

**Financial analysts' concerns, media exposure and corporate
environmental communication.**

Accounting for simultaneous relationships in an international perspective

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Abstract

The purpose of this study is to provide an integrated analysis of corporate environmental communication strategies using stakeholder theory. More precisely, we argue that there is a symbiotic relationship between managerial decisions with respect to environmental disclosure and stakeholders. On the one hand, stakeholders' claims determine managerial decisions with respect to corporate environmental disclosure. On the other hand, managerial decisions may affect key stakeholders' actions and decisions, more specifically financial analysts' forecasts. We investigate three research questions: (1) What are the determinants for voluntary environmental disclosure? (2) Does voluntary environmental disclosure allow analysts to make better forecasts? (3) Is there a difference in the determination and implications from environmental disclosure between continental European and North American firms? The sample comprises continental European firms (Belgium, France, Germany, and the Netherlands) and North American firms (Canada and the United States). Our measure of environmental disclosure reflects web disclosure, which encompasses print-based documents (e.g., environmental reporting in pdf) as well as web only disclosures (e.g., html documents or videos).

Through distinct determinant regressions using simultaneous equations, we find a significant relationship between business stakeholders' concerns and environmental disclosure for North American firms, while conversely, we find a weak statistical effect for continental European firms. Environmental news exposure is a significant determinant of environmental disclosure in both continents. Findings also suggest that financial markets' concerns are relevant as a determinant of environmental disclosure. Concerning the relevance of environmental disclosure for financial analysts' earnings forecasts, results show that print environmental disclosure is associated with a decrease in analysts' forecast dispersion both in continental Europe and in North America. Furthermore, environmental disclosure is less important a factor in explaining forecast dispersion for those firms that are followed by many analysts. However, in North America, it appears that analysts use environmental disclosure differently depending on the diffusion media (i.e., web or paper). It seems that in North America, the more discretionary is the information disclosed, the less it is relevant for market participants. Moreover, in continental Europe, environmental disclosure increases dispersion of analysts' forecasts for firms operating in more environmentally sensitive industries. Findings also suggest that for assessing information relevance for market participants, it is important to control for the endogenous effect of a firm's decision to disclose information as well as its exposition to media.

Key words: Analysts' forecasts, corporate disclosure, stakeholder theory, media exposure, environmental disclosure, environmental performance, web reporting.

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1. INTRODUCTION

Corporate scandals such as Enron and Worldcom have highlighted the critical importance of quality disclosure for well-functioning capital markets and for the efficient allocation of resources within society (Bhattacharya, Daouk and Welker, 2003). For instance, enhanced concerns by European and North American securities markets regulators about the quality of disclosure have led to the enactment of new legislations such as the Sarbanes-Oxley Act in the United States or *La loi sur sécurité financière* in France. Such regulatory actions are consistent with recent evidence that actually suggests that enhanced corporate financial disclosure can translate into a lower cost of capital for some firms (e.g., Botosan and Plumlee, 2002; Hope, 2003). However, especially as a result of the Internet, corporate disclosure extends far beyond financial disclosure and reaches constituencies beyond stockholders. Environmental disclosure is an area, which has wide financial and societal relevance as it provides a unique glimpse of a firm's underlying environmental activities.

While there is extensive research on the determinants of corporate environmental disclosure by either North American (e.g., Cormier and Magnan, 1999) or European firms (e.g., Cormier, Magnan and Van Velthoven, 2005), so far, its financial and social implications have received scant attention. Furthermore, most studies on the financial impact of environmental disclosure focus on specific disclosure items or events that may or may not be a reflection of a firm's overall environmental disclosure strategy. For instance, Blacconiere and Northcut (1997), Blacconiere and Patten (1994) or Hughes (2000) analyse how unique regulatory or ecological events affect a firm's stock market performance. Their findings are consistent with the view that environmental disclosure is potentially desirable (Epstein and Freedman, 1994). In contrast, using a more comprehensive measure, Richardson and Welker (2001) show that social disclosure, which encompasses environmental reporting, may actually increase a firm's cost of capital. These conflicting findings do present a puzzle to managers, market participants, regulators and other stakeholders as they do not provide clear guidance as to what is the best course of action.

Our study focuses on three key research questions. First, what are the determinants of voluntary environmental disclosure? Second, does voluntary environmental disclosure have a financial implication, as proxied by analysts' earnings forecasts divergences? Third, do

environmental disclosure patterns with respect to determination and implications differ between firms from each continent? Relying on stakeholder theory, this study purports to provide an integrated perspective as to how business, financial and social stakeholders' claims underlie corporate environmental communication strategies. Stakeholders are groups or individuals who can affect or are affected by the achievement of the organization's objectives (Freeman, 1984: 46). More specifically, Mitchell, Agle and Wood (1997) argue that the definition of a stakeholder can be narrowed by focusing on the legitimacy it claims on the costs and benefits to be derived from a firm's actions. Such claims may be legal, commercial, contractual, moral or otherwise. Mitchell *et al.* (1997) also argue that power to steer a firm's decisions into a particular direction, irrespective of claim legitimacy, must be taken into account when identifying who are the firm's stakeholders. Hence, claim legitimacy and power are the two foundations that underlie stakeholder relevance and, ultimately, authority in reciprocal exchanges.

With respect to a firm's environmental activities, we argue that there is a symbiotic relationship between managerial decisions, as proxied by a firm's environmental disclosure strategy, and the dispersion of financial analysts' earnings forecasts (financial implications) as well as environment-related media news (social implications). On the one hand, managers cannot be oblivious to information demand from financial markets' participants, business stakeholders (customers and suppliers) as well as to pressures from social stakeholders (employees, regulators and media) in the determination of their firm's environmental disclosure strategy. Prior research actually documents that stock market and media considerations do influence environmental disclosure (e.g., Neu, Warsame and Pedwell, 1998). On the other hand, financial stakeholders exert critical control, or power, over a firm's future survival, mostly by controlling its access to capital and, indirectly, its cost of capital. Hence, it is likely that financial stakeholders will induce firms to provide them with reliable and/or relevant environmental information. Use of that information may be through the estimation of earnings forecasts. For instance, since many environmental activities or events have long-term consequences (e.g., ecological accident, Superfund sites, etc.), additional information about them does allow analysts to better map a firm's future earnings. While corporate decisions will certainly affect other stakeholders, their reaction cannot be inferred directly.

However, actions by analysts and the media will be observed by managers, who are then likely to adjust their own disclosure. Hence, there is a three-way flow of information between the firm's managers, financial analysts and media players, with each party taking advantage of available information before taking action. Accordingly, our research design takes into account the simultaneous effects of three dimensions of a firm's environmental

communication environment: 1) its level of environmental disclosure, 2) analysts' divergence in their earnings forecasts and, 3) the extent of firm-specific environmental news exposure. More specifically, we implement the following empirical approach. First, we posit that various stakeholders' groups (business, social and financial) determine a firm's environmental disclosure. Second, we put forward that financial analysts rely on such environmental disclosure, as well as on other firm attributes, to improve their earnings forecasts. Hence, in light of the endogeneity between the two phenomena, we use a three-stage least square regression approach. We focus on financial analysts, as key financial stakeholders, as their actions in reaction to environmental disclosure is clearly and directly observable. Third, we also control for endogeneity in the determination of a firm's environmental media exposure.

We analyse and compare the dynamics of corporate environmental disclosure in two different institutional contexts: North America (Canada and the United States) and Continental Europe (France, Germany, Belgium, the Netherlands). While there have been numerous expositions of institutional differences between these two continents in financial disclosure matters (e.g., Hope, 2003), to the best of our knowledge, there is limited evidence with respect to environmental disclosure. Most environmental disclosure international comparisons are typically of survey form (e.g., KPMG 2002) and do not provide an integrated view of the information dynamics prevailing within each institutional setting. Consistent with prior research, we assert that North American firms evolve within a context where shareholders (who are financial stakeholders) drive corporate disclosure while European firms adhere to a disclosure model that is more broadly based on all stakeholders (Ball, Kotharin and Robin, 2000).

For the purpose of the study, environmental disclosure implies web-based information. Until a few years ago, most information, environmental or otherwise, was being disclosed through traditional print outlets (e.g. annual report print copy) or through intermediaries (e.g., press releases that may be picked up by some media outlets). However, the advent of the World Wide Web (Web) has led firms to reconsider their reporting strategies as the Web offers much more flexibility than traditional means for both the presentation and content of reporting. Moreover, the Web allows a firm to disclose far more information than is possible through traditional methods. Hence, we expect firms to take advantage of this opportunity by structuring their disclosure of environmental information in a way that is conditioned by its stakeholders and their relative socio-economic power (Ullmann, 1985). Accordingly, our measure of environmental disclosure is web-based but comprises two facets: 1) disclosure that replicates print-based reports or documents (e.g., environmental report in PDF) and, 2) disclosure that is unique to the web (e.g., video about firm's environmental management).

Overall, descriptive statistics suggest that North American firms exhibit more extensive environmental disclosure related to expenditures and risk, abatement, and remediation than continental European firms, while the opposite is observed for information concerning sustainable development and environmental management. Through distinct determinant regressions using simultaneous equations, we find a strong relationship between the concerns of business stakeholders (customer relationships and industry concentration) and environmental disclosure for North American firms. Conversely, we find a weak statistical effect for continental European firms. News exposure is a significant determinant of environmental disclosure in both continents. Moreover, financial market concerns are relevant as a determinant of environmental disclosure, especially for its more discretionary parts.

With regard to the relevance of environmental disclosure for financial analysts' earnings forecasts, results show that environmental disclosure that is also available in print form is associated with a decrease in analysts' forecast dispersion both in continental Europe and in North America. Furthermore, environmental disclosure is less important a factor in explaining forecast dispersion for those firms that are followed by many analysts. However, in North America, it appears that the financial implication of a firm's environmental disclosure differs depending on the disclosure platform being used. In effect, the discretionary nature of the information being disclosed does affect negatively its relevance for market participants. Moreover, in continental Europe, environmental disclosure increases dispersion of analysts' forecasts for firms operating in more environmentally sensitive industries. Findings suggest that for assessing information relevance for market participants, it is important to control for the endogenous effect of a firm's decision to disclose information as well as its exposition to news media.

This paper contributes to our knowledge of environmental disclosure in the following manner. First, through stakeholder theory, we provide an integrated and unique framework to understand the information dynamics of a firm's environmental disclosure. Most prior work relies on either economic or legitimacy paradigms that only explain disclosure determination. Second, we adopt a comprehensive and qualitative view of environmental reporting that comprises both quantitative and qualitative information. Third, we expect that insights into the determination of corporate environmental disclosure and its value relevance will help standard setters and regulators in the development of new and effective policies. Fourth, we document a clear association between a firm's environmental disclosure and the press coverage concerning environmental issues. Finally, we examine the relevance of different

environmental disclosure components in a cross-country setting. This contributes to the literature on determinants of analysts' earnings forecasts precision.

The remainder of the paper is organized as follows. Section 2 contains a theoretical framework for environmental disclosure as well as hypotheses. Section 3 provides background on the country-specific context. The study's empirical model and sample are described in section 4. Findings are reported in section 5. Finally, section 6 provides a discussion regarding the potential implications of our results.

2. THEORETICAL DEVELOPMENT

2.1 Prior Evidence on Environmental Disclosure

The evidence from the environmental reporting literature, mostly in Anglo-Saxon countries, suggests that firms' voluntary environmental disclosure increases with:

- firm size and membership in environment-sensitive industries such as oil and gas, chemicals, forest and paper products or utilities (Cowen, Ferreri and Parker, 1987; Anajjar, 2000; Barth, McNichols and Wilson, 1997; Bewley and Li, 2000; Cormier and Gordon, 2001; Neu *et al.*, 1998; Patten, 1991; 1992; 2002b; Eljido-Ten, 2004);
- the extent a firm is widely-owned (Patten, 1992; Cormier and Magnan, 1999, 2003);
- a firm's exposure to environment related legal proceedings or fines related to the environment (Deegan and Rankin, 1996; Neu *et al.*, 1998);
- the news exposure of a firm's environmental activities (Bewley and Li, 2000; Brown and Deegan, 1998; Neu *et al.*, 1998; Li, Richardson and Thornton, 1997; Cormier and Magnan, 2003);
- the probability for a firm to be involved in similar accidents in the future (see for example Exxon Valdez) (Walden and Schwartz, 1997);
- concerns on the part of environmental lobby groups about a firm's environmental performance (Deegan and Gordon, 1996).¹

As for continental Europe, based on a German sample, Cormier *et al.* (2005) show that risk, ownership, fixed assets age, firm size determine the level of a firm's environmental disclosure

¹ For a detailed literature review on environmental reporting, see Berthelot *et al.* (2003).

in a given year. Consistent with institutional theory, results suggest that German firms' disclosure is converging over time. In a French context, Cormier and Magnan (2003) suggest that proprietary costs (leverage, profitability) and information costs (risk, reliance on capital markets, trading volume, and ownership) are significant determinants of a firm's environmental reporting strategy. Corporate environmental reporting also appears to be related to a firm's news exposure. Finally, findings also suggest that environmental reporting is conditioned by industry membership (Aerts, Cormier and Magnan, 2004).

These findings rely on different theoretical frameworks such as information costs (e.g., Cormier and Magnan, 1999), impression management (e.g., Neu *et al.*, 1998), legitimacy theory (e.g., Patten, 1992) or institutional theory (e.g., Aerts *et al.*, 2004). However, using Ullman's 1985 stakeholder framework, Roberts (1992) provides evidence on the relationship between a firm's overall strategy and the level of its social responsibility disclosures. Roberts' findings (p. 610) indicate that stakeholder theory allows analysis of "the impact of prior economic performance, strategic posture toward social responsibility activities, and the intensity of stakeholder power on levels of corporate social disclosure". Roberts' argument provides a strong foundation for adopting a stakeholder theory perspective when assessing corporate environmental disclosure. Other arguments can also be put forward. First, a firm's environmental activities affect the lives and interests of many parties: employees, environmental regulators, customers (especially if they have ISO 14000 accreditation), investors (because of contingent liabilities and commitments). Thus, all these parties share an interest in a firm's environmental disclosure, which does allow for an easy mapping from stakeholder theory. This contrasts with financial disclosure which targets a narrower audience. Second, corporate disclosure decisions by managers are made within a dynamic context where there are pressures that are exerted upon them and in which their actions affect other parties' actions. Therefore, the interactive framework that underlies stakeholder theory fits well with reality. Third, stakeholder theory allows for claims and power to be framed in non-economic terms, which is often the case when dealing with environmental issues.

2.2 Stakeholders' Claims

It is often assumed that because a firm's performance affects their wealth, stockholders are most directly affected by a firm's disclosure. However, other stakeholders may have also a vested interest in a firm's performance disclosure. For instance, Evan and Freeman (1993) argue that a firm has a stewardship obligation with respect to its performance toward all stakeholders as they are all affected by its strategy. More precisely, a firm's value chain relies on numerous contractual interactions with stakeholders who are directly affected by its performance, with the quality of a firm's relationship with its various stakeholders directly

influencing its performance (Ogden et Watson, 1999). Beyond stockholders, these stakeholders encompass creditors, suppliers, customers, employees, etc. (Harrison and Freeman, 1999).

Hence, to ensure their firm's long-term survival, corporate managers have an incentive to effectively manage their stakeholder relations (Harrison and Freeman, 1999). In fact, managing competing stakeholders' interests and claims has emerged as a key managerial responsibility in modern firms (Ansoff, 1984). Through financial, commercial, regulatory or public pressures, stakeholders will strive to preserve the value of the claims that they have at stake in a particular firm. Such claims reflect the nature and the extent of the relationships that particular stakeholders conduct with the firm. In that regard, we identify three key groups of stakeholders who have legitimate claims upon a firm and which interests can be affected by its environmental management, thus providing managers with an incentive to consider these relationships when deciding upon corporate environmental disclosure:

- Stakeholders engaged in *business* relationships with the firm, encompassing suppliers and customers, otherwise called Business Stakeholders. These stakeholders derive business network capital from their commercial relations with a firm. Prior evidence suggests that the value of business stakeholders' claims can be seriously undermined by unethical or irresponsible corporate behaviour (Frooman, 1997).
- Stakeholders engaged in *human and social* relationships with the firm, such as employees, local communities, or governments, otherwise called Social Stakeholders. These stakeholders' claims heavily influence a firm's environmental activities, either through health and safety concerns, environmental laws and regulations or reputation (Cormier and Magnan, 1997).
- Stakeholders engaged in *financial* relationships with the firm, such as shareholders and debtholders, otherwise called Financial Stakeholders. These stakeholders have claims on a firm's residual cash flows once business and social stakeholders have received their shares. Prior evidence suggests that financial stakeholders exert an influence over environmental activities, especially when capital investments are involved (e.g., Clarkson, Li and Richardson, 2004).

These three groups of stakeholders essentially synthesize groupings that are put forward by Berman, Wicks, Kotha and Jones (1999) and by Agle, Mitchell and Sonnenfeld (1999).

2.3 Stakeholders' Power and the Implications from Environmental Disclosure

Freeman's (1984) definition of stakeholders as 'any group or individual who can affect or is affected by the achievement of the organization's objectives' (p. 46) implies that there is a two-way relationship between a firm's management and its stakeholders. Hence, if stakeholders can affect the attainment of specific corporate objectives, it is consistent to assume that managerial decisions, such as environmental disclosure, may be affected by stakeholders' actions or willingness to pursue their claims. However, if stakeholders are affected by the achievement of a firm's objectives, we can infer that managerial decisions and actions may affect the well-being of its stakeholders, i.e., their ability to successfully acquit their tasks and responsibilities (Berman et al., 1999).

Mitchell *et al.* (1997) further argue that a stakeholder's power influences its relationship with a firm's managers. Such power is defined as a stakeholder's ability to get managers to perform a task that they would not have done otherwise (Pfeffer, 1981). Furthermore, a stakeholder's power ensures that its claims will be viewed as important by corporate managers, with any delay in paying attention to them being viewed as unacceptable (Mitchell *et al.*, 1997). Such power will drive managers' perception as to which competing stakeholder claims must be given priority and, hence, will eventually be reflected in these stakeholders' actions or decisions (Mitchell *et al.*, 1997; Freeman, 1984).

There is prior evidence that stakeholders beyond stockholders exert power over the decisions by corporate managers regarding environmentally sensitive matters. For instance, Henriques and Sadorsky (1999) classify 400 Canadian firms into four categories (proactive, reactive, accommodative and defensive) based on the environmental profile of each firm. These profiles were then used to determine whether the sample firms differed with respect to the perceived relative importance of their stakeholders. The major finding was that the more environmentally proactive firms differed from their less proactive counterparts in their perception of the relative importance of stakeholders. In a similar vein, Harvey and Schaefer (2001) use a comparative case study approach to examine the relationship of six U.K. water and electrical utilities with their "green" stakeholders. Institutional stakeholders (e.g., government and regulators) are found to be the most influential groups, although customers and the public are also considered important. However, Harvey and Schaefer also find that economic stakeholders are not perceived to be as interested in the environmental performance of utilities. Finally, Cormier, Gordon and Magnan (2004) show that environmental executives

determine environmental disclosure on the basis of their attitudes towards various stakeholder groups, especially their appreciation of these stakeholders' information needs.²

Two stakeholder constituencies hold particular power over corporate managers as they control access to unique and essential resources without which the firm cannot survive. On the one hand, among financial stakeholders, there is extensive evidence that financial analysts exert tremendous power over corporate managers as they control a firm's access to capital as well as its cost of capital. For instance, failure by corporate managers to provide reliable and relevant disclosure to financial analysts does translate into less reliable forecasts but, more importantly, also into higher cost of capital (e.g., Hope, 2003; Botosan and Plumlee, 2002). On the other hand, among social stakeholders, the media does reflect society's perceptions about a firm's environmental performance (Deegan and Rankin, 1998). While firms can pursue their economic activities to the extent that society tolerates their environmental consequences, extreme media exposure may imply the end of such tolerance as well as future government, regulatory or public interventions. Hence, how a firm's environmental activities are portrayed in the media is extremely important for corporate managers.

2.4 Hypotheses

Business stakeholders' implicit claims and environmental disclosure

The pursuit of ongoing relations with business stakeholders such as customers and suppliers depend upon their appreciation of a firm's reliability, credibility and survivability as a commercial partner. In that regard, enhanced disclosure allows suppliers and customers to assess the value of their claims with a firm. This value is dependent upon critical attributes, e.g., both parties' going concern status (Bowen et al., 1995) as well as the firm's reputation for honesty (Karpoff and Lott, 1993). The evidence does suggest that if a firm is found not to be transparent in one aspect of its activities, stakeholders may infer that the firm's management as well as their own business relationships are somewhat tainted or untrustworthy (Nagar, Nanda and Wysocki, 2003).

Business stakeholders' influence over managerial actions with respect to environmental disclosure depends upon the nature of their claims. For instance, a firm that sells goods or

² For instance, in 2003, Sustain Consult surveyed RWE AG's key external stakeholders regarding the firm's sustainability strategy. RWE is one of Germany's leading energy and water services firm. Surveyed stakeholders encompassed non-governmental organizations and included individuals in the media, financial analysts, customers, municipalities, trade unions and scientists.

services through long-term contracts has an incentive to provide more information and to enhance its environmental performance since its customers have to commit for an extended period of time when they sign. In a financial reporting context, Bowen *et al.* (1995) show that managers choose accounting methods that improve their financial performance, as viewed by their customers, even when it is not beneficial in the short term (e.g., more income taxes). In contrast, business stakeholders in firms that entail short-term commercial relations (e.g., production of consumer goods) may have weaker claims and, thus, exert less leverage over managerial environmental disclosure decisions. Competitors may also be considered as business stakeholders since they can affect a firm's long-term survival. Therefore, concerns that environmental disclosures may enhance competitors' market position and, as a result, damage a firm's competitive position in product markets do condition managerial decisions (Healy and Palepu, 2001). Hence, our first hypothesis:

Hypothesis 1:

The extent of business stakeholders' claims relates to a firm's environmental disclosure.

Social stakeholders' implicit claims and environmental disclosure

Environmental disclosure may also be a managerial response to perceived claims that are put forward by stakeholders such as the public or government. In that context, managers have an incentive to enhance their firm's environmental disclosure as to induce a favourable response from societal agents such as regulators, pressures groups, etc. The emergence of the web has expanded the reach of a firm's disclosure, thus allowing managers to respond more directly to social stakeholders' claims. A key stakeholder, who is actually a proxy for public or regulatory pressures, is the media, its influence being derived from the information that it conveys about firms (Henriques and Sadoski, 1999). Hence, it can be inferred that there is an implicit social contract between the organization and those who are affected by its operations (Brown and Deegan, 1998). An organization that wants to continue its operations must ensure that it is meeting the terms of this social contract, even if they are evolving over time. A failure by a firm to operate in a manner that is consistent with community or public expectations, potentially leads to the firm's own demise (Deegan and Rankin, 1996; Neu *et al.*, 1998). The public considers a firm's treatment of employees, its respect for human rights, and its environmental impact as the most important issues for business to address (Dawkins and Lewis, 2003). Similarly, commodities producers (natural resources) with highly polluting activities may face more pressures from various social and community groups to provide

environmental information to dissipate any external concerns. This gives rise to the following hypothesis:

Hypothesis 2:

The extent of a firm's social stakeholder concerns relates to a firm's environmental disclosure.

Financial stakeholders' implicit claims and environmental disclosure

Financial stakeholders' claims over a firm mostly revolve about their ability to receive future cash flows, either with some certainty (e.g., creditors) or with some risk (e.g., stockholders). Although the importance attached to corporate responsibility issues by the investment community tends to be lower than that of other stakeholder groups, a large majority of professional investors and financial analysts agree that firms' are lacking in the level of attention they pay towards their environmental responsibilities (Dawkins and Lewis, 2003). Moreover, the effectiveness of a firm's environmental management does affect the cash flows that are potentially available to investors (e.g., Cormier and Magnan, 1997; Clarkson et al., 2004). Hence, managers are under pressure to reassure financial stakeholders about the quality of their claims, environmental disclosure being one tool at their disposal in that regard. This gives rise to our third hypothesis:

Hypothesis 3:

The extent of a firm's financial market concerns relates to its environmental disclosure.

Environmental disclosure and financial stakeholders' use

Among all firm stakeholders, financial stakeholders certainly hold particular power as they control its access to capital. Moreover, financial stakeholders' use of information that emanates from environmental disclosure can be ascertained in a more timely fashion than for other stakeholders. For instance, Richardson and Welker (2001) find that social disclosure (including environmental disclosure) may affect a firm's cost of equity capital. Therefore, for these stakeholders, managers have an incentive to provide reliable and relevant information. Otherwise, managers or their firm may suffer negative consequences as stakeholders start exerting pressures. However, assessing the effect of a firm's environmental disclosure policy on all financial stakeholders is rather difficult as most of their actions are not immediately visible (e.g., how do investors analyze and use environmental disclosure?). Nevertheless, among financial stakeholders, it is possible to directly measure how environmental disclosure affects the professional effectiveness of financial analysts. Financial analysts can be perceived

as capital markets' gatekeepers, gathering and analyzing information from various sources and relaying it to other financial stakeholders. Prior research documents the importance of corporate financial disclosure in the ability of financial analysts to effectively perform their work. For instance, Hope (2003) shows that enhanced corporate financial disclosure does translate into more precise earnings forecasts.

With respect to environmental disclosure, many information items have a direct impact on a firm's future earnings: environmental capital expenditures, contingent environmental liabilities, fines and penalties, etc. (Clarkson *et al.*, 2004). However, to the best of our knowledge, no research has been performed on the value of corporate environmental disclosure for financial analysts. Hence, we posit the following hypothesis:

Hypothesis 4

Enhanced environmental disclosure implies less dispersion in analysts' earnings forecasts.

Analyst reviews serve as a proxy for firms' information accessibility. We expect the degree at which environmental disclosure influences forecast consensus will vary depending on the number of analysts following the firm (Hope, 2003). The value implications from environmental disclosure are also affected by the intensity with which a firm is monitored by investors or their agents (Healy *et al.*, 1999). These agents include securities regulators and financial analysts. For instance, the S.E.C. has traditionally been diligent in its pursuit of firms with disclosure and reporting practices that are deemed inappropriate or illegal. In the same vein, financial analysts monitor financial and non-financial disclosures issued by firms and revise their own forecasts according to the credibility they assign to firms' corporate management (e.g., Williams, 1996). The effectiveness of analysts' monitoring, as well as market efficiency in a particular firm's shares, are enhanced if the number of analysts following the firm increases (Lang and Lundholm, 1996). Hence, as more analysts follow a firm, the less likely it is that any public disclosure will provide new and relevant information for individual analysts. This gives rise to our fifth hypothesis:

Hypothesis 5

The association between the level of environmental disclosure and the precision of analysts' forecasts is lower for those firms that are followed by many analysts than for those firms with a small following.

Patten (2002b) documents a lower relationship between environmental performance and environmental disclosure for more environmentally sensitive industries. This would imply that environmental disclosure is more likely to reflect environmental performance in less environmentally sensitive industries. Then, we predict that environmental disclosure is less relevant for market participants for highly sensitive industries. In our sample, we consider the four following industries to be environmentally sensitive: Energy; Chemicals and drugs; Industrials; and Materials (Resources).³ This gives rise to our last hypothesis:

Hypothesis 6

The association between the level of environmental disclosure and the precision of analysts' forecasts is lower for those firms operating in environmentally sensitive industries than for other firms.

3. INSTITUTIONAL CONTEXTS FOR ENVIRONMENTAL DISCLOSURE IN CONTINENTAL EUROPE AND IN NORTH AMERICA

3.1 Continental Europe

While environmental accountability and reporting has increased through the increasing legislative developments of the European Commission, environmental disclosure remains largely fragmentary, lacking embeddedness in a consistent environmental management policy (Hibbitt and Kamp-Roelands, 2001). In the fall of 2001, the European Commission (EC) published a green paper, entitled *Promoting a European Framework for Corporate Social Responsibility* to promote corporate social responsibility both within the 15 member states and internationally. The green paper states that EU member governments should “focus on putting the proper regulatory or legislative framework in place in order to define a level playing field on the basis of which socially responsible practices can be developed.” The European commission has also published detailed recommendations on the recognition, measurement and disclosure of environmental issues (Official Journal of the European Communities, June 13, 2001, L 156/33-42).

In addition, for European firms complying with international accounting standards (IASB), IAS No. 37 entitled *Provisions, Contingent Liabilities and Contingent Assets* provides guidance regarding provisions for site restoration. A provision must be taken according to the best estimate of the debt resulting from a past event. When a company releases an

³ These four industries have the highest disclosure scores.

environmental policy creating expectations in the public with regard to the protection of the environment (for example in a report on environmental management), IAS No. 37 indicates that a provision must be taken that corresponds to the best cost estimate of site remediation and decontamination even in the absence of legislation forcing the company to pay for a site restoration.

The aspects of environmental management that are reported most often include capital expenditures for anti-pollution equipment, recycling and conservation policy, environmental management and audit practices, and the costs of complying to governmental emissions standards. The quality of environmental disclosure varies widely across firms since the disclosure content is not strictly regulated. Overall, German firms' environmental concerns seem to be of a much higher order of magnitude than those shown by French or UK firms. However, there seems to have been a tendency towards international uniformity as evidenced by a survey from KPMG (2002), in 2002 36% of German firms reported environmental information compared to 21% for French firms. In a comparative analysis of corporate environmental reporting from 1985 to 1995, Adams and Kuasirikun (2000) find that the proportion of German companies reporting environmental information and the mean volume of such reporting is consistently higher compared to UK firms through the period.

In France, since 2002, the law concerning Economic Regulations requires all companies listed in the *Premier Marché* to report on a number of social and environmental issues. However, the reporting firms are given some discretion regarding which aspects to include. The annual reports must address the application of these factors, under conditions defined by the *Commission des opérations de bourse*.

In the Netherlands, companies that fall under the category of those that produce "serious adverse effects on the environment" (Environmental Reporting Decree, 1999) are legally obliged to publish a government report as well as a public report of their environmental performance on an annual basis. However, a firm is exempted from making a public report if it issues an annual environmental report based on EMAS (European Eco-Management and Audit Scheme).

Social and environmental issues are important components of new legislation reforming Germany's pension system. Since 2002, newly-conceived private pension schemes have to comply with ethical, environmental, and social disclosure regulations, including the disclosure of social responsibility policies, in order to be certified and as such qualify for tax deductions. In the same vein, in Belgium, the new legislation related to retirement schemes

imposes on companies the obligation to issue an annual report containing information on the financing method and investment strategies for the long and the short term as well as how social, ethical and environmental aspects are being taken into account.

3.2 North America

In the United States, under SEC regulations and accounting standards relating to contingencies (SFAS No. 5), American firms must disclose environmental information in their 10K reports and/or their annual reports. Firms registered on a stock exchange must provide information (in their 10K report) about the costs incurred to conform to environmental legislation (item 101) as well as any ongoing legal matters (item 103) that might affect their financial condition. These requirements concern five elements related to: descriptive statements about the present and future legislation; fulfilment of environmental legislation; present and future operating expenditures related to the environment; present and future capital expenditures connected with the environment; and legal proceedings related to the environment.

Moreover, the "Management Discussion and Analysis of Financial Condition and Results of Operation" (MD&A) (item 303) requires companies to disclose information that may affect their financial condition. This includes environmental liabilities.

The accounting standard on contingencies (SFAS No. 5) compels firms to disclose possible debts on the financial statements when there will be a significant environmental expenditure for which the costs can be reasonably estimated. If the expenditure cannot be reasonably estimated and it is not possible to assume that the costs will be incurred, regulations provide for disclosure of the possible expenditure in notes to the financial statements.

More recently, SFAS No. 121 (1995) entitled *Accounting for Impairment of Long-Lived Assets and for Long-Lived Assets to Be Disposed of* updated in 2002 by SFAS No. 144 *Accounting for the Impairment of disposed Long-Lived Assets* makes reference to the incidence of legislation on the value of assets and requires that companies take impairments in certain cases ("Regulator Adverse Assessment or Action"). Furthermore, SFAS No. 143 (2002) entitled *Accounting for Asset Retirement Obligations* requires that a liability be fully accrued when one can estimate the costs of restoring or dismantling the physical assets.

Under the Canadian Institute of Chartered Accountants' (CICA, section 3060, 1990) standard for future expenditures related to site removal and remediation, Canadian firms must make

provisions in their financial statements when these expenditures are likely to occur and their costs can be reasonably estimated.

3.3 International differences in demand for environmental disclosure transparency

A higher demand for corporate transparency by outside parties is especially expected within a context of high contract enforceability and to the extent that contracting parties do not have access to private information (Bushman *et al.*, 2003). Hope (2003) constructs a comprehensive measure of enforcement based on five country-level factors (audit spending, insider trading laws, judicial efficiency, rule of law, and shareholder protection). If we apply Hope's rating to our sample countries, the United States presents the strongest enforcement level followed by Canada, Netherlands, France, Belgium and Germany. In a high enforcement country like the U.S., where mandatory disclosure is highly regulated, we can expect more disclosure as is in fact the case (e.g. SEC regulation).

Hence, we expect North American firms, which operate in a more regulated context compared to continental European firms with respect to environmental management, to disclose more environmental information related to expenditures and risk, abatement and remediation.⁴

Relying on LaPorta *et al.* (1997), Ball *et al.* (2000) argue that stockholder-focused governance characterizes North American (common law) firms' financial disclosure while stakeholder-focused governance characterizes European (code law) firms. They then predict, and show, that financial disclosure is more conservative in North America than in Europe, which translates into enhanced disclosure timeliness. While Ball *et al.* (2000) focus on financial disclosure and do not rely directly on stakeholder theory, their arguments do extend to the determination of environmental disclosure and to its implications. On the one hand, continental Europe's stakeholder-based governance model implies that there is less need for firms to publicly disclose environmental information: since representatives from key stakeholders are involved in the various steps of the corporate governance process (supervisory board, joint union-corporation committees, etc.), they already have direct access to much of the relevant information. In contrast, for external stakeholders in North American firms, who are typically not involved in corporate governance processes, corporate voluntary disclosure constitutes a critical source of information and they are likely to exert pressures to obtain it. Hence, we can expect the explanatory power of the disclosure determination model

⁴ Based on a sample from 22 countries, Hope (2003) United States gets the highest enforcement score (1.21) while Spain gets the worst (-3.65).

to be lower for European firms than for North American firms. On the other hand, North America's emphasis on timeliness, especially for bad news, implies that the impact of environmental disclosure on financial analysts' forecasts is greater for North American firms than for European firms: environmental disclosure being timelier in North America than in Europe, it is more likely to be used by analysts in revising their forecasts.

4. THE SAMPLE SELECTION AND EMPIRICAL MODEL

The sample comprises 267 continental European firms (43 from Belgium, 97 from France, 84 from Germany, 43 from the Netherlands) and 625 North American firms (206 from Canada and 419 from the U.S.). Environmental disclosure is collected from corporate Internet sites (web page and HTML documents, so-called web-based disclosure), including annual reports (PDF format, so-called print disclosure) and 98 environmental reports (PDF format). Environmental disclosure is coded from the firms' Internet sites for the year 2002 (web page and HTML). We identified all non-financial firms represented on Euronext (SBF120; DAX70/DAX30; Euronext Brussels-50 biggest market capitalization; AEX/MIDKAP- 48 firms) and S&P500 (U.S.) and S&P/TSX300 (Canada). Financial data is collected from Worldscope/Disclosure and from firms' Internet sites. Earnings forecast estimates and the number of analysts following are collected from "YAHOO! Finance" for American, German and French firms. For Canadian firms this information comes from Les Affaires, and for Belgian/Dutch firms the information comes from Boursorama. The sample firms operate in the following industries (S&P classification):

- Consumer goods and services
- Energy
- Chemicals and drugs
- Industrials
- Information technology
- Materials (resources)
- Telecom & Media
- Utilities

Significant differences in disclosure levels are found in both industry and country studies (Meek *et al.*, 1995; Bushman and Smith, 2001; Hope, 2002). It is therefore important to test whether the presence of disclosure endogeneity affects the relationship between

environmental reporting and forecast dispersion. Consistent with Al-Tuwaijri *et al.* (2004)⁵, this study attempts to provide an integrated analysis of firms' overall environmental management strategy.

We posit that this strategy affects environmental disclosure, environmental news exposure and financial analysts' forecasts. We test for the value relevance of environmental disclosure for the precision (and stock price valuation) of analysts' forecasts because prior literature suggests that voluntary disclosure extending beyond financial performance measures may actually be value relevant for investors as it helps bridge the growing gap between traditional financial statements and market valuation needs (Leuz, 2003; Botosan and Harris, 2000; Healy and Palepu, 2001). The following structural equations summarize the approach to be adopted in the empirical analysis:

Environmental disclosure_{it} =

$$f(\text{Business stakeholders' claims, Social stakeholders' claims, Financial market claims})_{it} \quad (1.1)$$

Analysts' forecasts dispersion_{it} =

$$f(\text{Environmental disclosure, Financial market claims})_{it} \quad (1.2)$$

Moreover, there are indications that a firm's environmental news exposure is endogenously determined through various stakeholders' claims (Deegan and Gordon, 1996), the following regression is also performed to complete the structural equations set:

Environmental news exposure_{it} =

$$f(\text{Business stakeholders' claims, Social stakeholders' claims, Financial market claims})_{it} \quad (1.3)$$

Environmental disclosure is measured using a coding instrument in a way that is similar to Wiseman (1982), Cormier and Magnan (2003), and Al-Tuwaijri *et al.* (2004). The grid is comprised of 39 items measuring environmental disclosure quality where the items are grouped into six categories as follows: Expenditures and risk; laws and regulation; pollution

⁵ Al-Tuwaijri *et al.* (2004) use the SEC 10k form for environmental disclosure, mostly mandated. The authors posit that economic performance affects environmental performance and that environmental performance affects both economic performance and disclosure.

abatement; sustainable development; land remediation; and environmental management. The rating is based on a score from one to three, three points are awarded for an item described in monetary or quantitative terms, two when an item is described specifically, and one for an item discussed in general. Web sites are analyzed once, and one at a time. The content from the hardback site to the environmental reporting is coded according to the grid presented in appendix 1.

We believe that the use of a coding scale to qualify a firm's environmental disclosure is appropriate for the following reasons. First, it allows for some integration of different types of information into a single figure that is comparable across firms in terms of relevance. Second, while other disclosure studies rely on word counts to measure environmental disclosure (e.g., Neu *et al.* 1998; Williams and Ho Wern Pei, 1999), a qualitative scale allows for the researcher's judgment to be utilized in rating the value or quality of the disclosures made by a firm. While this process is more subjective, it ensures that irrelevant or redundant generalities are not considered to be strategic environmental disclosure.

To ensure consistency across firms, two people reviewed all individual scores independently. All disagreements were subsequently reviewed by one of the co-researchers.

4.3.1. Environmental disclosure model

The empirical model for Environmental disclosure is as follows:

Environmental disclosure_{it} =

$f(\text{Long term customer relationships, Concentration ratio, Return on assets, Leverage, Concentrated ownership, Forecasts' dispersion, Media exposure, Capital intensity, Commodities producers, Country})_{it}$ (2.1)

Business stakeholders' implicit claims

Two key considerations drive product market concerns relating to a firm's environmental information:

- Time horizon
- Industry concentration ratio

Time Horizon: A firm's decision to disclose information to investors is influenced both by its business stakeholders' claims and by concerns that such disclosures can damage their competitive position in product markets (Healy and Palepu, 2001). Business stakeholders' implicit claims mostly revolve around the time horizon that underlies transactions between the firm and its suppliers and customers. The firms are classified into two groups according to the type of relationship they have with customers. The first group of firms have short-term repeated transactions with clients (e.g. grocery stores). The second group of firms maintains a long-term relationship with clients (e.g. cable and entertainment) involving long term contracts (e.g. durable goods with warranties).

These variables are coded 1 or 0 according to their industry membership and one dummy variable is used (n-1) for long-term relationships with customers. We expect long-term relationship with customers to be associated with more disclosure.

Concentration Ratio: Essentially, the concentration ratio is an indicator of the relative size of firms in relation to the industry as a whole. This ratio helps to determine the market form of the industry as well as the nature of the relative power of the firm relative to its clients. It is common to use the four-firm concentration ratio, which consists of the percentage of market share owned by the largest four firms in the industry. The relation between a firm's concentration ratio and environmental disclosure is ambiguous. On the one hand, customers to firms that are in highly concentrated industries are expected to have weaker stakeholder claims, thus entailing less disclosure. On the other hand, in addition to customers, competitors are also business stakeholders. In that regard, high concentration implies that competitors have potentially much at stake in an individual firm's actions and decisions and vice-versa. The extent of competitors' claims in highly concentrated industries may translate into large potential claims and, therefore, more extensive environmental disclosure. Since the actual impact of product market competition on environmental reporting is unclear, no directional predictions are made for these variables.

Social stakeholders' implicit claims

Key social stakeholders encompass the government, local communities, employees and regulators.

Media Exposure: The concerns of Government and local communities are difficult to ascertain directly. However, prior work does suggest that media exposure is an appropriate proxy for community concerns (Deegan and Rankin, 1996). A firm's media exposure is computed by taking the average number of articles concerning environmental issues for the period 1997 through 2001, as contained in the ABI Disclosure database. The reason for this choice is that disclosure this year (2001) may be affected by the amount and types of articles that have been published about a firm in the recent past. We expect that as media exposure increases, the firm will increase its environmental reporting. Hence, a positive relationship is expected between Public Pressures and environmental disclosure.

Capital Intensity: The magnitude of a firm's capital investment makes it less flexible with respect to regulatory or government actions on social or environmental issues. Moreover, physical plant and equipment makes a firm much more visible to the public and the community at large. In addition to industry membership and the age of its fixed assets, a firm's capital intensity is likely to be related to polluting activities. Hence, we expect that the level of capital investment intensity, as measured by the ratio of gross property, plant and equipment divided by total assets, is associated with more environmental disclosure.

Commodities producers. We expect that commodities producers, which operate highly polluting facilities (mines and smelters, oil and gas wells, forestry and paper operations) and which typically deal with industrial customers, face more pressures to provide environmental information to dissipate external concerns.

Financial stakeholders' implicit claims

Four variables are used to capture financial stakeholders' claims with respect to a firm's environmental management:

Forecast Dispersion: Uncertainty as perceived by analysts' forecast dispersion is a proxy for information asymmetry between the firm and investors. The higher the forecast dispersion for a firm, the more difficult it is for investors to precisely assess the firm's value leading to more financial stakeholders claims for disclosure. Measures of analyst dispersion have been used in prior research (e.g. Hope, 2003). A positive relationship is expected between the level of forecast dispersion and the extent of environmental disclosure.

Concentrated Ownership: Firms with closely-held ownership structures are not expected to be responsive to public investors' claims since the dominant shareholders typically have access to the information they need. Concentrated ownership is measured as a dichotomous variable taking a value of one (1) when an investor, or a related group of investors, owns more than 20% of a firm's outstanding voting shares, and zero (0) otherwise.⁶ A negative relationship is expected to exist between concentrated ownership and the extent of environmental disclosure.

Return On Assets: Many studies document a positive association between a firm's level of disclosure and its financial performance (Mills and Gardner, 1984; Cochran and Wood, 1984; McGuire *et al.*, 1988; Cormier and Magnan, 1999, 2003). A positive relationship is expected between profitability, as measured by return on assets, and environmental reporting.

Leverage: Creditors' power as stakeholders depends upon the degree to which the firm relies on debt financing (Roberts, 1992). The more a firm relies on debt financing, the greater the extent to which managers are expected to respond to creditor expectations. Leverage can be seen as a proxy for creditor stakeholder power. Roberts (1992), and Richardson and Welker (2001) find a positive relationship between leverage and social disclosure while Elijido-Ten (2004) does not find any significant relationship between Leverage and environmental disclosure. Conversely, Cormier and Magnan (2003) document a negative relationship between leverage and environmental disclosure.⁷ By widely disseminating information about their environmental management and showing their ability to shoulder environmental obligations, these firms establish their credibility as a reliable and socially responsible partner among all stakeholder groups. We measure leverage by the ratio of long-term financial debt over equity (Long term financial debt/Equity). Since the actual impact of leverage on environmental reporting is unclear, no directional predictions are made for the variable.

4.3.2. Analysts' forecasts dispersion model

The empirical model concerning the relevance of environmental disclosure for analysts' forecasts dispersion is the following:

Analysts' forecasts dispersion_{it} =

⁶ According to International Accounting Standards (IAS No. 28, 2000), an ownership stake of 20% defines significant influence over a firm's affairs. Results remain unchanged using a cut-off varying between 15% and 30%.

⁷ An explanation for the inverse relationship (positive association for social disclosure and negative association for environmental disclosure) could be that social disclosure is more likely to be good news

$f(\text{Beta}, \text{Analyst following}, \text{Change in earnings per share}, \text{Negative earnings per share}, \text{Environmental disclosure}, \text{Environmental disclosure X Analyst following greater than median}, \text{Environmental disclosure X Environmentally sensitive industries}, \text{Environmentally sensitive industries}, \text{Size})_{it}$ (2.2)

Where,

- Analysts' forecast dispersion: The absolute value of the difference between the high EPS estimate and low EPS estimate for the year 2003 divided by the EPS average estimate;⁸
- Beta: The firms' systematic risk in 2002;
- Analyst following: Number of analysts that follow a firm in 2002;
- Change in earnings per share: Absolute value (Percentage change in EPS for the year 2002 versus EPS for 2001);
- Negative earnings per share: Indicative variable (1) if EPS is negative for 2002;
- Environmental disclosure: six environmental disclosure components for 2002 (Expenditures and risk; laws and regulation; pollution abatement; sustainable development; land remediation; and environmental management).
- Environmentally sensitive industries: Energy; Chemicals and drugs; Industrials; and Materials (Resources).

The number of analysts following a firm is used as a proxy for the level of other disclosures and the extent of a firm's communication with financial analysts (Leuz, 2003). A negative association between the number of analysts following and the level of forecast dispersion is expected. As earnings variability makes forecasting more difficult, a positive association is expected between earnings changes and forecast dispersion. The same reasoning applies for beta. Finally, we expect our indicative variable for negative earnings to be positively related to forecast dispersion.

4.3.3. Environmental news exposure model

As mentioned earlier, environmental news exposure, an explanatory variable in the environmental disclosure model, is endogenously determined through various stakeholders'

than environmental disclosure.

⁸ Analysts' dispersions were collected for 239 European firms and for 552 North American firms. Absolute values greater than three and followed by less than three analysts (11 + 11 for European firms and 16 + 42 for North American firms) were excluded from analyses. There were also nine missing data for European firms and 17 for North American firms. The final sample is 205 for continental European firms and 477 for North American firms.

claims. The following model summarizes the determinants used in the environmental news exposure model:

$$\text{Environmental news exposure}_{it} = f(\text{Number of employees, Age of fixed assets, Foreign listings, Market-to-book, Size, Industry, Country})_{it} \quad (2.3)$$

The media exposure model takes into account environmental sensitivity (industry type, size, age), societal embeddedness (number of employees), international exposure (foreign listings), institutional setting (country) and growth potential as an additional control. These factors are assumed to induce general and environment-specific media attention .

Previous research (Cowen *et al.* 1987; Deegan and Gordon, 1998; Hackston and Milne, 1996) suggest that firm size and industry membership are related to public pressure relative to environmental management. Public scrutiny and press coverage should be higher for large firms operating in industries that directly affect the environment. Moreover, it is predicted that there is a positive relationship between the age of a firm's fixed assets and the extent of environmental news exposure. In the absence of other disclosure, the media may rely on the age of a firm's fixed assets to assess the firm's environmental performance. The age of fixed assets is measured by the ratio of accumulated depreciation on property, plant and equipment divided by the annual depreciation expense.

Number of employees proxies for the societal impact of a firm's activities, where societal impact is assumed to direct media attention. In the same vein, foreign listings capture international exposure and related media coverage. Based on Hope's study (2003), a listing on a domestic exchange and on foreign exchanges (except U.S. listings and London) are given a weight of 1 per listing, while U.S. and London stock exchange listings are give a weight of 1.5 because of their importance. The score for each firm is summed. We expect a positive association between the variable stock exchange listings and the level of environmental news exposure. The existence of a market premium (market-to-book ratio) is used as a proxy for growth potential (Frankel *et al.*, 1999). This growth potential is likely to attract media attention. Hence, we expect a positive relationship between market-to-book ratio and media exposure.

5. RESULTS

5.1. Descriptive statistics

Descriptive statistics are reported in table 1. The extent of print environmental disclosure related to expenditures and risk (8.20 versus 3.02), laws and regulation (4.52 versus 0.58) and remediation (7.43 versus 1.60) is higher in North American firms compared to continental European firms, while the opposite is observed for information concerning pollution activities (8.38 versus 12.36), sustainable development (2.81 versus 5.57) and environmental management (6.63 versus 8.07). Within Europe, consistent with Adams (1998), German companies tend to disclose the most environmental information.

As expected, North American firms, which operate in a more regulated context with respect to environmental management, disclose more environmental information related to expenditures and risk, and abatement and remediation, than continental European firms. We observe the opposite relationship with respect to information that concerns sustainable development and environmental management, i.e. less regulated disclosure. This result is consistent with previous research documenting that firms operating in environmentally sensitive industries report more environmental information (Cowen et al., 1987; Patten, 1991, 2002b; Hackston & Milne, 1996) .

Web-based environmental disclosure essentially comprises information about pollution abatement and, to a lesser extent, sustainable development and environmental management. Compared to paper disclosure, environmental web reporting addresses the more regulated and less discretionary information segments (expenditures and risks, laws and regulations, pollution abatement) with much less intensity.

[Insert table 1]

As illustrated in Table 2, the level of print environmental disclosure varies from a mean score of 7.84 for Utilities to 77.68 for Industrials. Among the seven industries, the four industries for which firms' activities are more likely to affect the environment exhibit the highest environmental scores: Industrials 77.68; Chemicals and drugs 74.28; Resources 70.68; and Energy 69.95. This result is consistent with Patten (2002b) who finds that those firms operating in environmentally sensitive industries report more environmental information. Finally, as is the case for Web Disclosure and Overlap Disclosure, we can see that Print Environmental Disclosure is driven by those firms in highly polluting industries.

[Insert table 2]

Table 3 provides some descriptive statistics regarding the sample firms' explanatory

variables. Firm size is larger for U.S. and German firms. France and U.S. firms show higher systematic risk while Benelux and Canadian firms present lower risk. More than half of the sample firms have a concentrated ownership in France, while the free float is quite high for U.S. firms. Canadian firms are followed less by analysts than their American and continental European counterparts. Finally, the U.S. firms exhibit a higher market-to-book ratio (proxy for intangible assets) compared to other country firms.

[Insert table 3]

5.2. Simultaneous test of environmental disclosure, forecasts' dispersion and environmental news exposure

Since we posit that a firm's communication strategy affects environmental disclosure, environmental media exposure, and financial analyst forecasts simultaneously, we first assess whether or not endogeneity exists between these variables using the Hausman test. Using this procedure, we reject the null hypothesis of no endogeneity with respect to environmental disclosure and analyst forecast dispersion for North American firms ($t = -2.39$; $p < 0.017$). As for continental European firms, there is marginal evidence of endogeneity ($t = -1.45$; $p < 0.150$). Therefore, it is important to control for firms' incentives to disclose environmental information in order to assess the value relevance of disclosure for analyst forecast dispersion. Furthermore, the Hausman test confirms endogeneity between Media exposure and Environmental disclosure for continental European firms ($t = -3.54$; $p < 0.000$) but not for North American firms ($t = -0.64$; $p < 0.519$). Consequently, for North American firms, we keep media exposure exogenous for environmental disclosure regression estimations.

Table 4 provides evidence regarding the simultaneous test of environmental disclosure (eq. 2.1), forecast dispersion (eq. 2.2) and environmental news exposure (eq. 2.3) for continental European firms and for North American firms separately. Concerning the determinants of print environmental disclosure, there is a strong relationship between business stakeholder concerns and environmental disclosure for North American firms (H1). In North America, the time horizon of customer relationships affects environmental disclosure (23.715; $p < 0.01$). Furthermore, it appears that the more difficult it is to enter a market, the more confident North American firms feel about disclosing information (50.307; $p < 0.01$). There is strong support for social stakeholders' claims affecting environmental disclosure (H2). For instance, as a proxy for social stakeholders' claims, media exposure is a significant determinant of environmental disclosure in both continents, although the magnitude of the coefficient estimate is much larger for continental European firms (88.626; $p < 0.01$) than for North

American firms (25.713; $p < 0.01$) (Coefficient difference between continents: $p < 0.01$). Capital intensity also influences environmental disclosure for both European (32.662; $p < 0.01$) and North American firms (29.365; $p < 0.01$). Finally, commodities producers enhance their environmental disclosure in both Europe (41.182; $p < 0.01$) and North America (48.249; $p < 0.01$).

Consistent with H3, findings also suggest that financial market concerns such as forecast dispersion in continental Europe (28.085; $p < 0.05$) and indebtedness in North America (-1.924; $p < 0.05$) are relevant as a determinant of environmental disclosure, especially for the more discretionary parts of it.

With regard to the relevance of environmental disclosure in determining the properties of analysts' earnings forecasts (H4), environmental disclosure leads to a reduction in forecast dispersion both in continental Europe (-0.026; $p < 0.01$) and in North America (-0.006; $p < 0.05$). However, contrary to expectations, it appears that European firms' environmental disclosure is timelier than North American firms ($p < 0.10$).⁹

Consistent with H5, the interaction term "*Disclosure X analysts following greater than the median*" is positive and significant both in continental Europe (0.027; $p < 0.01$) and in North America (0.009; $p < 0.05$), thus suggesting that environmental reporting has a lower impact on forecast dispersion for those firms followed by many analysts. The decrease in analyst forecast dispersion is attenuated for those firms followed by many financial analysts. Moreover, analyst following has a greater on the relation between environmental disclosure and forecast precision for European firms than for North American firms (coefficient difference: $p < 0.10$). The sum of both coefficients indicates the extent of the relationship between environmental disclosure and forecast dispersion for highly followed firms, which is more or less close to zero for firms from both continents.

Consistent with H6, continental European firms' environmental disclosure translates into an increase in forecast dispersion for those firms operating in more environmentally sensitive industries (0.020; $p < 0.05$). No such relation is observed for North American firms and there is a significant difference between firms from both continents. Overall, these results suggest that environmental disclosure is value relevant for firms with relatively small analyst following (continental Europe and North America) and for firms in less environmentally

⁹ The coefficient for beta is not significant in regressions for North America. This might be due to the fact that beta is much lower in Canada (mean=0.56) compared to US (mean=1.08). When we perform separate regressions Canada and US, the coefficient for beta is positive and significant in both

sensitive industries (continental Europe). For North American firms, extensive disclosure regulations imply that it is less likely that disclosure relevance will vary across industries.

[Insert table 4]

5.3. Sensitivity analyses

First, to assess the robustness of our results, we replace analysts' forecasts dispersion as dependent variable by stock price (Al-Tuwaijri *et al.*, 2004). Since our intent is to assess if environmental disclosure has incremental value relevance for stock market investors in their interpretation of a firm's financial statements, we rely on an empirical model that incorporates both the balance sheet and the income statement. Such an approach is consistent with prior empirical work (Amir, 1993; Harris and Muller, 1999):

$$\text{Stock price}_{it} = \beta_0 + \beta_1 \text{Equity per share}_{it} + \beta_2 \text{EPS}_{it} + \beta_3 \text{Environmental disclosure}_{it} + \beta_4 \text{Environmental disclosure}_{it} \times \text{Analyst following greater than median} + \beta_5 \text{Negative EPS (1/0)}_{it} + e_{it}$$

The results (not presented) are consistent with those observed through using analyst forecast dispersion reported in table 4. For North American firms, results (not presented) are consistent with those observed through using analyst forecast dispersion reported in table 4. As expected, the coefficient of environmental disclosure is positive and significant (0.224; $p < 0.017$) while the interaction term of “*Environmental disclosure X Number of analysts greater than the median*” is negative and significant (0.395; $p < 0.004$). For continental European firms, results are also consistent with forecast dispersion regression (table 4) although less significant (1.023; $p < 0.086$; and -0.971, $p < 0.090$). The coefficients for environmental disclosure are not statistically different between continental European and North American firms ($p < 0.147$ two-tailed for environmental disclosure coefficient, and $p < 0.218$ two-tailed for the interaction term).

Second, as a robustness check, we scale our dispersion variable by stock price (Ashbaugh and Pincus, 2001; Hope, 2003). Results (not tabulated) are not sensitive to this procedure. This is not surprising since the scaled variable is correlated with our measure at 0.75 for European

regressions. All other results remain unchanged.

firms and 80% for North American firms.

As a third sensitivity analysis, we re-estimate regressions using the Web total disclosure instead of total print disclosure, i.e. environmental information published on the web page (HTML). As shown in table 5, results suggest that this information is only relevant in continental Europe. Hence, Web disclosure (-0.046; $p < 0.10$) leads to a reduction in forecast dispersion (H4). However, the Web disclosure coefficient is positive but not significant for North American firms (0.011; $p > 0.10$). The t-statistics of disclosure coefficient differences between continental European and North American firms confirms the statistical difference ($p < 0.05$). The value relevance underlying a firm's environmental disclosure differs depending on the diffusion media being used. This might be attributable to the large sources of environmental information available in North America. Market participants in North America can rely on various alternative sources of information that are potentially perceived as more credible than the web (e.g. MD&A, 10K, etc).

[Insert table 5]

Fourth, so far, our results suggest that media exposure is a significant determinant of environmental disclosure. In section 2.4., we argue that the amount of environmental news exposure is causally related to a firm's environmental "riskiness". In order to assess the marginal impact of media exposure over environmental disclosure in reducing the dispersion of forecasts, we estimate regressions adding the media exposure variable to the forecast dispersion regression and (also by) dropping the variable from the environmental disclosure regression. Results (not presented) show that for continental European firms, the coefficient for Media exposure is negative and significant (-0.445; 0.005 one-tailed), while disclosure and the interaction term Disclosure X analyst following greater than the median remain significant. Concerning North American firms, the coefficient for media exposure is positive and not significant (0.026; 0.631 two-tailed) while disclosure and the interaction term Disclosure X analyst following greater than the median remain significant. Our results would imply that environmental disclosure is more value relevant than media exposure for North American markets.

Fifth, for the US sample, consistent with Al-Tuwaijri *et al.* (2004), we use SEC 10K form environmental disclosure. These requirements concern elements that relate to: descriptive statements about the present and future legislation; fulfilment of environmental legislation requirements; present and future operating expenditures related to the environment; present and future capital expenditures connected with the environment; and legal proceedings related

to the environment. Since 10K disclosure is mandatory, endogeneity should not be an issue. Thus, we rely on an OLS regression. Surprisingly there is no relation between such environmental disclosure and analysts' forecasts' precision.¹⁰ An explanation could be that voluntary information disclosed in an annual report or environmental report is mostly of a positive nature, while 10K disclosure contains both positive and negative information. A firm's environmental disclosure contains a mix of positive and negative news, which taken individually may be value relevant, but if taken collectively cancel each other out. This result is consistent with the mixed findings reported by Al-Tuwaijri *et al.* (2004) who document an insignificant relation between 10K disclosure and industry-adjusted return and a significantly negative relation with stock price. This result is also consistent with Lancaster's findings (1998), which suggest that descriptions of lawsuits as well as statements on future environmental costs negatively affect firms' value, while statements of expenditure compared with the current year's environmental operating expenses and capital expenditure planned for the following year increase a firm's value. Lancaster also finds that other 10K elements, such as accounting provisions disclosing whether the firm is in compliance with environmental regulations, disclosure of recurring or total environment expenses, statements on the current costs of remediation, current environmental capital expenditures and accounting provisions in comparison with the costs of remediation are not significantly associated with firms' market value.

Sixth, to assess the reliability of our proxies for a firm's polluting activities, we estimate a 3SLS regression for the Canadian sample through a replacement of the capital intensity variable in the disclosure model, and a replacement of the age of fixed assets variable in the Media exposure model. Both were replaced with an actual environmental performance variable defined as a firm's level of annual discharges scaled by the number of employees involved in these polluting activities.¹¹ In 2001, the Canadian ministry of the environment released data for 84 firms included in our sample, 49 of which were followed by analysts (compared with our initial sample of 110 Canadian firms followed by analysts). Results (not presented) suggest that both proxies for environmental performance do not alter our conclusions concerning the impact of environmental disclosure on analysts' forecast precision since the coefficients disclosure and the interaction term remain similar. Replications of this test are not feasible for other countries as the information is either not available or not comparable.

¹⁰ The mean score for environmental disclosure in the 10K form is 16.01 and this score is correlated at 68% with total paper disclosure score and 74.4% with economic-based paper disclosure.

Seventh, findings discussed so far are based on regressions estimated for firms followed by at least three financial analysts. As a sensitivity analysis, all 3SLS regressions are estimated for firms followed by at least two financial analysts. As a result of this, we gain four observations for continental European firms and 18 observations for North American firms. Results (not reported) remain equivalent for both continental European and North American samples. Finally, we replace asset return by stock market return and the variable remains insignificant.

6. DISCUSSION AND CONCLUSION

The purpose of this study was to provide an integrated analysis of firms' overall environmental communication strategy using stakeholder theory. More precisely, we argue that there is a symbiotic relationship between managerial decisions with respect to environmental disclosure and stakeholders. On the one hand, stakeholders' claims determine managerial decisions with respect to corporate environmental disclosure. On the other hand, managerial decisions may affect key stakeholders' actions and decisions, e.g., financial analysts' forecasts. Three research questions were addressed in an international context (i.e., continental Europe vs. North America): 1) What are the determinants for voluntary environmental disclosure? (2) Does voluntary environmental disclosure allow analysts to make better forecasts? (3) Is there a difference in the determination and implications from environmental disclosure between continental European and North American firms?

We document that North American firms, operating in a more regulated context than continental European firms with respect to environmental management, release more environmental disclosure related to expenditures and risk, abatement and remediation than their European counterparts do. We observe the opposite with respect to information concerning sustainable development and environmental management, i.e. less regulated disclosure.

Through simultaneous equations, we find a strong relationship between business stakeholder concerns and environmental disclosure for North American firms, and a weak statistical effect for continental European firms. Media exposure is a significant determinant of environmental disclosure in both continents. Findings also suggest that financial market concerns are relevant as a determinant of environmental disclosure, especially for the more discretionary parts of it.

¹¹ A firm's capital intensity is likely to be related to polluting activities. Furthermore, in the absence of

Results also show that print environmental disclosure is associated with a decrease in analysts' forecast dispersion both in continental Europe and in North America. Furthermore, environmental disclosure is less important a factor in explaining forecast dispersion for those firms that are followed by many analysts. However, in North America, it appears that the value relevance underlying a firm's environmental disclosure differs depending on the diffusion media being used. Moreover, in continental Europe environmental disclosure increases dispersion of analysts' forecasts for firms operating in more environmentally sensitive industries. Our results suggest that a firm's exposition to media is to some extent value relevant in continental Europe while environmental disclosure is more value relevant than media exposure for North American markets.

Furthermore, we document that for both continents, foreign listings and a firm's size positively affect environmental news exposure. The age of fixed assets (in continental Europe) and the number of employees (in North America) are also positively related to media exposure.

This paper contributes to our knowledge of environmental disclosure in the following manner. First, we envision environmental management reporting through different disclosure mechanisms (print or web disclosure) and contexts (countries) that encompass stakeholders' implicit claims about corporate environmental disclosure. Second, we adopt a comprehensive and qualitative view of environmental disclosure that includes both financial and non-financial information. Third, we document a clear association between a firm's environmental disclosures and the press coverage concerning environmental issues. Fourth, we examine the relevance of different environmental disclosure components in a cross-country setting. This contributes to the literature regarding the determinants for the accuracy of analysts' earnings forecasts. Finally, the evidence that stakeholders claims determine corporate environmental disclosure, and that such disclosure is useful to financial analysts, suggests that standard setters and regulators should pay more attention to its quality and reliability.

Our findings are subject to various limitations. First, environmental disclosure is an issue for which various alternative measurement methods have been suggested. Hence, the use of a different measurement approach could have lead to different results. However, our approach, which takes into account the quality of corporate disclosure does seem to provide us with a comprehensive and reliable measure. Second, we focus on a sample of relatively large firms from specific countries. Disclosure patterns for small firms and for other countries could be

other disclosure, investors may rely on Fixed Asset Age to assess a firm's environmental performance.

different. Third, since stakeholders' claims are not directly observable, we have to infer them through proxy variables which may, or may not, be reliable.

An objective for further research should be to assess how temporal trends and industry specific ecosystems influence environmental disclosure. A strategic watch would be a useful method to assess the importance of these influencing factors. An argument can be made that public pressures may evolve over time thereby explaining shifts in the environmental reporting strategy of firms. Concerning the impact of stakeholders' claims on environmental disclosure strategy at an international level, interviews and questionnaires could serve to contrast managers' perceptions from reality in different settings. Finally, environmental disclosure could be assessed using different socio-political environments, and multi-theoretical lens such as economic incentives, public pressures and institutional theory.

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Table 1

**Environmental Disclosure Mean Scores by Country
Paper / Web / Overlap**

	Germany	France	Benelux	Canada	United States	North America	Continental Europe	Europe/ America Mean difference p-value
Expenditures and risks	4.75	2.49	1.93	6.51	9.03	8.20	3.02	0.000
	0.74	1.13	0.50	1.41	0.71	0.94	0.81	0.512
	0.42	0.55	0.20	0.50	0.32	0.38	0.39	0.940
Laws and regulations conformity	0.42	0.51	0.81	1.76	5.88	4.52	0.58	0.000
	0.16	0.12	0.24	0.56	0.76	0.70	0.17	0.000
	0.02	0.09	0.03	0.14	0.26	0.22	0.05	0.002
Pollution abatement	17.88	4.89	15.39	6.47	9.32	8.38	12.36	0.182
	3.42	2.61	4.63	3.94	4.69	4.44	3.51	0.231
	1.00	1.18	1.86	1.76	1.41	1.52	1.34	0.628
Sustainable development	8.57	4.31	4.06	2.29	3.06	2.81	5.57	0.000
	3.50	3.12	2.36	2.05	3.07	2.74	3.00	0.576
	1.33	1.18	0.74	0.71	0.47	0.55	1.09	0.007
Land remediation and contamination	0.74	3.16	0.67	4.18	9.03	7.43	1.60	0.000
	0.18	1.78	0.24	1.83	2.14	2.03	0.78	0.000
	0.10	0.97	0.13	0.81	0.59	0.66	0.42	0.148
Environmental management	11.67	6.77	6.05	7.15	6.38	6.63	8.07	0.141
	5.09	3.39	3.74	5.48	6.06	5.87	4.04	0.011
	2.05	2.03	1.70	2.11	1.42	1.65	1.93	0.442
Total paper	44.02	22.13	28.92	28.54	42.70	38.01	31.20	0.143
Total web	13.08	12.16	11.72	15.40	17.44	16.77	12.31	0.053
Total overlap	4.90	6.03	4.66	6.08	4.48	5.01	5.23	0.825
Sample	84	97	86	206	419			

Table 2

**Environmental disclosure Mean scores by Industry
Paper / Web / Overlap**

	Sample	Expenditures and risks	Laws and regulations conformity	Pollution abatement	Sustainable development	Land remediation and contamination	Environmental management	Total
Consumer goods and services	275	3.29	1.70	7.47	3.36	1.40	5.24	22.60
		0.84	0.27	3.80	3.04	0.57	4.55	13.17
		0.28	0.08	1.24	0.67	0.15	1.25	3.71
Energy	145	12.10	5.83	17.67	6.97	9.37	15.99	67.95
		1.48	1.06	7.00	4.26	3.39	8.86	26.05
		0.75	0.32	2.57	1.46	1.29	3.83	10.22
Chemicals and drugs	56	16.73	6.91	14.05	3.88	17.25	11.79	74.28
		2.18	1.41	6.45	3.84	4.79	9.00	36.62
		1.04	0.64	3.32	1.14	2.14	3.64	21.31
Industrials	110	9.33	3.38	12.03	3.65	9.45	6.00	77.68
		0.49	0.25	2.71	1.99	2.29	3.71	24.10
		0.19	0.02	0.80	0.25	0.45	0.71	6.74
Information technology	67	4.59	2.49	7.89	3.52	5.49	5.19	29.19
		0.72	0.75	4.30	2.61	1.72	5.27	15.36
		0.29	0.16	1.76	1.13	0.60	2.09	6.03
Materials (resources)	50	14.94	11.76	17.80	5.52	13.10	7.56	70.68
		1.42	1.20	8.40	4.32	2.28	7.90	25.45
		0.78	0.70	2.84	0.70	1.26	1.74	8.02
Telecom & Media	125	1.43	0.95	2.33	0.87	1.93	2.87	10.37
		0.36	0.27	1.95	1.38	0.64	3.73	8.33
		0.03	0.00	0.38	0.16	0.19	0.86	1.62
Utilities	63	1.19	0.37	1.57	1.03	0.89	2.19	7.24
		0.32	0.05	0.62	0.92	0.05	1.33	3.29
		0.27	0.02	0.24	0.25	0.05	0.46	1.29

Table 3
Descriptive statistics
Financial Market, Product Market and
Media Exposure Variables by Country
Means

	Germany	France	Benelux	Canada	United States
Total Assets (million €)	22,933	13,989	7,840	6,574	24,225
(median million €)	(5,522)	(3,891)	(2,425)	(2,285)	(7,526)
Beta	0.49	1.10	0.49	0.56	1.08
Leverage	1.35	1.00	1.02	0.94	1.19
Concentrated ownership	0.48	0.56	0.40	0.44	0.09
Return on Assets	0.06	0.03	0.03	0.01	0.02
Stock exchange listings	3.07	3.04	1.49	1.96	1.72
Equity per share	20.67	27.27	48.87	13.36	8.93
Market-to-book	2.56	2.77	2.15	2.11	7.18
Concentration ratio	0.54	0.56	0.55	0.55	0.44
Capital investment intensity	0.36	0.48	0.40	0.46	0.33
Age of fixed assets (Acc. Depr. / Fixed assets)	0.41	0.26	0.41	0.39	0.43
Analyst following (number)	12.86	16.21	12.31	5.64	15.93
Analysts' forecasts dispersions	0.88	0.85	0.66	0.74	0.33
Earnings per share in € 2002	1.61	1.53	2.05	0.62	0.57
Absolute change in EPS %	1.40	1.76	5.56	2.20	2.28
(median)	0.38	0.37	0.40	0.67	0.53
Negative EPS (1 or 0)(%)	0.12	0.24	0.27	0.24	0.23
Environmental news exposure- total number	0.17	0.08	0.05	0.09	0.18
Environmental news exposure- Average 5 years	0.15	0.06	0.03	0.07	0.20
Commodities	0.06	0.04	0.05	0.40	0.15
Short term relations	0.76	0.85	0.84	0.49	0.77
Long term relations	0.18	0.11	0.11	0.11	0.08
Number of employees	48,635	50,222	27,884	9,519	47,475

Table 4
3SLS regressions on the Determinants of Environmental Disclosure,
Media Exposure and Analysts' Forecasts Precisions
Print total disclosure

	Continental Europe			North America			Coefficient difference
	Predicted sign	Disclosure	Forecasts' dispersion	Media exposure	Disclosure	Forecasts' dispersion	
<i>Business Stakeholders' Claims</i>							
Long-term customer relations	+	4.822			***23.715		
Concentration ratio		-21.250			***50.307		***
<i>Social Stakeholders' Claims</i>							
Media Exposure	+	***88.626			***25.713		***
Capital intensity	+	***32.662			***29.365		
Commodities producers	+	***41.182			***48.249		
Number of employees	+			0.001			***0.001
Age of fixed assets	+			***0.521			0.247
<i>Financial Stakeholders' Claims</i>							
Return on Assets	+	31.347			9.617		
Concentrated ownership	-	0.657			4.355		
Forecasts' dispersion	+	**28.085			15.463		
Leverage		0.171			** -1,924		*
Foreign listings	+			**0.033			***0.236
Market-to-book	+			0.012			0.001
Beta	+			***0.277		0.046	**
Analysts' following	-			***-0.854		** -0.298	*
Change in EPS	+			0.001		0.001	
Negative EPS	+			0.092		***0.204	
Size (ln assets)	+			**0.100	***0.058	0.013	***0.154
<i>Environmental disclosure</i>							
Disclosure	-			***-0.026		** -0.006	*
Disclosure* Analyst following greater than median	+			***0.027		**0.009	*
Disclosure* Environmentally sensitive industries	+			**0.019		-0.002	**
Environmentally sensitive industries	+/-			*-0.391		-0.014	
R-Square		14.01%	4.52%	11.64%	29.46%	5.97%	21.28%
Durbin-Watson		1.51	1.92	1.40	1.84	1.96	1.99
N		205			477		

*: p < 0.10; **: p < 0.05; ***: p < 0.01. One-tailed if there is a predicted sign, two-tailed otherwise.
Coefficients for industry-specific and country-specific dummies not reported

Table 5
3SLS regressions on the Determinants of Environmental Disclosure,
Media Exposure and Analysts' Forecasts Precisions
Web restricted total disclosure

	Continental Europe				North America			Coefficient difference
	Predicted sign	Disclosure	Forecasts' dispersion	Media exposure	Disclosure	Forecasts' dispersion	Media exposure	
<i>Business Stakeholders' Claims</i>								
Long-term customer relations	+	2.463			*7.152			
Concentration ratio		1.436			*14.374			
<i>Social Stakeholders' Claims</i>								
Media Exposure	+	**34.335			***13.158			*
Capital intensity	+	8.002			***17.518			
Commodities producers	+	6.198			***10.923			
Number of employees	+			-0.001			***0.001	***
Age of fixed assets	+			**0.375			*0.278	
<i>Financial Stakeholders' Claims</i>								
Return on Assets	+	8.976			3.457			
Concentrated ownership	-	1.867			1.003			
Forecasts' dispersion	+	-5.522			8.231			
Market-to-book	+			-0.002			0.001	
Leverage		0.114			-0.395			
Foreign listings	+			***0.050			***0.234	***
Beta	+		***0.273			0.015		***
Analysts' following	-		**-0.499			0.245		***
Change in EPS	+		0.001			0.001		
Negative EPS	+		0.093			***0.260		
Size (ln assets)			0.054	*0.048	-0.027	***0.156		**/***
<i>Environmental disclosure</i>								
Disclosure	-		*-0.046			0.011		**
Disclosure* Analyst following greater than median	+		*0.045			-0.009		**
Disclosure* Environmentally sensitive industries	+		*0.023			0.001		*
Environmentally sensitive industries	+/-		-0.367			-0.059		
R-Square		2.00%	3.70%	13.59%	13.54%	12.23%	21.24%	
Durbin-Watson		1.88	1.92	1.36	1.96	1.88	1.99	
N		205			477			

*: p < 0.10; **: p < 0.05; ***: p < 0.01. One-tailed if there is a predicted sign, two-tailed otherwise. Coefficients for industry-specific and country-specific dummies not reported

Appendix
Environmental disclosure grid

Expenditures and risks	Sustainable development
Investments	Natural resource conservation
Operation costs	Recycling
Future investments	Life cycle information
Future operating costs	Land remediation and contamination
Financing for investments	Sites
Environmental debts	Efforts of remediation
Risks provisions	Potential liability- remediation
Risks litigations	Implicit liability
Provision for future expenditures	Spills (number, nature, efforts of reduction)
Laws and regulations conformity	Environmental management
Litigations, actual and potential	Environmental policies or company concern for the environment
Fines	Environmental management system
Orders to conform	Environmental auditing
Corrective actions	Goals and targets
Incidents	Awards
Future legislation and regulations	Department, group, service affected to the environment
Pollution abatement	ISO 14000
Emission of pollutants	Involvement of the firm to the development of environmental standards
Discharges	Involvement to environmental organizations (industry committees, etc)
Waste management	Joint projects with other firms on environmental management
Installation and process controls	
Compliance status of facilities	
Noise and odours	

Rating scale:

3: Item described in monetary or quantitative terms; 2: Item described specifically; 1: Item discussed in general