 2003; Vanstraelen *et al.*, 2003; Dhaliwal *et al.*, 2012; Lee, 2017). While some studies have shown the influence of country-level institutional factors on the decision to voluntarily release an integrated report (Frias-Aceituno *et al.*, 2014; Lai *et al.*, 2016; Vaz *et al.*, 2016; García-Sánchez *et al.*, 2019; Girella *et al.*, 2019), very little attention has been paid to how these factors moderate the report's impact on financial stakeholders (Flores *et al.*, 2019).

The impact of integrated report release on analyst behaviour is explored with reference to the forecast accuracy, which captures the preciseness of the analysts' predictions by comparing the companies that release reports with those that do not. While the present paper does not estimate the causal effect of integrated report release over the financial analysts' forecast, it aims to assess if accuracy of predictions systematically varies with report release in diverse institutional settings. To inspect the relation between integrated report release and analysts' behaviour, bringing out the moderating role of the institutional setting, we conduct an empirical quantitative analysis over three years. We identify companies releasing an integrated report by relying on the IR Examples Database provided by the IIRC, and then match a control sample of companies that do not release reports. We recognize that examining IR in a voluntary setting presents challenges in terms of self-selection as firms that expect to gain the most benefits from disclosing IR are more likely to

adopt it. Therefore, we use multiple econometric approaches – including propensity score matching (PSM) and the Heckman two-stage model. Furthermore, we acknowledge that using an international sample might give rise to endogeneity bias by omitted correlated variables. Therefore, we use the two-stage least squares (2SLS) instrumental variable to address omitted variable concerns (Cui *et al.*, 2018).

Among the different perspectives available for studying corporate discretionary disclosure strategies (Merkl-Davies and Brennan, 2007), we draw on voluntary disclosure theory (Healy and Palepu, 2001) and related literature on analysts' behaviour in different country-specific institutional settings (Lang and Lundholm, 1996; Dhaliwal *et al.*, 2012) to hypothesize a negative association between integrated report release and analysts' forecast error (used as an inverse measure of forecast accuracy)[1]. We also hypothesize that the country-level institutional setting moderates the association between integrated report release and analysts' forecast error. We find evidence supporting both hypotheses.

This paper offers unique contributions by exploring the moderating role of the country-level institutional setting on the association between integrated report release and analysts' behaviour. Indeed, by pooling companies according to clusters that group countries with similar institutional characteristics, the paper disentangles the magnitude of the informativeness of report release across countries, thus offering a more nuanced partition than the distinction between shareholder and stockholder orientations considered in prior studies (Flores *et al.*, 2019). We also develop an international sample including countries worldwide, instead of limiting the comparison to specific geographical areas. We provide straightforward evidence of IR impacts on analysts' behaviour, contrary to prior studies that did not find significant effects of voluntary release of integrated reports on analyst earnings forecast accuracy (Wahl *et al.*, 2020).

The remainder of this paper is organized as follows. Section 2 theoretically frames our study in the light of voluntary disclosure theory, and then presents a literature review of pertinent IR studies and develops the research hypotheses. Section 3 describes the research strategy by presenting the sample and the research methods. Section 4 shows the main findings and the results of additional analyses, including tests addressing endogeneity concerns, while Section 5 discusses the findings in the light of the theoretical framework and prior studies. Section 6 concludes by highlighting the contributions, implications and limitations of the study.

2. Theoretical framework, prior research and hypothesis

2.1 *Voluntary disclosure, integrated report release and analysts' forecasts*

Voluntary disclosure theory suggests that the disclosure of private information to investors enhances efficiency in resource allocation (Healy and Palepu, 2001) because it reduces information asymmetries claimed by agency theory (Verrecchia, 1983). According to the argument that the aim of a firm's disclosure policy is to increase the understanding of the company's performance and future perspectives (Holland, 1998), disclosure exceeding that mandatorily required by the regulation (Meek *et al.*, 1995) is expected to add information that facilitates financial analysts' understanding of the company's performance and prospects (Lang and Lundholm, 1996; Hope, 2003). Acting "as intermediaries who receive and process [...] information for investors" (Schipper, 1991, p. 105), analysts help investors in allocating their capital (Nichols, 1989; Schipper, 1991).

Financial analysts' behaviour is observable through their forecasts, the accuracy of which is a proxy of the company's information availability (Lang *et al.*, 2003). The more analysts' forecasts are precise, the more likely are investors able to allocate their capital efficiently, with positive effects on the capital market. The usefulness of voluntary disclosure to financial analysts can be detected by investigating the associations between voluntary disclosure and financial analysts' forecast accuracy. Lang and Lundholm (1996)

show that firms with more informative disclosure policies enhance analyst forecast accuracy, reducing the information asymmetry.

The decision to release the integrated report belongs to the overall company's disclosure policy, which is expected to be aimed at increasing the investors' set of information suitable to orient their decision-making processes, unless the costs of revealing information outweigh the benefit of the disclosure (Healy and Palepu, 2001). To the extent that IR is informative about the company's strategy, business model and prospects (de Villiers and Sharma, 2020), analysts' forecast error is likely to decrease when the company releases the report[2]. Indeed, investors and other financial investors (e.g. analysts and rating agencies) appear to be the main recipients not only within the IIRC's framework (International Integrated Reporting Council, 2013) but also in the preparers' view (Brown and Dillard, 2014; Flower, 2015; Thomson, 2015; International Integrated Reporting Council, 2017; Lai *et al.*, 2017, 2018).

The studies that have analytically explored the effect of IR on financial stakeholders' behaviour have been predominantly developed in the mandatory context of South Africa, where the South African Johannesburg Stock Exchange incorporated the move towards IR into its listing rules, under its King Code on Corporate Governance. These studies leave little doubt that, in this mandatory context, the integrated report is relevant for financial stakeholders (Barth, 2017; Zhou *et al.*, 2017; Bernardi and Stark, 2018; Wang *et al.*, 2020; Caglio *et al.*, 2020). The less numerous studies that have considered contexts where IR is voluntarily adopted do not exhibit the same straightforward evidence (Kim *et al.*, 2017; Flores *et al.*, 2019; Wahl *et al.*, 2020). However, following voluntary disclosure theory's line of reasoning, we expect that information contained in the integrated report is helpful for analysts in formulating accurate predictions for earnings. Consequently, we state the following directional hypothesis:

- H1. Voluntary release of the integrated report is negatively associated with analysts' forecast error.

2.2 Voluntary integrated report release and analysts' forecasts in diverse institutional settings

With the aim to gather nuanced evidence on the impacts of IR on the capital market, we explore whether the institutional characteristics of the countries in which reports are voluntarily released influence analysts' behaviour. Prior studies investigating voluntary disclosure in an international setting (Belkaoui and Karpik, 1989; Vanstraelen *et al.*, 2003; Lee and Hutchison, 2005; Kothari *et al.*, 2009; Dhaliwal *et al.*, 2012; Lee, 2017) underline that the disclosure's usefulness for analysts is influenced by cross-country differences. Most studies capture such cross-country differences through the legal system (Frias-Aceituno *et al.*, 2014; Simoni *et al.*, 2020). These studies sustain that companies located in civil-law countries are oriented to satisfy stakeholders' information requirements because they are more stakeholder-oriented (Ball *et al.*, 2000; Simnett *et al.*, 2009). According to this approach, in civil-law countries, voluntary disclosure is more informative than the disclosure released by companies located in common-law countries (Dhaliwal *et al.*, 2012).

However, the legal system *per se* is not able to capture all the cross-country differences in voluntary disclosure's usefulness for the capital market, and the institutional factors are potentially more meaningful in explaining cross-sectional variation in the usefulness of corporate disclosure (DeFond and Hung, 2004). In the light of several institutional factors, Leuz *et al.* (2003) group countries into three different clusters that convey different levels of institutional enforcement. With reference to studies that focus on nonfinancial reporting (Lee and Hutchison, 2005; de Villiers and Marques, 2016), we rely on a broad range of World Bank Institute indicators capturing a variety of country-level institutional characteristics: voice and accountability; government effectiveness; regulatory quality; rule of law; and anti-

corruption. De Villiers and Marques (2016) demonstrate that these indicators, described in Section 3.2 of our research strategy, are able to influence corporate social responsibility (CSR) disclosure determinants and consequences for the financial stakeholders because they reflect how the institutional context favours companies' engagement with and investors' appreciation of nonfinancial issues. We use these same characteristics at the country level to capture the traits of institutional enforcement that could potentially ground different levels of IR informativeness because of some commonalities that IR shares with CSR reporting – a voluntary, nonfinancial form of reporting [3].

Considering that IR is voluntarily adopted in several countries, we use voluntary report release as the empirical setting and inspect whether the different country-level institutional settings moderate the usefulness of the integrated report in analysts' behaviour. While a number of studies have investigated the role of institutional contexts in urging companies to release an integrated report (Frías-Aceituno *et al.*, 2014; Lai *et al.*, 2016; Vaz *et al.*, 2016; García-Sánchez *et al.*, 2019; Girella *et al.*, 2019), to the best of the authors' knowledge, no prior research has considered this moderating effect, with the only exception being Flores *et al.* (2019), who show that the governance regime moderates the impact of integrated report release on analysts' forecast errors, with reports prepared by firms belonging to countries with a shareholder-based governance regime (i.e. North America) having a greater impact on analysts' ability than those prepared within a stakeholder-based governance regime (i.e. Continental Europe). However, Wahl *et al.* (2020), using an international sample of listed companies, find no significant association between voluntary IR disclosure and analyst earnings forecast error. Therefore, in line with the need to disentangle the role of the institutional context characteristics in driving corporate reporting practices (Chen and Bouvain, 2009; Cordazzo *et al.*, 2017), this study goes beyond Flores *et al.*'s (2019) dichotomy in two ways: first, it includes countries spread all over the world, and, second, clusters are grouped according to a wide range of country-level institutional factors, which are expected to jointly influence the pressure companies are subjected to when deciding whether to release integrated reports as well as the impact on analysts' behaviour (de Villiers and Marques, 2016).

Literature investigating the benefits of corporate disclosure for the capital market demonstrates that the more the institutional enforcement is strong, the more financial reporting disclosure eases analysts' forecast accuracy (Hope, 2003). Such a relation is controversial with reference to voluntary corporate disclosure. Dhaliwal *et al.* (2012) show that there is a positive association between standalone CSR reports and analyst forecast accuracy, and it is stronger in countries that are more stakeholder-oriented and in countries with more opaque financial disclosure. With reference to IR, Flores *et al.* (2019) show that the association between report release and analyst forecast error is stronger in countries that are more shareholder-oriented. While not focused on financial analysts' forecast accuracy, Obeng *et al.* (2020) have a different view, expecting that in stakeholder-oriented countries, report preparers may embrace the concept of IR more fully, with their more transparent IR leading to lower agency costs. Because our cluster analysis goes beyond the shareholder and stakeholder dichotomy in grasping the patterns connotating the institutional settings, we state the following nondirectional hypothesis:

- H2. Country institutional setting moderates the association between the integrated report's voluntary release and the analysts' forecast error.

3. Research strategy

3.1 Identification of integrated reporting adopters and sample selection

Similarly to other studies that include in their samples voluntarily released integrated reports (Kim *et al.*, 2017; Melloni *et al.*, 2017; Kiliç and Kuzey, 2018; Flores *et al.*, 2019;

Girella *et al.*, 2019), we select the companies whose report is included in the IIRC's IR Examples Database as at 1st January 2017. This database is publicly accessible from the IIRC official website, and we hand-collect from the corporate website of each of the IR adopters a proprietary data set in time-series over the years 2015–2017, including the first year of report release (even before 1 January 2017); the choice to release the report for each year; and the date of report release. Companies located in South Africa, where integrated reports are mandatorily required for listed companies, are excluded. The initial sample includes 181 international companies.

We restrict our analysis over the years 2015–2017 for two reasons. First, because most companies from the base sample started to publish an integrated report between 2013 and 2016, we can capture the usefulness of report release, referring to companies that had already issued at least one integrated report. Second, considering that the IIRC framework was issued in 2013, we aim at capturing the usefulness of the report released according to the framework, starting two years afterwards.

A sample of companies not releasing integrated reports (IR non-adopters) is selected according to the industry sector classification (based on the NAICS code); the geographical location (same country); and the size (based on the volume of assets). We find 226 companies meeting these requirements.

To address concerns that firms self-select into the IR adopters' group, we use PSM and nearest neighbour to form a matched control sample of IR non-adopter firms. For the first stage of PSM, we estimate the probability of being an IR adopter firm by using a probit model that includes firm- and country-level variables. Specifically, we model the report release choice as a function of firm total assets, net income, leverage, industry and country's regulatory quality. Using the estimated coefficients from the probit model, we compute the expected probability of being an IR adopter firm for each firm-year observation and use these propensity scores to match the observations of the IR adopters to observations of the IR non-adopters.

For each company entered in the sample, we retrieve annual fundamental data and market data from Eikon. The scores depicting environmental, governance and social disclosure (ESG), board of directors' composition and ownership are retrieved from Bloomberg. The firm-specific data are collected from the Orbis database. The scores about the country institutional characteristics are retrieved from the World Bank database.

After filtering for analyst data and required control variables, and keeping the observations matched by the PSM, the final sample consists of 218 companies (139 IR adopters and 79 IR non-adopters), corresponding to 1,209 company-year observations over three years. Table 1 presents the sample selection and distribution along time. Panel A shows the sample selection; Panel B shows the companies' distribution along time and Panel C the observations' distribution along time.

3.2 Cluster analysis variables

We perform a descriptive country cluster analysis, grouping countries showing similar patterns of institutional characteristics. This analysis allows us to capture interactions among different factors and verify systematic patterns in the integrated report's impact on the capital market without relying on directional hypotheses. Drawing on de Villiers and Marques (2016), the cluster analysis is based on the World Bank Institute (2008) indicators at the country level, which capture the following institutional characteristics: voice and accountability; government effectiveness; regulatory quality; rule of law; and anti-corruption.

Table 1.
Sample selection and distribution

Steps of the sample selection process		No. of companies
<i>Panel A: Sample selection</i>		
Firms IIRC's IR Examples Database: the name of the companies whose IR is downloadable from this Database as of 1st January 2017 that engage in IR under a voluntary setting		181
Plus firms non-IR adopters selected according to the industry sector classification (based on NAICS code); the geographical location (same country); and the size (based on the volume of assets)		226
Total unmatched sample		407
Deleted firms because of propensity score matching		-140
Deleted firms with missing accounting or governance data		-49
Final matched sample		218
<i>Panel B: Sample distribution along the period of analysis</i>		
	<i>IR adopters</i>	<i>IR non-adopters</i>
Year	No. of companies	No. of companies
2015	33	11
2016	51	21
2017	55	47
Total	139	79
<i>Panel C: Observations' distribution</i>		
	<i>IR adopters</i>	<i>IR non-adopters</i>
Year	No. of observations	No. of observations
2015	94	22
2016	371	42
2017	464	216
Total	929	280

The voice and accountability index (*vae*) and its standard deviation (*vas*) indicate the freedom of expression and association, and the related individual's possibility to publicly express concerns on various matters. This possibility also relates to nonfinancial matters that an integrated report is expected to deal with.

The government effectiveness index and its standard deviation capture the quality and the variability of the public services, the civil service, the policy formulation and implementation, and the credibility of the government's commitment to such policies. If governmental services are efficient and independent from political pressures, firms' engagement with nonfinancial issues disclosed by an integrated report is more likely to be genuine.

The regulatory quality index and its standard deviation indicate the ability and its variability of the government to formulate and implement sound policies and regulations that permit and promote private-sector development. The level of regulatory quality indicates the likelihood companies are in a position to deploy fair practices, which are expected to be disclosed by means of an integrated report.

The rule of law measures the extent and its variability to which agents have confidence in and abide by the rules of society, in particular, the quality of contract enforcement, the police and the courts. The likelihood of crime and violence enforcement measure developed by Kaufmann *et al.* (2010) is used as a proxy for institutional quality as it is meant to capture a country's ability to implement regulation and government policies. In contexts with high rule of law levels, companies are expected to be more expert in dealing with nonfinancial matters that an integrated report is expected to disclose.

The control of corruption index and its standard deviation indicate the extent and the variability to which public power is able to avoid conflicts of interest and opportunistic behaviours grounded on corruption. In contexts with high control of corruption, companies are expected to adopt transparent behaviour, also in their reporting practices.

The data retrieved from the World Bank database are based on surveys of firms and individuals, as well as the assessments of commercial risk rating agencies, nongovernmental organizations and a number of multilateral aid agencies. We use estimates for indicators that are the result of a maximum likelihood function and therefore are normally distributed. To capture the differences in the patterns across the cluster, we consider the standard deviations of most of the variables. The standard deviations indicate that the clusters do not show different variabilities in the index levels.

3.3 Regression models

We estimate ordinary least squares (OLS) regressions to test our hypotheses. The model has been widely applied in prior studies investigating the usefulness of voluntary disclosure for investors (Dhaliwal *et al.*, 2012):

$$F_error_{it} = \beta_0 + \beta_1 IR_release_{it} + \sum \beta_j disclosure_controls_{it} + \sum \beta_j financial_controls_{it} + \sum \beta_j governance_controls_{it} + \varepsilon_{it} \quad (1)$$

Verifying *H1*, we expect β_1 in equation (1) to be negative and significantly associated with the dependent variable, thus indicating that integrated report release is likely to provide information useful to analysts to predict accurately the company's performance.

We adopt hierarchical linear models to examine the moderator effects of the differences across the institutional enforcements. We augment the model with the interactions between the companies belonging to one of the three clusters and their choice to release the report. Specifically, the variable of interest (*IR_release*) is interacted with each of the three dummy variables (*Cluster1*, *Cluster2* and *Cluster3*), indicating the belonging of each company to one of the three clusters (Cluster 1, Cluster 2 and Cluster 3). Both the interacted variables are dummies, and the base effects are calculated when both the interacted variables (*IR_release* and, respectively, *Cluster1*, *Cluster2* and *Cluster3*) are 0. The interaction effect of interest is calculated when both the interacted variables are equal to 1. The three interacted variables are named, respectively, *IR_release_Cluster1*, *IR_release_Cluster2* and *IR_release_Cluster3*. Coefficients are computed for all the baseline effects:

$$F_error_{it} = \beta_0 + \beta_1 IR_release_{it} + \beta_w Cluster_{it} + \beta_z IR_release_Cluster_{it} + \sum \beta_j disclosure_controls_{it} + \sum \beta_j financial_controls_{it} + \sum \beta_j governance_controls_{it} + \varepsilon_{it} \quad (2)$$

Equation (2) is estimated to verify *H2*; we expect β_z to be different from 0 and significantly associated with the forecast error, indicating that the report release is differently associated with the forecast error in relation to the cluster belonging. We estimate three β_z values, one for each interacted variable (*IR_release_Cluster1*, *IR_release_Cluster2* and *IR_release_Cluster3*).

We use robust standard errors to account for possible heteroscedasticity of the underlying data set. The standard errors are clustered at the firm level to allow errors of the same firm not to be correlated over time.

3.4 Variable definitions

We capture the integrated report's usefulness for the capital market by using financial analysts' forecast accuracy (Dhaliwal *et al.*, 2012; Zhou *et al.*, 2017). The analysts' forecast error (*f_error*) is used as an inverse measure of forecast accuracy. Forecast error is defined as the average of the absolute errors of all forecasts for target earnings, scaled by the share price at the fiscal year end (Behn *et al.*, 2008):

$$f_error(Y)_{it} = \frac{1}{N} \sum_{j=1}^N (FC_{i,t,j} - EPS_{i,t}) / P_{i,t} \quad (3)$$

Subscripts *i*, *t* and *j* denote company *i*, year *t* and analyst *j*. The target earnings and forecasts are for the current year. *FC* is the analysts' earnings forecast for time *t*, and *EPS* is the actual earnings per share for time *t*. *P* is the price per share at the end of period *t*. The forecast horizon is limited to one year because of a lack of forecasts available for a longer time horizon. Only forecasts made after the report issue date are used to allow analysts to incorporate the information contained in the integrated report into their forecasts. The analyst forecast error (*f_error*) is winsorized at 95% to remove the skewness in the data.

The main dependent variable is *IR_release*, defined as a dummy variable equal to 1 if the company released a report, and 0 otherwise. The variable of interest (*IR_release*) is interacted with each of the three dummy variables indicating the belonging of the companies to the clusters, generating the variables *IR_release_Cluster1*, *IR_release_Cluster2* and *IR_release_Cluster3*.

The model includes several control variables. Following Dhaliwal *et al.* (2011, 2012) and Zhou *et al.* (2017), the first set of control variables includes firm-level controls capturing specific firm financial features. Prior literature suggests that analysts' forecast accuracy is associated with the number of analysts following the company (Jiao *et al.*, 2012); thus, we control for this factor by including the variable *ln_nana*, which is the natural logarithm of the number of analysts following each company each year. Jiao *et al.* (2012) suggest that a firm's performance volatility decreases the informativeness of firm reports, thus decreasing analysts' forecast accuracy. We include the variable *l_eps_st*, which is computed as the natural logarithm of the earnings per share's standard deviation. Resource constraint is likely to determine the informativeness of nonfinancial disclosure (Dhaliwal *et al.*, 2011); therefore, we control for profitability, which is captured by return on assets (ROA), calculated as the ratio of earnings before interest and taxes (EBIT) to total assets. To control for financial risk that may injure corporate performance and, thus, performance predictability, we include the variable *lev*, which is measured by debt to asset ratio (Lai *et al.*, 2016; Caglio *et al.*, 2020). Following Flores *et al.* (2019), analysts might react differently to companies that issue an IR depending on whether or not they operate in sensitive industries. We control for sensitive industries with the dummy *Naics* that is equal to 1 when companies are operating in industries where IR release might be driven by the incentive to polish the corporate image for legitimacy purposes, and 0 otherwise.

The second set of control variables refers to firm-level disclosure. As recent evidence (Bernardi and Stark, 2018) documents an association between sustainability disclosures and analysts' forecast accuracy after the introduction of an IR regime, we control for Bloomberg's ESG scores (*ESG_env*, *ESG_gov* and *ESG_soc*) indicating, respectively, the proxies for environment, governance and social performance disclosure. Following Zhou *et al.* (2017), we also control for the issuance of standalone CSR (or sustainability) reports, with the aim of verifying that information contained in the integrated report is incrementally

useful to analysts in addition to other nonfinancial reporting practices. The control variable *CSR_report* is equal to 1 if the company issues a standalone CSR/sustainability report, and 0 otherwise. Prior evidence shows that analysts' forecast errors decreased after firms mandatorily adopted International Financial Reporting Standards (IFRS) but only in countries with strong enforcement regimes and where domestic accounting standards differed significantly from IFRS (Byard *et al.*, 2011). Therefore, we control for the financial accounting disclosure regime with the dummy variable *IFRS*, which is equal to 1 if the company prepares the annual report according to the IFRS, and 0 otherwise. Last, analysts might not respond to first-time report issuance because of a firm's lack of experience; thus, we control for the first release of the report by the companies in the sample (*IR_first*).

The third set of control variables captures corporate governance. Evidence shows that corporate governance is associated with greater voluntary disclosure (Eng and Mak, 2003) and is related to IR (Wang *et al.*, 2020). Following Barth *et al.* (2017), we control for the board composition with three variables indicating the board size (*BoardSize*), the percentage of women sitting on the board of directors (*W*) and the percentage of non-executive board members (*Nonex*). Further, we control the ownership concentration because prior evidence shows that ownership structure is associated with nonfinancial disclosure: Höllerer (2013) finds a positive association between dispersed ownership and the decision to release standalone non-financial reports. Consistently, Cormier and Magnan (1999) and Cormier *et al.* (2005) find that concentrated ownership is associated with less environmental disclosures. The variable *Controlled* is a dummy variable equal to 1 if the company is controlled by concentrated ownership, and 0 otherwise.

The natural logarithm of continuous variables is used to remove the skewness in the data as shown by the skewness/kurtosis tests. Table 2 details the variables definition.

4. Findings

4.1 Cluster analysis results

We preliminarily perform a descriptive country cluster analysis, which groups countries with similar institutional characteristics. A *k*-means cluster analysis with three distinct country clusters is conducted. Three distinct country clusters are identified as a result of the non-hierarchical algorithm, which relies on the level and the variability of the institutional characteristics. The reliability of the clusters has been established performing the analysis multiple times (Ketchen and Shook, 1996), providing consistent outcomes.

Table 3 shows the description of the three clusters obtained, detailing the features connotating each of the three clusters. Panel A shows the mean values of each of the institutional characteristics by cluster; Panel B shows the cluster membership of countries and Panel C shows the pervasiveness of integrated report release by cluster. The grouping shown in Panel B is consistent with the regional distinctions used in prior research to classify countries that overcome the simple distinction between common- and code-law traditions (Leuz *et al.*, 2003; de Villiers and Marques, 2016). Cluster 1 includes the Anglo-Saxon countries (UK and USA), along with Hong Kong, which was formerly under British rule and has inherited parts of the institutional framework. Cluster 2 includes Northern Europe countries that are civil-law countries (Germany, Canada, Denmark, Luxembourg, Netherlands and Switzerland), countries under British rule that have common law (Australia and New Zealand) and Canada. Cluster 3 includes countries that have civil law: Brazil, China, Greece, Italy, Republic of South Korea, Namibia and Sri Lanka. Therefore, the legal system is not disentangling countries belonging to Cluster 1 and Cluster 2.

With reference to the institutional setting of the countries included in the three clusters, Cluster 1 is characterized by mid-range score levels of the indicators used to define the

Table 2.
Variables definition

<i>Dependent variable</i>	Measurement
f_error	Forecast error, measured as the difference between earnings per share forecast and earnings per share actual scaled by share price at the end of the fiscal year
<i>Independent Variables</i>	
IR_release	Dummy variable equal to 1 if the company publishes the IR; and 0 otherwise
Cluster1	Dummy variable equal to 1 if the company is located in one of the countries belonging to Cluster 1 (namely, France, Hong Kong, Japan, the United Kingdom and the USA); and 0 otherwise
Cluster2	Dummy variable equal to 1 if the company is located in one of the countries belonging to Cluster 2 (namely, Australia, Canada, Denmark, Germany, Luxembourg, The Netherlands, New Zealand and Switzerland); and 0 otherwise
Cluster3	Dummy variable equal to 1 if the company is located in one of the countries belonging to Cluster 3 (namely, Brazil, China, Greece, Italy, Namibia, Republic of South Korea and Sri Lanka); and 0 otherwise
IR_release_Cluster1	Interaction between IR_release and Cluster1
IR_release_Cluster2	Interaction between IR_release and Cluster2
IR_release_Cluster3	Interaction between IR_release and Cluster3
<i>Firm-level financial controls</i>	
ln_nana	Natural logarithm of the number of analysts following each company each year
l_eps_st	Natural logarithm of the earnings per share standard deviation
Lev	Leverage is the ratio of total debt to the sum of total debt and the book value of common shareholders' equity
ROA	EBIT/total assets ratio
<i>Firm-level disclosure controls</i>	
CSR_report	Dummy variable equal to 1 if the company issues a standalone CSR/sustainability report, and 0 otherwise
ESG_env	ESG disclosure indicator section environment
ESG_gov	ESG disclosure indicator section governance
ESG_soc	ESG disclosure indicator section social
IFRS	Dummy variable equal to 1 if the company issues the annual report according to the IFRS; 0 otherwise
IR_first	Dummy variable equal to 1 if the company in that year release the IR for the first time
Naics	Dummy variable equal to 1 for sensitive industries (mining, manufacturing and trade), and 0 otherwise
<i>Firm-level corporate governance controls</i>	
BoardSize	Number of the board's members
W	Proportion of women on board of directors
Nonex	Proportion of non-executive board members sitting in the board
Controlled	Dummy variable equal to 1 if the company is controlled by a concentrated ownership
<i>Variables used for endogeneity test</i>	
antiself	Measure of the investor protection (Djankov <i>et al.</i> , 2003)
ESG_linked_bonus	Dummy variable equal to 1 if the management receives a bonus based on ESG indicators
Size	Natural logarithm of the total assets
Disc	Measure of the level of disclosure requirements in security offerings (La Porta <i>et al.</i> , 2006)

country-specific institutional characteristics (i.e. voice and accountability, government effectiveness, regulatory quality, rule of law and anti-corruption). In particular, Cluster 1 presents average scores higher than those of the countries included in the cluster with the lowest scores (i.e. Cluster 3), while its main difference from Cluster 2 relates to the score of

Panel A: Mean values of institutional characteristics by cluster				
		Cluster 1	Cluster 2	Cluster 3
Voice and accountability index		1.180	1.443	0.578
Voice and accountability standard deviation		0.142	0.144	0.135
Political stability index		0.484	0.847	0.104
Government effectiveness index		1.544	1.753	0.404
Government effectiveness standard deviation		0.222	0.222	0.212
Regulatory quality index		1.573	1.822	0.441
Regulatory quality standard deviation		0.222	0.225	0.208
Rule of law index		1.626	1.743	0.218
Rule of law standard deviation		0.167	0.168	0.163
Control of corruption index		1.659	1.908	-0.015
Control of corruption standard deviation		0.138	0.141	0.137
Panel B: Cluster membership of countries				
Cluster 1		Cluster 2		Cluster 3
France		Australia		Brazil
Japan		Canada		China
Hong Kong		Denmark		Greece
United Kingdom		Germany		Italy
USA		Luxembourg		Namibia
		The Netherlands		Republic of South Korea
		New Zealand		Sri Lanka
		Switzerland		
Panel C: Pervasiveness of IR release by cluster				
Cluster	IR adopters		IR non-adopters	
	No. of companies	No. of observations	No. of companies	No. of observations
1	85	474	57	205
2	31	301	20	54
3	23	154	2	21
<i>Total</i>	<i>139</i>	<i>929</i>	<i>79</i>	<i>280</i>

Table 3.
Cluster analysis

the “voice and accountability” indicator, which in Cluster 2 is considerably higher than in Cluster 1. In brief, Cluster 3 includes the countries that show the lowest levels of institutional enforcement, whereas Cluster 1 and Cluster 2 include the countries that show high levels of institutional enforcement. Further, in contrast to the countries in Cluster 1, the countries in Cluster 2 are characterized by high freedom of expression and related possibilities to publicly express concerns on various matters. In sum, Cluster 1 is characterized by strong institutional enforcement, Cluster 2 by strong institutional enforcement and a pluralistic society and Cluster 3 by weak institutional enforcement.

4.2 Descriptive analysis

We limit the analysis to the observations matched with the PSM. After matching, we obtain 1,209 firm-year observations related to 139 IR adopters and 79 IR non-adopters (as not all firms have complete data for every year, our panel is unbalanced).

Table 4 shows the descriptive statistics. Panel A shows the statistics for the pooled sample; Panel B shows the statistics for the IR adopters and Panel C shows the statistics for the IR non-adopters. Panel D presents the difference in the means of the variables between the two sub-samples (IR adopters and IR non-adopters). Table 4, Panel A shows that most

	Count	Mean	First quartile	Median	Third quartile	Standard deviation
<i>Panel A – Overall sample statistics</i>						
Ferror	1209	0.0154282	0.0005826	0.0107923	0.0166885	0.0257539
IR_release	1209	0.7684036	1	1	1	0.422027
Cluster1	1209	0.5616212	0	1	1	0.4963936
Cluster2	1209	0.2936311	0	0	1	0.4556134
Cluster3	1209	0.1447477	0	0	0	0.3519919
l_eps_st	1209	0.3243897	0.0201244	0.1094877	0.3143583	0.7072649
ln_nana	1209	2.437656	2.197225	2.484907	2.890372	0.5106806
lev	1209	0.6158355	0.5133115	0.6007727	0.7508818	0.1813958
ROA	1209	0.0545902	0.0195116	0.049781	0.0758303	0.0677495
ESG_env	1209	44.55269	34.4828	43.4109	55.814	16.05806
ESG_gov	1209	62.83677	57.1429	62.5	67.8571	6.409519
ESG_soc	1209	50.0152	42.1053	49.1228	59.6491	13.17261
IFRS	1209	0.783292	1	1	1	0.4121725
IR_first	1209	0.1116625	0	0	0	0.3150811
Naics	1209	0.7675765	0	1	1	0.4225524
W	1209	0.2601821	0.2	0.25	0.3636364	0.1374432
controlled	1209	0.0512821	0	0	0	0.2206637
Nonex	1209	80.40873	75	87.5	100	22.0741
BoardSize	1209	11.34574	9	11	13	3.006819
CSR_report	1209	0.0215054	0	0	0	0.1451217
N	1209					
<i>Panel B – IR-adopters sample statistics</i>						
ferror	929	0.0139568	0.0002826	0.0100656	0.0135046	0.0259346
IR_release	929	1	1	1	1	0
Cluster1	929	0.510226	0	1	1	0.5001647
Cluster2	929	0.3240043	0	0	1	0.4682537
Cluster3	929	0.1657696	0	0	0	0.372074
l_eps_st	929	0.2596826	0.0302778	0.1094877	0.3768521	0.4117148
ln_nana	929	2.539539	2.197225	2.564949	2.944439	0.470953
lev	929	0.6293282	0.5314091	0.6007727	0.7624348	0.1772833
ROA	929	0.0566361	0.0156483	0.0477089	0.0758303	0.0747558
ESG_env	929	46.32578	36.4341	43.75	58.6777	16.08011
ESG_gov	929	64.353	62.5	62.5	71.4286	5.678386
ESG_soc	929	53.90224	47.3684	52.6316	60	11.23201
IFRS	929	0.926803	1	1	1	0.2605999
IR_first	929	0.1453175	0	0	0	0.3526105
Naics	929	0.7244349	0	1	1	0.4470393
W	929	0.2856739	0.2222222	0.2777778	0.3846154	0.1171897
controlled	929	0.0441335	0	0	0	0.2055022
Nonex	929	86.17515	80	90	100	15.16648
BoardSize	929	11.60926	10	11	13	2.962983
CSR_report	929	0.0279871	0	0	0	0.1650246
N	929					
<i>Panel C – IR non-adopters statistics</i>						
ferror	280	0.0203098	0.0053799	0.0113806	0.0267903	0.0245652
IR_release	280	0	0	0	0	0
Cluster1	280	0.7321429	0	1	1	0.4436357
Cluster2	280	0.1928571	0	0	0	0.3952483
Cluster3	280	0.075	0	0	0	0.2638629

(continued)

Table 4. Descriptive statistics

	Count	Mean	First quartile	Median	Third quartile	Standard deviation
l_eps_st	280	0.5390785	0	0.0463149	0.2331777	1.241704
ln_nana	280	2.099625	1.791759	2.197225	2.397895	0.4921431
lev	280	0.5710686	0.4719426	0.588239	0.6613109	0.1879125
ROA	280	0.0478022	0.0276452	0.0518748	0.067144	0.0350046
ESG_env	280	38.66983	27.907	43.4109	47.2868	14.53371
ESG_gov	280	57.80613	51.7857	57.1429	62.5	6.129632
ESG_soc	280	37.11857	31.5789	36.8421	43.8596	10.6975
IFRS	280	0.3071429	0	0	1	0.4621351
IR_first	280	0	0	0	0	0
Naics	280	0.9107143	1	1	1	0.2856663
W	280	0.1756041	0	0.1111111	0.3	0.1636131
controlled	280	0.075	0	0	0	0.2638629
Nonex	280	61.27656	30	76.389	88.889	29.43768
BoardSize	280	10.47143	9	10	11	2.990889
CSR_report	280	0	0	0	0	0
N	280					

Panel D – t-Test differences between the means of forecast error

	IR adopters	IR non-adopters	Difference	p-Value
Pooled sample	0.139	0.203	0.015	0.000
Cluster1	0.004	0.018	0.009	0.000
Cluster2	0.020	0.033	0.022	0.008
Cluster3	0.032	0.005	-0.026	0.000

Table 4.

of the companies are located in countries belonging to Cluster 1 (56%). Because the selection of the control sample is originally driven by the geographical location (other than industry and size), also the matched IR non-adopters are mostly located in Cluster 1 (73%).

We examine the difference in means between the matched firms for the variables included in our first-stage model. The difference is not significant for most of the variables.

Forecast error (*f_error*) is significantly lower in the IR adopters than IR non-adopters. This suggests that financial analysts following companies releasing reports predict the earnings per share with more accuracy compared with companies that do not release reports. However, the difference in the means of *f_error* between IR adopters and IR non-adopters is not significantly consistent across the clusters.

Table 5 presents the simple correlations among the variables. The accuracy of the analysts' forecast is significantly and negatively related to *IR_release* and *Cluster1*, while it is positively and significantly related to *Cluster2* and *Cluster3*.

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

4.3 Multivariate results

Table 6 shows the results from the estimation for the model specifications measuring the analysts' forecast error. The model specifications report the association between the accuracy of the earnings forecasts and the integrated report release.

Model 1 shows the specifications for equation (1). The coefficient of *IR_release* is negative and statistically significant (*IR_release*: -0.008, *p*-value: 0.00), suggesting that firms that release reports are associated with more forecast accuracy than companies that do not issue reports, providing preliminary indicators to accept *H1*.

(continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(1) f_error	1																			
(2) IR_release	-0.1041*	1																		
(3) Cluster1	0.0003	-0.3020*	-0.1887*	1																
(4) Cluster2	0.0000	0.0000	0.1215*	-0.7298*	1															
(5) Cluster3	0.0000	0.0000	0.2097*	0.1088*	-0.4656*	-0.2652*	1													
(6) L_eps_st	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.1056*	1												
(7) ln_nana	0.0352	0.3635*	-0.3934*	0.3060*	0.1586*	-0.1060*	0.0000	0.0000	1											
(8) lev	0.0112	0.1355*	-0.0103	-0.2614*	0.3529*	-0.2052*	0.0002	0.0000	0.0000	1										
(9) ROA	-0.0908*	0.055	-0.1580*	0.3406*	-0.2184*	0.1936*	0.1502*	-0.2646*	0.0000	0.0000	1									
(10) ESG_env	0.0016	0.0558	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1								
(11) ESG_gov	-0.0394	0.2012*	-0.1983*	0.1056*	0.1429*	0.0027	0.2466*	-0.0471	-0.1704*	0.0000	0.0000	0.0000	1							
(12) ESC_soc	0.1707	0.0000	0.0000	0.0002	0.0000	0.9244	0.0000	0.1017	0.0000	0.2457*	0.0000	0.0000	0.4889*	1						
(13) naites2	0.0000	0.0000	0.8585	0.0507	0.0227	0.0000	0.0000	0.0805	0.9712	0.0000	0.0000	0.3023*	0.4889*	0.0000	1					
(14) IFRS	-0.0484	0.5377*	-0.2440*	0.0453*	0.2854*	-0.1278*	0.2003*	0.0306	-0.1152*	0.3023*	0.4889*	0.0000	0.0000	0.0000	0.0000	1				
(15) IR_first	0.0927	0.0000	0.0000	0.1152	0.0000	0.0000	0.0000	0.2884	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0526	1			
(16) W	0.0341	-0.1860*	0.1729*	0.0386	-0.2912*	0.1751*	0.0657*	-0.2509*	0.1156*	0.3294*	0.1414*	0.0389	0.0000	0.0674	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
(17) controlled	0.2366	0.0000	0.0000	0.2036	0.0000	0.0000	0.0224	0.0000	0.0001	0.0000	0.0000	0.1767	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
(18) Nomex	-0.054	0.6345*	-0.3797*	0.3391*	0.0966*	-0.3489*	0.3337*	0.0226	0.0456	0.1045*	0.3600*	0.5020*	-0.2372*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
(19) CSK_report	0.0004	0.0000	0.0000	0.0000	0.0008	0.0000	0.0000	0.4314	0.1132	0.0003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	-0.0193	0.1946*	-0.0043	-0.0960*	0.1303*	-0.0742*	-0.0748*	-0.0178	-0.015	-0.0941*	0.0275	0.0566*	-0.2028*	0.0526	0.0674	0.0000	0.0000	0.0000	0.0000	0.0000
	0.5029	0.0000	0.8803	0.0008	0.0000	0.0099	0.0093	0.5373	0.6012	0.001	0.3398	0.0493	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	-0.0642*	0.3380*	-0.1188*	0.1703*	-0.0527	-0.2679*	0.2279*	0.2211*	0.1094*	-0.1071*	0.3224*	0.2829*	-0.0829*	0.4605*	-0.1008*	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0256	0.0000	0.0000	0.0000	0.067	0.0000	0.0000	0.0000	0.0001	0.0002	0.0000	0.0000	0.0039	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	-0.0006	-0.0590*	0.0618*	-0.1499*	0.1069*	0.1082*	-0.0901*	-0.1907*	0.0102	0.1153*	-0.0174	0.0337	0.0125	-0.0324	-0.0586*	-0.2768*	0.0000	0.0000	0.0000	0.0000
	0.9832	0.0401	0.0316	0.0000	0.0002	0.0002	0.0017	0.0000	0.7229	0.0001	0.5445	0.2415	0.6636	0.2597	0.0416	0	0	0	0	0
	0.0079	0.4760*	-0.5524*	0.4823*	0.1548*	-0.3111*	0.5357*	0.2322*	0.1107*	0.0882*	0.4257*	0.3630*	-0.1957*	0.5868*	-0.0168	0.5587*	-0.0928*	0.5587*	-0.0928*	1
	0.7842	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0021	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0012
	0.1005*	0.0814*	-0.1103*	-0.0956*	0.2793*	0.012	-0.0586*	0.0636*	-0.041	0.1233*	-0.0523	0.2032*	0.0681*	0.0730*	-0.0164	-0.1102*	0.2240*	0.1099*	1	1

Table 5. Correlation matrix

Table 5.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
0.0005	0.0046	0.0001	0.0009	0.0000	0.6763	0.0418	0.0271	0.1538	0.0000	0.0691	0.0000	0.0179	0.0067	0.57	0.0001	0.0000	0.0000	0.0001		
-0.0503	0.1597*	-0.0476	0.0201	0.0411	-0.2090*	0.2268*	0.2546*	-0.0581*	0.1163*	0.1048*	0.1218*	-0.3048*	0.1320*	-0.0836*	0.1985*	-0.1315*	0.1875*	-0.0853*	1	
0.0804	0.0000	0.0983	0.485	0.1536	0.0000	0.0000	0.0000	0.0433	0.0001	0.0003	0.0000	0.0000	0.0000	0.0036	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

		Panel A – Estimated models			
		(1)	(2)	(3)	(4)
	IR_release	f_error -0.008*** (0.00)	f_error 0.007** (0.04)	f_error -0.003 (0.25)	f_error -0.008*** (0.00)
	Cluster1		-0.017*** (0.00)		
	IR_release_Cluster1		-0.023*** (0.00)		
	Cluster2			0.023*** (0.00)	
	IR_release_Cluster2			0.014*** (0.00)	
	Cluster3				-0.015** (0.01)
	IR_release_Cluster3				0.019*** (0.00)
Firm-level financial controls	ln_nana	0.005*** (0.01)	-0.000 (0.93)	0.006*** (0.00)	0.001 (0.56)
	l_eps_st	0.011*** (0.00)	0.010*** (0.00)	0.010*** (0.00)	0.011*** (0.00)
	ROA	-0.075*** (0.00)	-0.108*** (0.00)	-0.097*** (0.00)	-0.066*** (0.00)
	lev	0.001 (0.79)	0.006 (0.18)	0.015*** (0.00)	-0.010** (0.04)
Firm-level disclosure controls	ESG_env	-0.000*** (0.00)	-0.000*** (0.00)	-0.000*** (0.00)	-0.000*** (0.00)
	ESG_gov	-0.001*** (0.00)	-0.000 (0.54)	-0.001*** (0.00)	-0.000*** (0.00)
	ESG_soc	0.000 (0.28)	-0.000 (0.32)	0.000** (0.04)	-0.000** (0.01)
	CSR_report	0.012** (0.02)	0.012** (0.02)	0.021*** (0.00)	-0.001 (0.86)
	IFRS	0.006** (0.03)	0.001 (0.60)	-0.001 (0.80)	0.004 (0.12)
	IR_first	0.003 (0.15)	0.003 (0.12)	0.005** (0.04)	0.001 (0.77)
	Naics	0.007*** (0.00)	0.013*** (0.00)	0.005** (0.03)	0.013*** (0.00)
Firm-level corporate governance controls	BoardSize	0.000 (0.37)	0.001*** (0.00)	0.000 (0.55)	0.001** (0.03)
	W	-0.008 (0.29)	0.015** (0.03)	0.003 (0.72)	-0.011 (0.11)
	Nonex	0.000*** (0.00)	-0.000*** (0.01)	-0.000 (0.35)	0.000*** (0.00)
	Controlled	-0.003 (0.45)	0.004 (0.20)	0.005 (0.18)	-0.007** (0.03)
	Constant	0.034*** (0.00)	0.038*** (0.00)	0.025*** (0.00)	0.027*** (0.00)
	r ²	0.144	0.274	0.192	0.214
	N	1,209.000	1,209.000	1,209.000	1,209.000

Table 6. Regression model – analysts' forecast error (*f_error*)

Notes: **p* < 0.10, ***p* < 0.05, ****p* < 0.01

Models 2, 3 and 4 show the specifications for equation (2), where each interaction term is added individually. The baseline effect indicating the choice to release an integrated report (*IR_release*) is differently associated with the forecast error across the models. The interactions (*IR_release_Cluster1*, *IR_release_Cluster2* and *IR_release_Cluster3*) are all significantly associated with the dependent variable, indicating that the cluster belonging plays a moderating role in the relationship between the choice to release a report and forecast accuracy, providing preliminary indicators to accept **H2**.

Model 2 shows that IR adopters located in Cluster 1 are negatively associated with the forecast error (*IR_release_Cluster1*: -0.023, *p*-value: 0.000). The baseline effect of *Cluster1* indicates that firms located in countries characterized by strong institutional enforcement (Cluster 1) are negatively and significantly associated with the forecast error (*Cluster1*: -0.017, *p*-value: 0.00) regardless they are IR adopters or not. The baseline effect of *IR_release* is positive and significant (*IR_release*: 0.007, *p*-value: 0.004), indicating that the choice to release the IR, *per se*, is not beneficial for the analysts' forecast accuracy regardless the clusters' belonging.

Model 3 shows that IR adopters located in Cluster 2 are positively and significantly associated with the forecast error (*IR_release_Cluster2*: 0.014, *p*-value: 0.000). The baseline effect of *Cluster2* indicates that firms located in countries belonging to Cluster 2 are positively and significantly associated with the forecast error (*Cluster2*: 0.023, *p*-value: 0.000), while the baseline effect capturing the choice to release IR is not significantly associated with the financial analysts' accuracy (*IR_release*: -0.003; *p*-value 0.25).

Model 4 shows that IR adopters located in Cluster 3 are positively and significantly associated with the forecast error (*IR_release_Cluster3*: -0.019, *p*-value: 0.000). The baseline effect shows that the choice to issue the IR is, *per se*, negatively and significantly associated with the forecast error (*IR_release*: -0.008; *p*-value: 0.00). The baseline effect of Cluster 3 indicates that firms located in countries belonging to Cluster 3 are negatively and significantly associated with the forecast error (*Cluster3*: -0.015, *p*-value: 0.000).

These results suggest that capital market benefits from the integrated report informativeness vary systematically across different institutional enforcement.

4.4 Additional analysis

We conduct a series of additional tests to address endogeneity concerns. Indeed, it is likely that the decision to release an integrated report is not random as this decision could be based on expectations of impact on future performance or even other firms' specific unobservable variables.

To address selection bias because of sample selection, we use a Heckman two-stage model (Heckman, 1979). We first develop a probit model predicting the integrated report release choice. The first-stage model includes a variable that satisfies the exclusion restriction. In our case, such a variable is related to the choice of integrated report release, but unrelated to forecast error. We argue that companies are more likely to release integrated reports depending on the investor protection at country level, while it is unlikely to affect the firm-level forecast error. Our first-stage probit model is specified below:

$$IR_release_{it} = \beta_0 + \beta_1 antiself_{it} + \beta_2 lev_{it} + \beta_3 ROA_{it} + \beta_4 Size + \beta_5 BoardSize_{it} + \beta_6 Nonex_{it} + \beta_7 IFRS_{it} + \varepsilon_{it} \quad (4)$$

where *antiself* is the measure of the investor protection for firm *i* in year *t* (Djankov *et al.*, 2003); *antiself* is an index that measures the level of legal protection of minority shareholders against expropriation by corporate insiders, taking into account vote by mail; shares not

blocked or deposited; cumulative voting; oppressed minority; pre-emptive rights; and capital to call meeting. We use *antiself* as a variable satisfying the exclusion restriction, arguing that the level of investor protection is likely to drive companies' disclosure choice in two alternative directions. On the one hand, the higher the investor protection is, the more the companies are pressured to reduce agency conflict and information asymmetry, choosing to voluntarily release integrated reports. Conversely, high investor protection might indicate that there is no need for further measures to reduce information asymmetries because investors are already assured by extant practices. Either way, investor protection dictates a firm's disclosure practice, and thus is expected to be correlated with integrated report release choice. The other variables included in the first-stage probit are likely determinants of report release choice selected from prior literature (Obeng *et al.*, 2020) and defined in Table 2. The variable *lev* indicates the leverage ratio and captures the information demand about firms' downside risks (Goss and Roberts, 2011). *ROA* and *Size* indicate, respectively, the company's profitability and total assets, capturing the resources available for IR disclosure (Zhou *et al.*, 2017). We include the board size (*BoardSize*) and the percentage of non-executive directors (*Nonex*), following the literature (Frias-Aceituno *et al.*, 2014). *IFRS* captures the adoption of accounting standards in preparing mandatory disclosure that several studies have found to be beneficial for forecast accuracy (Byard *et al.*, 2011). Then, we use the inverse Mills ratio (IMR) estimated from the first-stage model as an additional regressor in equation (2).

Table 7 shows the results of the Heckman two-stage model. Panel A presents the model in the first step, where the exclusion restriction variable *antiself* is negatively and significantly associated with the choice to release an integrated report, consistent with the motivation that the choice to release a report is inversely associated with the investor protection level (*antiself*: -0.851 , p -value: 0.00). This result indicates that the pressure to reduce information asymmetry is significant in explaining the choice to release a report.

Panel B presents the model in the second step, where the coefficients of *IR_release_Cluster1*, *IR_release_Cluster2* and *IR_release_Cluster3* remain significantly associated with the dependent variable, with the same sign detected in the main analysis, confirming that the informativeness of IR for the market is systematically different across different institutional settings. The IMR is statistically significant, indicating that there is selection bias. Therefore, the two-step estimation is necessary to deal with the selection bias (Certo *et al.*, 2016). In the second step, the true effect is recovered, and the results confirm our previous findings.

Heckman model performs poorly when other sources of endogeneity exist (Certo *et al.*, 2016). To address other sources of endogeneity, such as omitted variables and simultaneity, we perform a 2SLS instrumental variables approach.

Obtaining appropriate instruments challenges the implementation of statistical approaches for dealing with omitted variables and simultaneity (Lang *et al.*, 2012). We identify an instrumental variable related to the choice to release an integrated report that, at the same time, has not been identified as a determinant of the financial analysts' forecast accuracy. Specifically, we estimate the IR adopter/non-adopter choice as a function of the choice to grant top managers a variable remuneration based on the ESG performance. Companies granting the top managers a bonus linked to ESG performance are likely to be more facilitated in preparing integrated reports, which increases their incentives to release the report. *ESG_LINKED_BONUS* is a dummy variable equal to 1 if company i in year t grants the top managers a variable bonus linked to ESG performance, and 0 otherwise. Our first-stage model is specified below:

Panel A				
First step				
<i>IR_release</i>				
antiself	-0.851***			
	(0.00)			
IFRS	3.644***			
	(0.00)			
ROA	2.431*			
	(0.06)			
size	0.277***			
	(0.00)			
Nonex	-0.003			
	(0.56)			
lev	0.120			
	(0.73)			
BoardSize	-0.013			
	(0.54)			
Constant	-8.181***			
	(0.00)			
Pseudo R2	0.415			
Panel B				
Second step	(1)	(2)	(3)	(4)
<i>l_eps_st</i>	0.024***	0.016***	0.023***	0.022***
	(0.00)	(0.00)	(0.00)	(0.00)
<i>ln_nana</i>	0.004	-0.001	0.002	0.005**
	(0.11)	(0.50)	(0.34)	(0.02)
Controlled	0.004	0.005	0.006	-0.006
	(0.31)	(0.25)	(0.15)	(0.20)
<i>IR_first</i>	0.006**	0.004	0.006**	0.004*
	(0.02)	(0.11)	(0.02)	(0.10)
<i>W</i>	0.004	0.017**	0.007	0.001
	(0.68)	(0.04)	(0.43)	(0.88)
<i>IR_release_Cluster1</i>		-0.019***		
		(0.00)		
<i>IR_release_Cluster2</i>			0.004*	
			(0.07)	
<i>IR_release_Cluster3</i>				0.022***
				(0.00)
Constant	0.004	0.018***	0.005	-0.006
	(0.49)	(0.00)	(0.41)	(0.34)
<i>/mills</i>				
<i>Lambda</i>	-0.028***	-0.009**	-0.026***	-0.017***
	(0.00)	(0.05)	(0.00)	(0.00)
<i>p</i>	0.000	0.000	0.000	0.000
<i>Chi</i> ²	104.193	195.230	105.628	186.236
<i>rho</i>	-0.976	-0.381	-0.919	-0.684
<i>N</i>	1,091.000	1,091.000	1,091.000	1,091.000

Table 7.
Heckman model

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

$$IR_{release_{it}} = \beta_0 + \beta_1 ESG_linked_bonus_{it} + Controls + \varepsilon_{it} \quad (5)$$

Table 8 presents the results of the four models. Column 1 shows the first stage where the instrumental variable (*ESG_LINKED_BONUS*: 0.080; *p*-value: 0.000) is positively and significantly related to *IR_release*, consistently with our expectations. This result indicates that the ESG-based remuneration incentives granted to managers is significant in explaining the company's choice to release the IR.

		(1) First stage	(2) Second stage
	VARIABLES	IR_release	ferror_0
Firm-level financial controls	l_eps_st	0.063*** (0.000)	0.006** (0.032)
	ln_nana	0.122*** (0.000)	-0.006 (0.191)
	lev	0.264*** (0.000)	-0.017* (0.075)
	ROA	0.094 (0.506)	-0.065*** (0.000)
Firm-level disclosure controls	IR_first	0.262*** (0.000)	-0.019** (0.033)
	IFRS	0.529*** (0.000)	-0.041** (0.020)
	CSR_report	0.146** (0.025)	0.007 (0.439)
	Naics	-0.022 (0.403)	-0.001 (0.846)
Firm-level corporate governance controls	BoardSize	0.009*** (0.007)	-0.001* (0.098)
	W	0.103 (0.238)	-0.016 (0.146)
	Controlled	0.028 (0.520)	-0.006 (0.201)
	Nonex	0.001 (0.137)	0.000 (0.441)
	ESG_LINKED_BONUS	0.080*** (0.000)	
	IR_release		0.070** (0.021)
	Constant	-0.383*** (0.000)	0.031** (0.027)
	Observations	1,209	1,209
	R-squared		-0.804
	Under-identification (t-stat)		14.328
	Under-identification (<i>p</i> -value)		0.000
	Weak-identification (t-stat)		14.332
	Stock-Yogo (10% max IV size)		16.38
	Sargan (t-stat)		0.000
	Sargan (<i>p</i> -value)		0.000

Notes: **p* < 0.10, ***p* < 0.05, ****p* < 0.01

Table 8. Two-stage least squares instrumental variable (ESG_LINKED_BONUS)

Column 2 shows the second stage, which uses the predicted value of *IR_release* estimated in the first stage. The coefficient of the variables of interest (*IR_release*: 0.070; *p*-value: 0.021) in the second stage is not consistent with the main result, indicating that the choice to release the integrated report is not, *per se*, beneficial for the capital market. Thus, we cannot accept **H1**. This result supports the idea that the benefit of the IR is not observable unless the different institutional settings are taken into account.

The Cragg Donald Wald F statistic reveals that the first stage estimation is not weak according to the rule of thumb of [Staiger and Stock \(1997\)](#). Because the first stage model includes a single endogenous variable, we perform the refinement to the rule of thumb according to the [Stock and Yogo \(2005\)](#), confirming that the first stage is not weak. The *p*-value of the under-identification test is less than significance level; therefore, we reject the null hypothesis of under-identification and we confirm that the model is exactly identified. The overidentification hypothesis is rejected because only one instrument is included.

We believe that the omitted variables and simultaneity problems might affect the cross-sectional moderator role of the institutional setting captured in the main analysis by the interaction terms. Therefore, we identify two instrumental variables related to the choice to release an integrated report across different institutional setting that, at the same time, has not been identified as a determinant of the financial analysts' forecast accuracy.

Specifically, we estimate the endogenous interacted variables, respectively; *IR_release_Cluster1*, *IR_release_Cluster2* and *IR_release_Cluster3* as a function of the choice to grant top managers a variable remuneration based on the ESG performance (*ESG_LINKED_BONUS*) and the measure of the country level of disclosure requirements in security offerings (*Disc*) retrieved from the World Bank database. The variable *Disc* summarizes the disclosure requirements faced by firms referring to security offerings in a given country. The disclosure requirements in security offerings capture the ability to make it cheaper for investors to recover damages when information about the promoter of a security is wrong or omitted ([La Porta et al., 2006](#)). The variable *Disc* is an index calculated as the average of the following proxies: whether promoters can issue securities without delivering a prospectus describing the securities to potential investors in advance; insiders' compensation; ownership by large shareholders; inside ownership; contracts outside the normal course of business; and transactions with related parties ([La Porta et al., 2006](#)). The instrumental variable *Disc* is expected to capture cross-sectional variation in the disclosure requirements across different institutional settings[4]. We argue that the strength of the disclosure requirement is likely to drive companies' disclosure choice in two alternative directions. On the one hand, a high level of disclosure requirements urges companies to be equipped with corporate systems and data management suitable to supply information to prepare corporate disclosure meeting the requirements. Therefore, the more the disclosure requirements are strict, the more companies are likely to release the IR. Conversely, a demanding disclosure requirement might indicate that companies are already preparing a high standing corporate disclosure to meet the requirements. Therefore, the more the disclosure requirements are strict, the less companies are willing to invest additional effort to voluntary issue the IR. We expect that disclosure requirement drives firm's disclosure choice differently in diverse institutional setting, because the patterns of institutional characteristics are likely to urge companies to be or not willing to invest the extra effort to issue IR. We do not have expectation about the direction where diverse institutional settings patterns are likely to drive the companies' choices. However, the level of disclosure requirement is expected to be correlated with different integrated report release choice in diverse clusters.

As the endogenous variable to be estimated is an interacted term, following [Wooldridge \(2010\)](#), we model the first stage interacting each instrumental variable with, respectively, the dummies: *Cluster1*, *Cluster2* and *Cluster3*. Our first-stage model is specified below:

$$IR_release_Cluster_{it} = \beta_0 + \beta_q ESG_linked_bonus * Cluster_{it} + \beta_s Disc * Cluster_{it} + \beta_w Cluster_{it} + Controls + \varepsilon_{it} \quad (6)$$

[Table 9](#) presents the results of the models.

Columns 1, 3 and 5 show the first stage of the model specifications estimating the endogenous interaction, respectively, when IR adopter belongs to each of the three clusters. The first stage of each model's specifications shows that the instrumental variables are significantly related to the endogenous interacted variables.

In the first stage, the instrumental variable *ESG_LINKED_BONUS* interacted with each dummy variable, indicating the clusters' belonging (*ESG_LINKED_BONUS_Cluster1*, *ESG_LINKED_BONUS_Cluster2*, *ESG_LINKED_BONUS_Cluster3*) is positively and significantly associated with the endogenous variable across the clusters, indicating that the choice to grant manager bonus linked to ESG performance is significantly likely to predict the choice to release IR. This result indicates that the ESG-based managers' incentives are significant in explaining the companies' choice to release a report regardless the cluster belonging.

The instrumental variable *Disc* interacted with each dummy variable, indicating the clusters' belonging (*Disc_Cluster1*, *Disc_Cluster2*, *Disc_Cluster3*) is positively and significantly associated with the choice to release the IR in Cluster 1 (*Disc_Cluster1*: 0.649; *p*-value: 0.000) and in Cluster 3 (*Disc_Cluster3*: 0.151; *p*-value: 0.000), indicating that the more tighten the disclosure requirements, the more likely companies are choosing to release the integrated report. Interestingly the opposite phenomenon is observable in Cluster 2 (*Disc_Cluster2*: -1.995; *p*-value: 0.000), where the disclosure requirement at a country level is negatively and significantly associated with the likelihood the companies choose to release the integrated report. We interpret this phenomenon in light of the high "regulatory quality" characterizing Cluster 2. The high "regulatory quality" urges companies to prepare mandatory corporate reporting according to high standard of disclosure requirements and this is likely to discourage companies to embrace an additional voluntary reporting. This result indicates that the disclosure requirement is significant in explaining the companies' choice to release a report across different clusters.

The Cragg Donald Wald F statistic reveals that the first stage estimation is not weak according to the rule of thumb of [Staiger and Stock \(1997\)](#). The *p*-value of the under-identification test is less than significance level; therefore, we reject the null hypothesis of under-identification and we confirm that the model is exactly identified. The Sargan test indicates that overidentification hypothesis of all instruments is rejected.

Columns 3, 6 and 9 show the second stage of each model's specifications, which use the predicted value of *IR_release* estimated in the first stage.

In the second stage, the signs and the significance of the coefficients are different across the three clusters. Thus, we can assert that in contexts where IR is voluntary, the usefulness of IR in providing financial analysts with information that allows them to forecast the market performance is systematically different across countries with different institutional characteristics, confirming **H2**.

However, the coefficients of the interactions are not all consistent with prior findings. Specifically, the coefficients of the interactions are consistent with prior findings for Cluster

Table 9.
Two-stage least
squares instrumental
variables (ESG_
LINKED_BONUS
and Disc)

Variables	(1)		(2)		(3)		(4)		(5)		(6)	
	IR_release_Cluster1	First stage IR_release_Cluster1	error_0	Second stage error_0	IR_release_Cluster2	First stage IR_release_Cluster2	error_0	Second stage error_0	IR_release_Cluster3	First stage IR_release_Cluster3	error_0	Second stage error_0
L_eps_st	0.033*** (0.001)	0.004 (0.547)	0.012*** (0.000)	0.010*** (0.000)	0.004 (0.000)	0.004 (0.000)	0.010*** (0.000)	0.010*** (0.000)	0.035*** (0.000)	0.000 (0.000)	0.007*** (0.000)	0.000 (0.000)
ln_nana	0.019 (0.254)	0.066*** (0.000)	-0.001 (0.788)	0.004 (0.154)	0.027* (0.086)	0.004 (0.154)	0.004 (0.154)	0.004 (0.154)	-0.004 (0.611)	-0.004 (0.168)	-0.003 (0.168)	-0.003 (0.168)
lev	0.016 (0.698)	0.010** (0.045)	0.010** (0.045)	0.021*** (0.000)	-0.029 (0.360)	0.021*** (0.000)	0.021*** (0.000)	0.021*** (0.000)	-0.032 (0.119)	-0.032 (0.119)	-0.004 (0.527)	-0.004 (0.527)
ROA	-0.337*** (0.001)	-0.096*** (0.000)	-0.096*** (0.000)	0.021*** (0.000)	1.127*** (0.000)	0.021*** (0.000)	-0.080*** (0.000)	0.021*** (0.000)	0.144*** (0.002)	0.144*** (0.002)	-0.057*** (0.000)	-0.057*** (0.000)
IR_first	0.157*** (0.000)	0.027* (0.086)	0.010*** (0.004)	0.004 (0.154)	0.027* (0.086)	0.004 (0.154)	0.004 (0.154)	0.004 (0.154)	-0.009 (0.350)	-0.009 (0.350)	-0.000 (0.947)	-0.000 (0.947)
IFRS	0.105** (0.013)	0.105** (0.013)	0.021*** (0.000)	0.021*** (0.000)	0.010 (0.659)	0.010 (0.659)	-0.007* (0.089)	-0.007* (0.089)	0.370*** (0.000)	0.370*** (0.000)	-0.035** (0.034)	-0.035** (0.034)
CSR_report	0.036 (0.423)	0.036 (0.423)	0.012** (0.036)	0.012** (0.036)	-0.036 (0.275)	-0.036 (0.275)	0.026*** (0.000)	0.026*** (0.000)	0.186*** (0.000)	0.186*** (0.000)	-0.005 (0.527)	-0.005 (0.527)
Naics	-0.022 (0.267)	-0.022 (0.267)	0.008*** (0.001)	0.008*** (0.001)	-0.011 (0.405)	-0.011 (0.405)	0.002 (0.498)	0.002 (0.498)	-0.056*** (0.000)	-0.056*** (0.000)	0.010*** (0.002)	0.010*** (0.002)
BoardSize	0.000 (0.958)	0.000 (0.958)	0.001* (0.070)	0.001* (0.070)	-0.007*** (0.000)	-0.007*** (0.000)	0.000 (0.541)	0.000 (0.541)	0.003*** (0.006)	0.003*** (0.006)	0.000 (0.849)	0.000 (0.849)
W	0.463*** (0.000)	0.463*** (0.000)	0.036*** (0.000)	0.036*** (0.000)	-0.253*** (0.000)	-0.253*** (0.000)	0.018** (0.044)	0.018** (0.044)	0.018 (0.572)	0.018 (0.572)	-0.001 (0.881)	-0.001 (0.881)
Controlled	0.003 (0.935)	0.003 (0.935)	0.001 (0.728)	0.001 (0.728)	-0.073*** (0.002)	-0.073*** (0.002)	0.005 (0.201)	0.005 (0.201)	0.068*** (0.000)	0.068*** (0.000)	-0.011*** (0.008)	-0.011*** (0.008)
Nonex	0.006*** (0.000)	0.006*** (0.000)	0.000 (0.762)	0.000 (0.762)	0.001*** (0.004)	0.001*** (0.004)	-0.000* (0.076)	-0.000* (0.076)	-0.005*** (0.000)	-0.005*** (0.000)	0.001*** (0.008)	0.001*** (0.008)
ESG_LINKED_BONUS_Cluster1	0.158*** (0.000)	0.158*** (0.000)										
Disc_Cluster1	0.649*** (0.000)	0.649*** (0.000)										
Cluster1	0.289** (0.022)	0.289** (0.022)	0.031** (0.023)	0.031** (0.023)								
IR_release_Cluster1			-0.058*** (0.000)	-0.058*** (0.000)								

(continued)

Variables	(1)		(2)		(3)		(4)		(5)		(6)	
	IR_release_Cluster1	Second stage ferror_0	IR_release_Cluster2	Second stage ferror_0	IR_release_Cluster2	Second stage ferror_0	IR_release_Cluster3	Second stage ferror_0	IR_release_Cluster3	Second stage ferror_0	IR_release_Cluster3	Second stage ferror_0
ESG_LINKED_BONUS_Cluster2		(0.000)										
Disc_Cluster2												
Cluster2												
IR_release_Cluster2												
ESG_LINKED_BONUS_Cluster3												
Disc_Cluster3												
Cluster3												
IR_release_Cluster3												
Constant	-0.811*** (0.000)	-0.025 (0.115)	-0.131*** (0.000)	-0.005 (0.423)	0.069*** (0.002)	1.091	1.091	1.091	1.091	1.091	1.091	1.091
Observations	1,091	1,091	1,091	1,091	1,091	1,091	1,091	1,091	1,091	1,091	1,091	1,091
R-squared		0.106		0.170		0.170		0.170		0.171		0.171
Under-identification (t-stat)		81.477		364.918		364.918		364.918		364.918		364.918
Under-identification (p-value)		0.000		0.000		0.000		0.000		0.000		0.000
Weak-identification (t-stat)		43.381		270.139		270.139		270.139		270.139		270.139
Stock-Yogo (10% max IV size)		19.93		19.93		19.93		19.93		19.93		19.93
Sargan (t-stat)		10.377		104.313		104.313		104.313		104.313		104.313
Sargan (p-value)		0.001		0.000		0.000		0.000		0.000		0.000

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9.

1 (in Column 2 *IR_release_Cluster1*: -0.058 ; p -value: 0.000) and for Cluster 3 (in column 6 *IR_release_Cluster3*: 0.076; p -value: 0.074), while they are not consistent with prior findings for Cluster 2.

In Cluster 2, the benefits of IR for the forecast accuracy emerge, indicating its informativeness. The latter result (in Column 4 *IR_release_Cluster2*: -0.019 ; p -value: 0.009) shows that the IR released is informative for the financial analysts also in strong institutional settings with pluralistic society. However, the IR informativeness depends on the fact that the choice to release IR is conditioned by the ESG-based managers' incentives and the disclosure requirements.

According to the literature (Certo *et al.*, 2016), when both sample-induced and alternately sourced endogeneity exist, the 2SLS models provide less biased estimates than Heckman models. For this reason, the results obtained with the 2SLS models offer the best estimation of the coefficients of our interests. Relying on the results obtained with the 2SLS models, we reject *H1* and we accept *H2*.

5. Discussion

Voluntary disclosure theory indicates that nonfinancial disclosure complements mandatory disclosure, providing additional information to stakeholders, including financial analysts. Our evidence indicates that IR's positive impact on the financial market is not confirmed unless the different institutional settings are taken into account.

Results support that the institutional settings play a moderation role in explaining the IR's informativeness for the market.

Analysts' forecast is more accurate for IR adopters located in strong institutional enforcement (Cluster 1) than for all the other companies.

In institutional settings characterized by a strong institutional enforcement and a pluralistic society (Cluster 2), the integrated report appears to be not informative for financial analysts providing no benefits to the forecast accuracy. In such a context characterized by the highest institutional enforcement, the high "regulatory quality" urges companies to prepare transparent mandatory corporate disclosure, thus disclosing all the information that financial analysts need to predict earnings. This inference is supported by the additional analysis showing that disclosure requirements discourage companies to release the IR. However, additional analysis shows that for those companies that are likely to choose to release IR, given the ESG-linked managers' incentives and the level of disclosure requirements, the forecasts are more accurate. Therefore, the additional analysis allows us to tease out the strength of the disclosure requirements at the country level and explains the different informativeness observable across strong institutional settings (Cluster 1 and Cluster 2).

Integrated report release is associated with less forecast accuracy in weak institutional enforcement, where companies are faintly urged to adhere to accounting and reporting rules, thus making corporate reporting less reliable. In such a context, analysts' forecasts are more complex and, consequently, more inaccurate (Hope, 2003). The integrated report turns out to be not informative for financial analysts to predict the performance of companies located in weak institutional enforcement.

These results are in line with Flores *et al.* (2019), whose study shows that the association between integrated report release and analyst forecast error is stronger in countries that are more shareholder-oriented than stakeholder-oriented. However, our results are able to show that institutional settings are essential to grasp IR informativeness for the market.

Our evidence reveals that the detected relations are affected by two endogeneity sources that we dealt with in the light of the literature.

First, a sample-bias endogeneity is found in estimating the probability of choosing to release an integrated report as a function of investor protection, consistent with de Villiers

and Marques (2016). This indicates that the market endowments to reduce information asymmetries contribute to drive the results obtained. The Heckman two-stage model restores the true effects confirming that cross-sectional variations in the institutional settings are essential to grasp IR informativeness for the market.

Second, endogeneity because of an omitted variable capturing the top managers' remuneration based on ESG performance and the disclosure requirements at the country level is found to be significant. This result indicates that IR potential for the capital market is affected by the fact that managers' incentives are linked to ESG performance, which is consistent with [Bernardi and Stark \(2018\)](#) and the institutional disclosure requirement, which is consistent with [Hope \(2003\)](#).

The explanatory power of the instrumental variables included in our study can be seen as an additional result that allows to infer the reasons clarifying what are the institutional traits that are likely to explain the IR's informativeness. Furthermore, the instrumental variables have not been used in previous evidence, in spite of they capture prior literature insights consistent with the theoretical framework. The inclusion of these terms in our study can be seen as a potential for the use of such variables in future empirical evidence.

6. Conclusion

Although IR has gained momentum in the tumultuous arena of nonfinancial reporting, empirical research on IR "impacts" ([Rinaldi et al., 2018](#)) is still limited and dominated by analyses focused on the context where IR is mandatorily adopted (i.e. South Africa). The less numerous studies that have focused on contexts where IR is voluntarily adopted show sparse results about the impact of IR on financial analyst behaviour. The variety of these results seems to be caused by the specific (voluntary) contexts explored. However, although the institutional setting is shown to influence the voluntary decision to release the integrated report ([Frias-Aceituno et al., 2014](#); [Lai et al., 2016](#); [Vaz et al., 2016](#); [García-Sánchez et al., 2019](#); [Girella et al., 2019](#)), few studies consider the institutional setting as capable of influencing financial analyst behaviour. [Obeng et al. \(2020\)](#) capture the IR benefit for the capital market, disentangling shareholder from stockholder orientations, while [Flores et al. \(2019\)](#) provide unique research that considers the role of these country-level orientations in moderating the relationship between (voluntary) integrated report release and financial analysts' forecasts.

Starting from this premise, the present paper contributes to IR research on the voluntary adoption of this innovative form of reporting in an international setting ([Flores et al., 2019](#); [Obeng et al., 2020](#)) by showing that voluntarily released integrated report informativeness is not uniform across countries.

In settings with a strong institutional enforcement (Cluster 1), IR adopters' performance are predicted by the financial analysts more accurately than all the other companies (IR non-adopters or IR adopters located elsewhere). In institutional settings characterized by a strong institutional enforcement and a pluralistic society (Cluster 2), the IR is not informative for the market. However, this finding is biased by endogeneity concerns of omitted variables. Once dealing with this bias, for those companies that are likely to choose to release IR given the ESG-linked managers' incentives and the level of disclosure requirements, the forecasts are more accurate. Therefore, the additional analysis allows us to tease out the strength of the disclosure requirements at the country level and explains the different informativeness observable across strong institutional settings. In countries with weak institutional enforcement (Cluster 3), IR is not beneficial for analysts' accuracy.

Our evidence calls for future research investigating the integrated report's usefulness for the capital market to take country-level institutional characteristics into systematic consideration. In particular, it highlights the importance of relying on specific institutional patterns, rather

than single country-level institutional characteristics, such as civil versus common law and the related stakeholder versus shareholder approach (Flores *et al.*, 2019; Obeng *et al.*, 2020).

More generally, the paper contributes to the research on IR “impacts” (Rinaldi *et al.*, 2018) by unveiling the potential of IR for financial stakeholders. While some scholars have questioned the role of IR for stakeholders, including financial effects, the research shows that financial analysts rely on IR in predicting earnings per share. The research findings offer a comforting answer to the question of IR’s usefulness for financial stakeholders (International Integrated Reporting Council, 2013; Higgins *et al.*, 2014; Flower, 2015; Rowbottom and Locke, 2016; Lai *et al.*, 2017, 2018), on the condition that the institutional setting urges report preparers to address investors’ information needs and these needs are not satisfied by different sources of information.

Further, the paper contributes to the literature on voluntary disclosure and analyst forecasts by showing that the usefulness of voluntary nonfinancial disclosure claimed by voluntary disclosure theory varies according to the institutional setting. Our results show that IR’s complementary role relative to mandatory corporate disclosure benefits forecast analysts’ accuracy only where there is a strong institutional enforcement and once the ESG-linked managers’ incentives and the strength of the disclosure requirements are considered.

The paper also has implications for practitioners in their understanding of the role played by IR for the capital market in diverse institutional settings. In particular, our findings offer insights for policymakers, standard setters and regulators involved in enhancing the quality and enforcement of nonfinancial disclosures to stimulate organizations to behave responsibly (Lai and Stacchezzini, 2021). While we are not in a position to comment on the impact of mandatory integrated report release, with some scholars recommending a rapid transition to mandatory nonfinancial reporting (Adams, 2020), our evidence should discourage the promotion of IR as a voluntary disclosure in contexts of weak institutional enforcement. Managers of companies operating in countries where IR is voluntarily prepared may find our findings interesting if they wish to initiate the voluntary release of reports, reasoning on the extent to which their IR may facilitate analysts’ forecasts in relation to the institutional context in which they operate.

This paper is not exempt from limitations. First, we built our base sample by considering companies that have published their reports in the IR Examples Database, thus not taking into consideration companies that have realized an integrated report not included in this database. We are aware of possible self-selection bias because of the absence of other searchable databases. However, this sample selection approach is similar to other studies that included in their samples voluntarily released integrated reports (Kim *et al.*, 2017; Melloni *et al.*, 2017; Kiliç and Kuzey, 2018; Flores *et al.*, 2019; Girella *et al.*, 2019). Second, we did not control our findings for the quality of the report. However, other studies have searched for impacts of both report release and report quality on analyst forecast accuracy, finding convergent results (Kim *et al.*, 2017; Zhou *et al.*, 2017). Future studies could mitigate the limitations of this study by expanding the base sample to integrated reports not published in the IR Examples Database and controlling for the quality of the report. Future research may also expand the timeframe of the analysis to inspect whether report release is increasingly capturing analysts’ attention.

Notes

1. The detection of a negative association would support the voluntary disclosure theory perspective but also lead to reject the competing perspective of impression management (Merkl-Davies and Brennan, 2007), which suggests that IR discretionary disclosure manages users’

impressions, with potential negative capital market implications (Clatworthy and Jones, 2003; García Osma and Guillamón-Saorin, 2011; Stacchezzini *et al.*, 2016). Therefore, we do not develop this line of reasoning.

2. This line of reasoning draws on voluntary disclosure theory, and competes with the opposite perspective of impression management (see previous note).
3. Further, we are well aware of the fact that IR is designed not to provide CSR-related disclosures only, but rather to integrate the financial information traditionally provided by means of annual reports with non-financial information.
4. We are unaware of theoretical reasons to expect the multiple dimensions included in the variable *Disc* to be jointly correlated with financial analysts' accuracy. However, without a fully specified structural model, it is impossible to ensure these instruments satisfy the exclusion restriction assumption. Therefore, the 2SLS analysis should be interpreted with caution.

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Corresponding author

Alessandro Lai can be contacted at: alessandro.lai@univr.it

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