Can Graphs in Sustainability Reports Actually Manage Impressions? An Analysis from the Investors' Perspective

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1 Introduction

Within the field of research on accounting, accountability, and sustainability disclosures, the study of the role of 'visuals' is increasing in importance. Over the last few years, a number of articles have focused on the use of visuals (e.g., pictures, graphs, and drawings) in company annual reports and on their implications in the analysis of the form and content of organizational communication and disclosure and the motivations thereof (Davison 2007, 2009, 2011; Parker and Guthrie 2009; Cho et al. 2012a, b; Pesci et al. 2015). In respect of the latter, one contemporary framework of classification and analysis relates to the concept of 'impression management,' which originates from the studies of the sociologist Goffman (1959) who describes each individual as an actor in a theater whose main objective is to 'impress' viewers. Impression management encompasses a number of possible strategies aimed at

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favorably impressing upon the receivers of accountability public information (Brennan et al. 2009; Merkl-Davies and Brennan 2011; Merkl-Davies et al. 2011). In the majority of accounting studies, the preparers of financial reporting or social and environmental reporting are conceptualized as rational organizational actors who seek to influence the target audience of the disclosure.

In this regard, and reminiscent of a commonly held view that '*a picture is worth a thousand words*,' *impression management* has become a notable perspective seeking to conceptualize the use of visuals in accounting disclosure and narratives (Pesci et al. 2015). This perspective asserts that a visual disclosure contained in accounting reports can be a powerful device to manage, distort, and direct readers' attention with a view to convey a positive image of the organization in relation to a given subject matter or more generally about the organization itself. The motivations for impression management can be diverse and could, for instance, be associated to managerial self-interests (i.e., in line with classical agency theory predictions) or to ensure the organization is seen to operate in line with society values and expectations (e.g., legitimacy theory; Suchman 1995). So far, the evidence on the use of visuals in annual reports has addressed the role of graphs (Beattie and Jones 1992; Jones 2011; Cho et al. 2012a). These studies typically found high levelof graph distortions and associated the distortion to impression management techniques aimed at legitimating the companies' actions (Suchman 1995; Hrasky 2012; O'Donovan 2002). However, the vast majority of these studies have tended to rely on an analysis of the disclosures per se and the impact on users is presumed rather than being actually observed (e.g., Craig and Brennan 2012); i.e., it is far less evident from extant research whether what researchers identify as an impression management strategy does *actually* influence readers such as investors, lenders, employees, and other stakeholders. This gap in the literature is pertinent because arguably, this relates to whether there is a material role (or not) for visual impression management strategies and thereby this warrants further discussion and implications for readers, preparers, and policy-makers. Currently, studies considering the readers' point of view are rare (Diouf and Boiral 2017). Consequently, we raise the following research question: What is the relevance of graph distortion as an impression management strategy for investors?

We, therefore, adopt a value relevance approach to study the investors' reaction to the use of visuals, and specifically in relation to graph distortions in annual reports. While the role of graph distortions has been studied in a number of cases (Beattie and Jones 1992; Jones 2011; Cho et al. 2012a), the emphasis has been rather exclusively on the supposed managerial intent of managing impressions, but not in relation to their potential impact on investors. If visual impression management (such as graph distortions) does not produce the expected effects, further questions may arise as to why managers seek to distort this information and/or whether some visuals can be more 'effective' than others and under which conditions these visual tools could be potent or impotent. In this regard, recent studies showed that stakeholders' needs for information can be deeply different (Fornaciari and Pesci 2018; Costa et al. 2019) and consequently information can produce different effects on different stakeholders. We focus on investors because they are stakeholders who are keenly interested in financial information and generally more skilled in reading such information, arguably

even when presented in different forms (i.e., in the graphical form). Furthermore, an investor can be seen as the most important stakeholder for a listed company and we could contend that the vast majority of the disclosure tactics would be directed to these particular stakeholders. An absence of value relevance can indicate that distortion is unnecessary for investors and/or that this type of visual tactic may be aimed at impress different stakeholder(s).

To address the research question, we rely on a sample of 105 European listed companies (Italian, Spanish, and French) that have adopted GRI guidelines and we adopt Ohlson's (1995) modified value relevance approach to model for an analysis of the relationship between market value and graph distortion contained in social and environmental information. The research methodology is based on a mixed method (i) a content analysis (Krippendorff 2004; Unerman 2000) to determine the level of graph distortion/discrepancy (Beattie and Jones 1992) and (ii) an estimation of value relevance coefficients by considering Ohlson's (1995) modified model inclusive of a graph distortion index. Our results support the idea that while visual impression management is value relevant, it paradoxically has a negative association to market value. This paper contributes to the literature by offering a multifaceted explanation of the use of graph distortion and on the possible impressions generated by such a visual 'tactic.' It enriches the impression management literature by seeking evaluating the actual impact of an impression management strategy (the graph's distortion) on investors' decisions.

The remaining paper is articulated as follows: the following section shows the literature review on the topic of visual impression management by highlighting its effect on the readers' decision-making process, followed by a methodological section describing the sample and the mixed method used for the analysis. Thereafter, the findings and the discussion are presented, and finally the paper concludes with the key contributions, implications, and limitations of the study.

2 Literature Review: Visuals as Impression Management Tools in Accounting and Accountability, The Role of Graphs

The research attention to visual forms of communication has increased as demonstrated by the advent of 'visual disciplines' (Pieters and Wedel 2007). Visual representations are often used as a vehicle to present quantitative data about performance and as a way to frame or reflect a given narrative. Accounting and accountability scholars have also recognized that visual disclosures play an important role in conveying financial and socio-environmental information and evidence of corporate 'visual narratives' (Warren 2005; Davison 2007, 2009, 2011, 2014; Bernardi et al. 2002, 2005; Brown 2010; Parker 2009; Hrasky 2012; Pesci et al. 2015) has been extensively reported. These authors contend that visuals could have a strong impact on readers.

An interesting perspective for analyzing the effect and the use of visuals originates from Goffman's (1959) sociological notion of 'impression management' which refers to the possibility of one impressing on others' minds in order to be perceived in a favorable light. Goffman's (1959) 'impression management' perspective originally attributed to human behavior has been transposed to the field of organizational and corporate behavior, including in terms of how they might report or disclose information in different media (e.g., annual reports, press releases, and Web sites). Within this perspective, it has been argued that the use of visuals can be powerful in terms of its ability to impress upon cognitive memory (Davison 2014).

Brennan et al. (2009) explicitly list visuals as a tactic that should be investigated in accounting and accountability statements. According to the authors, a number of tactics can be used to distort information in an attempt at impression management: syntactical manipulation, rhetorical manipulation, attribution of organizational outcomes, thematic manipulation, selectivity, visual/presentation effects (including also visual images), and impression management using performance comparisons. Focusing on the case of visual representation, an emphasis can be created when companies use presentation techniques to make a piece of information more obvious to readers (Brennan et al. 2009). In addition, the use of visuals as a technique of impression management can be achieved through the use of colors (So and Smith 2002; Courtis 2004a, b) or a repetition of the narratives together with visuals (Courtis 1996; Pesci et al. 2015).

Informed by the above consideration, many scholars link the role of images, picture, and graphs to an intent by preparers to impress upon the receivers of the disclosed information (Brennan et al. 2009; So and Smith 2002; Courtis 2004a, b; Beattie and Jones 1997; Beattie and Jones 2008; Jones 2011; Cho et al. 2010, 2012a). Some of these scholars focus on the selectivity tactic of impression management, with particular attention paid to the role of graphs (Beattie and Jones 1997; Jones 2011; Cho et al. 2012a). The potential of graphs to improve the effectiveness of communication in external financial reporting has been well established. According to Lee and Tweedie (1975), humans have more capacity to remember visual patterns than memorize textual or numerical tabulations. In this regard, graphs are more visually appealing than the (text) readability of information in the annual reports, and thus the former is more likely to be remembered (Paivio 1971; Bettie and Jones 1992).

Furthermore, graphs have the advantage of attracting and holding the attention of readers (Usmani et al. 2019) and are able of increasing the speed of decision making (Sullivan 1988). Considering the importance and the effectiveness of graphs as tools of communication and learning, some authors investigated the 'real purpose' of graphs, the way they are designed, and their power to impress the readers. Graphs represent ideal impression management vehicles to mislead the readers by producing a favorable image of companies and by distorting information both in annual and in sustainability reports (Beattie and Jones 1992, 2002, 2008; Godfrey et al. 2003; Merkl-Davies and Brennan 2007, 2011; Falschlunger et al. 2015; Jones 2011; Hrasky 2012; Cho et al. 2012a, b). The early contributions to the accounting literature relate to graph misrepresentation practices (Beattie and Jones 1992, 1997).

The authors conduct studies about the use and abuse of graphs showing that companies consciously exaggerate rather than understate time trends, empathize good news, obfuscate bad news, and use a confused language to give a more favorable portrayal to the company. Other studies suggest an active manipulation by the preparers of graphs and find that companies usually portray the good news more than the bad news (Jones 2011) and that companies in less restrictive reporting regulatory environments appear to be more likely to engage in impression management through the use of graphs (Cho et al. 2012a). Although graphical manipulation is well documented, it remains that these studies do not consider how the readers (i.e., the receivers of the distorted information) and their decision-making process are actually influenced by these tactics. The issue of understanding if the impression management tactics are able to achieve their aim or not is crucial, especially given the ample resonance the literature assigns to the efforts of managers in distorting accounting and accountability information (Beattie and Jones 1992, 2008; Godfrey et al. 2003; Merkl-Davies and Brennan 2007, 2011; Falschlunger et al. 2015; Jones 2011; Hrasky 2012; Cho et al. 2012a, b).

In this regard, Beattie and Jones (2008) expressed the need to investigate more on the 'human data processing context' such as shareholder's investment decisions. Moreover, Merkl-Davies and Brennan (2011) recognize that if there is a managerial intent to impress the readers of the disclosure documents, there should also be a receiver's reaction in response to this (perceived) managerial attitude. In other words, if readers/receivers are aware of the misleading intent, do they actually care and react accordingly? In this way, the receivers' reaction determines whether visual impression management leads to a substantive change or whether managerial efforts to manage impressions are not effective.[1] In this regard, Diouf and Boiral (2017) conduct an experimental study on the quality of sustainability reports by focusing on the stakeholders' perspective. The authors give a fundamental and inspiring contribution by interviewing the main recipients of the sustainability reports, namely the stakeholders. The interview involves practitioners of socially responsible investments in order to evaluate their perceptions of the quality of sustainable reports. They find that these stakeholders are 'aware of the limitations of the sustainability reports' (Diouf and Boiral 2017) and they are not swayed by the company's attempts to impress them.

In line with the last stream of research, this study aims to extend our understanding of the reader's reactions to the use of graph distortion and whether impression management tactics are able to impact on the decision-making processes of the receivers. With the aim of progressing the literature toward a better understanding of the visual power of graphs, this study focuses on a practice involving less restrictive reporting regulatory environments (Cho et al. 2012a), namely sustainability reporting practices (Diouf and Boiral 2017).

[1] A similar discussion exists in the earnings management literature and in relation to stock market efficiency/reactions. In a similar vein therefore, we ask whether the market value 'impounds the manipulated information' or does it 'see through' the attempts by the company to apply an accounting sleight of hand?

To investigate the reader's reactions to the use of graphs, we focus our attention on the case of investors and rely on the value relevance methodology because it is '*designed to assess whether particular accounting amounts reflect information that is used by investors in valuing firms' equity*' (Barth et al. 2001a). The ascertaining of the existence of a statistically significant relationship between some measure of the value of the company (usually the stock exchange price) and the financial and non-financial statement values as well as the existence of the disclosures/information can be considered as evidence that the information is useful to investors for decisions relative to the allocation of their resources (Mechelli 2013), i.e., the information or disclosure is value-relevant.

The value relevance approach is one of the most researched and cited areas in capital market research in accounting (Kothari 2001), whose beginning dates back to the work of Ball and Brown (1968), Beaver (1968) and Ohlson (1995). Many researchers have analyzed the relevance of financial information focusing, for example, on the adoption of different accounting standards (Barth et al. 2008; Bartov at el. 2005; Devalle et al. 2010) or on specific accounting values (Aboody and Lev 1998). Furthermore, others have studied the value relevance of non-financial information. For example, Amir and Lev (1996) examined value relevance of accounting and non-financial information disclosed by the sample companies. While they found that financial information was largely irrelevant for investors, non-financial indicators (such as market penetration data) were actually highly value relevant. Carnevale et al. (2012) also found that value relevance could be attributed to social reporting, and Clarkson et al. (2013) observed that clearly set out voluntary environmental disclosures were incrementally informative. This was confirmed by Hassel et al. (2005). Lastly, Gamerschlag (2013) focused on the case of human capital information and demonstrated that disclosures about the qualification and competence of the workforce were considered value-relevant.

The above confirms the notion that non-financial information does have implications for investors and markets. Of particular note however is that, as opposed to financial reporting information whose presentation and disclosure are often framed on the basis of mandatory requirements (e.g., accounting standards), there is still a variety of ways (e.g., narratives, graphs, tables, diagrams, and images) in which companies can voluntarily report on non-financial, social, environmental, and other types of governance aspects, such as those communicated in sustainability reports. Evidence from studies investigating such types of disclosures has highlighted this diversity of disclosure, as well as concerns that there may be attempts to manage impressions vis-à-vis stakeholders (Merkl-Davies and Brennan 2007). Hence, beyond the information that is provided in relation to legal requirements or in relation to voluntary standards relating to social and environmental disclosure, we contend that visuals can play a prominent role (Lightstone and Driscoll 2008; Linsley and Kajüter 2008; O'Keefe and Conway 2008; Dumay 2012).

In sum, based on Goffman's notions of impression management and its theoretical implications for organizational accounting and disclosure (Merkl-Davies and

Brennan 2011), this study investigates whether readers react on non-financial information documents (Diouf and Boiral 2017) containing visual impression management devices (Brennan et al. 2009), among which graphs play a prominent role (Cho et al. 2012a; Jones 2011; Beattie and Jones 2008). In the absence of prior empirical insights, we formulate non-directional and alternative hypothesis as follows:

H1 Distortions in graphs relating to social and environmental information in company sustainability reports are significantly value relevant.

3 Methodological Design

3.1 Sample and Data Selection

This study investigates listed firms that have adopted Global Reporting Initiatives (GRI) guidelines (which are considered to be one of the most used and authoritative sustainability reporting guidelines) and it is based on a sample of listed companies from three continental European countries: Italy, France, and Spain for the period 2004–2013. The GRI report can be used for displaying data other than the ones required by law and while the guidelines focus on the content of the narrative/numerical disclosures (e.g., carbon emissions data; workers' rights), there is little in the way of requirements for how this data can be presented. Therefore, this allows for the possibility of an extensive use of visuals designed to enhance communication and learning (Pesci et al. 2015), or could be used for impression management purposes (Merkl-Davies and Brennan 2011).

More specifically, the information used for the regression models is collected from annual reports and from sustainability reports. The accounting and market price data are collected using a two-stage process, firstly from the Datastream/Compustat databases, and secondly any missing data is extracted collected from the consolidated financial statements of listed companies (for accounting information) at the Milan, Madrid, and Paris Stock Exchange Web sites (for market values). The resulting final sample is composed of companies that publish sustainability reports on their Web sites for at least two consecutive years and that disclose financial and market information necessary for the regression model. For the period under investigation, there are 516 firm-year observations, consisting of 243, 123, and 150 firm-year observations, respectively, for Italy, Spain, and France. Table 1 describes the composition of the sample for each year.

Earnings, book value, and number of shares are based on the figures at December 31 for each year considered. Since there is a time lag between market values and accounting information, the market values for April 30 of each year (following the date of the financial statements) are instead selected (Barth et al. 2008; Harris and Muller 1999). According to Barth and Clinch (2009), a deflated specification of the modified Ohlson (1995) model is the most effective way to mitigate the potential of

Table 1 Sample composition

Year	Italy	Spain	France	Total
2004	11	5	1	17
2005	13	7	2	22
2006	17	10	6	33
2007	20	11	6	37
2008	24	16	7	47
2009	22	14	12	48
2010	31	15	20	66
2011	32	13	29	74
2012	36	16	35	87
2013	37	16	32	85
Total	243	123	150	516

incorrect inferences based on size differences (scale effect). Considering the above-mentioned works, the authors deflate all accounting variables by a number of shares (Barth and Clinch 2009).

3.2 Research Methodology

The study can be considered as mixed methods because the regression model contains both qualitative information based on a manual content analysis and quantitative data retrieved by databases. In the first phase, a content analysis index is developed, and in the second stage, the index that measured the graphs discrepancy of sustainability reporting is regressed in the model. By following Beattie and Jones (1992, 1997, 2008) and Jones (2011), we use the graph discrepancy index to measure the visual power of the graphs:

$$\text{Graph Discrepancy Index} = [(a/b)-1]$$

where:

– a percentage change (in cm) depicted in graphs;
– b percentage change in data.

To determine the graph discrepancy index, we have developed a manual content analysis to collect the necessary information to apply to the previous formula. In particular, we have manually measured the change depicted in graphs and the change in data for each graph in each sustainability report of the sample companies. Finally, to measure the level of discrepancy for each sustainability report, we have calculated

the average of the graph discrepancy index. We call this average a Visual Graphs Discrepancy Index (VGDI) and use it as a variable, expressing the level of discrepancy, in the regression model.

In the second phase, this research analyzes the value relevance of earnings and graphs of the sustainability report by using the Ohlson's model (1995). In this study, a price specification is used (Easton 1999; Kothari and Zimmerman 1995; Barth et al. 2001b; Barth 2006). Following Barth et al. (2008), our metric for value relevance is the explanatory power of a regression of the share price of the company on book value of equity per share and earnings per share. This model derives from Ohlson's (1995) linear information model (LIM) (Devalle et al. 2010). In particular, in this model, the residual income is replaced by the net income in order to reduce the measurement errors that may lead from the first estimate. Some studies have also demonstrated, even empirically, that such a replacement represents the best possible approximation (Penman 1997, 2012).

As previously highlighted, in recent years, numerous researchers have evaluated the relevance of non-financial information. In this respect, the Olshon's model is structured by included three independent expressive variables of both financial and non-financial information. In particular, the linear representation of this model is as follow (Olshon 1995):

$$P_t = y_t + \alpha_1 x_t^a + \alpha v_t$$

where:

P_t is the share market value of the company;
y_t is the book value in t;
x_t^a is the earnings in t;
v_t is all non-accounting information used in the prediction of future earnings.

The variable v_t is therefore expressive, in studies of value relevance, of all those information not expressed by the financial statements that nevertheless influence the economic values of the company. From variable v_t, many researchers (Amir and Lev 1996; Carnevale et al. 2012; Clarkson et al. 2013; Hassel et al. 2005; Gamerschlag 2013) also include environmental and social information due to the significant impact they have in economic terms in the short and medium long term. Our model thus examines whether the combined effect of financial accounting information with graphs' sustainability disclosure explains market values better than an exclusive focus on financial accounting information. The authors follow two steps to achieve their objective (Hassel et al. 2005).

The first step is to examine whether financial accounting information is associated with share price (see Eq. 1). The second step is to add the Visual Graphical Discrepancy Index (*VGDI*) to represent other non-accounting value-relevant information in the regression model (see Eq. 2). For steps 1 and 2, the research estimates the following equations:

$$P_{it} = \beta_0 + \beta_1 \text{BVPS}_{it} + \beta_2 \text{EPS}_{it} + \text{Year dummies} + \text{Industry dummies} + \varepsilon_{it} \quad (1)$$

$$P_{it} = \beta_0 + \beta_1 BVPS_{it} + \beta_2 EPS_{it} + \beta_3 VGDI_{it} + Yeardummies + Industrydummies + \varepsilon_{it} \quad (2)$$

where P_{it} is the share price four months after the end of the year; β_0 is the constant; BVPS_{it} is the book value per share at 31/12/*t*; EPS_{it} is the earning per share at 31/12/*t*; VGDI_{it} is the Visual Graphical Discrepancy Index at 31/12/*t*; and β_1, β_2, and β_3 are the coefficients of independent variables.

Basing their analysis on the previous literature (Barth et al. 2008; Harris and Muller 1999), we investigate if β_3 is positively or negatively (and significantly) associated with share price. Also, of interest is whether the explanatory power of our model (measured in terms of the *adj.* R^2) increases when VGDI_{it} is added to the regression as an independent variable. To analyze the usefulness of graphs, the study uses an incremental F-test (Stock and Watson 2009) to measure the statistical significance of the introduction of a new variable (VGDI_{it}) to the model (1). In particular, this test examines whether the change in the *adj.* R^2 is significant.

The authors study these associations in a pooled model, controlling both for the year (year dummies included) and for the industry effects (industry dummies). The coefficients in the equations are estimated using the ordinary least-squares technique. Heteroscedasticity-consistent standard errors using White's procedure are estimated to allow for any non-constant residual variance (White 1980).

One issue discussed in this study concerns the multicollinearity of the model's variables (Verbeek 2006). To measure the existence and intensity of multicollinearity, a variance inflation factor (VIF) is estimated. As a general rule, it is common to consider VIF score of no more than 4. Consequently, we determine and assess this indicator to measure the level of collinearity between independent variables, and we determine and analyze the correlation matrix.

Furthermore, the researchers introduce two control variables to analyze the impact of firms that are loss-making in a given year and firm size in assessing value relevance. Following other researchers (Mitra and Hossain 2009; Entwistle et al. 2010), each model is corrected by adding a dummy variable. Loss, i.e., equal to 1 if earnings are negative and 0 otherwise. In addition, another control variable for size is included, i.e., the natural logarithm of the book value of the total assets (So and Smith 2009; Bartov et al. 2005).

4 Findings and Discussion

4.1 Descriptive Statistics and Correlation Matrix

The descriptive statistics are presented in Table 2 for the full period. In particular, this table shows a high standard deviation for price and BVPS.

Table 2 Descriptive statistics

	Mean	Stand. Dev.	Min.	Max.
P	21.414	27.774	0.01	172.75
EPS	1.277	2.258	−13.873	12.462
BVPS	12.791	16.499	0.088	115.105
VGDI	−1.039	0.383	−2.964	−0.501
LNTA	16.637	2.134	9.954	27.235
LOSS	0.0988	0.298	0	1

Table 3 Correlation matrix

	P	EPS	BVPS	VGDI	LNTA	LOSS
P	1					
EPS	**0.591**	1				
BVPS	**0.578**	**0.608**	1			
VGDI	**−0.156**	**−0.161**	**−0.083**	1		
LNTA	0.040	**0.103**	**0.180**	**−0.122**	1	
LOSS	**−0.170**	**−0.364**	**−0.10**	**0.103**	0.006	1

Significance at 10% in bold text

The correlation matrix (Table 3) shows that there is no noticeable problem of multicollinearity between the variables. These results are also confirmed by the calculation of the VIF, in terms of being less than 4. P is statistically correlated with EPS, BVPS, and VGDI in this univariate test. This suggests that the accounting value and discrepancy index of European listed companies is relevant to investors.

4.2 Regression Model and Discussion

Table 4 shows the results of the regressions calculated in order to investigate the research question. The table shows the results of the equations with and without control variables. In addition, in the last line of the table, the authors show the incremental F-test, used to assess the statistical significance of the change in the R^2 of the two models that differs by one variable. Using this test, the significance of the introduction of the VGDI in model (1) is evaluated. The introduction of a new variable produces a statistically significant increase in R^2. This means that, albeit in a limited way, the VGDI affects stock price variability and is therefore value-relevant. For example, 3.39 is the incremental F-test value used to measure the significance of the introduction of VGDI in model (1) (without control variables) and the relevance of this information to investors.

Table 4 Regression model

	Model 1		Model 2	
COST	6.504 (5.50)***	1.898 (0.69)	18.252 (2.44)**	14.703 (1.939)*
EPS	4.924 (8.34)***	4.771 (8.03)***	5.133 (7.94)***	4.991 (7.71)***
BVPS	0.607 (8.00)***	0.610 (8.06)***	0.610 (7.83)***	0.614 (7.91)***
VGDI		−4.569 (−1.84)*		−5.167 (−2.07)**
LNTA			−0.733 (−1.64)	−0.837 (−1.86)*
LOSS			2.433 (0.71)	2.784 (0.82)
	0.448***	0.452***	0.450***	0.454
	3.39*		2.47*	

t-statistics in parentheses; $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

The coefficient for EPS and for BVPS is significant with the expected sign; this means that earning and equity affect positively the variability of listed companies prices. In particular, the EPS coefficient takes on significantly higher values than the BVPS coefficient. This result is consistent with what is specified in the main literature (Barth et al. 2008; Harris and Muller 1999) and it shows that the variability of the price is positively influenced by the variability of EPS.

For Model 1, the adjusted R^2 equals 0.4487 and the F-statistic is significant; the adjusted R^2 equals to 0.4501 for the model with control variables. Adding the VGDI variable, the adjusted R^2 increases and the incremental F-test is statistically significant for each model. In general, this indicates that not only graphical information is value-relevant for investors but also when the information relates to social and environmental information. H1 is therefore supported.

Focusing on the VGDI, there are two noteworthy points: (1) the visual index is value relevant; (2) it shows a coefficient that is negative for both models. The fact that the VGDI is value-relevant means that it is observed to influence investment decisions. The negative sign of the coefficient for VGDI, however, is the most significant finding of this research. Indeed, this result highlights an important implication in terms of a better understanding of visual impression management tactics' achievement. In particular, the negative sign shows that the investors have a negative consideration of the use of graph distortion by companies. The graph distortion can be interpreted as an attempt to manage impressions (Cho et al. 2012a; Bettie and Jones 2008). Consequently, the fact that it negatively impacts on prices means that this impression management tactic does not produce the expected result of swaying readers to perceive the company's social and environmental efforts in a more favorable light. This finding is somewhat surprising given the resonance attributed to the

impression management strategies, including the use of visuals and graph distortions (Cho et al. 2012a; Jones 2011; Bettie and Jones 2008). It does therefore imply that attempts to influence the readers' perceptions through the use/abuse of graphs do not appear to have the intended effect. Instead, it may be argued that investors are able to detect the graphs discrepancy and impound such instance as a negative attribute in the decision-making process. Relatedly, this may that investors are skillful readers (Fornaciari and Pesci 2018) that are able of detecting impression management tactics adopted by managers who prepare the sustainability reports (Diouf and Boiral 2017). The idea that investors are able to detect impression management tactics also sheds light on the necessity of further investigations on other stakeholders' perceptions of the disclosed and potentially distorted information. The visual power of graph distortions (Usmani et al. 2019) does appear to show any ability to influence investors in conveying a good impression of the company. Contrastingly, our study indeed shows that investors positively react to financial information. Furthermore, due to the interest of investors in financial performance, they might be less inclined to trust information contained in sustainability reports (Diouf and Boiral 2017), whose content is only partially linked to financial results.

The surprising finding of the negative impact of graphs' distortion is important because it helps to distinguish among different types of stakeholders when impression management tactics are applied (Fornaciari and Pesci 2018; Costa et al. 2019). In addition, this study underscores the importance of investigating both the preparers' perspective and the readers' perspective (Merkl-Davies and Brennan 2011) for a better understanding of impression management supposed results and use.

Finally, comparing the coefficients of the proposed models, a further important result of this research is that by adding the VGDI, the EPS coefficient decreased. In reading this finding within the impression management framework, it is important to look at the global impact of the distorted information, because it signals that when impression management techniques are detected by skilled stakeholder the result could influence readers to take more skeptical look at the other information disclosed by companies. Our results, indeed, seem to show that the visual impression management tactics, detected and recognized by investors, may need the perceptions of untrustworthiness about the company's information set, particularly in relation to earnings performance—albeit that such information is subject to audit and regulatory scrutiny.

5 Conclusions

This paper sought to analyze the readers' reaction to the use/abuse of visuals, in particular of graphs, by relying on the interpretive lens of impression management (Brennan et al. 2009; Merkl-Davies and Brennan 2011). In particular, our data interpretation focuses on investors as reader of the disclosure of big listed companies and such companies are supposed to have the willingness of influencing the reaction of their more salient stakeholders (Mitchell et al. 1997).

Prior researchers focus their analysis on the preparers/managers effort to impress readers by producing a favorable perception of the organization, but little attention is paid to the concrete results of these efforts. If the effort does not lead to a 'real' consequence, i.e., if readers' decision-making process is not influenced by the tactics, there is a question as to why companies should distort visual/graphical information. More concretely, this study accepts the Beattie and Jones (2008) recommendations to investigate more on the 'human data processing context', such as shareholders' investment decisions and it address a gap in the literature in relation to the possible consequences of corporate impression management techniques. Despite the preparers' behavior and the efforts done by scholars to understand it (Cho et al. 2012a; Jones 2011), we argue that graph distortion is a concrete impression management tool only if it is able to influence the investors' decisions.

Following the impression management literature, there is an implication that graph distortion would positively impress upon readers and thereby achieving in this way the preparers' aims. Our results contradict this expectation, showing that graph distortion has a significant and negative impact on market value and upon the investors' decision-making process. On one hand, therefore, visual impression management tactics seem value relevant, but on the other hand, it does not have the intended effect. Despite the potential of graphs to improve the effectiveness of communication (Lee and Tweedie 1975; Paivio 1971; Bettie and Jones 1992), these findings seem to suggest that sophisticated users (e.g., investors) are able to read and recognize distorted information, thereby Diouf and Boiral's (2017) findings.

The implication of these results is that the impression management literature needs to pay more attention to the readers' reactions to complement the well-established work on the preparers' intent(s). In fact, even though the literature does emphasis graph distortions as a key impression management technique (Beattie and Jones 1992 and 1997; Jones 2011; Cho et al. 2012a), the distortion tactic appears to have been 'found out' thereby leading to a significant negative influence on the investors' decision-making process. Hence, if as intended, the managers appear to have failed in their attempts to create favorable impressions in the minds of the receivers of the disclosed information.

This study represents a first attempt of evaluating the impression management effects on the receivers of different disclosure documents. Its key contribution leads to three important implications for the existing literature and for the managers responsible for corporate disclosure. First, this research shows the necessity of considering both the preparers and the receivers' perspectives when evaluating impression management techniques (Merkl-Davies and Brennan 2011). In evaluating graph distortion as an impression management strategy (Cho et al. 2012a; Jones 2011), the literature appears to have so far missed a crucial point as to the real power of distortion, namely that, if detected, impression management strategies can produce the opposite effects. Second, in this study, it is shown that there is a concrete effect of visual disclosures (Brennan et al. 2009; Cho et al. 2012a; Jones 2011; Pesci et al. 2015) and this should be further evaluated in relation to the stakeholders who receive the distorted information. Arguably, investors (and/or their advisers, such as analysts) are skilled stakeholders (Fornaciari and Pesci 2018) that would have the ability of

detecting visual impression management techniques. Third, the distorted information, if detected, can affect the general trust as to the reliability of the company's disclosure. This last observation is particularly worthy of attention because corporate disclosure does still on trust and can positively influence the decision-making process, only if it is considered reliable. This last implication should be carefully evaluated by mangers, who are responsible for the companies' disclosure.

Finally, we acknowledge that this analysis is subject to some limitations. It considers only one type of visuals (i.e., graph distortions). It does not consider other typologies of disclosure documents or communication tools used by companies that can contain graphs and it is based on a sample of three European countries. In this regard, it is argued that the development of the mixed method (manual content analysis and use of the regression model) is time-consuming while allowing researchers to test their research question under the above-mentioned specific conditions. The sample data could certainly be extended in future studies in terms of more recent years and number of countries and include additional typologies of visual information or impression management tactics.

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