

Why are managers optimistic? An investigation of corporate environmental disclosure tone

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Abstract

We examine the relation between disclosure tone and future environmental performance to disentangle whether managers' use of optimistic language in environmental reporting represents an opportunistic discretionary strategy (i.e. impression management), or serves as an incremental information tool. Furthermore, we explore whether and to what extent the relation between disclosure tone and future environmental performance varies according to the board of directors' monitoring intensity and stakeholder orientation. Using a sample of 288 US firms belonging to the Oil&Gas industry, we find that the bias towards a positive language in environmental narratives does not reflect purely managerial opportunistic reasons, but rather predicts future environmental performance. In addition, we document that the board monitoring intensity reinforces the relationship between disclosure tone and future environmental performance, while the stakeholder orientation substitute for environmental disclosure tone in signalling the firm's superior performance. Our findings contribute to the literature's debate on whether discretionary strategies in environmental disclosure are more about increased transparency or corporate image manipulation. Moreover, they help investors interpret managers' language choices. Finally, they are of interest for policy-makers, suggesting some conditions that could compensate the managers' legal accountability for qualitative disclosures.

Keywords: disclosure tone; board of directors; environmental disclosure; incremental information; impression management.

1. Introduction

In a context of growing competitiveness and scarce resources disclosure on environmental issues and, more in general CSR activities, has become increasingly relevant not only for the external community but also for capital market participants. Empirical studies suggest that it translates into a decrease of the cost of equity capital, an increase in the firm's value and a decrease in the analyst forecast error (Aerts et al., 2008; Plumlee et al., 2008; Dhaliwal et al., 2011, 2012). Such evidence would explain why there has been a growing diffusion of this type of disclosures either in the annual report or in *ad-hoc* stand-alone reporting (Bebbington et al., 2008; Simnett et al., 2009). A recent survey conducted by KPMG (2011) points out that 95 percent out of the 250 largest global companies now report on their CSR activities.

At the same time, a debate has opened in the academic literature over its potential for increasing firms' accountability towards stakeholders, versus being just another tool for corporate public relations (Cho et al., 2012). For instance, anecdotal evidence shows that companies engaging in unscrupulous business practices (e.g. oil companies) may turn to environmental disclosure as a form of promotional strategy, to counter the negative public sentiments in the aftermath of environmental disasters (Du and Vieira, 2012). In these cases, the discrepancy between the declared intentions and the environmental consequence of their actions results in a sense of scepticism about their real commitment toward CSR strategies. According to this perspective, environmental reporting is considered a tool to cheat on stakeholders, hide the firm's detrimental impact on local communities, and ultimately manage organizational legitimacy (Woolfson and Beck, 2005).

A factor that further contributes to this scepticism is the still voluntary and unregulated nature of environmental disclosure. In the U.S setting¹ according to the existing disclosure requirements in

¹ According to the requirements relating to environmental disclosure in SEC filings, a duty to disclose actual or potential environmental liabilities in SEC filings may arise under: (i) the specific disclosure requirements of Regulation S-K promulgated under the Securities Act of 1933, as amended (the "Securities Act"); (ii) the general antifraud provisions of the Securities Act or the Securities Exchange Act of 1934 (the "Exchange Act"); (iii) and the requirements

Regulation S-K and accounting guidance (i.e. FAS 5), companies are required to disclose a variety of environmental information. Nevertheless, securities regulations and accounting standards do not specifically address the way in which this information should be presented. Therefore, managers may engage in a number of communication tactics that can enhance the informativeness of such disclosure, but also increase their potential for controlling or manipulating the impression conveyed to external stakeholders (Clatworthy and Jones, 2001).

Motivated by these factors, the aim of this paper is to investigate whether managers use environmental disclosure opportunistically to affect the user's perception of corporate achievement (i.e. impression management), or rather provide useful information for predicting future environmental performance. Moreover, it explores whether and to what extent the use of discretionary disclosure strategies varies according to reporting incentives stemming from the board of directors' characteristics.

We analyze a sample of firms listed in the US Stock Exchange from 2008 to 2010, belonging to the Oil&Gas industry. The Oil&Gas is one of the most controversial industries, at the heart of the public debate around companies' environmental violations and abuses. Therefore, for these companies environmental disclosure may serve as an effective tool for gaining a broader social acceptance, ensuring the continuous flow of resources and contribute to their long-term prosperity (De Roeck and Delobbe, 2012).

We start our analysis by recognizing that discretionary disclosure strategies in narrative sections of corporate documents can be used either for impression management or for incremental information purposes. Most of the research on environmental disclosure with few exceptions (Clarkson et al., 2008), adopts the opportunistic view (Neu et al., 1998; Cho et al., 2010; Jones, 2011) without first assessing whether or not discretionary choices in environmental disclosure are aimed at exploiting

of Form 20-F with respect to foreign private issuers filing annual reports or registration statements pursuant to the Securities Act or the Exchange Act. Moreover there are several accounting standards and guidance governing environmental liabilities (i.e. FAS 5) [Davis Polk, Environmental Disclosure in SEC Filing, Jan. 21, 2009].

information asymmetries through engaging in biased reporting. We attempt to differentiate between these two perspectives, analyzing the relationship between manager's use of language as a specific type of thematic manipulation and future environmental performance.

Specifically, we focus on the bias towards positive tone and formulate two alternative hypotheses. The incremental information hypothesis posits that managers use optimistic tone in environmental disclosure to signal future positive environmental performance. Conversely, under the impression management hypothesis, managers would use optimistic tone to conceal expected negative environmental performance.

Next, we exploit the cross sectional variation across board of directors characteristics to investigate whether they play a moderating role for the relationship between environmental disclosure tone and future environmental performance. We do this following a recent stream of literature that investigates the relationship between discretion in corporate narratives and some corporate governance characteristics, mainly related to the board of directors. These studies find that board monitoring shapes managerial incentives to engage in discretionary disclosure strategies (Abrahamson and Park, 1994; García Osma and Guillamón-Saorín, 2011). However, other than board monitoring, the board stakeholder orientation may play a role in addressing environmental disclosure (Mallin et al., 2013). We add to this literature the analysis of the use of language in environmental disclosures and, considering either the impression management or the incremental information hypothesis, we anticipate that both board monitoring and stakeholder orientation will play a moderating role in the relationship between optimism in environmental disclosure and future environmental performance.

Our evidence gives support to the incremental information hypothesis, documenting that sample firms use optimism in 10-K environmental disclosures to truthfully convey information on future environmental performance.

The results also confirm a moderating effect of the board monitoring and stakeholder orientation, both separately and simultaneously. Specifically, we find that in presence of low stakeholder orientation firms are equally likely to use optimism to signal future positive environmental performance, even though the "signalling role" (predictive value) of optimism increases for *highly monitored* firms. Conversely, in presence of high stakeholder orientation, regardless of the board monitoring, the optimism in environmental disclosure becomes unrelated to future environmental performance, suggesting that *highly stakeholder oriented* firms tend not to rely on environmental disclosure tone to signal their superior performance, as the degree of stakeholder orientation can behave as a substitute for disclosure.

We perform several additional analyses to check the robustness of our results. We first split our sample firms according to the sample median of the firm's size and find that the relationship between environmental disclosure tone and future environmental performance is mainly attributable to big firms. Then, we perform an additional analysis on environmental disclosure in press releases. We check whether managers are strategic in their choice of language in environmental press releases since they are different in nature and scope, being also subject to lower litigation risk (Aerts and Cormier, 2009; Guillamon-Saorin et al., 2012). Using the Heckman model to control for selectivity (Guillamon-Saorin et al., 2012), we still find that managers use optimistic tone in environmental press releases to signal future environmental performance, suggesting that our results are not driven by the mandatory nature of 10-k environmental information.

The research contributes in several ways to the literature and the practice. First of all, it answers the recent call in the disclosure literature for incorporating both possibilities (impression management vs. incremental information) into research design aiming at investigating the discretionary disclosure strategies in corporate narratives (Merkl-Davies and Brennan, 2007).

Second, it does not only assess the extent of discretion in environmental reporting, but it also identifies some corporate governance dimensions that may affect the informative - rather than

opportunistic - role. By combining two different theories to explain the moderating effect of the board of directors' for the relationship between optimism and future environmental performance, we are also able to investigate the influence of two roles of the board both simultaneously and in isolation, thus contributing to the corporate governance literature.

Third, our results could provide investors with valuable insight to interpret managers' use of language in corporate narratives and evaluate whether CSR disclosure is more about increased transparency or corporate image manipulation (Cho et al., 2012). Finally, our evidence also contributes to the regulators' debate on whether and under what conditions managers should be held legally accountable for qualitative disclosures in general, and linguistic choices in particular. Although we do not provide a general examination of the language, we show that, at least in a high litigation environment, the inherent flexibility of environmental disclosure tone provides firms with the opportunity to achieve a further reduction of information asymmetries, avoiding the costs of a tight regulation on disclosures.

The paper is structured as follows. The following section reviews relevant literature and develops testable hypotheses. Section III details research design, describing data and measures for the empirical analysis. Section IV presents descriptive and regression results, while section V concludes with a discussion of the main implications, limitations of this study and avenues for future research.

2. Theoretical background and hypotheses

This study combines three different areas of research: environmental disclosure; impression management and corporate governance. We start this section by reviewing different theoretical perspectives on the use of discretionary disclosure strategies. Then, we introduce the thematic manipulation of disclosure through the use of language and formulate the first set of hypotheses.

Then, we discuss the moderating role of the board of directors' for the relationship between optimism in environmental reporting and future environmental performance and posit the second set of hypotheses.

2.1 Discretionary strategies in environmental disclosure

Discretionary disclosure strategies can be explained in the light of two competing views: the incremental information vs. impression management arguments (Merkl-Davies and Brennan, 2007).

According to the agency theory, disclosure mitigates information asymmetries and agency costs between insiders and outsiders (Verrecchia, 2001). Therefore, managers exploit discretion in corporate narratives to truthfully convey additional value-relevant information in order to reduce the cost of capital and increase the market value of the firm (Healy and Palepu, 2001). This perspective is known in literature as the incremental information argument and assumes that managers have no economic incentives to engage in opportunistically reporting, since the market is able to assess bias, punishing the firm with low share price performance (Clarkson et al., 2010).

Nevertheless, another stream of literature suggests that managers may successfully engage in self-serving communication tactics to influence prices because the market is unable to assess reporting bias, at least in the short term (*Impression management*) (Clatworthy and Jones, 2001). The impression management view is grounded either in agency theory or in socio-political theories (e.g. legitimacy theory, stakeholder theory). Under agency theory, opportunistic managers might obfuscate failures and emphasize success to enhance their reputation and compensation, avoiding the negative consequences of poor performance. From a different point of view, socio-political theories argue that managers use impression management strategies to alter the user's perception of corporate achievements in an attempt to convince stakeholders to accept the management's view of society (Hooghiemstra, 2000). Although impression management literature stems from different theoretical frameworks, the main argument is that managers self-servingly use the discretion in

corporate communication to manipulate public' impression of the company, rather than conveying truthful information.

Although there are a few studies that attempt to differentiate between incremental information and impression management arguments (Lang and Lundholm, 2000; Barton and Mercer, 2005; Bowen et al., 2005), research on environmental disclosure, with few exceptions (Clarkson et al., 2008, 2010), often adopt an impression management perspective. For instance, analyzing a sample of 33 publicly traded Canadian companies from 1982 to 1991, Neu et al. (1998) claim that “*the textually-mediated environmental disclosures contained in annual reports provide organizations with an effective method of managing public impression*” (Neu et al., 1998: 279). Jones (2011) examine the selective inclusion of graphs and the distortion of graphs in social and environmental disclosure and find that companies from high impact industries tend to be more selective, trying to present relatively more good news than bad news. Cho et al. (2012) find evidence of both enhancement and obfuscation in the graph displayed in corporate sustainability reports. These aforementioned studies interpret the use of discretionary disclosure strategies in environmental reporting as opportunistic managerial behaviour, aiming at self-servingly biasing information through decisions on the amount of information, the range of topics, and the rhetorical devices to be included in such disclosure.

Nevertheless, in order to shed new light on the incremental information vs. impression management debate we argue that we should first assess whether discretionary strategies in corporate narratives provide truthful information about *future* firm performance or not. To discern between these two alternative views, we focus on the verbal tone in environmental reporting and investigate its association with future environmental performance.

2.2 Disclosure tone: incremental information or impression management?

Managers can adopt different discretionary strategies in corporate narratives: disclosure choices on quantity, thematic content and attribution of organizational outcomes, choices on presentation and diffusion of information (Merkl-Davies and Brennan, 2007).

Previous studies on environmental disclosure mainly focus on the amount and the characteristics (Neu et al., 1998; Hughes et al., 2001), the thematic content (Cho and Patten, 2007) as well as visual and structural presentation of disclosure (Cho et al., 2012). However, because of the increasingly diffusion and the length of environmental reporting (KPMG, 2011), another dimension becomes pivotal in corporate communication: the use of language and verbal tone (Cho et al., 2010).

Disclosure tone (i.e. the use of optimistic versus pessimistic language) is a characteristic of the narrative disclosure that is captured through the use of nouns, adjectives, or verbs that express different sentiments (Sydserff and Weetman, 1999). According to Davis et al. (2012) language use and verbal tone is an important element of the information package of the firm. It provides a unifying framework for disclosures, that affect how market participants process the information but also how they perceive and understand it (Morris et al., 2005). However, this aspect of disclosure is by nature largely unregulated, thus leaving managers an inherent flexibility that can be used either to signal their expectations about future performance or to opportunistically manage the impression of market participants about the firm. Prior work on the information content of disclosure tone reports mixed results, some supporting the incremental information argument, while others the impression management view.

Research arguing that tone is informative for market participants (*Incremental information school*) shows that it is significantly associated with both current and future firm performance. Demers and Vega (2010) find that language in management quarterly earnings press releases is incrementally informative over the contemporaneously available “hard” information. Davis and Tama-Sweet (2012) find that a higher level of pessimistic language is associated with lower future firm

performance. Davis et al. (2012) find a significant association between “optimism” in earnings press releases and future firm performance, and conclude that the language has information content beyond the quantitative disclosures. They also document that investors respond to this incremental information.

Nevertheless, as disclosure tone is relatively costless and difficult to detect, it provides managers with the opportunity to engage in opportunistic behaviour aiming at influencing market’s perception about the firm. Therefore, another stream of literature points out that the language may serve as an impression management strategy to alter and/or manipulate users perception of corporate achievements (*Impression management school*). According to Merkel-Davis and Brennan (2007) the bias towards reporting good news vs. bad news represents a type of thematic manipulation that is known as “concealment” behaviour, through which managers may obfuscate failures (obfuscation) and emphasize success (image enhancement). Consistently, Land and Lundholm (2000) find that managers use language to “hype” their stock before seasoned equity offerings. Cho et al. (2010) document that the worst environmental performers use more “optimism” (image enhancement) and less “certainty” (obfuscation) in their environmental disclosure than better performing peers.

Given this conflicting evidence, we empirically investigate whether the “optimism” in environmental disclosure is a discretionary strategy to provide truthful information rather than being an impression management tool, by formulating two alternative hypotheses on its association with future environmental performance.

In line with the incremental information school, we argue that managers using the language of environmental disclosure to communicate truthful information will bias the tone of corporate narratives to align investors’ expectation about future performance to their own assessment (Ajinkya and Gift, 1984). Therefore, managers anticipating positive environmental performance

will use more optimistic language to convey their future expectation to shareholders. Thus, we formulate the following hypothesis (*Incremental information hypothesis*).

HP_{1a} Ceteris paribus, the “optimism” in corporate environmental disclosure is positively associated with future environmental performance

Conversely, from an impression management perspective, managers may self-servingly bias environmental disclosure to pursue their own benefits at the expense of the informativeness of such disclosure and/or to face threats of legitimacy. In such a setting, the more the firm performance differs from a desired benchmark, the more the management is motivated to adopt opportunistic language choices to alter stakeholders' impression of corporate achievements (Cho et al., 2010). Therefore, we expect that managers anticipating poor environmental performance will use more “optimistic” language in environmental disclosure. We then formulate the following alternative hypothesis (*Opportunistic impression management hypothesis*).

HP_{1b} Ceteris paribus, the “optimism” in corporate environmental disclosure is negatively associated with future environmental performance

2.3 The role of board monitoring and stakeholder orientation

Environmental disclosure is, however, part of the overall disclosure strategy that is determined by a cost-benefit assessment (Cormier and Magnan, 1999). Therefore, the managerial use of the language in environmental disclosure is shaped by the incentives that managers have when deciding to disclose truthfully rather than opportunistically. As disclosure emanates from the board (Haniffa and Cooke 2005; Cheng and Courtenay 2006; Cerbioni and Parbonetti 2007; Michelon and Parbonetti 2012), we focus on that part of incentives stemming from the board of directors' characteristics.

Traditionally, studies on the influence of board of directors on corporate transparency emphasize the monitoring or control role of the board of directors (Johnson et al., 1996; Zahra and Pearce

1989). This literature, rooted in agency theory, claims that the primary role of the board is to monitor managers ensuring that they behave in the shareholders' interests. Because disclosure is selective and self-interested managers may exploit reporting discretion to conceal or distort information, the monitoring of the board is essential in ensuring high level of firm transparency (Jensen and Meckling, 1976). Within the agency framework, a well-developed strand of literature examines whether board of directors' attributes, such as board size and structure or the board-CEO relationship mitigate opportunistic management behavioural the context of quantitative mandatory information (Beasley, 1996; Peasnell et al., 2005).

However, studies on the influence of board of directors on discretionary disclosure strategies are much more limited. Abrahamson and Park (1994) document that outside directors, large institutional investors, and accountants constrain the concealment of negative organizational outcomes in the president letters. Mather and Ramsay (2007) find that board independence limits the selective inclusion of graphs in financial reports and the distortion of the graphs' construction. Analyzing a broader set of impression management measures, García Osma and Guillamón-Saorín (2011) find that the strength of corporate governance (proxied by characteristics of structure and functioning of the board of directors) constrains managerial incentives to bias the presentation and the diffusion of information in ARPR, thus reducing the extent of impression management.

We base our prediction on this literature and anticipate that that board monitoring intensity will moderate the relationship between optimism in environmental disclosure and future environmental performance. Therefore, we formulate the following hypothesis:

HP₂ The intensity of board monitoring moderates the relationship between optimism in environmental disclosure and future environmental performance.

Nevertheless, according to the resource dependence theory, the board is assigned another important function: the service role (Hillman and Dalziel, 2003)². Within this framework directors, because of their prestige in the profession and community, are able to extract resources vital to the corporation (e.g. information, ties, legitimacy), reducing the transaction costs associated with the environmental uncertainty (Pfeffer, 1972). Hence, the importance of the board of directors is strictly related to its ability to establish linkages with external environment, through which it may represent the firm in the community, enhancing organizational legitimacy and reputation (Daily and Dalton, 1994; Hambrick and D'Abeni, 1992)³. Mallin et al. (2013) point out that the service role of the board with respect to stakeholders gives rise to a further dimension of the board activity, which becomes particularly important in the context of environmental reporting: the “stakeholder orientation”.

This dimension captures the ability of the board of directors to fulfil its fiduciary duties not only towards the owners, but also towards all the firm's stakeholders, by responding to their various and diverse expectations. For instance, a board composed of directors who are highly reputed in the community, or with a greater variation among its members may increase the degree to which stakeholders enforce their claims because they are likely to be proposed by relevant stakeholders and their interests are more closely aligned with the external community (Kassinis and Vafeas, 2002). This, in turn, fosters the corporate social responsibility (Sacconi, 2006) and enhances the organizational legitimacy (Ullmann, 1985; Zattoni, 2011). Michelin and Parbonetti (2012) argue that the stakeholders-legitimacy perspective of directors' role can be considered complementary to the agency-based view of the board, and helps explain the influence of board of directors on social and environmental disclosure. In the analysis of the corporate governance path leading to social and environmental disclosure, Mallin et al. (2013), find that stakeholder-oriented governance mechanisms lead to higher environmental performance, and eventually to more transparent

² A third role assigned to the board of directors is the strategic role. As the examination of the strategic role of directors is outside the scope of our analysis, we refer to Pugliese et al. (2009) for a complete review.

³ Also from a legalistic perspective the service role of the board involves enhancing company reputation, establishing contact with the external environment, giving counsel and advice to executives (Carpenter, 1988; Zahra and Pearce, 1989).

environmental disclosure⁴. However, other research points out that environmental governance mechanisms can also be part of a symbolic approach to CRS and are not necessarily intended to proactively improve environmental performance (Rodrigue et al., 2012)

Moving from these studies, we expect that the stakeholder orientation of the board will play a role also in shaping the relationship between the environmental disclosure tone and future environmental performance (i.e the informativeness vs. the opportunistic use of language). Hence, we posit the following hypothesis:

HP₃ The stakeholder orientation of the board moderates the relationship between optimism in environmental disclosure and future environmental performance.

3. Research Design

3.1 Sample

We select a sample of firms listed in the US Stock Market from 2008 to 2010 belonging to the Oil&Gas industry. We focus on the Oil&Gas industry since it is one of most controversial environmentally sensitive industries, at the heart of the public debate around companies' environmental violations and abuses. Therefore, for these companies environmental disclosure plays a very significant role for gaining a broader social acceptance, ensure the continuous flow of resources and contribute to their long-term prosperity (De Roeck and Delobbe, 2012). The choice of the sample is also driven by recent studies documenting a large diffusion among Oil&Gas companies of several communication tactics to boost the effectiveness of CSR-related information (Du and Vieira, 2012).

⁴ Mallin et al. (2013) examine the determinants of the social and environmental disclosure taking into account dimensions of the corporate governance that go beyond the role of the board of directors, such as the nature and the concentration of the ownership. However, as we are interested only in the effect of the board of directors, we will only consider characteristics of the board.

Our initial sample comprises all companies from Compustat Global dataset. Next, we select US companies operating in the Oil & Gas industry by using the two-digit SIC code classification. Then, we eliminate companies that are not listed in KLD's SOCRATES database. Finally, we eliminate companies for which we were unable to collect 10-K filings and other required documents and companies with missing data for our financial and governance variables. The total number of the firm-years observation is equal 288, corresponding to 96 unique firms (Table 1).

[INSERT TABLE 1 ABOUT HERE]

3.2 Variables

I. *Measure of environmental performance*

To test our hypotheses we require a measure of future environmental performance as dependent variable. We rely on KLD's SOCRATES database, which is a comprehensive research database measuring the social and environmental performance of corporations, widely used in the recent environmental accounting research (Cho et al., 2006; Cho and Patten, 2007; Cho et al., 2010). The database provides independent rates of hundreds of companies traded on the US Stock Exchanges measuring their social performance across a range of dimensions such as Community, Corporate Governance, Environment, Employee Relations. For each area, KLD analysts assign "strengths" and "concerns" on a 5-point scale. Among the multi-dimensional concepts of corporate social performance provided by the KLD's database, we select the scores for the environmental performance one year ahead the fiscal year of environmental disclosure tone (2009-2010-2011)⁵. Specifically, according to Cho et al., (2010) we refer to the environmental concern ratings that are assigned to companies referring to the following seven items (i) Hazardous Waste, (ii) Regulatory Problems, (iii) Ozone Depleting Chemicals, (iv) Substantial Emissions, (v) Agricultural Chemicals, (vi) Climate Change, (vii) Other Concern. Thus, firms with higher environmental concern scores have worse environmental performance. However, as more than 44% of our sample firms have

⁵ We also collect data on environmental performance for the fiscal years of environmental disclosure (2008-2009-2010) since we include it as a control in regression analysis.

environmental ratings equal to 0 (n= 127), we conduct our analysis by focusing on sample firms that have at least one concern. Therefore, our dependent variables (EP_{t+1}) is a dummy variable equal to one if sample firms exhibit environmental concerns greater or equal to 1, 0 otherwise.

II. *Disclosure tone*

We measure the extent of discretionary disclosure strategies in environmental reporting using the bias in disclosure tone. In doing so, we follow the suggestion of Cho et al. (2010) arguing that “*the language and verbal tone used in environmental disclosures (...) must be considered when investigating the relationship between corporate disclosure and performance*”. According to Cho et al. (2010), we capture the tone of environmental disclosure in the 10-K filings, by performing a computer-aided content analysis of the information provided in Section 1 (Description of the Business)⁶. We choose to analyze the tone of narrative information in 10-K mandatory filings, as they are among the potentially most effective means to manage impressions given the closeness of the narrative section and the more credible and verifiable audited information (Neu et al., 1998). However, as additional analysis, we also examine disclosure tone in voluntary corporate documents (environmental press releases) to check whether the nature of the information provided (mandatory vs. voluntary) affect the informative value of communication strategies.

We use DICTION 5.0 to measure disclosure. It is widely used software for linguistic analysis. Relying on a set of dictionaries developed according to the linguistic theory, this software perform a word frequency counts on the input text, providing as output five master variables (“optimism”, “activity”, “realism”, “commonality”) that allow users to perform a lexical analysis⁷. The use of DICTION has several advantages. First, it computes an optimism score, which is a continuous

⁶ Other section that potentially could contain environmental information are Section 3 (Legal Proceedings) and Section 7 (Management’s Discussion and Analysis). However, following the suggestion of Cho et al. (2010) we exclude both Sections to minimize concern of a confounding analysis.

⁷ The software provides the user with the choice of the normative profiles to be use in the empirical analysis. These profiles have been generated by running different types of that range from public speeches to poetry, from newspaper editorials to business reports. We conducted the empirical analysis under the “corporate financial reports” normative values.

variable rather than a categorical variable. Second, the score is normalized by the word number, increasing the comparability of results between disclosures of different lengths. Finally, it ensures greater objectivity of the results and allows substantial time saving relative to other manual coding procedures. Nevertheless, it is not without limitations. Unlike manual procedures, DICTION does not consider the context in which the words have been used, thus introducing noise into the computed score. However, the trade-off between DICTION's strength and weaknesses is arguably in favour of the use of this software. We, thus, employ the "optimism" score as our measure of the tone bias (OPT)⁸.

III. Board monitoring

We capture the influence of reporting incentives over the informativeness of disclosure tone by focusing on two roles of the board of directors: the board monitoring and the board stakeholder orientation. Each of the two dimensions emphasizes different directors' responsibility and is captured by different attributes of the board. From an agency perspective the quality of the board as a monitor is a function of several attributes such as the director's independence, the degree to which they are dependent from the CEO and the presence of the audit committee (Zahra and Pearce, 1989). Thus, we measure the board monitoring intensity with three different measures: (i) board size, (ii) CEO-duality, (iii) proportion of independent directors.

A board comprised of many directors may experiment coordination costs and free-riding problems that prevent the effective monitoring on the financial reporting practices (Lipton and Lorsh, 1992). However, it may also offer a better advice to the CEO due to the broader expertise of its member (Dalton et al., 1999). We measure the board size (B_SIZE) as the total number of directors sitting on the board. Board consisting primarily of insiders is considered to be less effective at monitoring. Conversely, independent directors are less susceptible to the CEO (Weisbach, 1988), thus they help

⁸ Optimism is defined as "*Language endorsing some person, group, concept or event or highlighting their positive entailments*". It is computed through the following formula [Praise + Satisfaction + Inspiration] - [Blame + Hardship + Denial] (DICTION 5.0 Manual - Hart, 2000). Following Ober, Zhao, Davis and Alexander (1999) and Cho et al. (2010) we report the "optimism" master variable without adjustment.

aligning the board activities with the interest of stakeholders (Brammer and Pavelin, 2006). We capture the independence of the board (IND) by considering the number of independent directors. CEO duality refers to the combination of the CEO and Chairman's role. Agency-centered theories and codes of best practice of corporate governance recommend the separation of these roles to ensure the board has greater independence from management (Fama and Jensen, 1983). Therefore, we measure the independence of the board members from the CEO with a dummy variable taking the value of 1 if CEO is also the Chairman of the board (CEO_DUAL).

IV. Board stakeholder orientation

We also consider the stakeholder-orientation of the board. We rely on the characteristics of the board of directors that, according to the resource dependence theory, may proxy for its ability to perform a service role towards firm's stakeholders. They are: (i) directors connections (Zahra and Pearce, 1989), (ii) presence of directors who are "community influential" (Kassinis and Vafeas, 2002), (iii) board diversity (Brammer et al., 2009), (iv) presence of a specific CSR/ethic/sustainability committee (Post et al., 2002).

The first attribute encapsulates the network of ties to other firms created through the presence of the same director on the board of different organizations, a situation that is often referred in the literature as interlocking directorship (Haunschild, 1993). Directors connections not only provide a network of ties with other organizations, that are pivotal for the company's success and survival but also professional competence and prestige, necessary to legitimizing the firm service (Zahra and Pearce, 1989). We measure the directors connection as the total number of directorships held by each director (B_EXT).

We identify the presence of community influential members, i.e. retired politicians, academics, members of social organizations, that due to their experience bring connections to community groups and provide non-business perspectives on the firm's actions and strategies (Hillman et al.,

2000). They often directly represent the interests of external stakeholders (Kassinis and Vafeas, 2002), and put pressure on executives for more informative disclosure in order to promote the firm's legitimacy. The presence of "community influential" is measured by a dummy variable taking the value of 1 if the number of "community influential" is equal or above the sample median (B_CI). This proxy was chosen in order to better isolate firms that, having a number of "community influential" particularly high, distinguish themselves relative to their peers. We read each board member biography and classify directors as community influential if they were academicians, politicians (including retired politicians), military officers (including retired military officers) and members or directors of social/non profit organizations (including members of clergy and religious leaders) (Hillman et al., 2000; Michelon and Parbonetti, 2012). Board diversity refers to the variation among its members as proxied by the gender diversity (i.e. the presence of female on board)⁹. Several studies show that having more women on boards enhances firms' reputation (Bernardi et al., 2006; Brammer et al., 2009). Finally, women on board are more likely than man to be community influential (Hillman et al., 2002), being able to sensitize boards towards CRS activities, including environmental disclosure (Bear et al. 2010). Therefore, we measure the board diversity with the number of female directors (B_FEM). The last measure of stakeholder orientation is the presence of a specific CSR/ethic/sustainability committee (D_SHE). It oversees the company's policies on social, environmental, and other matters of significance to the firm's reputation as a global corporate citizen (Post et al., 2002). Among its responsibilities and activities there is the monitoring of practices relating to the company's global social and environmental accountability and the oversight of the publication of CSR Report (if present). We measure the presence of a CSR committee with a dummy variable equal to 1 if a firm has a specific CSR/ethic/sustainability committee.

V. Control variables

⁹ We recognize that board diversity is a broader concept, including not only gender diversity, but also race, age and possible disabilities. However, given the difficulties in proxying for such multiple aspects, following Mallin et al. (2013) and Coffey and Fryxell (1991) we focus on gender diversity.

As the use of impression management tactics in environmental reporting is a part of a broader communication strategy that include financial accounting information, our first control variable is the level of earnings management. Several recent studies document the presence of a close relationship between the manipulation of quantitative accounting data (earnings management) and manipulation of more qualitative narrative information (impression management) (Godfrey et al., 2003; Guillamón-Saorín and García Osma, 2012; Aerts and Chen, 2011; García Osma and Guillamón-Saorín, 2011). As consequence we control for the extent of earnings management that may play a role in addressing the manager decision to bias the tone as an opportunistic device to maintain organizational legitimacy and garner support from stakeholders whose interests are damaged by EM practices.

To measure the extent of earnings management, we use the cross-sectional modified Jones Model (Dechow et al., 1995) by pooling firms for year to estimate coefficients in equation (1)

$$\left(\frac{TA_{j,t}}{Assets_{j,t}} \right) = a_1 \left(\frac{1}{Assets_{j,t}} \right) + a_2 \left(\frac{\Delta SALES_{j,t}}{Assets_{j,t}} \right) + a_3 \left(\frac{PPE_{j,t}}{Assets_{j,t}} \right) + \varepsilon_{jt} \quad (1)$$

where

$$TA_{j,t} = EBEI_{j,t} - CFO_{j,t} ;$$

$EBEI_{j,t}$ = Earnings before extraordinary items for the period t;

$CFO_{j,t}$ = Operating Cash Flow for the period t

$\Delta SALES_{j,t}$ = change in sales from period t-1 to period t;

$PPE_{j,t}$ = gross level of property, plant and equipment

We then use the estimated parameters from the Equation (1) in the following model to calculate non discretionary accruals ($NDA_{j,t}$)

$$NDA_{i,t} = \hat{a}_1 \left(\frac{1}{Assets_{jt}} \right) + \hat{a}_2 \left(\frac{\Delta SALES_{j,t} - \Delta AR_{i,t}}{Assets_{jt}} \right) + \hat{a}_3 \left(\frac{PPE_{j,t}}{Assets_{jt}} \right) \quad (2)$$

where

$\Delta SALES_{j,t}$ = change in sales from period t-1 to period t;

$\Delta AR_{i,t}$ = change in accounts receivable from period t-1 to period t;

$PPE_{j,t}$ = gross level of property, plant and equipment

Then, we compute discretionary accruals ($DA_{i,t}$) as follows.

$$DA_{i,t} = \left(\frac{TA_p}{Assets_{jt}} \right) - NDA_{i,t}$$

Our final measure of earnings management is the absolute value of the computed discretionary accruals (DA_ABS), as we are not interested in the direction of the manipulation, but rather in the level of manipulation,

Then, we consider variables that may drive discretionary disclosure strategies and also affect the informativeness of the tone, including variables that might be related with future environmental performance such as the current environmental performance, which is measured as the number of environmental concern in the year t (EP_t). We measure the presence of growth opportunities with the Market-to-Book ratio (MTB) and the level of capital intensity with the level of property, plant and equipment divided by the total asset (TANG). We control for firm size with the logarithm of total asset (SIZE). Finally, we control for economic performance with the Return on Equity (ROE) and for the financial structure with an indicator variable taking the value of 1 if the company total debt is increased by more than 10% in the current period, 0 otherwise (D_ISSUE). Archival data on board of directors are hand-collected from proxy statement, while financial variables are gathered

from COMPUSTAT Database¹⁰. Appendix A provides a detailed explanation of the variables definition and sources.

4. Results

4.1 Descriptive statistics

Table 2 presents descriptive statistics for dependent and independent variables used in our empirical analysis.

[INSERT TABLE 2 ABOUT HERE]

Almost a half of our sample firms (44%) have positive future environmental performance ($EP_{t+1}=0$), suggesting that companies from high environmental sensitive industry (Oil&Gas) are under greater pressure for their environmental outcomes. The optimism score takes values between 34.69 and 51.6, with the average company having a score of 47.2. Concerning the characteristics of the board of directors the mean (median) value of directors sitting on a board is about 9 while the median number of independent directors is 7. These results are in line with the strict enforcement and regulatory regime existing in the US in the post Sarbanes-Oxley era. Looking at the board's stakeholder orientation attributes, we can observe a tendency towards a low degree of board diversity, with the median number of female sitting on the board equal to 0. The average directors connections with external community is about 14, while only the 22% of the sample firms has at least one community influential. Very surprisingly, only 16% of the board has a formal CRS/ethics/Sustainability committee. Finally, concerning the financial structure the average sample firm tends to be a growing firm with high level of capital intensity, strong financial needs and poor economic performance.

Table 3 provides the Pearson (Spearman) correlation coefficients between the variables employed in our empirical analysis.

¹⁰ To control for outliers financial variables are winsorized at 10%.

[INSERT TABLE 3 ABOUT HERE]

Future environmental performance is negatively correlated with the optimism score, while positively correlated with the current performance. Current (and future) environmental performance is positively correlated with all board of directors' attributes. The optimism score is positively related with monitoring proxies, while negatively related with the stakeholder orientation variables.

4.2 Board monitoring and stakeholder orientation factors

Previous literature suggests that monitoring and stakeholder orientation refers to two roles of the board of directors that are theoretically distinct, but may be performed together (Hillman et al., 2000). Therefore, to examine the moderating role of these two dimensions for the relationship between environmental disclosure tone and future environmental performance both separately and simultaneously we choose a matrix format built as follows.

To capture the extent of monitoring intensity and stakeholder orientation of the board we combine the board of directors' measures in two factors through a principal component analysis. The first factor (MONITORING) proxies for the board monitoring intensity and include the agency-based board attributes (board size; CEO duality; number of independent directors). The second factor (STAKEHOLDER_ORIENTATION) captures the stakeholder orientation of the board and includes measures that, according to the resource dependence role, are indicative of an orientation towards the stakeholders (directors connections; female representation; community influential; presence of a CSR/ethical/sustainability committee). Table 4, Panel A provides eigenvectors and the Kaiser-Meyer-Olkin measure of sampling adequacy for the monitoring factor (MONITORING), while Panel B provides these measures for the stakeholder orientation factor (STAKEHOLDER ORIENTATION).

[INSERT TABLE 4 ABOUT HERE]

Next, we partition our sample firms according to the sample median of both factors and interact the resulting binary variables to analyze the relationship between environmental disclosure tone and future environmental performance in four distinct circumstances. Figure 1 illustrates the four possible combinations of board types using a matrix format.

[INSERT FIGURE 1 ABOUT HERE]

In the upper left quadrant, companies with *high board monitoring and high board stakeholder orientation* tend to exhibit large board size, greater independence from the CEO with high number of independent directors sitting on the board. Moreover, they have a strong network of ties with other organizations and the firm's external environment, due to the presence of directors with experience and linkages relevant to the firm's community. Finally, they tend to exhibit high level of board diversity and appear to be actively involved in CSR practices. Essentially, these companies have a type of board that looks like an effective "watchdog" for the shareholders, being also able to satisfy the interests of all the other firm's stakeholders, as indicated by the high reputation and legitimacy in the community.

Moving to the upper right quadrant, companies with *high board monitoring and low board stakeholder orientation* tend to be characterized by a high proportion of independent directors and large board size. However, they lack strong network connections with other organization. Directors have relatively low reputation and legitimacy in the community, due to their scarce influence over important non-business organizations. Finally, they are characterized by very low adherence to CSR standards (such as the presence of CSR committee). Thus, directors concerns are more about the maximization of shareholder wealth, controlling opportunistic managerial choices, rather than protecting the interest of the firm's broader community of stakeholders.

In the lower left quadrant, companies with *low board monitoring and high board stakeholder orientation* tend to exhibit CEO duality, low proportion of independent directors and smaller

boards. Thus, it is less able to protect the interests of shareholders, being more “a pawns of powerful managers” (Mace, 1971). At the same time, the boards of directors of these companies exhibit a high number of links to external community and greater board diversity. These characteristics suggest that the board of directors of these firms would perform a “social role”, ensuring that the company behaves within the bounds of the society, enhancing stakeholder engagement and organizational legitimacy.

Finally, in the lower right quadrant, companies with *low board monitoring and low board stakeholder orientation* can be considered the opposite of the upper left quadrant board type. They have a small managerial board, whose directors lack of experience in controlling manager disclosure choices. Moreover, they also lack of independence from the CEO as well as prestige and reputation in the external environment. Therefore, this type of board appears not really aligned with the interests of either shareholders or other firm’s stakeholders, being unable to fulfil both the monitoring and the service role.

This matrix format offers the opportunity to perform a univariate comparison of firms’ characteristics across the four different quadrants. To this aim, we first compute the variables’ means for each quadrant and, then, perform a battery of tests to contrast the variables means across quadrants. The results of this comparison are shown in Table 5.

[INSERT TABLE5 ABOUT HERE]

Firms belonging to the upper two and the lower two quadrants are significantly different in terms of either environmental performance or optimism scores. Firms with *high board monitoring and low board stakeholder orientation* tend to be significantly more optimistic than all the other firms. As expected, the four groups are statistically different with regard to the board of directors’ characteristics. Firms with *high board monitoring and high board stakeholder orientation* exhibit highest level of almost all board monitoring proxies, followed by firms with *high board monitoring and low board stakeholder orientation*. Firms from the lower left quadrant (companies with *low*

board monitoring and high board stakeholder orientation) show higher stakeholder orientation measures than companies with *high board monitoring and low board stakeholder orientation*. Firms in the lower right quadrant (*low board monitoring and stakeholder orientation*) have the lowest value of both monitoring and stakeholder orientation variables. Finally, moving from the upper left to the lower right quadrant firms tend to exhibit increasing value of discretionary accruals, growth opportunities and tangibility while decreasing value of size and profitability. The difference among economic characteristics that are part of our controls are, however, not always significant across the four quadrants.

The results of this univariate analysis, however, tell little about the use of the language in environmental disclosure. Therefore, we turn our attention to the analysis of the relationship between language and future environmental performance.

4.3 Regression analysis

We start our empirical analysis by examining whether the language choice serves as incremental information strategy or impression management tool. We hypothesize that if tone bias is a discretionary strategy to communicate truthful information, then “optimism” in environmental disclosure should signal future positive environmental performance (*Incremental information hypothesis*). Conversely, if managers use tone to opportunistically bias environmental reporting, we expect that “optimisms” would conceal expected negative environmental performance (*Impression management hypothesis*). Empirically, for the incremental information hypothesis to hold, a positive association between “optimism” in environmental disclosure in the year t and the likelihood of having positive environmental performance in the year $t+1$ should be found. On the contrary, if we observe a negative relationship between “optimism” in the year t and environmental

performance in the year $t+1$, this will give support to the opportunistic impression management hypothesis. Figure 2 illustrates our hypotheses.

[INSERT FIGURE 2 ABOUT HERE]

To identify the relation between tone and environmental performance in the year $t+1$ we use a probit regression, since our dependent variable (EP_{t+1}) is specified as a dummy variable. As environmental disclosure tone may be affected by the level of environmental performance in the current year (Cho et al., 2010), in all models we also include the environmental performance in the year t . Finally, we control for other factors potentially influencing the language choice¹¹. Thus, our first model is stated as:

$$EP_{i,t+1} = \beta_0 + \beta_1 * OPT_{i,t} + \beta_2 * EP_{i,t} + \beta_3 * DA_ABS_{i,t} + \beta_4 * MTB_{i,t} + \beta_5 * TANG_{i,t} + \beta_6 * SIZE_{i,t} + \beta_7 * D_ISSUE_{i,t} + \beta_8 * ROE_{i,t} + \varepsilon_{i,t} \quad (1)$$

Table 6, Column 1 reports the results of the model testing H_{p1a} and H_{p1b} ¹².

[INSERT TABLE 6 ABOUT HERE]

Optimism in the year t is negatively and significantly related with the likelihood of having at least one environmental concern in the year $t+1$ ($\beta_1 = -0.0857$). This result gives support to the *Incremental information hypothesis*, suggesting that sample firms use more optimistic language to convey truthful information on future environmental performance. This result is not really surprising for at least three reasons. First, US litigation environment imposes asymmetric loss function to the firms (i.e. firms are more likely to be sued when they have large negative surprises). This, in turn, encourages firms to be less optimistic in their forecast about future firms performance (Rogers and Stocken, 2005). Second, the Oil&Gas industry can be considered one of the most important environmental sensitive sectors, and it faces greater societal pressure with regard to the environmental impact of companies' activities. Third, in the US there is a form of semi-

¹¹ All regression models include year fixed effects and standard errors clustered at firm-level to control for heteroskedasticity.

¹² We report the estimated coefficients rather than the odds ratio since we are interested in evaluating the sign of the association.

strong/strong market efficiency where investors, on average, are able to assess reporting bias. These factors push managers to use discretion in corporate narratives in order to overcome information asymmetries, avoiding unduly optimistic disclosures that would cause higher cost of capital, lower share price performance and increased likelihood to be sued (Rogers et al., 2011).

As expected, environmental performance of the year t has a positive and highly significant relationship with future environmental performance one year ahead. Furthermore, the level of earnings management and the firm's size are positively associated with the likelihood of having at least one environmental concern in the year $t+1$. This result indicates that large firms with more opaque earnings are more likely to experiment negative environmental performance in the year $t+1$.

Next, we investigate the moderating effect of two dimensions of the board activity, monitoring and stakeholder orientation, for the relationship between environmental disclosure tone and future environmental performance. To this aim we augment model 1 to include the dummy variables indicating firms with high/low monitoring (MON) and high/low stakeholder orientation (STK), and then interact them with the optimism score. Our second model is stated as follows (model 2):

$$EP_{i,t+1} = \beta_0 + \beta_1 * OPT_{i,t} + \beta_2 * MON_{i,t} + \beta_3 * SKT_{i,t} + \beta_4 * MON * OPT_{i,t} + \beta_5 * STK * OPT_{i,t} + \beta_6 * MON * STK * OPT_{i,t} + \beta_7 * EP_{i,t} + \beta_8 * DA_ABS_{i,t} + \beta_9 * MTB_{i,t} + \beta_{10} * TANG_{i,t} + \beta_{11} * SIZE_{i,t} + \beta_{12} * D_ISSUE_{i,t} + \beta_{13} * ROE_{i,t} + \varepsilon(2)$$

where the coefficient β_1 indicates the relationship between optimism and future environmental performance for firms positioned in the lower right quadrant of Figure 1 (*low board monitoring and low stakeholder orientation*). The sum of the coefficients ($\beta_1 + \beta_4$) explains the relationship between OPT and $EP_{i,t+1}$ for firms belonging to the upper right quadrant (*high board monitoring and low stakeholder orientation*). The sum of the coefficients ($\beta_1 + \beta_5$) explain the relationship between optimism and future environmental performance for firms in the lower left quadrant (*low board monitoring and high stakeholder orientation*), while summing up the coefficients ($\beta_1 + \beta_4 + \beta_5 + \beta_6$) we

can examine the relationship between optimism and future environmental performance for firms belonging to the upper left quadrant (*high board monitoring and high stakeholder orientation*).

Table 6, Column 2 reports estimation results for the model 2. Looking at the effect of the board monitoring and stakeholder orientation on future environmental performance, we find that the coefficient of STK is significantly and negatively related with the likelihood of having at least one environmental concern one year ahead. Nevertheless, the coefficient of MON is negative but not statistically significant and the sum of the coefficients $\beta_2+\beta_3$ is not significantly different from 0, suggesting that having effective board monitoring does not affect *per se* the future environmental performance of the firm.

Moving to the analysis of the moderating effect of the board of directors, we find that the optimism in the year t is negatively associated with the likelihood of having at least one environmental concern one year ahead ($\beta_1= -0.1697$), indicating that firms with *low board monitoring and low stakeholder orientation* use more optimistic language to signal future positive environmental performance. The relationship between optimism and environmental performance becomes more intense for firms having *high board monitoring and low stakeholder orientation* as suggested by the sign and the significance of the joint test $\beta_1+\beta_4$. However, when we come to the firms having *low board monitoring and high stakeholder orientation* the relationship between optimism and future environmental performance becomes not significant all (the sum of the coefficients $\beta_1+\beta_5$ is not significantly different from 0). Finally, summing up the coefficients ($\beta_1+\beta_4+\beta_5+\beta_6$) we observe that even for firms with *high board monitoring and high stakeholder orientation* the tendency towards positive language in environmental disclosure is not significantly related with the future environmental performance. Taken together our results suggest that firms use optimism as a signalling mechanism to trustfully convey future environmental performance. We also find that having high board monitoring does not change, but rather reinforce, the relationship between optimism and future environmental performance (i.e "signalling effect" of optimism). Nevertheless,

in presence of high stakeholder orientation, regardless of the board monitoring, firms tend not to use environmental disclosure to convey private information on their future environmental performance. In the light of the stakeholder-based arguments claiming that environmental governance mechanisms are themselves substantive mechanisms to signal a real commitment towards the environment that, in turn, translates into better corporate environmental performance (Ashfort and Gibbs, 1990), a possible interpretation of our results is that a high stakeholder orientation can behave as a substitutive mechanism for environmental disclosure tone in order to signal firm's superior environmental performance¹³.

4.4 Additional analysis

4.4.1 Big vs. small firms

So far, we have examined the association between the disclosure tone and future environmental performance to disentangle whether managers use discretion in environmental reporting to truthfully convey additional information or to opportunistically conceal negative organizational outcomes. Nevertheless, prior work suggests that due to the higher visibility, larger firms tend to exhibit more informative environmental disclosure (Cho et al., 2010). Hence, the informative vs. opportunistic use of environmental disclosure tone may be affected by the variability of the sample size. Therefore, as additional test we perform our regression analysis separately for the big vs. small firms. To this aim we partition our sample firms according to the sample median of the firm's size, and then identify big (small) firms as the ones having the firm-specific value of the firm's size higher (smaller) than the sample median.

Table 7 reports the descriptive statistics for the big vs. small firms. As expected there is a significant difference between big and small firms across almost all test variables. Larger firms

¹³ An alternative interpretation of our results is that in presence of high stakeholder orientation firms do not rely on optimism to convey future positive performance since they have *a priori* superior performance than the others. Hence there is no need of signalling mechanisms. Nevertheless our research design does not allow to rule out this alternative explanation.

have more environmental concern either in the year t or in the year $t+1$. They have more directors sitting on the board (B_SIZE) which are more independent (IND). The degree of board diversity (B_FEM) is higher, as well as the number of external connections and the presence of community influentials. Finally, they have lower value of earnings management (DA_ABS) and tangibility (TANG), while higher value of debt issue (D_ISSUE) and profitability (ROE).

[INSERT TABLE 7 ABOUT HERE]

[INSERT TABLE 8 ABOUT HERE]

Table 8 reports regression results indicating the relationship between environmental disclosure tone and future environmental performance for the two subgroups of firms. Column 1 and 2 reports results for the model 1 testing HP_{1a} and HP_{1b}. As expected we find that the relationship between optimism and future environmental performance is still negative and significant for the big firms ($\beta_1 = -0.0984$), suggesting that optimism in environmental disclosure is used as an incremental information device to convey truthful information on future environmental performance. Conversely, for firms having sample size lower than the median (Column 2), the tendency towards positive language in environmental disclosure is negative but not statistically related to the likelihood of having at least one environmental concern one year ahead. Column 3 and 4 test HP₂ and HP₃ on the moderating role of the board of directors. Regression results for the big firms (Column 3) repeat the ones of the full sample, suggesting that for large firms optimism is a significant predictor of future positive environmental performance for firms having low level of board stakeholder orientation, and the effectiveness of the board monitoring intensifies this result. The relationship between optimism and future environmental performance becomes not significant at all, for the two subgroups of firms having successful board stakeholder orientation (*low board monitoring and high stakeholder orientation* and *high board monitoring and high stakeholder orientation*). Nevertheless, when we come to the Column 4, we observe that the optimism is significantly related to future environmental performance only for the subgroup of firms having *low*

board monitoring and low stakeholder orientation, while for *high board monitoring and low stakeholder orientation* board we observe a loss of significance compared to the full model. Finally, consistent with the results from the full sample, in presence of successful stakeholder orientation there is no significant association between optimism and the likelihood of having at least one environmental concern one year ahead. In sum, the evidence from this additional analysis suggests that the results on the association between environmental disclosure tone and future environmental performance as well as the moderating role of the board of directors (Table 6) are mainly attributable to the larger firms.

4.4.2 Disclosure tone in environmental press releases

As discussed earlier, firms tend to use tone in environmental reporting to overcome information asymmetries, by revealing managers' expectation about future environmental performance. Nevertheless, a factor potentially addressing our results is that we measure disclosure tone of environmental information provided in mandatory section of 10-K filings (Section 1). Thus, the high scrutiny concern and the risk of detection characterizing mandatory disclosures could further dampen managerial incentives to engage in self-serving disclosure choice.

Therefore, to check whether our evidence is driven by the mandatory nature of 10K filings we perform an additional analysis on the tone of environmental press releases¹⁴. According to Guillamon-Saorin et al. (2012), press releases are a more tactically oriented disclosure vehicle used to fulfil different disclosure strategies. Moreover, they are largely unregulated and unaudited being also subject to a limited external scrutiny. These features, in turn, may lower litigation risk increasing the potential for impression management strategies.

¹⁴ We originally planned to investigate disclosure tone in voluntary environmental reports. Nevertheless, only 22 companies provide an environmental report in year 2010 and only 13 in 2009. Thus, given the low number of observations, we opted for looking at environmental disclosure in press releases where we were able to obtain a sufficient number of observations to perform statistical analyses.

To perform this additional test, we review all the press releases issued by sample companies during the fiscal year 2008-2009-2010. We, then, select the ones providing information with regard to environmental issues¹⁵. Once environmental press releases have been identified, we separately quantify the optimism for each single press release with DICTION, as described in Section 3. Similar to previous work (Kothari et al., 2009) our final optimism score is a firm-specific average of the DICTION's optimism scores for press releases issued by a company during each fiscal year (OPT_PR).

Table 9 Panel A provides descriptive statistics for the two sub-groups of firms issuing and not issuing environmental press releases.

[INSERT TABLE 9 ABOUT HERE]

What is notable is that the two groups are different across many characteristics. Firms issuing press releases (n=120) have worst current (EP_t) and future environmental performance (EP_{t+1}). They also have significantly larger board size (B_SIZE) and more independent directors (IND). Similarly, they also have significantly higher value of stakeholder orientation measures, such as board diversity (B_FEM), community influentials (B_CI) and the provision of a CSR Committee (D_SHE). They are larger and less capital intensive relative to the non-issuing firms (n=168). Finally, they have less opaque earnings, more growth opportunities and better economic performance. These results suggest that firms issuing environmental press releases are statistically different from the others. In addition, it should be considered that firms choose to issue a press releases and this choice may be itself an impression management strategy (Guillamon-Saorin et al., 2012). As a consequence, a key problem of this analysis is that a simple OLS regression would suffer from self-selection (Heckman, 1978). In response to this problem we estimate the following two set of equations:

¹⁵ We include press releases concerning (among others) energy efficiency programs; environmental incidents; Oil spill; LEED certification; environmental permits and licences; EISs; EPAs; climate change; reduction of greenhouse gas; waste reduction; compliance to environmental regulations; research with environmental impact; environmental projects (e.g. Enhanced Oil Recovery); other environmentally sensitive policies.

$$D_PR_{i,t} = \beta_0 + \beta_1 * MONITORING_{i,t} + \beta_2 * STAKEHOLDER_ORIENTATION_{i,t} + \beta_3 * DA_ABS_{i,t} + \beta_4 * SIZE_{i,t} + \beta_5 * D_ISSUE_{i,t} + \beta_6 * ROE_{i,t} + \beta_7 * MTB_{i,t} + \beta_8 * TANG_{i,t} + \varepsilon \quad (4a)$$

$$EP_{i,t+1} = \beta_0 + \beta_1 * OPT_PR_{i,t} + \beta_2 * TANG_{i,t} + \beta_3 * ROE_{i,t} + \beta_4 * SIZE_{i,t} + \beta_5 * INV_MILLS_{i,t} \quad (4b)$$

The first equation (4a) models the likelihood that firms issue environmental press releases, conditional on their board of directors characteristics through a probit regression. We also control for the level of earnings management, firm size, economic performance, financial structure, growth opportunities and tangibility, including year- and industry- fixed effects (4-digit SIC-codes). In model (4b), we still use a probit regression and estimate the likelihood that firms will have at least one environmental concern in the year $t+1$ as a function of the optimism in environmental press releases in the year t (OPT_PR) and other variables potentially affecting environmental performance. If optimism in environmental press releases predicts future environmental performance, we expect to observe a negative coefficient β_2 in the model (4b).

Table 10, Panel A reports the regression result of the model (4a), while Panel B provides the results of the model (4b).

[INSERT TABLE 10 ABOUT HERE]

Results from Panel A document that the likelihood of issuing environmental press releases is increasing with the firm size and decreasing with the level of tangibility. Conversely, it is not significantly associated with the factor variables that capture the board monitoring intensity (MONITORING) and stakeholder orientation (STAKEHOLDER ORIENTATION). Moreover, contrary to previous evidence (Guillamon-Saorin et al., 2012) we do not find that firms with lower quality of accounting numbers prefer not to issue (environmental) press releases. Moving to the regression results of Panel B, we find a negative and significant relationship between OPT_PR and EP_{t+1} ($\beta_2 = -0.2068$), documenting that managers use more optimistic language in environmental press releases to signal future environmental performance. This result suggests that our sample

firms do not strategically use language in 10-K filings vs. voluntary press releases. More importantly, this evidence indicates that our main conclusion on the relationship between environmental disclosure tone and future environmental performance are not driven by the mandatory nature of the 10-K disclosure.

5. Conclusion

We study the extent of discretionary strategies in narrative information with the goal of identifying whether they are informative about future environmental performance (*Incremental information hypothesis*) or they are impression management tools to manipulate the users perception of corporate achievements (*Impression management hypothesis*).

To this aim, we focus on the tone of environmental disclosure issued by a sample of US Oil&Gas companies from 2008 to 2010 and analyze its relationship with future environmental performance. We find that the more optimistic tone of environmental disclosures does not reflect purely managerial opportunistic reasons, but rather signals future positive environmental performance (Demers and Vega, 2010; Davis et al., 2012; Baginski et al., 2012).

Our paper is closely related to the literature on the role of environmental disclosure (Patten, 2002; Al-Tuwaijri et al., 2004; Cho and Patten, 2007; Clarkson et al., 2008) and the use of language and verbal tone (Cho et al., 2010). Testing two competing predictions (*Incremental information hypothesis* vs. *Impression management hypotheses*) we document that the bias toward positive language in environmental narratives is informative about future environmental performance, thus lending empirical support to those studies indicating that environmental disclosure is used as a signal to reveal superior performance because of the greater societal pressure with regard to environmental issues (Cormier and Magnan, 1999; Al-Tuwaijri et al., 2004; Clarkson et al., 2008).

Furthermore, we add to this literature the analysis of firm-specific incentives that can lead to cross-sectional differences in the role of environmental disclosure tone. In this way, we extend prior work on the association between corporate governance features and discretionary disclosure strategies (García Osma and Guillamón-Saorín, 2011) by focusing on two dimensions of the board of directors (monitoring and stakeholder orientation) and showing how they interact with each other, ultimately affecting the relationship between environmental disclosure tone and future environmental performance.

Our evidence is also in line with Mallin et al. (2013), confirming that although board monitoring and stakeholder orientation are theoretically distinct, they should be considered simultaneously when examining the moderating role of the board of directors for environmental disclosure tone. However, our study does not support the view that board stakeholder orientation is a symbolic mechanism to portray a concern for the environment that does not translate into actual improvement of environmental performance (Cho et al., 2012; Rodrigue et al., 2012). Our results rather suggest that firms with strong stakeholder orientation tend not to use environmental disclosure to signal future environmental performance since the degree of stakeholder orientation can behave as a "substitutive signalling mechanism".

In additional tests, we find that even though our results are mainly attributable to the large firms, they are not driven by the mandatory nature of 10-K environmental disclosure. Conditioning the issuance of environmental press releases on the firm's governance and economic characteristics, we still find that managers use optimistic tone in environmental press releases to signal future environmental performance, rather than to self-servingly bias disclosures.

We acknowledge the limitations of our research. First of all, our analysis is based on a single country-industry, it does not allow isolating the effect of external incentives that may limit managerial use of self-serving reporting strategies (e.g. litigation risk). Therefore, a natural

extension of our research could be investigating the same research question in different settings with lower litigation risk (such as other non-environmental sensitive industry and/other non-US countries). Second, characteristics of environmental disclosure other than the tone (width, depth, coverage, readability, reliability) may also affect the future environmental disclosure. As our research design does not capture these aspects, we are not able to assess whether the informative value of the tone is *incremental* relative to other features of environmental disclosure. Moreover, although our evidence indicates that the tone is informative about future environmental performance, we do not know if the market responds to this information. Therefore, future research effort could be directed in addressing these limitations. Finally, our study is not aimed at showing whether managers *intentionally* disclose overly optimistic disclosures to convey information, rather than to mislead stakeholders. Our results only indicate that optimism in environmental press releases is associated with higher likelihood of being good environmental performers in the next year and this relationship varies according to different board of directors characteristics.

Subject to these caveats, we claim that our findings could have interesting implications for both investors and policy-makers. Investors should be aware of the use of language as a signal over future firm performance and rely on it to take better investment decisions. From a regulators perspective, our results could contribute to the longstanding debate on the costs and benefits of a regulation for qualitative disclosures, suggesting that in the absence of a tight regulation it is possible to force managers to be forthcoming by increasing the level of shareholder litigation, which may act as a constraint for opportunistic disclosure choices. Finally, in line with recent research (Rodrigue et al., 2012) they shed light on some additional mechanisms (CRS committee, the presence of “community influentials” on the board) that can be considered substitutive to environmental disclosure tone in signalling superior environmental performance of the firms.

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Figure 1. Board types matrix

		<u>STAKEHOLDER ORIENTATION</u>	
		HIGH	LOW
<u>MONITORING</u>	HIGH	MON_STK	MON
	LOW	STK	NO_MON_STK

Figure 1 displays the matrix obtained by combining the MONITORING and STAKEHOLDER ORIENTATION factors, according to the sample median. Firms from the upper left quadrant exhibit the firm-specific value of both MONITORING and STAKEHOLDER ORIENTATION factors above the sample median (n=111). Firms from the upper right quadrant exhibit the firm specific value of MONITORING factor above the sample median while the value of STAKEHOLDER ORIENTATION factor equal or below the sample median (n=32). Firms from the lower left quadrant exhibit the firm specific value of MONITORING factor equal or below the sample median while the value of STAKEHOLDER ORIENTATION factor above the sample median (n=33). Firms from the lower right quadrant exhibit the firm-specific value of both MONITORING and STAKEHOLDER ORIENTATION factors equal or below the sample median (n=112). The full sample comprises 288 firm-year observations corresponding to 96 unique US firms belonging to the Oil&Gas industry in 2008-2010. See Appendix A for variables definitions.

Figure 2. Empirical predictions

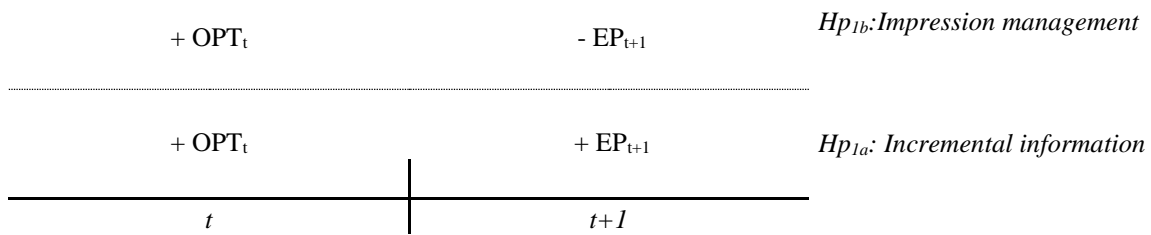


Figure 2 depicts empirical predictions for the analysis of the tone's informativeness. Under the Incremental information hypothesis (Hp_{1a}) a positive association between optimism in the year t and environmental performance in the year t+1 is expected. Under the Impression management hypothesis (Hp_{1b}) a negative association between optimism in the year t and environmental performance in the year t+1 is expected.

Table 1. Sample distribution

SIC-code	Year			Total
	2008	2009	2010	
1311	50	50	50	150
1381	7	7	7	21
1382	2	2	2	6
1389	8	8	8	24
2911	11	11	11	33
4922	2	2	2	6
4923	6	6	6	18
4924	10	10	10	30
Total	96	96	96	288

Table 1 reports the sample distribution. The full sample comprises 288 firm-year observations corresponding to 96 unique US firms belonging to the Oil&Gas industry in 2008-2010.

Table 2. Descriptive statistics

	N	mean	min	p25	p50	p75	max	sd
Panel A: Environmental performance and disclosure tone								
EPT+1	288	0.560	0	0	0	1	1	0.497
OPT	288	46.809	34.69	45.445	47.2	48.41	51.6	2.273
EP	288	1.010	0	0	1	1	5	1.273
Panel B: Board monitoring measures								
B_SIZE	288	8.875	1	7	9	10	17	2.428
CEO_DUAL	288	0.562	0	0	1	1	1	0.497
IND	288	7.236	3	5	7	9	16	2.609
Panel C: Board stakeholder orientation measures								
B_FEM	288	0.684	0	0	0	1	4	0.888
B_EXT	288	15.816	0	8	14	21	72	11.103
B_CI	288	0.222	0	0	0	0	1	0.416
D_SHE	288	0.163	0	0	0	0	1	0.370
Panel D: Control variables								
DA_ABS	288	0.090	0.001	0.029	0.065	0.127	0.583	0.091
MTB	288	1.986	-12.318	1.097	1.686	2.270	33.460	2.684
TANG	288	1.310	0.793	0.068	0.920	1.122	1.431	0.793
SIZE	288	8.090	6.086	7.184	7.974	8.918	10.298	1.290
D_ISSUE	288	0.545	0	0	1	1	1	0.499
ROE	288	0.0315	-0.271	-0.069	0.081	0.149	0.243	0.164

Table 2 reports the descriptive statistics for variables of analysis. Panel A provides results for environmental performance and disclosure tone. Panel B provides results board monitoring proxies. Panel C provides results for stakeholder orientation proxies, while Panel D provides descriptives for control variables. The full sample comprises 288 firm-year observations corresponding to 96 unique US firms belonging to the Oil&Gas industry in 2008-2010. See Appendix A for variables definitions.

Table 3. Correlation analysis

	N	A	B	C	D	E	F	G	H	I	L	M	N	O	P	Q	S
A: EP _{t+1}			-0.117*	0.708*	0.143*	0.105*	0.156*	0.070	0.025*	0.021	0.184*	0.068	0.064	0.075	0.407*	0.102*	0.091
B: OPT		-0.094		-0.058	0.029	0.034	0.091	0.043	-0.025	-0.063	-0.093	-0.026	0.030	0.153*	-0.024	0.051	-0.132*
C: EP _t		0.569*	-0.054		0.320*	0.147*	0.318*	0.257*	0.154*	0.160*	0.345*	0.070	-0.043	-0.014	0.518*	0.131*	0.111*
D: B_SIZE		0.145*	0.017	0.451*		0.083	0.877*	0.608*	0.588*	0.359*	0.446*	-0.211*	-0.053	-0.232*	0.621*	0.036	0.123*
E: CEO_DUAL		0.105*	0.021	0.194*	0.108*		0.198*	0.123*	0.038	0.252*	0.124*	-0.073	0.080	0.085	0.252*	-0.004	0.093
F: IND		0.164*	0.065	0.459*	0.903*	0.206*		0.578*	0.511*	0.408*	0.446*	-0.236*	-0.053	-0.158*	0.651*	0.104*	0.141*
G: B_FEM		0.054	-0.014	0.314*	0.612*	0.183*	0.610*		0.391*	0.249*	0.354*	-0.212*	-0.001	-0.239*	0.442*	-0.098*	0.155*
H: B_EXT		-0.007	-0.065	0.250*	0.570*	0.040	0.527*	0.431*		0.313*	0.366*	-0.135*	-0.097*	-0.314*	0.418*	0.033	0.087
I: B_CI		0.020	-0.110*	0.337*	0.369*	0.252*	0.423*	0.266*	0.336*		0.306*	-0.073	-0.026*	-0.070	0.338*	0.019*	0.106*
L: D_SHE		0.184*	-0.125*	0.507*	0.476*	0.124*	0.494*	0.369*	0.425*	0.306*		-0.077	0.082	-0.158*	0.393*	0.101*	0.191*
M: DA_ABS		0.097	-0.006	-0.013	-0.171*	-0.137*	-0.205*	-0.178*	-0.154*	-0.118*	-0.080		0.044	-0.054	-0.197*	0.137*	0.053
N: MTB		0.110*	0.032	-0.020	-0.062	-0.066	-0.112*	-0.040	-0.041	-0.042	-0.007	0.264*		0.150*	0.028	0.025	0.189*
O: TANG		0.047	0.114*	-0.074	-0.250*	0.112*	-0.206*	-0.188*	-0.244*	-0.083	-0.146*	-0.056	0.029		-0.096	-0.023	-0.196*
P: SIZE		0.399*	-0.028	0.615*	0.620*	0.249*	0.652*	0.447*	0.346*	0.346*	0.409*	-0.262*	-0.068	-0.222*		0.127*	0.192*
Q: D_ISSUE		0.102*	0.067	0.134*	0.062	-0.004	0.107*	-0.090*	0.029	0.019*	0.101*	0.167*	0.011	-0.130*	0.131*		0.020
R: ROE		0.089	-0.130*	0.166*	0.158*	0.081	0.168*	0.156*	0.161*	0.114*	0.188*	-0.050	-0.048	-0.170*	0.208*	0.0345	

Table 3 reports the correlation analysis for variables used for empirical analysis. Below (above) the diagonal are reported Pearson (Spearman) correlation coefficients. The full sample comprises 288 firm-year observations corresponding to 96 unique US firms belonging to the Oil&Gas industry in 2008-2010. * denotes significance at 10% level (two-tailed). See Appendix A for variables definitions.

Table 4. Factor analysis

Panel A: Monitoring factor

<i>Variable</i>	<i>Eigenvectors</i>	<i>kmo</i>
B_SIZE	0.683	0.492
CEO_DUAL	0.225	0.357
IND	0.695	0.493

Number of obs	288
Eigenvalue	1.954
Variation explained	0.6514
Overall kmo	0.487

Panel B: Stakeholder orientation factor

<i>Variable</i>	<i>Eigenvectors</i>	<i>kmo</i>
B_FEM	0.502	0.735
B_EXT	0.541	0.703
B_CI	0.439	0.784
D_SHE	0.512	0.739

Number of obs	288
Eigenvalue	2.075
Variation explained	0.519
Overall kmo	0.690

Table 4 reports results of the principal component analysis. Panel A provides eigenvectors and the Kaiser-Meyer-Olkin measure of sampling adequacy (kmo) for the monitoring factor (MONITORING), while Panel B provides these measures for the stakeholder orientation factor (STAKEHOLDER ORIENTATION). In both cases we retain the first factor which is the only one having an eigenvalue greater than 1. The full sample comprises 288 firm-year observations corresponding to 113 unique US firms belonging to the Oil&Gas industry in 2008-2010. See Appendix A for variables definitions.

Table 5. Comparison of variables means across board types

<i>Variable</i>	<i>MON_STK</i> <i>vs. B_MON</i>	<i>MON_STK</i> <i>vs. B_STK</i>	<i>MON_STK vs.</i> <i>NO_MON_STK</i>	<i>B_MON vs.</i> <i>B_STK</i>	<i>B_MON vs.</i> <i>NO_MON_STK</i>	<i>B_STK vs.</i> <i>NO_MON_STK</i>
EP _{t+1}	0.084	0.033	-0.148*	-0.051	-0.232*	-0.181*
EP _t	-0.863*	-1.039*	-1.158*	-0.176	-0.295*	-0.118
OPT	0.659	-0.773	-0.025	-1.433*	-0.684	0.748*
B_SIZE	-1.647*	-2.748*	-4.160*	-1.101*	-2.513*	-1.412*
CEO_DUAL	.0113	-0.557*	-0.292*	-0.568*	-0.303*	0.264*
IND	-1.582*	-4.039*	-4.631*	-2.457*	-3.049*	-0.592*
B_FEM	-1.066*	-0.893*	-1.218*	0.172	-0.152	-0.324*
B_EXT	-11.973*	-3.730*	-13.883*	8.242*	-1.910*	-10.153*
B_CI	-0.495*	-0.253*	-0.486*	0.242*	0.009	-0.233*
D_SHE	-0.387*	-0.266*	-0.387*	0.121*	0	-0.121*
DA_ABS	0.012	0.029	0.045*	0.017	0.033*	0.016
MTB	0.274	1.167	0.159	0.894	-0.115	-1.090
TANG	0.274*	0.092	0.376*	-0.181*	0.102	0.283*
SIZE	-0.835*	-1.214*	-1.909*	-0.379	-1.074*	-0.695*
D_ISSUE	0.093	0.014	0.004	-0.079	-0.089	-0.010
ROE	-0.078*	-0.048*	-0.061*	0.030	0.017	-0.013

Table 5 reports the results comparison of variables means across quadrants corresponding to the four boards types. MON_STK denotes firms from the upper left quadrant of Figure 1 (*effective monitored stakeholder oriented*). MON denotes firms from the upper right quadrant of Figure 1 (*effective monitored not stakeholder oriented*). STK denotes firms from the lower left quadrant of Figure 1 (*ineffective monitored stakeholder oriented*). NO_MON_STK denotes firms from the lower right quadrant of Figure 1 (*ineffective monitored not stakeholder oriented*). * denotes significance at 10% level (two-tailed). The p-values of the tests of differences in means for continuous variables are based on t-test. The p-values of the tests of differences in means for binary variables are based on test of proportions. The full sample comprises 288 firm-year observations corresponding to 96 unique US firms belonging to the Oil&Gas industry in 2008-2010. See Appendix A for variables definitions.

Table 6. The relationship between disclosure tone and future environmental performance

	(1) EP _{t+1}	(2) EP _{t+1}
OPT	-0.0857** [0.039]	-0.1697*** [0.065]
MON		1.4611 [4.144]
STK		-11.3766** [4.703]
MON_OPT		-0.0266 [0.087]
STK_OPT		0.2542** [0.103]
MON_STK_OPT		-0.0347*** [0.011]
EP _t	1.3874*** [0.243]	1.3589*** [0.232]
DA_ABS	1.9761* [1.047]	1.8278* [1.095]
MTB	0.0930 [0.083]	0.0974 [0.081]
TANG	0.2409 [0.148]	0.2613* [0.144]
SIZE	0.2712** [0.107]	0.4718*** [0.130]
DEBT_ISSUE	-0.0380 [0.219]	-0.0790 [0.238]
ROE	0.1038 [0.612]	0.3240 [0.679]
(β ₂ +β ₃)		0.0748*
(β ₁ +β ₄)		0.0254**
(β ₁ +β ₅)		0.3184
(β ₁ +β ₄ +β ₅ +β ₆)		0.7756
Wald Chi2	66.96	84.17
Obs.	288	288
Intercept	Yes	Yes
Year-dummies	Yes	Yes

Table 6 reports results of the regression analysis for the full sample. Column 1 reports the probit regression testing the relationship between environmental disclosure tone and future environmental performance. Column 2 reports the moderating role of the board of directors. MON is a dummy variable equal to one if a firm has the firm's specific value of the MONITORING factor above the sample median, otherwise it is zero; otherwise it is zero. STK is a dummy variable equal to one if a firm has the firm's specific value of the STAKEHOLDER ORIENTATION factor above the sample median, otherwise it is zero; otherwise it is zero. MON_OPT is the interaction term between MON and the optimism score (OPT). STK_OPT is the interaction term between STK and the optimism score (OPT). MON_STK_OPT is the interaction term between MON, STK and the optimism score (OPT). The full sample comprises 288 firm-year observations corresponding to 96 unique US firms belonging to the Oil&Gas industry in 2008-2010. *, **, *** denotes significance at 10%, 5%, 1% levels (two-tailed). In parentheses are reported z test statistics based on standard errors clustered at firm-level. See Appendix A for variables definitions.

Table 7. Descriptives for big vs. small firms

		N	mean	min	p25	p50	p75	max	sd
Panel A: Environmental performance and disclosure tone									
EP _{t+1}	BIG	135	0.763*	0	1	1	1	1	0.427
	SMALL	153	0.379	0	0	0	1	1	0.487
OPT	BIG	135	46.740	38.86	45.28	47.24	48.52	50.85	2.383
	SMALL	153	46.869	34.69	45.74	47.17	48.37	51.6	2.177
EP _t	BIG	135	1.637*	0	0	1	3	5	1.543
	SMALL	153	0.457	0	0	0	1	2	0.550
Panel B: Board monitoring measures									
B_SIZE	BIG	135	10.126*	1	8	10	12	17	2.469
	SMALL	153	7.771	4	6	8	9	13	1.771
CEO_DUAL	BIG	135	0.674*	0	0	1	1	1	0.470
	SMALL	153	0.464	0	0	0	1	1	0.500
IND	BIG	135	8.726*	4	7	9	10	16	2.442
	SMALL	153	5.921	3	4	6	7	12	1.972
Panel C: Board stakeholder orientation measures									
B_FEM	BIG	135	0.926*	0	0	1	1	4	0.943
	SMALL	153	0.470	0	0	0	1	3	0.778
B_EXT	BIG	135	18.778*	0	11	17	25	72	10.495
	SMALL	153	13.203	0	7	10	17	67	11.000
B_CI	BIG	135	0.333*	0	0	0	1	1	0.473
	SMALL	153	0.124	0	0	0	0	1	0.331
D_SHE	BIG	135	0.289*	0	0	0	1	1	0.455
	SMALL	153	0.052	0	0	0	0	1	0.223
Panel D: Control variables									
DA_ABS	BIG	135	0.068*	0.001	0.025	0.056	0.099	0.251	0.053
	SMALL	153	0.109	0.001	0.032	0.071	0.138	0.583	0.112
MTB	BIG	135	1.910	0.517	1.347	1.670	2.316	8.300	1.067
	SMALL	153	2.052	-12.318	0.992	1.715	2.253	33.460	3.548
TANG	BIG	135	1.192*	0.296	0.962	1.122	1.368	2.795	0.391
	SMALL	153	1.414	0.068	0.845	1.125	1.626	7.165	1.014
SIZE	BIG	135	9.199*	8.117	8.411	9.063	10.192	10.298	0.824
	SMALL	153	7.110	6.086	6.397	7.261	7.731	8.099	0.697
D_ISSUE	BIG	135	0.607*	0	0	1	1	1	0.490
	SMALL	153	0.490	0	0	0	1	1	0.501
ROE	BIG	135	0.063*	-0.271	-0.007	0.100	0.158	0.243	0.146
	SMALL	153	0.003	-0.271	-0.107	0.039	0.147	0.243	0.175

Table 8 reports the descriptive statistics for the analysis of the informativeness of the tone in big vs. small firms. Panel A provides results for environmental performance and disclosure tone. Panel B provides results board monitoring proxies. Panel C provides results for stakeholder orientation proxies, while Panel D provides descriptives for control variables. The full sample is divided in two sub-groups of firms according to the sample median of the firm's size: big firms (BIG=1) and small firms (BIG=0). * denotes significance at 10% level (two tailed). The p-values of the tests of differences in means for continuous variables are based on t-test. The p-values of the tests of differences in means for binary variables are based on test of proportions. The full sample comprises 288 firm-year observations corresponding to 96 unique US firms belonging to the Oil&Gas industry in 2008-2010. See Appendix A for variables definitions.

Table 8. Big vs. small firms

	(1)	(2)	(3)	(4)
	EP _{t+1}	EP _{t+1}	EP _{t+1}	EP _{t+1}
	Big firms	Small firms	Big firms	Small firms
OPT	-0.0984** [0.050]	-0.0788 [0.054]	-0.2388** [0.118]	-0.1613* [0.086]
MON			3.2129 [7.695]	-1.3064 [10.744]
STK			-16.8843** [7.310]	-16.3474 [10.397]
MON_OPT			-0.0682 [0.160]	0.0337 [0.231]
STK_OPT			0.3913** [0.165]	0.3583 [0.226]
MON_STK_OPT			-0.0640*** [0.021]	-0.0366** [0.016]
EP _t	0.9970*** [0.256]	1.8880*** [0.325]	1.0094*** [0.245]	1.9410*** [0.341]
DA_ABS	0.5389 [2.200]	2.1945* [1.149]	-0.8917 [2.687]	1.9104* [1.122]
MTB	0.2373* [0.140]	0.0517 [0.081]	-0.0491 [0.152]	0.0656 [0.110]
TANG	0.2771 [0.491]	0.1815 [0.164]	-0.2376 [0.509]	0.2559 [0.171]
SIZE	0.2162 [0.252]	-0.0193 [0.238]	0.7512** [0.302]	0.1672 [0.270]
DEBT_ISSUE	0.0156 [0.318]	-0.0829 [0.290]	-0.2580 [0.377]	-0.0747 [0.291]
ROE	-0.8685 [0.949]	0.1839 [0.936]	-0.3548 [1.091]	0.1310 [1.030]
(β ₂ +β ₃)			0.0597*	0.1044
(β ₁ +β ₄)			0.0404**	0.5937
(β ₁ +β ₅)			0.3578	0.3460
(β ₁ +β ₄ +β ₅ +β ₆)			0.8008	0.3393
Wald Chi2	30.57	104.33	93.47	111.16
Obs.	135	153	135	153
Intercept	Yes	Yes	Yes	Yes
Year-dummies	Yes	Yes	Yes	Yes

Table 8 reports results of the regression analysis indicating the relationship between environmental disclosure tone and future environmental performance for the two subgroups of firms: big firms vs. small firms. Column 1 and 2 report the probit regressions testing HP_{1a} and HP_{1b}. Column 1 indicates results for the subgroup of firms having the firm's specific size above the sample median (big firms), while Column 2 reports results for the subgroup of firms having the firm's specific size below the sample median (small firms). Column 3 and 4 report the probit regressions testing the moderating role of the board of directors (HP₂ and HP₃). Column 3 displays results for big firms while Column 4 reports results for the small firms. MON is a dummy variable equal to one if a firm has the firm's specific value of the MONITORING factor above the sample median, otherwise it is zero; otherwise it is zero. STK is a dummy variable equal to one if a firm has the firm's specific value of the STAKEHOLDER ORIENTATION factor above the sample median, otherwise it is zero; otherwise it is zero. MON_OPT is the interaction term between MON and the optimism score (OPT). STK_OPT is the interaction term between STK and the optimism score (OPT). MON_STK_OPT is the interaction term between MON, STK and the optimism score (OPT). The full sample comprises 288 firm-year observations corresponding to 96 unique US firms belonging to the Oil&Gas industry in 2008-2010. *, **, *** denotes significance at 10%, 5%, 1% levels (two-tailed). In parentheses are reported z test statistics based on standard errors clustered at firm-level. See Appendix A for variables definitions.

Table 9. Descriptives for firms issuing/not issuing environmental press-releases

		N	mean	min	p25	p50	p75	max	sd
Panel A: Environmental performance and disclosure tone									
EP _{t+1}	D_PR=1	120	0.625*	0	0	1	1	1	0.486
	D_PR=0	168	0.512	0	0	1	1	1	0.501
OPT	D_PR=1	120	46.821	34.69	45.26	47.34	48.64	50.85	2.541
	D_PR=0	168	46.800	38.86	45.65	47.085	48.23	51.6	2.068
OPT_PR	D_PR=1	120	29.854	0.06	0.735	47.46	49.855	52.62	23.892
	D_PR=0	168	0	0	0	0	0	0	0
EP _t	D_PR=1	120	1.208*	0	0	1	2	5	1.390
	D_PR=0	168	0.869	0	0	1	1	5	1.166
Panel B: Board monitoring measures									
B_SIZE	D_PR=1	120	9.267*	1	7	9	11	17	2.592
	D_PR=0	168	8.595	4	7	8	10	15	2.267
CEO_DUAL	D_PR=1	120	0.608	0	0	1	1	1	0.490
	D_PR=0	168	0.530	0	0	1	1	1	0.500
IND	D_PR=1	120	7.792*	3	6	7	10	16	2.656
	D_PR=0	168	6.839	3	5	7	8	14	2.508
Panel C: Board stakeholder orientation measures									
B_FEM	D_PR=1	120	0.942*	0	0	1	2	4	1.014
	D_PR=0	168	0.500	0	0	0	1	3	0.734
B_EXT	D_PR=1	120	17.308*	0	9	15	21	67	12.257
	D_PR=0	168	14.75	0	7	13	21	72	10.103
B_CI	D_PR=1	120	0.275*	0	0	0	1	1	0.448
	D_PR=0	168	0.184	0	0	0	0	1	0.389
D_SHE	D_PR=1	120	0.208*	0	0	0	0	1	0.407
	D_PR=0	168	0.131	0	0	0	0	1	0.334
Panel D: Control variables									
DA_ABS	D_PR=1	120	0.075*	0.001	0.025	0.054	0.101	0.500	0.079
	D_PR=0	168	0.101	0.001	0.032	0.072	0.135	0.583	0.099
MTB	D_PR=1	120	2.387*	0.616	1.436	1.832	2.319	33.460	3.167
	D_PR=0	168	1.700	-12.318	0.905	1.480	2.221	11.684	2.244
TANG	D_PR=1	120	1.216*	0.176	0.914	1.086	1.322	6.138	0.675
	D_PR=0	168	1.377	0.068	0.936	1.145	1.551	7.165	0.862
SIZE	D_PR=1	120	8.463*	6.086	7.601	8.269	9.604	10.298	1.288
	D_PR=0	168	7.823	6.086	6.921	7.761	8.493	10.298	1.228
D_ISSUE	D_PR=1	120	0.500	0	0	1	1	1	0.502
	D_PR=0	168	0.577	0	0	1	1	1	.495
ROE	D_PR=1	120	0.048*	-0.271	-0.0231	0.096	0.138	0.243	0.136
	D_PR=0	168	.0194	-0.271	-0.107	0.069	0.165	0.243	0.181

Table 9 reports the descriptive statistics for the analysis of the informativeness of the tone in environmental press releases. Panel A provides results for environmental performance and disclosure tone. Panel B provides results board monitoring proxies. Panel C provides results for stakeholder orientation proxies, while Panel D provides descriptives for control variables. The full sample is divided in two sub-groups of firms: issuing firms (D_PR=1) and not issuing firms (D_PR=0). * denotes significance at 10% level (two tailed). The p-values of the tests of differences in means for continuous variables are based on t-test. The p-values of the tests of differences in means for binary variables are based on test of proportions. The full sample comprises 288 firm-year observations corresponding to 96 unique US firms belonging to the Oil&Gas industry in 2008-2010. See Appendix A for variables definitions.

Table 10. Disclosure tone in environmental press releases

Panel A: Stage 1	
	(1) D_PR
MONITORING	-0.0635 [0.122]
STAKEHOLDERORIENTATION	0.1188 [0.114]
DA_ABS	0.1186 [1.130]
SIZE	0.3459*** [0.102]
D_ISSUE	-0.2719 [0.170]
ROE	0.1877 [0.586]
MTB	0.0539 [0.036]
TANG	-0.2816* [0.168]
<i>Wald chi2</i>	95.07
<i>Obs.</i>	282
<i>Intercept</i>	Yes
<i>Industry fixed effects</i>	Yes
<i>Year-dummies</i>	Yes
Panel B: Stage 2	
	(1) EP _{t+1}
EP _t	1.3001*** [0.338]
OPT_PR	-0.2068* [0.119]
TANG	0.3366 [0.222]
ROE	-1.2885 [0.956]
SIZE	0.2903 [0.213]
INV_MILLS	-0.8205 [0.736]
<i>Wald chi2</i>	42.04
<i>Obs.</i>	120
<i>Intercept</i>	Yes
<i>Year-dummies</i>	Yes

Table 10 reports results of the probit regressions testing the informativeness of the tone in environmental press releases. The full sample comprises 288 firm-year observations corresponding to 96 unique US firms belonging to the Oil&Gas industry in 2008-2010. *, **, *** denotes significance at 10%, 5%, 1% levels (two-tailed). In parentheses are reported z test statistics based on robust standard errors. See Appendix A for variables definitions.

Appendix A. Variables definition

<i>Variables Definition</i>			
Variable Name	Variable Label	Definition	Source
<i>Panel A: Environmental performance</i>			
EP _{t+1}	Environmental performance one year ahead	Dummy variable equal to one if firm has at least one environmental concern in the year t+1	KLD's SOCRATES database
EP _t	Environmental performance	Total number of environmental concern in the year t	KLD's SOCRATES database
<i>Panel B: Discretionary disclosure strategies</i>			
OPT	Optimism in environmental 10-K disclosure	DICTION's "optimism" score computed by analyzing Section 1 of 10-K filings	Companies 10-K filings
OPT_PR	Optimism in environmental press releases	DICTION's "optimism" score computed by analyzing environmental press releases	Companies Press Releases
<i>Panel C: Board monitoring</i>			
B_SIZE	Board Size	Total number of directors sitting on company board	Hand-collected from 10-K filings
IND	Board Independence	Total number of independent directors sitting on company board	Hand-collected from 10-K filings
CEO_DUAL	CEO_Duality	Dummy variable =1 if CEO is also Chairman of the board; 0 otherwise	Hand-collected from 10-K filings
<i>Panel D: Stakeholder orientation</i>			
B_EXT	Directors connections	Total number of directorships held by each director	Hand-collected from 10-K filings
B_FEM	Female representation	Total number of female directors	Hand-collected from 10-K filings
B_CI	Community Influentials	Dummy variable= 1 if the number of "community influential" (Hillman et al., 2000) is equal or above the sample median; 0 otherwise	Hand-collected from 10-K filings
D_SHE	CSR/Ethic/Sustainability committee	Dummy variable =1 if company board has a formal CSR/ethic/sustainability committee; 0 otherwise.	Hand-collected from 10-K filings
<i>Panel E: Control variables</i>			
DA_ABS	Discretionary accruals	Absolute value of discretionary accruals from the Modified-Jones Model	COMPUSTAT GLOBAL

TANG	Tangibility	End of the year property, plant and equipment divided by the end of the year total asset	COMPUSTAT GLOBAL
ROE	Return on Equity	Net Income divided by the end of the year book value of equity	COMPUSTAT GLOBAL
SIZE	Firm Size	Natural Logarithm of the end of the year Total Asset	COMPUSTAT GLOBAL
D_ISSUE	Debt issue	Dummy variable=1 if company total debt is increased by more than 10% in the current period; 0 otherwise	COMPUSTAT GLOBAL

Panel F: Earnings management variables

TA	Total Accrual	EBI-CFO	COMPUSTAT GLOBAL
EBI	Earnings before extraordinary items	Earnings before extraordinary items for the period t	COMPUSTAT GLOBAL
CFO	Operating Cash Flow	Operating Cash Flow for the period t	COMPUSTAT GLOBAL
Δ SALES	Change in Net Sales	Net Sales for the period t minus net Sales for the period t-1	COMPUSTAT GLOBAL
PPE	Property, plant and equipment	Gross level of property, plant and equipment for the period t	COMPUSTAT GLOBAL
ASSETS	Total Asset	Total Asset for the period t	COMPUSTAT GLOBAL
Δ AR	Change in Accounts Receivables	Net Account Receivables for the period t minus Account Receivables for the period t-1	COMPUSTAT GLOBAL
