Voluntary vs. mandatory sustainability disclosure from the analyst's viewpoint

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Abstract

Over the last few years, a positive interaction between corporate sustainability and financial performance has been evidenced. However, the usefulness of sustainability disclosure mechanisms is controversial due to the diversity and lack of comparability. These reasons motivated the enforcement of a mandatory regime in the European contextas regards disclosure of non-financial and diversity information. As a result, European countries adjusted their local legal frameworks to this new regulation, which would enhance the sustainable disclosure mechanisms and the integration among stakeholders. Financial analysts, as the main requesters of sustainability reports, should have improved their forecasts because of the improvement in sustainable disclosure.The aim of this study, therefore, is to analyse whether the adoption of the directive, as a mandatory regime, has contributed to improve the accuracy achieved by financial analysts. The results show that EPS forecast accuracy has increased as a result of the directive although this effect is different depending on the type of company, the sustainable framework considered and the level of sustainable commitment of each country.

Keywords: Financial analysts, sustainability, disclosure, directive.

1.- INTRODUCTION

Over the last few years, corporate sustainability has emerged as a new paradigm for value-creation (Bansan & Song, 2017). Corporate sustainability is defined by Amini & Bienstock (2014), Lozano (2015) and Salvioni & Gennari (2016), among others, as an integrated approach based on stakeholder interdependence, integrated management, economic and socio-environmental responsibility, results and capability in obtaining consents and resources. It also encompasses new challenges, such as planetary boundaries and sustainable development goals, within the current core business model (Whiteman et al., 2013; Bebbington & Unerman, 2018; Schaltegger & Burritt, 2018).Financial markets are placing growing demands on businesses to commit to sustainable practices which have been shown to improve financial performance (Cowton & Sandber, 2012; Gallego-Alvarez et al., 2018) and enhance corporate legitimacy (Criado et al, 2007, p.246). Companies are thus required to develop specific sustainability disclosure instruments for reporting on their business practices. Accordingly, Aras & Crowther (2009) define sustainable disclosure as a set of sustainable performance assessment mechanisms.

However, the usefulness of sustainability reports, as disclosure mechanisms, is controversial. Wang et al. (2016) describe such reports as low in readability due to their complexity. Boiral & Henri (2017) highlight the fact that the voluntary nature of these reports hampers the possibility of cross-firm comparison. Furthermore, although continuous innovation in corporate sustainability requires constant renovation of sustainability guidelines, this does not regularly take place (Schaltegger et al., 2017). In the European context, these reasons motivated the enforcement of the directive 2014/95/EU of the European Parliament and of the Council of 22 October 2014 amending directive 2013/34/EU as regards disclosure of non-financial and diversity information by certain large undertakings and groups. This new regulation, also adopted by other countries in the European sphere, such as Switzerland, was intended to harmonize the different proposals through the introduction of a mandatory regime built around the key pillars of simplicity in sustainability reporting and the promotion of sustainability reports as a transparency mechanism (Abeysekera, 2013). To this end, the different countries had to adjust their local legal frameworks to this new regulation, which would theoretically improve the sustainable disclosure mechanisms and improve integration among stakeholders with rights to corporate information.

Among the main requesters of sustainability reports are financial analysts, who use them to make their forecasts and provide markets with recommendations and company coverage (Luo et al, 2015). In particular, the disclosure of information about a company's sustainability practices should imply a higher level of accuracy in its analyst forecast, according to Dhaliwal et al (2012), Pascual et al (2016), Muslu et al (2017) and Bernardi & Stark (2018b). However, this impact on analyst forecasts has not been evaluated in the European context since the end of the directive transposition period. The aim of this study, therefore, is to analyse whether the adoption of the directive, as a mandatory regime, has contributed to improve the accuracy achieved by financial analysts. To accomplish this objective, we have obtained a sample of earnings per share (EPS) forecasts for European listed companies subjected to the regulatory regime imposed by the directive for the period 2008-2017[1].We also propose to analyse the impact of this new regime on companies with high/low sustainability disclosure levels, considering, within this framework, the various available sustainability standards and the transposition stage reached by each country. The results show that EPS forecast accuracy has increased as a result of the directive, especially in the context of low-sustainability companies. This

[1]https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32014L0095&from=ES. Large undertakings which are public-interest entities exceeding on their balance sheet dates the criterion of the average number of 500 employees during the financial year.

study contributes to the existing literature in various ways. Firstly, it reveals that the enforcement of this directive enables a more accurate assessment of the level of sustainability disclosure and increases the reliability of analysts' forecasts. The gap between academics and practitioners is also addressed by examining a specific field of application of the development of sustainability disclosure. In this respect, the study evidences that the development of sustainable reporting standards is a tool for enhancing financial market efficiency. Finally, implications can also be drawn for regulators and law makers. In this sense, the improvement in accuracy implies that the mandatory regime has significantly contributed to increase the quality of sustainability reporting by European companies.

The remainder of this paper is structured as follows. The following section provides a literature review and presents our working hypotheses. Section three introduces the data, variables, and research design for testing the proposed hypotheses. Section four presents the main findings, which are discussed in section five, and our final section provides some conclusions.

2.- LITERATURE REVIEW AND WORKING HYPOTHESES

2.1.- Integrated reporting and regulatory trends

Several papers have evidenced a positive interaction between sustainability practices and economic performance (Margolis & Walsh, 2001; Orlitzky, Schmidt, & Rynes, 2003; Nieto & Fernández, 2004; Van Beurden & Gössling, 2008). This has awakened the interest of financial agents, who are increasing their demands for access to corporate information that will reveal the level of sustainability achieved by an organization. This demand can only be satisfied through transparency mechanisms such as sustainability disclosure (López-Arceiz et al, 2018). Bushman, Piotroski, & Smith (2004) and Gandía (2008) associate this term with integrated reporting including the provision of accessible, intense and qualified information about sustainable (economic, governance, social and environmental) practices.

Integrated corporate reporting and disclosure has thus emerged as an innovation to combat the criticism and alleged limitations of corporate reports and render them more meaningful to users (Dumay et al., 2016; Abhayawansa et al, 2018, p.1). Traditionally, the Global Reporting Initiative (GRI) has been considered the most useful and thorough framework for integrated sustainability reporting (Wilburn & Wilburn, 2013, p.64). This initiative has been highlighted as an international reference for all stakeholders interested in the disclosure of governance approach and the environmental, social and economic impacts of organizations (GRI, 2012; 2015). Far from being unique, it shares space with other initiatives, such as the Eco-Management and Audit Scheme (EMAS), the United Nations (UN) Global Compact and the International Organisation for Standardisation's ISO 26000, among others. Recently, diverse legal initiatives have regulated integrated reporting as a new quasi-mandatory financial statement based on previous initiatives (Duff, 2017). In this sense, in the European context, directives 2014/95/EU and 2013/34/EU require firms to record and report non-financial information relating to "environmental, social and employee matters (…) and any relevant non-financial key performance indicators". EU countries have transposed these directives into their national framework, in accordance with one or other of the available sustainability standards (COM 2017/C 215/01/EU). A similar trend can be observed in other countries, such as Switzerland, Denmark and South Africa, among others (Ioannou & Serafeim, 2017).

Legitimacy theory has usually been considered the dominant approach to assessing the quality of sustainability reporting (Criado et al, 2007, p. 246). However, although this theory highlights the role of sustainability information in satisfying the demands of stakeholders and helps to explain differences between voluntary/mandatory regimes, it does not provide a measure of the utility of the information disclosed under each type of regime. This study is therefore framed within the context of the instrumental stakeholder theory (Jones, 1995)and thus enables us to consider not the compilation and quality of information, but its utility for stakeholders. Under this theory, organizations are considered as “a constellation of cooperative and competitive interests possessing intrinsic value” (Donaldson & Preston, 1995, p.66). These different interests belong to a pleiad of participants and must be managed in order to create economic and social value (Jensen, 2017). Therefore, organizations are oriented not only towards shareholders but towards all their potential stakeholders, including customers, suppliers, employees and society, all of whose needs must be considered (Freeman, 1984; Freeman et al, 2018). Under this approach, firms that treat stakeholders’ interests on the basis of mutual trust and cooperation will obtain a competitive advantage over firms that do not (Jones & Wicks, 1999, p.208). So, the satisfaction of these interests, needs and wants emerges as an informational duty which companies have to satisfy (Gibson, 2000, p.250).

Financial analysts are both one of the main stakeholder and a logical nexus between other stakeholder and organizations, providing markets with overall company appraisals (Easley et al, 1998, p.176; Luo et al, 2015). As a consequence, they request companies to provide information about their progress in sustainable practices, and diverse organizations and agents have designed mechanisms and indicators to communicate achievements in these practices.

2.2.- Financial analysts and integrated reporting

As sophisticated users of corporate information, financial analysts employ specialized financial software and databases such as Reuters and Bloomberg, among others, to collect information about firms (Rowbottom & Lymer, 2009; Saleh & Roberts, 2017, p.60). As expert agents, they analyse companies operating in financial markets. After obtaining and assessing financial and non-financial information about an organization, they make predictions about its future evolution (Nichols 1989; Schipper 1991; Bercel 1994; Walther 1997). These predictions are disclosed to financial markets as recommendations for buying, holding or selling shares and other financial instruments, and constitute a key factor in investors' decision-making processes (Asquith et al., 2005; Barron et al., 2002; Palmon & Yezegel, 2012). Thus, analysts play a mediating role between organizations and investors whose main source of assessment is the financial and non-financial information provided by the entities.

This information will be useful if it improves the level of accuracy in analysts' forecasts. Traditionally, financial analysts have only assessed financial reporting, and tended to be wary of investments not aimed purely at profit maximization (Statman & Glushkov, 2009, p.34; Barnea & Rubin 2006, 2010). In recent years, however, they have begun to assess non-financial information relating the organization's sustainability performance (environmental, social and governance). The stakeholder theory evidences that these practices can improve not only economic performance but also corporate reputation (Fombrun, 2005; Fombrun & Shanley, 1990; Freeman et al., 2007). Financial analysts, therefore, need to consider both types of information, and will provide more accurate recommendations about companies that achieve a high level of corporate sustainability because more information will be available to them.

The economic literature has analysed the interaction between the disclosure of non-financial information about sustainability and analyst accuracy with diverse results (Brown et al. 1987; Lang and Lundholm, 1996; Hope 2003; Behn et al. 2008). Abhayawansa et al. (2018) examine the usefulness of non-financial information in sustainability reporting, as a tool for financial analysts; their conclusions being that the reports are neither sufficiently detailed nor formatted so as to suit analysts. Slack and Campbell (2016) find no interaction effect between the two variables, attributing this to the fact that financial analysts are not familiar with non-financial information and tend to ignore it. Likewise, Arvidsson & Johansson (2019) conclude that this type of information is yet to be legitimated because its ambiguity creates difficulties for financial analysts. Other authors obtain contrasting results. Seeking a possible link between the voluntary disclosure of non-financial information about sustainability issues and the accuracy of analysts' earnings per share (EPS) forecasts, Garrido-Miralles et al. (2016) find evidence of lower prediction error in relation to firms issuing sustainability reports in compliance with the Global Reporting Initiative during the period 2005-2010. Similar results were obtained by Dhaliwal et al. (2012) who evidence a significant relationship between sustainability reporting and analyst accuracy, especially in countries characterized by low financial transparency and a high stakeholder orientation. In these cases, sustainability reporting complements financial information, enabling analysts to achieve higher levels of accuracy[2].

Financial analysts, therefore, provide the market with recommendations and company performance assessments (Luo et al, 2015), relying on both financial and non-financial information for their forecasts. Previous studies, based on voluntarily disclosed

[2] This study analyses 31 countries and the publication of the CSR report as a proxy for non-financial information, using data from the Corporate Register (http://www.corporateregister.com) and Corporate Responsibility Newswire (http://www.csrwire.com).

information about sustainability, have obtained mixed results. In the European case, however, the impact of the reform of the Directive 2014/95/EU and completion of its transposition has not been fully analyzed, although the implementation of a set of practices for non-financial sustainability reporting has been positively assessed in other contexts. Meanwhile, Zhou, Simnett & Green (2017), question the relevance of integrated reporting matters for the capital markets of South Africa, where the Johannesburg Stock Exchange, under the local Corporate Governance Code, has made integrated reporting mandatory as a necessary condition for market participation. Their study finds evidence of a negative association between the sustainability information contained in an integrated report, and the dispersion in earnings per share (EPS) forecasts, suggesting that this non-information is useful to financial analysts when assessing company performance. Similar results were obtained by Barth et al. (2017) and Bernardi & Stark (2018b) who analyse the relationship between integrated sustainability reporting and analyst accuracy in the South African context. However, other authors investigating in the same setting for the same period find no link at all. Sampong et al. (2018) find an insignificant relationship between sustainability disclosure performance and firm value forecasts. Consequently, the change in organizational disclosure practices could have an intense impact on the activity of financial analysts, and may explain the diversity of results obtained in previous studies.

2.3- Working Hypotheses

As a result of the changes in organizational disclosure practices, various studies have undertaken analysis of the impact of sustainability regulations on financial analysts' activity. Loprevite et al (2018) address the issue of sustainable integrated reporting regulations for listed companies, evaluating the usefulness of introducing a mandatory regime by comparing the European case prior to the regulatory reform and the South African case after reporting was made mandatory. Their conclusions show that mandatory reporting has positive mid-term and irrelevant short-term effects on integrated disclosure levels. Aureli et al (2018) analyse the EU Directive 2014/95/EU transposition of EU member states, finding significant cross-country differences in terms of sustainability disclosure, which might explain the irrelevance of non-financial information for financial analysts. However, these results differ from those obtained by Jones et al. (2007) and Hong & Kacperczyk (2009) who find evidence that investors may be willing to accept lower returns in exchange for a reduction in information risk thanks to better-quality reporting. The information content of sustainability reporting will be useful to financial analysts if it contributes to improve their forecasts. Consequently, the new European regulation will have achieved its goals if the level of analyst accuracy has increased with respect to that achieved under the previous regulations. In order to test this assertion, we propose the following working hypothesis:

> H1: EPS forecast accuracy improves significantly after the enforcement of the directive.

The non-rejection of H1 would indicate that there is a significant difference between the impact of the previous regulation and that of the new one. This result would show that the type of regulation together with the completion of the transposition process and the adopted sustainability framework have contributed to improve the quality of sustainability reporting. However, the rejection of H_1 would also have key implications. Firstly, previous results could be biased by the type of organization studied. Thus, if the sample is a mixture of high- and low- sustainability listed companies, the final effect could be biased by the high sustainability companies having already voluntarily adopted sustainability standards. This limitation can be observed in several studies, both qualitative and quantitative. Thus, Abhayawansa et al (2018, p. 9) base their research on a sample composed exclusively of participants in the International Integrated Reporting Council, and Bernardi & Starck (2018a, p. 290) on one made up of 138 companies with full environmental and social disclosure data for a five year period. Similar sample compositions can be observed in other studies, such as Lee & Schaltegger (2018. p.285), Bernardi & Starck (2018b, p. 22), Luo et al (2015, p. 126), Dhaliwal et al. (2012, p 728), among others. Moreover, any research needs to allow for the fact that some financial analysts may have a preference for a certain sustainability framework (e.g. GRI; ISO, EMAS,…). Sampong et al (2018) find evidence of a possible influence of analyst preferences when distinguishing between social and environmental reporting standards. Similarly, Abhayawansa et al (2018) conclude that corporate governance is the most important aspect for financial analysts. These comparisons, however, do not address sustainability as an integrated concept. Finally, the different dates and degrees of transposition identified among European countries, may explain the contradictory results obtained by previous studies (Aureli et al, 2018; Versluis, 2007). To test the impact of these factors, we propose the following working hypotheses,

H2: EPS forecast accuracy improves significantly in companies showing lower pre-directive sustainability reporting levels.

H3: EPS forecast accuracy improves significantly based on the specific regulatory framework adopted for the directive transposition process.

H4: EPS forecast accuracy improves significantly in countries that have been stricter in the transposition of the directive.

Non-rejection of H2 would imply differences in behaviour patterns between low-sustainability companies and their more sustainable counterparts. Thus, the new regulation would be seen to be effective in improving sustainability reporting levels and thereby analyst accuracy. Moreover, the specific regulatory framework adopted (H3) and the country's degree of commitment in transposing the European directive (H4) would be shown to potentiate this effect. The rejection of these hypotheses, on the other hand, would suggest that mandatory reporting did not increase analyst accuracy, while also ruling out these differences as the source of the conflicting results reported in previous economic literature.

3.-EMPIRICAL ANALYSIS

3.1.-Sample

The data for our analysis include earnings per share (EPS) forecasts made by financial analysts from 2008 to 2017, which enables us to span the period before and after issue of the directive, and thus consider both the transposition period and the enforcement of the directive in each country. The analyst activity data were retrieved from the database FACTSET[3].

Our particular analysis focuses on an international sample of firms currently or previously listed on the stock exchange indexes of one of fifteen European countries (Austria, Belgium, Denmark, Finland, France, Germany, Italy, Luxemburg, Netherland, Norway,

[3]The reason for this choice of database is that it provides fuller coverage in Europe than the I/B/E/S, as noted by Balboa, et al. (2008).

Portugal, the UK, Spain, Sweden and Switzerland[4]) all of which have adopted mandatory sustainability reporting (Directives 2014/95/EU and 2013/34/EU for European Union countries and Responsible Business Initiative for Switzerland).Our sample companies are all subjected to the sustainable legal framework and commercial laws governing listed companies.

Thus, the final sample is made up of 434 companies, 241 of which are classified as low-sustainability companies. The total number of observations is 4,710. Table 1 reports the number of firms and observations per country.

INSERT TABLE 1 ABOUT HERE

3.2.- Main variables

3.2.1. Dependent variables

EPS forecasting accuracy, as a measure of financial analyst performance, is constructed from analyst consensus (median) EPS forecasts and annual EPS data, drawn, as already stated, from the FACTSET database. Mansi et al. (2011)define analysts' EPS forecasting accuracy as the negative absolute value of analysts' EPS forecasting errors, calculated as the difference between actual EPS for the fiscal year y and firm i, minus the (median[5]) consensus forecast for fiscal year y and firm i, scaled by the absolute value of the EPS consensus forecast. A coefficient of the analyst accuracy (ACC) index close to 0 indicates

[4] Bueno (2018) highlights that Switzerland's standards incorporate the content of the European Directive despite non-membership of the European Union.
[5]To reduce the EPS skewness effect, we consider median rather than mean consensus.

higher accuracy; the further it is from 0, the greater the deviation from the consensus. Expression [1] describes the specification for this variable.

$$\mathrm{ACCi,t,y} = -1 * \mathrm{abs}\left(\frac{\mathrm{ActualEPSi,y} - \mathrm{EPSi,t,y}}{\mathrm{Abs}(\mathrm{EPS_{i,t,y}})}\right) \qquad [1]$$

We also consider incremental analyst accuracy ($\Delta ACC_{i,t}$), defined as [2],

$$\Delta \mathrm{ACC_{i,t}} = \frac{\mathrm{ACC_{i,t}} - \mathrm{ACC_{i,t-1}}}{\mathrm{ACC_{i,t-1}}} \qquad [2]$$

This variable allows us to monitor the increase in analyst accuracy due to the increase in sustainability disclosure brought about through implementation of the directive.

3.2.2.Independent variables

Carini et al (2018, p. 9) identify the Directive 2014/95/EU as the starting point in the development of sustainability disclosure and describe its structure. This regulation obliges member states to adapt their national regulations to this new proposal within a maximum period of three years. We measure the enforcement of this ruling as a dummy variable (Dir_{14}) which takes the value 1 for the post-directive period (2014-2017) and 0 for the pre-directive period (2008-2013).This variable provides the basis for testing Hypothesis 1 (H1). It has also enabled us to construct a categorical variable to measure progress in the implementation of the directive (*Comp*). A value of 0 for this variable indicates the pre-directive period (2008-2013), of 1 indicates the transposition period (2014-2016) and of 2 indicates the end of the transposition period (2017).

Hypothesis 2 (H2) states that companies scoring low on thoroughness or accuracy in voluntary sustainability reporting will have improved their sustainability disclosure practices after enforcement of the directive. To test this hypothesis, we split the sample into low- and high-sustainability companies (Eccles et al., 2014; Nicolăescu et al., 2015; Leleux & Van Der Kaaij, 2019). The low-sustainability group is formed by companies that did little sustainability reporting prior to the directive. High-sustainability companies, on the other hand, not only disclosed their sustainability practices but were also listed in the RobecoSAM Sustainability Yearbook”[6]. Consequently, the dummy variable (*L_Sus*) takes the value 1 for low-sustainability companies and 0 otherwise.

In testing Hypothesis 3 (H3), we take into account the different sustainability standards mentioned by the directive (*Fwork*). These standards are the starting point for financial analysts’ assessment of each company’s sustainability performance, which they then incorporate into their forecasts (Folkens & Schneider. 2019; Moratis, 2017; Slager & Chapple, 2016; Zinenco et al., 2015).Specifically, we consider three dummy variables (*No_GRI, No_ISO* and *No_CSRR*), which take the value 1 if the company’s sustainability reporting in the pre-directive period was not done in compliance with the GRI, ISO and other standards (CSRR), respectively, and 0, otherwise. We used this classification to capture the different perspectives and reporting criteria of each standard (Sethi et al., 2017; Montiel, 2015; Zinenko et al., 2015). The information was drawn from the Thomson Reuters ESG Scores database.

Finally, in relation to Hypothesis 4 (H4), the degree of transposition reflects the progress and commitment of the various countries in incorporating the requirements of the directive into their national regulatory frameworks. We classify the countries into three groups based on their degree of transposition. The criteria for this classification are the transposition scores obtained by each country and published in the report “Member State Implementation of Directive 2014/95/EU” (CSR Europe and GRI, 2017). This study uses nine indicators of transposition performance[7] which enable us to divide the member states

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[6] Since 2008, RobecoSAM has been publishing a “Sustainability Yearbook” which contains a ranking of the 15% most sustainable companies in different industries.

[7] These nine indicators are: a) Definition of a large undertaking, b) Definition of a public interest entity, c) Report topics and content, d) Reporting framework, e) Disclosure format, f) Auditor's involvement, g) Noncompliance penalties, h) Safe harbour principle and i) Diversity reporting required.

into three groups. The countries in the first group have gone beyond the directive's requirements; those in the second have achieved full transposition; and those in the third have only partially transposed the directive. As a consequence, we create a categorical variable (*Env*) that takes the value 0 for countries that have performed beyond requirements (Denmark, Germany, Italy, Sweden, Austria), 1 for those that have performed strictly to requirements (Belgium, Finland, Luxembourg and Portugal) and 2 for those that have not transposed all of the original content of the directive (Spain, the United Kingdom, Netherlands, Norway and France). We consider Switzerland as belonging to this group.

3.2.3. Control variables

Since we also need to control for additional firm-level characteristics potentially affecting analyst forecasting accuracy, all the estimates of our model include firm size (*Size*) as the natural logarithm of total assets at the end of the previous year. *Lossebit* is a dummy variable that takes the value 1 for firms with negative earnings and 0 otherwise. We also include asset tangibility (*Tang*), computed as the ratio of tangible assets to total assets. Leverage (*Lev*) is computed as the ratio of long-term liabilities to total liabilities and *Sales_Growth* is estimated as sales in period t minus sales in period t-1, divided by sales in period t-1. To control for financial analyst factors, we also include $Follow_{t-1}$and $Sigma_{t-1}$, to represent the number of forecasts used to compute the consensus and dispersion of the forecasts forming the consensus, respectively. We take into account the quality of account reporting (Piot and Missonier-Piera, 2007; or Kim et al., 2013), by estimating *Big4*, a variable which takes the value 1 if the company is audited by one of the big four auditing firms and 0 otherwise[8]. The required data were drawn from the OSIRIS BvD

[8]In the French case, the variable Big4 takes the value 1if the company is performing one of the two mandatory auditing processes.

database. Finally, we include the dummy variable *Constituent*, which takes the value 1 if the company was part of a constituent index in a specific year and 0, otherwise. The data for this variable was obtained from the Thomson Reuters (Datastream) database.

3.3.- Research Design

To detect a possible increase in EPS forecast accuracy after enforcement of the directive, we perform an analysis based on panel regressions using a Diff-in-diff (DID) specification, where the dependent variable is analyst accuracy for firm i, in industry j, and country k, at period t. The following are the specifications for our set of hypotheses:

H1: $ACC_{ijkt} = \alpha + \beta_1 Dir_{14} + \sum_{r=1}^{s} \beta_{r+1} Ctvar_{rijkt-1} + \delta_{kt} + \varphi_{jt} + \gamma_{kj} + \varepsilon_{ijkt}$ [3]

H2: $ACC_{ijkt} = \alpha + \beta_1 Dir_{14} + \beta_2 Dir_{14} * L\_Sus + \sum_{r=1}^{s} \beta_{r+1} Ctvar_{rijkt-1} + \delta_{kt} + \varphi_{jt} + \gamma_{kj} + \varepsilon_{ijkt}$[4]

H3: $ACC_{ijkt} = \alpha + \beta_1 Dir_{14} + \beta_2 Dir_{14} * Fwork + \sum_{r=1}^{s} \beta_{r+1} Ctvar_{rijkt-1} + \delta_{kt} + \varphi_{jt} + \gamma_{kj} + \varepsilon_{ijkt}$[5]

H4: $ACC_{ijkt} = \alpha + \beta_1 Dir_{14} + \beta_2 Dir_{14} * Env + \sum_{r=1}^{s} \beta_{r+1} Ctvar_{rijkt-1} + \delta_{kt} + \varphi_{jt} + \gamma_{kj} + \varepsilon_{ijkt}$ [6]

where Dir_{14} is a dummy variable that takes the value 1 in the post-directive period (2014-2017) and 0, otherwise; *L_Sus* indicates the degree of sustainability disclosure, the term *Fwork* represents sustainability framework categories across firms through three dummy variables: *No_GRI, No_ISO* and *No_CSRR*. The variable *Env,* which measures transposition performance, has three categories based on the stage reached in the transposition process. The moderating effect on accuracy is given by the interaction of the different variables withDir_{14}, taking into account the previous hypotheses. All estimations include k control variables ($Ctvar_{rijkt-1}$) potentially affecting analyst accuracy.

The variable ΔACC_{ijkt} is also included to test the increase in analyst forecasting accuracy resulting from the increase in sustainability reporting following enforcement of the directive. The specifications [7-10] for these models are as follows,

$$H1: \Delta ACC_{ijkt} = \alpha + \beta_1 Dir_{14} + \sum_{r=1}^{s} \beta_{r+1} Ctvar_{rijkt-1} + \delta_{kt} + \varphi_{jt} + \gamma_{kj} + \varepsilon_{ijkt} \quad [7]$$

$$H2: \Delta ACC_{ijkt} = \alpha + \beta_1 Dir_{14} + \beta_2 Dir_{14} * L\_Sus + \sum_{r=1}^{s} \beta_{r+1} Ctvar_{rijkt-1} + \delta_{kt} + \varphi_{jt} + \gamma_{kj} + \varepsilon_{ijkt} [8]$$

$$H3: \Delta ACC_{ijkt} = \alpha + \beta_1 Dir_{14} + \beta_2 Dir_{14} * Fwork + \sum_{r=1}^{s} \beta_{r+1} Ctvar_{rijkt-1} + \delta_{kt} + \varphi_{jt} + \gamma_{kj} + \varepsilon_{ijkt} [9]$$

$$H4: \Delta ACC_{ijkt} = \alpha + \beta_1 Dir_{14} + \beta_2 Dir_{14} * Env + \sum_{r=1}^{s} \beta_{r+1} Ctvar_{rijkt-1} + \delta_{kt} + \varphi_{jt} + \gamma_{kj} + \varepsilon_{ijkt} [10]$$

The expressions [7-10] match the previous models [3-6], respectively, and all the symbols and variables have the same meaning. In order to check for potential endogeneity, the firm-level control variables in all our estimates are lagged by one year to avoid simultaneity with analyst forecasting accuracy. Finally, the basic estimation includes various alternative combinations of specific effects: country-year (δkt), industry-year (φjt) and country-industry (γkj) fixed effects, which allow us to account for potential misspecification of the model and control for any shocks that might affect analyst accuracy and are not covered by our set of explanatory variables. Our basic results are obtained using an industry-year cluster to capture correlations between different firms in the same country across time. We therefore apply the more general framework used in Petersen (2009), which avoids the need for assumptions regarding the dependence structure of the standard errors by employing a simultaneous two-level (industry/year) clustering approach. The symbol $\varepsilon ijkt$ is the white noise error term.The models were estimated using Stata v.14.2.

4.-RESULTS

Table 2 shows the descriptive statistics for post-directive (*Dir_{14}*)accuracy and incremental accuracy, firm type (*low/high sustainability*), sustainability framework (*GRI, CSRR and ISO*) and progress in the transposition process (*Env*), including the mean, standard deviation and the results of an ANOVA test in all cases.

INSERT TABLE 2

The results show that the directive led to an increase in accuracy ($ACC_{2008\text{-}2013}$: -0.229; $ACC_{2014\text{-}2017}$: -0.186) and incremental accuracy($\Delta ACC_{2008\text{-}2013}$: -3.812; $\Delta ACC_{2014\text{-}2017}$: -2.844) and a decrease in dispersion ($ACC_{2008\text{-}2013}$: 0.373; $ACC_{2014\text{-}2017}$: 0.335; $\Delta ACC_{2008\text{-}2013}$: 25.569; $\Delta ACC_{2014\text{-}2017}$: 13.144). This effect was more intense in low-sustainability companies ($ACC_{L\_Sus\ 2008\text{-}2013}$: -0.195; $ACC_{H\_Sus\ 2014\text{-}2017}$: -0.132), which were specifically targeted by the new legislation. The results across sustainability frameworks show no change with the GRI ($ACC_{GRI\ 2008\text{-}2013}$: -0.231; $ACC_{GRI\ 2014\text{-}2017}$: -0.238) and some improvements with the other standards ($ACC_{CSRR\ 2008\text{-}2013}$: -0.206; $ACC_{CSRR\ 2014\text{-}2017}$: -0.165; $ACC_{ISO\ 2008\text{-}2013}$: -0.228; $ACC_{ISO\ 2014\text{-}2017}$: -0.171). Finally, transposition progress is also shown to have an impact on accuracy and incremental accuracy, in that companies with low sustainability disclosure scores prior to the directive achieved improvements in the study variables following introduction of the directive ($ACC_{Env1\ 2008\text{-}2013:}$ -0.229; $ACC_{Env1\ 2014\text{-}2017}$: -0.179).

Statistical tests show a positive impact on accuracy following introduction of this new directive, especially for low-sustainability companies using standards other than the GRI and in countries traditionally characterized by laxity in their sustainability reporting requirements. This descriptive and univariate approximation yields similar conclusions when estimated with an empirical analysis of variance (Table 2).

The results for the basic models [3-6] are presented in Table 3, where columns (1) and (3) show the results of the estimations including country-year and country-industry fixed effects and standard errors clustered at industry-year level; columns (2) and (4) show those obtained when including country-year, industry-year and country-industry fixed effects. Columns (1) and (2) refer to ACC (analyst accuracy) and columns (3) and (4) show the results obtained using ΔACC.

INSERT TABLE 3 ABOUT HERE

The various regressions reveal a positive and significant relationship between analyst accuracy and the variable Dir_{14}(ACC: 0.0429-0.0433; pvalue<0.01; ΔACC: 1.3874-1.8692; pvalue<0.10).We can empirically confirm the existence of a positive link between the implementation of the Directive in 2014 and both analyst accuracy and incremental accuracy (ΔACC). The results for the overall sample evidence the importance of the directive as a variable with the capacity to improve analyst accuracy by reducing forecasting error. This finding is consistent with the aforementioned hypothesis (H1) regarding the potential of this directive to promote sustainable reporting and, thereby, increase analyst accuracy. The control variables also show the expected signs. *Lossebit* and *Leverage* are both negative and significant. Thus, negative income and a higher debt level both have a negative influence on the accuracy of analyst forecasts. *Constituent* is positive and significant, thereby evidencing that inclusion in a reference index improves the accuracy of a firm's analyst forecast. The remaining variables have the expected sign, but lack significance.

The introduction of the directive should specifically improve the behaviour of low-sustainability companies, whose traditional lack of sustainability reporting has made assessment by financial analysts more difficult *a priori*. The impact of the directive in low-sustainability companies, where a significant improvement in analyst accuracy is expected, is depicted in Table 4. This enables a comparison of the pre- and post-directive performances of companies with high/low levels of sustainability reporting (Dir_{14}*L_Sus*). These are the estimates from models [5] and [8]. Columns (1) and (2) report the results for ACC and columns (3) and (4) those for ΔACC.

INSERT TABLE 4 ABOUT HERE

According to the above results, the impact of the directive remains positive and significant, showing that analyst accuracy has improved across all types of assets. This finding holds for both accuracy (ACC: 0.0631-0.0632; pvalue<0.01) and incremental accuracy (ΔACC: 1.4546-1.9439; pvalue<0.10). However, the inclusion of the dummy variable (*L_Sus*) reveals considerable differences in analyst accuracy when firm type is considered. In all the reported estimates for ACC, we obtain negative and significant coefficients on the interaction terms between the directive 2014 and low-sustainability firms (ACC: -0.0361; pvalue<0.10). Despite the negative coefficients, however, the overall effect of the directive is positive, judging by the improvements observed during this period. Therefore, financial analysts should be able to provide higher levels of accuracy in relation to these companies.

Thus, analysts appear to have improved the accuracy of their forecasts for low-sustainability companies, as evidenced by the increase in accuracy values with respect to the baseline across the entire sample. Nevertheless, this group of companies continues to show lower accuracy than their sustainable counterparts. The results for the variable ΔACC show a similar pattern, albeit without statistical significance. This result does not allow us to reject hypothesis 2 (H2) because EPS forecast accuracy is higher in companies with lower pre-directive levels of sustainability reporting.

Table 5 shows the results for the sustainability framework variable estimated by models [5] and [9]. Columns (1) to (3) show the results for ACC and columns (4) to (6) provide the results for ΔACC.

INSERT TABLE 5 ABOUT HERE

As observed in the above tables, the directive has a positive and significant impact on analyst accuracy (ACC: 0.0542-0.0660; pvalue<0.01; ΔACC: 0.9797-1.4708; pvalue<0.10). In relation to the interaction between the variable Dir_{14} and each specific framework, the results vary. For companies which responded to the directive by adopting GRI standards, we obtain a positive and significant effect (ACC: 0.1211; pvalue<0.10; ΔACC: 2.1543; pvalue<0.05). Thus, the adoption of GRI standards has encouraged these companies to increase their level of sustainability disclosure, thereby enabling analysts to provide more accurate forecasts. This proves the effectiveness of the directive in correcting sustainability reporting levels, to the greater benefit of analysts.

Similar evidence is not obtained for the ISO and CSRR standards, however. Although the directive has a positive and significant coefficient, the results for its interaction with the respective variables are inconclusive. Thus, the interaction Dir_{14}*NO_CSRR is positive, but not significant (pvalue > 0.10), whereas the interaction Dir_{14}*NO_ISO is negative and significant (ACC: -0.0468; pvalue<0.01). These results may bear some relation with the costs and difficulties involved in implementing ISO standards. The results for the variable ΔACC lead to similar conclusions. Consequently, we are unable to reject hypothesis 3 (H3) because EPS forecast accuracy is influenced by the sustainability standard adopted in the transposition of the directive.

Finally, table 6 shows the results for models [6] and [10] which analyse the joint effect of the directive and the transposition stage reached by each country. Columns (1) and (2) show the results for ACC and columns (3) and (4) provide those for ΔACC, respectively.

INSERT TABLE 6 ABOUT HERE

The impact of the directive is observed in an increase in analyst accuracy during the post-directive period (2014-2017). The moderating effect of the stage reached in the transposition process (Dir_{14}*Env) is not significant (pvalue>0.10), suggesting that the degree of transposition does not play a decisive role in explaining the improvements in the accuracy of financial analyst forecasts. This conclusion also holds for the variable ΔACC (pvalue>0.10). Thus, hypothesis 4 (H4) must be rejected because EPS forecast accuracy shows no dependence on the stage reached by each country in the transposition process.

5.-ROBUSTNESS ANALYSIS

Various alternatives are used to test the robustness of the above results. These include other financial analyst performance measures, such as forecast dispersion ($Sigma_t$) and the number of analysts following ($Follow_t$). In addition, we use a variable to measure progress in adoption of the directive (*Comp*) for three time periods: a) Prior to the directive (2008-2013), b) during transposition (2014-2016) and c) following the transposition period (2017). Finally, we propose alternative measures for defining high- and low-sustainability companies.

5.1.-Other analyst activity variables

While this paper focuses exclusively on the accuracy of analyst forecasts, there are other analyst performance activity variables that might be worth including; namely, $Sigma_t$ and $Follow_t$. $Sigma_t$ is useful because greater dispersion among analysts is usually linked to lower agreement as to the future trend of a given variable; in this case, EPS, which will presumably be negatively associated with accuracy. Thus, the variable $Sigma_t$, defined in FACTSET as the percentage difference between the standard deviation of source estimates for a consensus and the mean consensus calculated using the same estimates, should be negatively associated with the implementation of the directive. Likewise, the variable $Follow_t$ is defined as the number of analyst forecasts issued for a firm during the time period considered. In Table 7, we present the empirical estimates of the role of this additional set of analyst-related variables. Columns (1) to (5) show the results for $Sigma_t$ and columns (6) to (10) those for $Follow_t$.

INSERT TABLE 7 ABOUT HERE

The results confirm the impact of the directive on both measures of analyst accuracy. The negative and significant coefficients show that the directive improved the level of sustainability disclosure, thereby reducing analyst forecast dispersion (0.0039-0.0324; pvalue<0.10) and the number of analysts covering each company (-0.0353-0.0449; pvalue<0.01). With respect to interaction effects, observation shows that the interaction Dir_{14}*L_Sus* is non-significant (pvalue>0.10). Thus, the reduction in dispersion and the number of analysts does not hold for these companies. A similar effect is observed for the interaction effects between the adopted sustainability standard and the stage reached in the transposition process, with one observable exception: the GRI standard, which has the capacity to reduce dispersion among financial analysts (-0.3526; pvalue<0.10). In any event, the implementation of the directive, in itself, generates an improvement not only in accuracy, but also in dispersion and the level of analyst following.

5.2.- Adoption process of directive requirements

Table 8 shows the results for the adoption process of directive requirements (*Comp*), broken down into three periods. Columns (1) to (5) contain the results for ACC while columns (6) to (10) present the estimates for ΔACC).

INSERT TABLE 8 ABOUT HERE

As can be seen, the directive adoption process shows a positive trend. Thus, the parameter associated with the variable *Comp* is positive and significant (ACC: 0.0124-0.0657; pvalue<0.10). Moreover, countries with fuller directive implementation have seen increased levels of analyst accuracy (ACC: 0.0137; pvalue<0.05).

The results are inconclusive for low-sustainability companies, due to the lack of significance observed (pvalue>0.10) despite the positive sign. The most revealing effects are those relating to sustainability standards. The progressive adoption of the directive and GRI standards has notably contributed to improving analyst accuracy (ACC: 0.1030; pvalue<0.05; ΔACC: 2.1789; pvalue<0.01) which indicates that, financial analysts assess both sustainability disclosure practices in companies and the specific standards they choose to follow. This effect is also influenced by the company's operating environment. These same conclusions can be observed for ΔACC.

5.3.-Alternative classification of low-sustainability firms

Our main classification of high- and low-sustainability companies is based on information provided by RobecoSAM. In this section, we pursue the issue further, using an alternative, more restrictive, low/high sustainability firm classification method.

There are three criteria for classifying companies as low-sustainability. The first is not having been listed in the Sustainability Yearbook in the six years prior to the implementation of the directive (2008-2013). The second is absence from this listing for a period of four years between 2008 and 2013. The third is absence from the listing in the Yearbook for 2013, this being the year immediately prior to the introduction of the directive. These alternative classifications are reported in Table 9, where columns (1) to (3) list the estimates for ACC and columns (4) to (6) those for ΔACC.

INSERT TABLE 9 ABOUT HERE

Columns (1) and (4) contain the results for the first classification (6 years); columns (2) and (5) the results for the second classification; and columns (3) and (6) the results for the year 2013. In all six estimations, the variable Dir_{14} retains its sign and remains statistically significant, suggesting that analyst forecast accuracy decreases significantly with the implementation of the directive. As in our previous estimations, the interaction $Dir_{14}*L\_Sus$ lacks significance thereby further reinforcing the results obtained in the previous section.

5.- DISCUSSION

The results obtained in this study show that EPS forecast accuracy has increased as a result of the directive. This positive effect is particularly remarkable in the case of companies with previously low sustainability commitment; and GRI standards emerge as the most useful reporting framework, especially in the opinion of financial analysts.

Previous literature has analysed mandatory sustainability disclosure regulations (Zhou et al., 2017; Bergmann & Posch, 2018) with conflicting results. Ioannou & Serafeim (2017, p.2) summarize the controversy over mandatory sustainability reporting as a tension between two forces: transparency and cost. Thus, mandatory sustainability disclosure can serve as a tool for promoting commitment towards social and environmental sustainability, and providing clearer reporting for the use of financial market agents, such as financial analysts. However, since information gathering and reporting is a cost-generating process, it is necessary to seek equilibrium between the two forces. The search for this equilibrium has been studied in relation to financial analyst forecasts. Kim et al (2017) examined 156 companies from 18 countries in 2014 and 2015, highlighting that mandatory sustainability reporting results in more content and detail, which may reduce uncertainty about a firm's information environment and thereby strengthen analysts' decisions. Similarly, Bernardi & Stark (2018b) study the impact of the change of reporting regime on analyst forecast accuracy in South Africa for the period 2008 to 2012. These authors conclude that analyst accuracy improves due to the mediating effect of environmental, social and governance disclosure on financial performance. Hinze & Sump (2019), on the other hand, evidence that analysts' perceptions of sustainability fail to uniformly support an increasing interest in sustainability reporting, despite the fact that a higher level of sustainability disclosure is positively associated with analyst forecast accuracy. Our results support the idea that the directive has been successful in improving analyst accuracy, but this result does not reveal anything about analysts' preferences concerning sustainability practices.

Although mandatory sustainability reporting has positive effects overall, this effect should not be the same for all companies. Particularly, the directive will have proved its effectiveness if it has succeeded in convincing low-sustainability companies to disclose their sustainability efforts. Loprovite et al (2018) do not share this opinion. After comparing voluntary and mandatory regimes, these authors conclude that voluntary regimes have the potential to improve the analyst accuracy. However, we do not examine the correlation between the degree of sustainable practices and the decision to adopt a mandatory versus a voluntary regime, which is a debate that belongs to the domain of legitimacy theory (Criado et al 2007). Our results have focused on comparing analyst forecasts before and after the introduction of a set of standards. As observed, the mandatory regime improves analyst accuracy, especially, in the case of low-sustainability companies, which analysts find more difficult to assess and forecast. Something similar is observed in relation to the sustainability standards promoted by different companies. Despite the fact that some authors highlight EMAS, ISO and other sustainability standards as resulting in more detailed information (Folkens &Schneider. 2019; Moratis, 2017; Zinenco et al, 2015), financial analysts improve their accuracy when GRI standards are applied. This result is in keeping with the findings of Slager & Chapple (2016), who claim that GRI standards propitiate an integrated perspective and alternative sustainability measures. Finally, this process could depend on the rigorousness of the different legal frameworks. Researchers examining some countries, find evidence linking the stricter regulatory content of a mandatory regime to higher accuracy (e.g. South Africa, Denmark and Malaysia). In this respect, Setia et al (2015), analysing a sample of 25 listed companies in South Africa, report a positive correlation between intensity and accuracy. Lueg et al (2016) reached a similar conclusion in the Danish context, evidencing the fact that stricter sustainability standards and guidelines can enable a company to improve in integrated reporting. The same conclusion is reached for European countries under the directive. Venturelli et al (2019) compare the United Kingdom and Italy, evidencing that UK shows greater compliance and reports fewer forecasting errors than Italy. Our results do not support these findings in line with Carini et al (2017), Quinn & Connolly (2017) and Coluccia et al (2018),

Despite the fact that the acceptance and consideration of sustainability reports bring benefits in terms of analyst accuracy, this practice is not widespread among financial analysts (Krasodomska & Cho, 2017). This limitation is one of the main challenges currently facing sustainability disclosure. Thus, the directive has helped to identify companies with low sustainability disclosure, promote specific sustainability standards for different stakeholders and advance towards content harmonization in an environment characterized by high levels of dispersion.

6.-CONCLUSIONS

Traditionally, sustainability disclosure has been a voluntary option for EU firms. Under the voluntary regime, private companies were expected to decide their own level of implementation and disclosure of sustainable practices. However, although this proposal was consistent with the private free will underlying modern economies, it was not enough to promote genuine commitment towards sustainability. The EU therefore promoted legislation compelling public companies to report their sustainability practices. This included various legal initiatives (Directives 2014/95/EU and 2013/34/EU for European Union countries and the Responsible Business Initiative for Switzerland).

The adoption of this regulatory framework has had key implications for financial analysts. As already stated, in making their forecasts, these agents are motivated by the observed positive correlation between financial performance and sustainable practices to request increasingly higher levels of sustainability disclosure. The mandatory regime has allowed low-sustainability companies, whose results were difficult to forecast before the enforcement of the directive, to obtain more positive performance evaluations and has thereby encouraged them to develop sustainability reporting mechanisms. Mandatory sustainability disclosure has also led to the adoption of different sets of sustainability standards and guidelines. In this respect, our results show that financial analysts tend to work with GRI standards, which are easily understood and enable more accurate forecasting and lower levels of dispersion. Finally, it is important to note that the enforcement of this directive is a further step towards Europe’s harmonization, having reduced the disparity among local regulatory frameworks and enabled financial analysts’ forecasts to achieve greater comparability and higher accuracy.

This study provides practitioners with useful insights for financial decision-making. Thanks to the directive, analysts are able to make a more accurate assessment of firms’ sustainability performance, and thus produce more reliable forecasts. Another contribution of this research is to address the gap between academics and practitioners by examining a specific field of application in the development of sustainable practices. In this respect, while the positive interaction between sustainability and financial performance has already been analysed, this study examines this positive effect and its consequences for investment decisions in a specific context. The findings can also be applied by regulators and law makers. Thus, the implementation of mandatory reporting regimes, as well as having a positive effect on already sustainable companies, has a special capacity to convince formerly non-committed companies to practise sustainability reporting.

Some limitations of this study must be acknowledged. The data used for the identification of sustainable companies refer only to listed companies, for whom the directive's requirements were mandatory from the start. The results might therefore vary across samples and settings. Similarly, the effects of the directive require long-term analysis in order to contextualize its impact on accounting harmonization processes. Finally, the newly-emerging concepts of planetary and social boundaries are changing the perception of sustainability, and legal reform may be needed to adjust the law to the new reality. Therefore, the reasons for the implementation of mandatory vs voluntary regimes require analysis. These limitations could be addressed in future research in order to gain further insights into sustainability disclosure.

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***Table 1*: List of countries, firms and observations per country. Year: 2013**

Variable	%	Total # Firms	# Observations
High sustainable company	43.09%	187	2030
Low sustainable company	56.91%	247	2680
GRI	91.19%	396	4295
CSRR	93.88%	407	4422
ISO	55.94%	243	2635
Env0	25.27%	110	1190
Austria	5.10%	22	240
Denmark	4.25%	20	200
Germany	6.16%	28	290
Italy	5.31%	22	250
Sweden	4.46%	20	210
Env1	17.20%	74	810
Belgium	4.88%	21	230
Finland	5.94%	28	280
Luxembourg	1.06%	2	50
Portugal	5.31%	22	250
Env2	57.54%	250	2710
France	8.70%	39	410
Netherlands	5.31%	22	250
Norway	8.07%	30	380
Spain	7.22%	32	340
Switzerland	3.40%	15	160
United Kingdom	24.84%	111	1170
		434	4710

***Table 2*: Descriptive Statistics**

	2008-2013						2014-2017						
	Mean	Std. dev					Mean	Std. dev					ANOVA
Accuracy	-0.229	0.373					-0.186	0.335					***
Δaccuracy	-3.812	25.569					-2.844	13.144					*
	Low sustainable				High sustainable		Low sustainable				High sustainable		
	Mean	Std. dev			Mean	Std. dev	Mean	Std. dev			Mean	Std. dev	
Accuracy	-0.195	0.345			-0.257	0.394	-0.132	0.253			-0.230	0.383	***
Δaccuracy	-3.547	20.039			-4.038	29.470	-2.400	10.218			-3.208	15.123	**
	GRI		CSRR		ISO		GRI		CSRR		ISO		
	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev	
Accuracy	-0.231	0.371	-0.207	0.349	-0.229	0.378	-0.238	0.412	-0.166	0.306	-0.171	0.308	**
Δaccuracy	-3.718	24.361	-3.430	21.570	-3.036	16.827	-1.272	7.370	-2.586	11.175	-2.832	13.043	-
	ENV1		ENV2		ENV3		ENV1		ENV2		ENV3		
	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev	
Accuracy	-0.229	0.365	-0.315	0.420	-0.204	0.359	-0.179	0.309	-0.167	0.268	-0.195	0.363	***
Δaccuracy	-3.721	25.786	-3.690	19.064	-3.887	27.075	-2.629	10.488	-3.572	16.321	-2.743	13.002	-

Table 3: **Directive 2014 and analyst accuracy**

	ACC	ACC	ΔACC	ΔACC
Dir_{14}	0.0433***	0.0429***	1.3874*	1.8692*
	(3.00)	(2.56)	(1.68)	(1.74)
$Size_{t-1}$	0.0066	0.0067	0.2772	0.2638
	(0.30)	(0.38)	(0.41)	(0.34)
$Lossebit_{t-1}$	-0.2018***	-0.2024***	0.3823	0.3725
	(-7.12)	(-10.17)	(0.26)	(0.31)
$Tang_{t-1}$	-0.0566	-0.0568	-2.331	-2.4113
	(-1.19)	(-1.32)	(-1.20)	(-1.29)
$Leverage_{t-1}$	-0.1762***	-0.1762***	1.1144	1.1445
	(-3.02)	(-3.33)	(0.69)	(0.45)
$Sales\_Growth_{t-1}$	0.0229	0.0227	0.6733	0.6943
	(0.62)	(0.87)	(0.34)	(0.42)
$Sigma_{t-1}$	0.0018	0.0016	0.9280	0.9048
	(0.07)	(0.11)	(1.41)	(1.03)
$Follow_{t-1}$	0.0764	0.0765*	-0.1157	-0.0762
	(1.47)	(1.81)	(-0.09)	(-0.04)
Big4	0.0021	0.0022	-0.6741	-0.7457
	(0.08)	(0.10)	(-1.20)	(-0.82)
Constituent	0.0849***	0.0848***	1.0376	1.0527
	(4.84)	(5.16)	(0.82)	(1.14)
Intercept	-0.3785***	-0.3797***	-6.0109	-5.7627
	(-2.83)	(-3.63)	(-1.51)	(-1.32)
Country –Year	Yes	Yes	Yes	Yes
Country –Industry	Yes	Yes	Yes	Yes
Industry - Year	No	Yes	No	Yes
Cluster Industry-Year	Yes	No	Yes	No
R^2	0.1238	0.1239	0.0031	0.0033
Wald Test (p-value)	0.0000	0.0000	0.3678	0.6103
#Observations	3,430	3,430	3,429	3,429
#Firms	434	434	434	434

Table 4: Directive 2014, analyst accuracy and sustainability

	ACC	ACC	ΔACC	ΔACC
Dir $_{14}$	0.0632***	0.0631***	1.4546*	1.9439*
	(4.39)	(3.22)	(1.89)	(1.57)
Dir $_{14}$ **L_Sus*	-0.0361*	-0.0361**	-0.1193	-0.1317
	(-1.78)	(-1.97)	(-0.17)	(-0.12)
Size $_{t-1}$	0.0017	0.0018	0.2605	0.2453
	(0.08)	(0.10)	(0.38)	(0.31)
Lossebit $_{t-1}$	-0.2002***	-0.2008***	0.3899	0.3804
	(-7.04)	(-10.09)	(0.26)	(0.32)
Tang $_{t-1}$	-0.0541	-0.0544	-2.3241	-2.4041
	(-1.14)	(-1.27)	(-1.19)	(-1.28)
Leverage $_{t-1}$	-0.1749***	-0.1749***	1.1181	1.1485
	(-2.99)	(-3.31)	(0.69)	(0.45)
Sales_Growth $_{t-1}$	0.0254	0.0251	0.6871	0.7091
	(0.70)	(0.96)	(0.34)	(0.43)
Sigma $_{t-1}$	0.0021	0.0019	0.9302	0.9072
	(0.08)	(0.14)	(1.41)	(1.03)
Follow $_{t-1}$	0.0734	0.0735*	-0.1342	-0.0965
	(1.41)	(1.74)	(-0.10)	(-0.05)
Big4	0.0031	0.0031	-0.6709	-0.7424
	(0.13)	(0.14)	(1.18)	(-0.82)
Constituent	0.0837***	0.0837***	1.0364	1.0511
	(4.80)	(5.09)	(0.81)	(1.14)
Intercept	-0.3411**	-0.3420***	-5.8743	-5.6109
	(-2.55)	(-3.21)	(-1.39)	(-1.23)
Country –Year	Yes	Yes	Yes	Yes
Country –Industry	Yes	Yes	Yes	Yes
Industry - Year	No	Yes	No	Yes
Cluster Industry-Year	Yes	No	Yes	No
R^2	0.1243	0.1244	0.0031	0.0033
Wald Test (p-value)	0.0000	0.0000	0.3634	0.6848
#Observations	3,430	3,430	3,429	3,429
#Firms	434	434	434	434

Table 5: Directive 2014, analyst accuracy and previous voluntary accounting rules

	ACC	ACC	ACC	ΔACC	ΔACC	ΔACC
Dir_{14}	0.0617***	0.0542***	0.0660***	1.4708*	1.0803	0.9797
	(3.56)	(3.62)	(4.44)	(1.63)	(1.43)	(1.23)
*Dir_{14} *No_GRI*	0.1211*			2.1543**		
	(1.94)			(2.06)		
*Dir_{14} *NO_CSRR*		0.0129			1.2013*	
		(0.28)			(1.63)	
Dir_{14*} NO_ISO			-0.0468***			0.1577
			(-2.78)			(0.26)
$Size_{t-1}$	0.0158	0.0063	-0.0014	0.1579	0.1488	-0.0887
	(0.69)	(0.29)	(-0.06)	(0.20)	(0.23)	(-0.15)
$Lossebit_{t-1}$	-0.2195***	-0.2065***	-0.1991***	0.731	0.5114	0.5416
	(-6.02)	(-6.10)	(-5.58)	(0.45)	(0.41)	(0.45)
$Tang_{t-1}$	-0.0835	-0.1032*	-0.0960*	-1.4745	-2.0487	-1.999
	(-1.26)	(-1.77)	(-1.66)	(-0.66)	(-1.14)	(-1.16)
$Leverage_{t-1}$	-0.1721**	-0.1509**	-0.1715***	1.1401	1.1645	1.3682
	(-2.38)	(-2.47)	(-2.79)	(0.67)	(0.80)	(1.00)
$Sales\_Growth_{t-1}$	0.0484	0.0638	0.0613	2.5321	0.6855	0.7867
	(0.97)	(1.46)	(1.53)	(1.09)	(0.33)	(0.43)
$Sigma_{t-1}$	-0.011	-0.0003	0.0042	1.4275	0.8787	0.899
	(-0.31)	(-0.01)	(0.14)	(1.41)	(1.11)	(1.24)
$Follow_{t-1}$	-0.0344	-0.0119	0.0308	0.5454	0.3697	1.1745
	(-0.44)	(-0.18)	(0.47)	(0.29)	(0.25)	(0.84)
Big4	0.0072	0.0156	0.0078	-0.7751	-0.3898	-0.3856
	(0.28)	(0.63)	(0.30)	(-1.19)	(-0.70)	(-0.73)
Constituent	0.0882***	0.0791***	0.0793***	1.497	0.6715	0.5518
	(3.55)	(4.25)	(4.23)	(0.82)	(0.56)	(0.50)
Intercept	-0.2979**	-0.2575**	-0.2657*	-7.082	-5.7042	-4.9103
	(-2.25)	(-1.98)	(-1.87)	(-1.40)	(-1.48)	(-1.44)
Country –Year	Yes	Yes	Yes	Yes	Yes	Yes
Country –Industry	Yes	Yes	Yes	Yes	Yes	Yes
Industry - Year	No	No	No	No	No	No
Cluster Industry-Year	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.1196	0.1198	0.1173	0.0044	0.0029	0.0027
Wald Test (p-value)	0.0000	0.0000	0.0000	0.2364	0.2387	0.4529
#Observations	2,215	2,828	3,015	2,215	2,827	3,014
#Firms	342	376	387	342	376	387

Table 6: Directive 2014, analyst accuracy, sustainability and voluntary previous accounting rules

	ACC	ACC	ΔACC	ΔACC
Dir 14	0.0604***	0.0583***	1.5367*	1.0433
	(2.93)	(3.85)	(1.64)	(1.14)
*Dir 14 *Env*	-0.0164	-0.016	0.3128	0.3657
	(-1.46)	(-1.40)	(0.47)	(0.76)
Size t-1	0.0078	0.0078	0.2341	0.2412
	(0.45)	(0.36)	(0.30)	(0.35)
Lossebit t-1	-0.202***	-0.2015***	0.3554	0.3627
	(-10.16)	(-7.10)	(0.29)	(0.24)
Tang t-1	-0.0576	-0.0567	-2.4016	-2.3271
	(-1.34)	(-1.19)	(-1.29)	(-1.21)
Leverage t-1	-0.1765***	-0.1766***	1.1585	1.1339
	(-3.34)	(-3.03)	(0.46)	(0.70)
Sales_Growth t-1	0.0225	0.0225	0.6826	0.6629
	(0.86)	(0.61)	(0.41)	(0.33)
Sigma t-1	0.0012	0.0015	0.9124	0.9347
	(0.09)	(0.06)	(1.04)	(1.41)
Follow t-1	0.0759*	0.0756	-0.0656	-0.1001
	(1.80)	(1.45)	(-0.03)	(-0.08)
Big4	0.0024	0.0027	-0.7522	-0.6885
	(0.10)	(0.11)	(-0.83)	(-1.23)
Constituent	0.0838***	0.0838***	1.089	1.0829
	(5.10)	(4.78)	(1.18)	(0.84)
Intercept	-0.3905***	-0.3907***	-5.5153	-5.6992
	(-0.72)	(-2.87)	(-1.26)	(-1.39)
Country –Year	Yes	Yes	No	No
Country –Industry	Yes	Yes	Yes	Yes
Industry - Year	No	No	No	No
Cluster Industry-Year	Yes	Yes	No	No
R^2	0.1237	0.1236	0.0030	0.0030
Wald Test (p-value)	0.0000	0.0000	0.6676	0.1240
#Observations	3,430	3,430	3,429	3,429
#Firms	434	434	434	434

Table 7: Other analysts' variables

	$Sigma_t$	$Sigma_t$	$Sigma_t$	$Sigma_t$	$Sigma_t$	$Follow_t$	$Follow_t$	$Follow_t$	$Follow_t$	$Follow_t$
Dir_{14}	-0.0147	-0.0324*	-0.0143	-0.0303*	0.0039	-0.0434***	-0.0411***	-0.0353***	-0.0378***	-0.0449***
	(-0.89)	(-1.58)	(-0.75)	(-1.64)	(0.23)	(-4.09)	(-3.96)	(-4.55)	(-4.80)	(-4.83)
Dir_{14} *L_Sus	0.0056					-0.0067				
	(0.35)					(-0.60)				
Dir_{14} *No_GRI		-0.3526*					0.0226			
		(-1.62)					(0.57)			
Dir_{14} *No_CSRR			-0.0575					-0.0064		
			(-0.68)					(-0.30)		
Dir_{14} *No_ISO				0.0298					0.0036	
				(1.53)					(0.44)	
Dir_{14} * No_Env					-0.0165					0.0044
					(-1.30)					(0.84)
$Size_{t-1}$	0.0253	0.0336*	0.0235	0.0201	0.0257	0.2058***	0.1634***	0.1722***	0.1752***	0.2057***
	(1.39)	(1.95)	(1.39)	(1.00)	(1.45)	(13.72)	(12.44)	(15.02)	(15.37)	(17.56)
$Lossebit_{t-1}$	-0.0282	-0.0869*	-0.0034	-0.0075	-0.0279	-0.0116	-0.0155	-0.0143	-0.0161*	-0.0120
	(-0.69)	(-1.61)	(-0.07)	(-0.17)	(-0.69)	(-1.17)	(-1.36)	(-1.50)	(-1.75)	(-1.32)
$Tang_{t-1}$	-0.0247	-0.0859*	-0.0347	-0.0248	-0.0244	0.0020	-0.0464	-0.0442	-0.0207	-0.0021
	(-0.50)	(-1.83)	(-0.78)	(-0.50)	(-0.50)	(0.05)	(-1.24)	(-1.51)	(-0.71)	(-0.07)
$Leverage_{t-1}$	0.1226*	0.0537	0.0561	0.0673	0.1222*	-0.1377***	-0.1094***	-0.1068***	-0.1086***	-0.1374***
	(1.84)	(1.09)	(0.99)	(1.06)	(1.82)	(-3.46)	(-2.98)	(-3.52)	(-3.72)	(-4.63)
$Sales\_Growth_{t-1}$	-0.0946*	-0.1538**	-0.1293*	-0.1484**	-0.0946*	-0.0179	-0.0262**	-0.0214	-0.0237*	-0.0171
	(-1.86)	(-2.16)	(-1.92)	(-2.36)	(-1.86)	(-1.45)	(-1.96)	(-1.61)	(-1.92)	(-1.44)
$Sigma_{t-1}$						0.0037	0.0036	0.0024	-0.0000	0.0033
						(0.58)	(0.43)	(0.37)	(-0.01)	(0.54)
$Follow_{t-1}$	-0.1072***	-0.1859***	-0.1378***	-0.1409***	-0.1078***					
	(-2.72)	(-3.82)	(-3.21)	(-2.94)	(-2.72)					
Big4	0.0367*	0.0351**	0.0331*	0.0304	0.0375*	0.0002	0.0197	0.0176	0.0136	-0.0037
	(1.68)	(2.24)	(1.66)	(1.36)	(1.72)	(0.01)	(1.11)	(1.01)	(0.76)	(-0.18)
Constituent	-0.0079	0.0507	0.0158	0.0079	-0.0096	0.0697***	0.0672***	0.0494***	0.0462***	0.0705***
	(-0.36)	(1.50)	(1.66)	(0.32)	(-0.44)	(6.83)	(5.87)	(5.84)	(5.75)	(9.08)
Intercept	0.0261	0.0415	0.0762	0.1133	0.0193	-0.2125**	0.1065	0.0596	0.0315	-0.2066**
	(0.23)	(0.40)	(0.69)	(0.89)	(0.18)	(-1.96)	(1.12)	(0.72)	(0.38)	(-2.48)
Country –Year	Yes	Yes	No	No	No	Yes	Yes	No	No	Yes
Country –Industry	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes
Industry - Year	No	Yes	No	No	No	No	Yes	Yes	Yes	Yes
Cluster Industry-Year	Yes	No	No	No	No	Yes	No	No	No	Yes
R^2	0.0111	0.0273	0.0126	0.0142	0.0116	0.3523	0.2844	0.2911	0.2792	0.3527
Wald Test (p-value)	0.0094	0.0007	0.0176	0.0078	0.0031	0.0000	0.0000	0.0000	0.0000	0.0000
#Observations	3,476	2,23	2,851	3,041	3,476	3,483	2,232	2,587	3,045	3,483
#Firms	437	343	377	389	437	440	343	377	388	440

Table 8: Environment analysis: Implementation of the Directive 2014

	ACC	ACC	ACC	ACC	ACC	ΔACC	ΔACC	ΔACC	ΔACC	ΔACC
Comp	0.0124*	0.0204**	0.0155**	0.0152**	0.0657***	0.3396	0.2195	0.2638	0.2241	1.6669**
	(1.87)	(2.44)	(2.11)	(2.04)	(3.55)	(1.07)	(0.57)	(0.84)	(0.73)	(2.22)
Comp L_Sust*	0.0072					0.3249				
	(0.64)					(0.62)				
*Comp*No_GRI*		0.1030**					2.1789***			
		(2.32)					(2.69)			
*Comp*No_CSRR*			0.0285					1.0704*		
			(1.03)					(1.71)		
*Comp*No_ISO*				-0.0153					-0.0531	
				(-1.22)					(-0.10)	
*Comp*Env*					0.0137**					0.3990
					(2.09)					(1.14)
$Size_{t-1}$	0.0093	0.0174	0.0076	0.0021	0.0084	0.3423	0.1659	0.1361	-0.0938	0.2680
	(0.43)	(0.75)	(0.35)	(0.09)	(0.39)	(0.48)	(0.21)	(0.21)	(-0.16)	(0.42)
$Lossebit_{t-1}$	-0.2025***	-0.2189***	-0.2067***	-0.2001***	-0.2024***	0.3465	0.7189	0.5017	0.5398	0.3486
	(-7.14)	(-6.01)	(-6.11)	(-5.63)	(-7.14)	(0.23)	-44	(0.40)	(0.45)	(0.23)
$Tang_{t-1}$	-0.0573	-0.0860	-0.1051*	-0.0966*	-0.0570	-23.749	-15.555	-20.878	-20.483	-23.670
	(-1.22)	(-1.32)	(-1.84)	(-1.69)	(-1.21)	(-1.22)	(-0.69)	(-1.16)	(-1.18)	(-1.22)
$Leverage_{t-1}$	-0.1808***	-0.1791**	-0.1573**	-0.1771***	-0.1808***	10.330	11.097	11.253	13.243	10.318
	(-3.11)	(-2.49)	(-2.58)	(-2.88)	(-3.11)	(0.64)	(0.65)	(0.78)	(0.97)	(0.64)
$Sales\_Growth_{t-1}$	0.0144	0.0309	0.0500	0.0475	0.0141	0.3512	19.195	0.3383	0.4843	0.3301
	(0.39)	(0.63)	(1.16)	(1.18)	(0.38)	(0.18)	(0.85)	(0.16)	(0.27)	(0.17)
$Sigma_{t-1}$	0.0016	-0.0126	-0.0004	0.0032	0.0017	0.9076	13.728	0.8651	0.8772	0.9138
	(0.07)	(-0.36)	(-0.02)	(0.11)	(0.07)	(1.37)	(1.36)	(1.09)	(1.21)	(1.39)
$Follow_{t-1}$	0.0673	-0.0511	-0.0241	0.0122	0.0652	-0.2655	0.3402	0.2444	10.654	-0.3573
	(1.30)	(-0.66)	(-0.36)	(0.19)	(1.26)	(-0.21)	(0.18)	(0.17)	(0.78)	(-0.28)
Big4	-0.0010	0.0031	0.0107	0.0017	-0.0013	-0.7528	-0.8633	-0.4586	-0.4451	-0.7572
	(-0.04)	(0.12)	(0.44)	(0.07)	(-0.05)	(-1.30)	(-1.28)	(-0.81)	(-0.81)	(-1.30)
Constituent	0.0859***	0.0905***	0.0810***	0.0802***	0.0858***	11.065	15.712	0.7436	0.6003	11.038
	(4.90)	(3.60)	(4.34)	(4.26)	(4.89)	(0.86)	(0.84)	(0.60)	(0.53)	(0.86)
Intercept	-0.3775***	-0.2741**	-0.2391*	-0.2519*	-0.3674***	-59.989	-65.514	-52.253	-45.126	-54.444
	(-2.81)	(-2.06)	(-1.82)	(-1.77)	(-2.71)	(-1.39)	(-1.32)	(-1.38)	(-1.32)	(-1.41)
Country –Year	No	No	No	No	Yes	No	No	No	No	Yes
Country –Industry	Yes	Yes	Yes	Yes	Yes	No	No	No	No	Yes
Industry - Year	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Cluster Industry-Year	No	No	No	No	Yes	No	No	No	No	Yes
R^2	0.1224	0.1163	0.1161	0.1151	0.1222	0.0027	0.0036	0.0025	0.0023	0.0027
Wald Test (p-value)	0.0000	0.0000	0.0000	0.0000	0.0000	0.1684	0.205	0.2364	0.4326	0.1935
#Observations	4,43	2,215	2,828	3,015	3,43	3,429	2,215	2,827	3,014	3,429
#Firms	434	342	376	387	434	434	342	376	387	434

Table 9: Alternative sustainability measures

	ACC	ACC	ACC	ΔACC	ΔACC	ΔACC
Dir_{14}	0.0522**	0.0610***	0.0660***	0.8981	13.359	1.6014*
	(2.34)	(3.00)	(3.17)	(0.82)	(1.52)	(1.91)
*Dir_{14}*L_Sus*	0.0143	0.0029	-0.0059	0.7947	0.2560	-0.1966
	(0.63)	(0.14)	(-0.28)	(0.78)	(0.30)	(-0.24)
$Size_{t-1}$	0.0177	0.0171	0.0161	0.2095	0.1903	0.1412
	(0.77)	(0.75)	(0.71)	(0.27)	(0.25)	(0.18)
$Lossebit_{t-1}$	-0.2199***	-0.2201***	-0.2200***	0.7303	0.7198	0.7287
	(-6.05)	(-6.04)	(-6.03)	(0.45)	(0.45)	(0.45)
$Tang_{t-1}$	-0.0837	-0.0834	-0.0831	-14.651	-14.587	-14.568
	(-1.26)	(-1.26)	(-1.26)	(-0.66)	(-0.65)	(-0.65)
$Leverage_{t-1}$	-0.1780**	-0.1779**	-0.1783**	10.513	10.651	10.526
	(-2.46)	(-2.46)	(-2.47)	(0.61)	(0.62)	(0.61)
$Sales\_Growth_{t-1}$	0.0488	0.0488	0.0491	25.367	25.376	25.604
	(0.98)	(0.98)	(0.98)	(1.10)	(1.10)	(1.10)
$Sigma_{t-1}$	-0.0110	-0.0110	-0.0110	14.185	14.226	14.290
	(-0.31)	(-0.31)	(-0.31)	(1.40)	(1.40)	(1.41)
$Follow_{t-1}$	-0.0330	-0.0345	-0.0348	0.7300	0.6198	0.5445
	(-0.42)	(-0.44)	(-0.45)	(0.37)	(0.32)	(0.28)
Big4	0.0086	0.0082	0.0080	-0.7387	-0.7603	-0.7703
	(0.34)	(0.32)	(0.31)	(-1.16)	(-1.18)	(-1.20)
Constituent	0.0888***	0.0884***	0.0881***	15.255	15.113	14.942
	(3.59)	(3.58)	(3.56)	(0.83)	(0.82)	(0.82)
Intercept	-0.3135**	-0.3064**	-0.2981**	-77.271	-74.164	-69.328
	(-2.35)	(-2.28)	(-2.22)	(-1.53)	(-1.44)	(-1.37)
Country –Year	Yes	Yes	Yes	Yes	Yes	Yes
Country –Industry	Yes	Yes	Yes	Yes	Yes	Yes
Industry - Year	No	No	No	No	No	No
Cluster Industry-Year	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.1196	0.1200	0.1200	0.0045	0.0044	0.0044
Wald Test (p-value)	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000
#Observations	2,215	2,215	2,215	2,215	2,215	2,215
#Firms	342	342	342	342	342	342