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The relationship between financial attributes, environmental performance and environmental disclosure

Empirical investigation on French firms listed on CAC 40

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Abstract

Purpose – An increasing number of business organizations around the world are engaged in the accounting reporting on non-financial performance aspects, mainly within the field of environmental responsibility. The purpose of this paper is to assess the association between environmental disclosure and environmental performance and examine the financial attributes of companies using a composite disclosure index to investigate the status of the environmental disclosure practices of the top 40 companies operating in France.

Design/methodology/approach – The sample used in this study consists of the 40 largest companies operating in France (index CAC 40).

Findings – The findings of the study show that environmental disclosure is positively associated to environmental performance. Financial attributes, such as firm size, the need for capital, profitability and capital spending, are positively associated with environmental disclosure quality. Equally, a high quality of environmental disclosure will reflect the effectiveness of corporate governance and would tend to face fewer difficulties in accessing capital markets. The authors found that firms revealed on healthcare and gas oil business sector disclose more environmental information than other industries.

Originality/value – A web-based search was performed during the fourth quarter of 2014, locating the corporate websites of the sample firms. The sample period is 2011-2013 (108 firm-year observations).

Keywords Environmental performance, Business sector, Environmental disclosure, Financial attributes

Paper type Research paper

1. Introduction

Since 1990s, firms that endorse social and environmental disclosure have substantially increased while the extent of such disclosure has risen respectively (KPMG, 2011). A variety of terms have been coined in the accounting literature in order to define social and environmental disclosure practices. These terms fall beyond the financial domain: "corporate social responsibility" "social and environmental disclosure," and "ethical practices" and reflect the expanded accountability efforts of a company toward its stakeholders and society as a whole. The environmental disclosure practice is the process of communicating environmental effects of companies beyond the financial account to the shareholders. Such an extension builds upon the assumption that organizations have responsibilities to create value for their shareholders.

The social and environmental disclosure encompasses multiple ranges of firms' performance aspects related to social product responsibility efforts, human rights protection and environmental management that can be measured with multidimensional corporate social responsibility construct. As such, it has attracted the interest of recent research studies in order to unveil and identify the regional, cultural or industrial trajectories of social and environmental disclosure practices (Sardinha *et al.*, 2011;

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Lozano and Huisingh, 2011; Roca and Searcy, 2012; Sobhani *et al.*, 2012; Lodhia, 2012; Marimon *et al.*, 2012; Antonis *et al.*, 2014).

This study seeks to examine the relationship between financial attributes, environmental performance and environmental disclosure among a sample of 40 large French firms (CAC 40). To reach this end, the objective of the paper is twofold. The first one aims to shed light on the content and comprehensiveness of environmental disclosure practices of 40 large French firms (CAC 40). The second objective seeks to investigate a number of determining factors for such practices and the pressures regarding the financial attributes and firm environmental performance.

Sight that financial values, the scarcity and the costs of natural resources are considered as crucial to business activities, it is important to protect them. Thereby, financial reporting is necessary to show the adoption of environment-friendly and industrial practices. Also, environmental disclosure policies in annual reports can allow other information users to make informed judgments about the efficiency and impact of managers' sustainability decisions and actions (Deegan, 2004). Indeed, a high quality of disclosure provides a signal of transparency and would enhance managers' reputation and social profile (Deegan *et al.*, 2006; Simnett *et al.*, 2009).

In a recent study, Antonis *et al.* (2014) showed that the information about the management policies on spending relating to significant environmental actions contribute to reduce uncertainty and would earn a competitive advantage for the company. The justification of some characteristics of disclosures to be of high quality, will need to present information about managerial judgments, assumptions and estimations relating to relevant valuation and projection models. The environmental disclosure should include keys findings of environmental and sustainability matters and their impact on firms' financial performance and position, policies on significant environmental issues, activities, uncertainties and risks, material items of income or expense. Environmental reporting should be reports on emissions trading schemes and include reporting greenhouse gas direct and indirect emissions, recycling or disposal waste and fuel combustion in boilers. The environmental reporting must reflect to the emissions trading schemes and include reporting greenhouse gas direct and indirect emissions, recycling or disposal waste and fuel combustion in boilers. The environmental disclosures should also explain how firms' assets may be affected by environmental impairment, specifically regarding the hazardous items that they would require special treatment.

The remaining sections of the study are as follows. Section 2 presents literature background considerations. Section 3 shows the research hypotheses. Section 4 describes the methodology. Section 5 discusses the results, and Section 6 presents the conclusions of the study.

2. Literature background

2.1 Evaluating environmental disclosure in annual report

Recent research are interested by understanding the environmental disclosure practices that reflect the importance of content narrative capture in annual reports (e.g. Toms, 2002; Hammond and Miles, 2004). Beyond the limitations, in terms of the reliability of findings of mechanistic analysis reported by recent studies, also there is a less agreement about the method of content analysis that can be used to capture content, extent or frequency of environmental information, the most of these techniques are loosely classified under the umbrella of content analysis.

The extent of environmental disclosures can be assessed for each report (annual/standalone/internet/other) by counting the number of pages or sentences of environmental reporting. Usually, pages are analyzed in hard copy and counted to the nearest quarter page using a standardized grid. In regard to sentence count of other forms of visual communication contained

in the annual report such as tables and figures, Hooks and Van Staden (2011) employ a standard sentence of 15 consecutive words. In the literature, some studies have discussed what the term "quality" means in the reporting narrative and how it can be measured as part of a content analysis. While other studies sought engagement with users to establish information needed to be disclosed (e.g. Solomon and Lewis, 2002).

Loew *et al.* (2004) suggested guidelines in regard to the content of high-quality reports. Indeed, they suggested a high-quality report that informed not only about the firm objectives, but also about the activities and strategies to achieve those objectives. Cormier *et al.* (2005) defined the high quality of voluntary disclosure as the aggregate of precision, relevance and usefulness for making decision. The measurement of environmental disclosure quality consists on added a further dimension to the assessment of environmental reporting and it is recognized that certain types of information are more useful to readers than others (Hooks and Van Staden, 2011).

Most environmental disclosure studies concerning hazardous emissions fall under the rubric of voluntary disclosures. Although material capital expenditures to reduce the hazardous emissions are required in environmental disclosure, there is usually no way of ascertaining the purpose of environmental capital expenditure information disclosed. Any material contingent liability regarding the hazardous emissions is required to be disclosed, but these disclosures do not usually occur unless there is litigation. Therefore, recent studies assume that environmental information should be disclosed voluntary. The voluntary disclosure theorists, Clarkson *et al.* (2004, 2008), stated that firms that do well in terms of environmental performance disclose this information in a way that cannot be easily mimicked by poor performers. Indeed, Clarkson *et al.* (2008), after the use of objective environmental performance indicators, proved that the elements of environmental disclosures have a positive relationship with the level of environmental performance.

2.2 Measuring environmental performance

It can be defined as "a nonfinancial ratio based on the level of pollution emissions released by the organization or the relative quantity of hazardous waste (HW) recycled, and they feel that it is important to qualify the measure of environmental disclosure and distinguish it from its more generic connotation" (Tuwaijria *et al.*, 2004). Usually, three main categories of environmental performance measurement are used: environmental impact (toxicity, recycling HW, energy use), regulatory compliance (compliance with ISO, number of audits.) and organizational processes (environmental accounting, audits, environmental reports) (Ilinitch, 1998; Lober, 1996; Wood, 1991; Delmas and Blass, 2010).

In the literature of environmental disclosure, the Toxics Release Inventory (TRI) has been extensively developed and used as an aggregate measure of emissions to ground, water and air. Konar and Cohen (1997) stated that the TRI was created for exposed communities to be aware of dangerous pollution which was compounded by annual releases of hazardous chemicals from US plants. The criterion quantitative quality of TRI makes it useful to aggregate overall corporate pollution.

Referring to the EPA, the annual emissions can also be measured by chemical and by destination (air, water or land), and it includes in particular the ones that are most immediately hazardous of different types of pollutants. TRI has a number of limits as an aggregate measure of emissions of environmental performance. First, the emissions defined by EPA focus only on hazardous chemicals but other pollutants emissions are not included in TRI such as sulphur oxides and carbon dioxide. Second, virtually all the research employing TRI uses total pounds of pollution releases and considers all releases considered as toxic. Third, TRI is only available on a plant basis so using it to determine corporate pollution makes it a difficult task.

2.3 Relationship between financial attributes and environmental disclosure level

The relationship between industry membership and the extent of the environmental disclosure has been investigated by many theoretical and empirical studies. With regard to the relationship between industry membership and the extent of environmental disclosure, usually findings argues that companies from environmentally sensitive industries disclose more than less polluting companies (e.g. Patten, 2002; Cormier and Magnan, 2003; Brammer and Pavelin, 2006; Ho and Taylor, 2007; Pahuja, 2009; Galani *et al.*, 2012).

In the literature, it is interesting to study the impact of profitability on the level of environmental disclosures. Indeed, the results on the association between profitability and environmental disclosure are mixed. Neu *et al.* (1998) argues that profitability is positively associated with environmental disclosure level. Some studies report that a positive association between a firm's profitability and its level of environmental disclosure does not exist (e.g. Cormier and Magnan, 1999; Gray *et al.*, 2001; Al-Tuwaijri *et al.*, 2004; Pahuja, 2009; Saha and Akter, 2013). While other studies provide a negative effects of firm's profitability on its environmental disclosure (e.g. Neu *et al.*, 1998; Ho and Taylor, 2007; Michelon and Parbonetti, 2012; Andrikopoulos and Kriklani, 2013)

Roberts (1992), Richardson and Welker (2001) and Elijido-Ten (2004) do not find any significant relationship between leverage and social disclosure while Clarkson *et al.* (2008) found a positive relationship between leverage and environmental disclosure based on Global Reporting Initiative guidelines. Conversely, Cormier and Magnan (2003) document a negative relationship between leverage and environmental disclosure. Since the actual impact of leverage on environmental disclosure is unclear, no directional predictions are made for the variable. We expect that higher stock price volatility reduce the level of environmental disclosure. In fact, firms convey information to the market frequently, the impact of new information disclosed about its performance will decrease, causing a lower variation on stock prices. As disclosure increases, the firm's risk decreases that can directly cause a smoothness in the stock price volatility (Sengupta, 1998; Bushee and Noe, 2000).

With a few exceptions, most of the studies have found a positive association between the firm size and the level of environmental disclosure. In fact, large firms may tend to disclose more environmental information than smaller companies in their annual reports due to their competitive cost advantage, and they might publish more information in their reports to disclose information relevant to different users (Lobo and Zhou, 2001).

3. Research hypotheses, environmental disclosures and environmental performance

The environmental disclosure literature indicates that firms are inclined to report good news, while they are discouraged to disclose bad news. Indeed, these firms can resort to earnings management or earnings smoothing to mitigate the adverse impact of bad news (Verrecchia, 1983; Dye, 1985; Li *et al.*, 1997). Firms with superior environmental performance level due to their proactive environmental strategy have incentives to disclose voluntarily more environmental information to investors and other stakeholders.

Firms environmentally sensitive and that adopt sound environmental policies are motivated to disclose voluntary environmental information to inform investors of their global environmental strategy. Al-Tuwaijri *et al.* (2004) stated that firms with good environmental performers would tend to disclose "hard," verifiable and difficult to mimic environmental disclosures. Unlike the poor environmental performers who may be inclined to report "soft," these contain general information and not easy to verify environmental disclosures (Clarkson *et al.*, 2011). The provision of voluntary environmental disclosures tend to improve investor perceptions and to reduce uncertainty, thereby increasing firm valuation (Clarkson *et al.*, 2008).

Both the quality and the value relevance of the reported environmental information influence firms' valuation:

H1. Environmental disclosure is positively associated with environmental performance.

4. Methodology

4.1 Sample description and data collection methods

The sample used in this study consists of the 40 largest companies operating in France (index CAC 40). The financial firms are ignored from the final sample refers to their specific referential of disclosure out of the companies in question, 22.2 percent belong to the manufacturing sector and the technology sector, followed by firms engaged in health activities (11.1 percent). No other general business sector yielded more than 10 percent of the sample (basic materials, the construction and building materials, gas oil firms represent 8.3 percent; the trade activities 5.6 percent while firms pertaining to other tertiary/service business represent 14 percent of the sample). Our study seeks to explore the publicly available environmental information. To achieve this, a web-based search was performed during the fourth quarter of 2014, locating the corporate websites of the sample firms. The sample period is 2011-2013. The sample consists of 108 firm-years.

4.2 Measurement of variables

Dependent variable. In order to assess the index of environmental disclosure of sample companies, a composite quantitative content analysis approach was devised to evaluate the scope and comprehensiveness of environmental disclosure level. Riffe *et al.* (2008) expected that the quantitative content analysis can be defined as the systematic and replicable examination of communication symbols, which have been assigned numeric values according to valid measurement rules and the analysis of relationships involving those values using statistical methods, in order to describe the communication, draw inferences about its meaning, or infer from the communication to its context, both of production and consumption. The environmental disclosure level can be measured by a coding instrument in a manner similar to Cormier and Magnan (2003) and Al-Tuwaijri *et al.* (2004). Our self-constructed index comprises 44 items measuring environmental disclosure quality where items are grouped into six different sub-categories as follows: award for environmental; laws and regulations; pollution abatement; sustainable development; restoring sites and environmental management. To evaluate the index of environmental disclosure, we use a dichotomous procedure based on a score from 1 in information is verified and 0 for otherwise.

The index comprises 44 un-weighted scoring criteria ("topics," see list of items is coded according to the grid presented in Appendix 2) distinguished into six sub-categories to allow for the classification of the different types of publically disclosed information. These are obtained from the core corporate social responsibility subjects as defined by ISO (14000, 14001, etc.), Global Compact's principles for socially responsible business conduct, GRI's major aspects of organizational performance and other important voluntary information. Furthermore, previous studies were of great help in defining the disclosure topics employed in the study (e.g. see Adams *et al.*, 1998; Gray *et al.*, 1995; Holder-Webb *et al.*, 2009; Purushothaman *et al.*, 2000; Ratanajongkol *et al.*, 2006; Branco and Rodrigues, 2008; Gallego-Alvarez, 2008; Bolívar, 2009; Rowbottom and Lymer, 2009; Sobhani *et al.*, 2009).

The use of a self-constructed index scale to qualify a firm's environmental disclosure can be considered as appropriate for many reasons. The first one is that it allows for the integration of some different sub-categories of environmental information into a single figure that is comparable across firms in terms of relevance. The second one is that while some studies rely on word counts to evaluate environmental disclosure level or quality (e.g. Neu *et al.*, 1998;

Williams and Ho Wern Pei, 1999), a qualitative scale allows for academic researcher's judgment to be used in rating the level or quality of environmental disclosure.

Based on the defined 44 items, a composite environmental disclosure index was constructed as follows:

$$\text{ENVDINDX}_{it} = \sum_{i=1}^{44} \frac{\text{score } X_{it}}{\text{score max}} \quad (1)$$

where X_{it} equals 0 for non-disclosure, 1 if the firm i discloses information on the j item. Score max is equal to 44 that can be disclosed by firms.

Independent variables. Environmental performance. Studies results are mixed. Indeed, Freedman and Wasley (1990) and Fekrat *et al.* (1996) found no significant relationship between environmental disclosure level (in the annual report or in the 10 K report) and the Council on Economic Priorities of environmental performance index. While Patten (2002) established a negative relationship, more recent studies find a positive association between firms' environmental performance and discretionary environmental information extent (Al-Tuwaijri *et al.*, 2004; Clarkson *et al.*, 2008) such as found by Al-Tuwaijri *et al.* (2004). A positive relationship conjectures that mixed findings of prior studies describing their interrelations may be attributed to the fact that researchers have not jointly test the association environmental disclosure, environmental performance, and financial performance. Since the actual impact of environmental performance on environmental disclosure is unclear, no directional predictions are made.

Environmental sensitivity. Generally firms in environmentally sensitive activity sectors are subject to greater environmental scrutiny than firms of other sectors (Patten, 1991; Hackston and Milne, 1996) and have been requested to disclose a higher level of environmental topics. Environmental sensitivity, consumer proximity and subscription to CSR initiatives are also expressed by a binary 1/0 variable, where 1 designates a company falling in these categories and 0 if it is does not.

Business sector. It is considered as an important factor affecting the extent of environmental information disclosed (Bewley and Li, 2000; Cormier and Gordon, 2001), because the pollution propensity and outside monitoring vary from one industry to another (Dawkins and Fraas, 2011). Business sector is measured by a dichotomous classification of business activities into secondary sector or tertiary sector, as well as an eight dummy variable pertaining to the segmentation of the CAC 40 firms presented in Appendix 1.

Financial attributes. Several previous studies findings show a positive association between the disclosure level and firm's financial performance level (Cormier and Magnan, 2003). Firms with high profitability level have a higher propensity to disclose their "good news," Gray *et al.* (1987) stated that firms with consistently higher returns tend to have higher levels of global and voluntary social and environmental disclosure. According to these results, they anticipate a positive relationship between firms' earnings performance, as measured by the return on assets (ROA), and environmental disclosure level. Firm profitability is measured by using the ROA (Belkaoui and Karpik, 1989; Bewley and Li, 2000; Magness, 2006).

It is anticipated that companies able to support more potential proprietary costs from the disclosure environmental information are likely to outweigh their costs spent from the disclosure of environmental information. By disseminating information about their environmental management strategies and showing their ability to shoulder the environmental, Roberts (1992) and Richardson and Welker (2001) revealed a positive association between leverage and social and environmental disclosure level, while a recent research by Elijido-Ten (2004) does not show any significant association with the environmental disclosure.

Conversely, Cormier and Magnan (2003) and Cormier *et al.* (2009) stated a negative relationship between leverage and environmental disclosure index. Values of leverage are taken to Echos site interested by SBF index. The actual impact of leverage on environmental disclosure is unclear; no predict sign made for this variable.

The firm size is measured by the number of employees and turnover (Belkaoui and Karpik, 1989; Meek *et al.*, 1995; Prencipe, 2004; Roberts, 1992; Trotman and Bradley, 1981). Size will affect the firm's visibility to the general public and tends to engender increased public scrutiny. Firm size, measured as log (assets), is introduced as a control variable, with no directional prediction. Under this operationalization of different variables and in order to examine the multiple association between environmental disclosure level and independent variables of CAC 40 companies, the generic mathematical equation of our analysis upon which an econometric model will be utilized for its verification, has the following form (Table I):

$$\mathrm{ENVDINDX}_{it} = f\{a_0 + a_1\mathrm{HW}_{it} + a_2\mathrm{TCS}_{it} + a_3\mathrm{NF}_{it} + a_{12}\mathrm{IND}_{it} + a_{10}\mathrm{CAPSP}_{it} + a_4\mathrm{SVOL}_{it} + a_5\mathrm{ROA}_{it} + a_7\mathrm{GEAR}_{it} + a_8\mathrm{LOGCP}_{it} + e_{it}\} \quad (2)$$

5. Results

5.1 Descriptive statistics

Panel A in Table II present the descriptive statistics for the (in) dependent variables used in the empirical model. The mean of environmental disclosure score (ENVDINDX) is 29.185. The mean HW produced is equal to 0.009 tons per thousand dollars of net sales. The mean of ROA is 4.7 percent. The mean leverage (GEAR) is high and amounts to 44.55 percent of total assets. The mean of firm size (LOGCP) is 7.01. The mean capital spending scaled by revenues (CAPSP) amounts to 0.656.

As illustrated in the Panel B of Table II, the level of environmental disclosure varies from a mean score of 26.56 trade to 31.92 for healthcare. Among the business industries, the four industries for which firms' activities are more likely to affect the environment exhibit the highest environmental scores: healthcare 31.92; gas oil 30.556; technology 29.217 and trade 29.668. These findings are consistent with previous studies by Patten (2002) and Aerts *et al.* (2006) who shows that firms operating in environmentally sensitive industries report more

Variable	Label	Measurement
Environmental disclosure index	ENVDINDX	Refers the level of environmental disclosure based on proxy for environmental disclosure quality
Amount of hazardous	HW	Total amount of hazardous waste produced in tons divided by the total of net sales. The directional prediction is made if a lower value for $HW_{i,t}$ would reflect better environmental performance
Adoption of environmental initiatives	TCS	Equal to 1 for firms that adopt such environmental initiatives and reflect environmental awareness, 0 for otherwise
Capital spending	CAPSP	Measured by the capital spending scaled by the total of revenues at the end of the fiscal year
Amount of debt or equity capital raised by the firm	NF	Total of common and preferred shares, less any stock repurchase, plus the amount of long-term debt, less any debt reduction, scaled by total assets at the end of the fiscal year
Industry classification	BS	Is a dummy variable that proxies for industry classification
Stock price volatility	SVOL	The standard deviation of monthly stock returns
Return on assets	ROA	The return on assets equal to income before extraordinary items scaled by total assets at the end of the year
Leverage ratio	GEAR	The total debt scaled by total assets at the end of the year
Firm size	LOGCP	Is the natural logarithm of total assets at the end of the year

Table I.
Variables measurement

Panel A: descriptive statistics of dependent and independent variables

Variable	Mean	SD	Min.	Max.
ENVDINDX: level of environmental disclosure	29.18519	3.258771	23	37
HW: total amount of hazardous waste	0.0090044	0.0223282	7.11e-06	0.0844389
TCS: adoption of environmental initiatives	0.6944444	0.4627899	0	1
CAPSP: capital spending	0.6564815	0.3313674	0.07	1.8
NF: total of common and preferred shares	0.432037	0.267745	0.06	1.44
BS: industry classification	0.8148148	0.3902587	0	1
ROA: return on assets	0.0470495	0.0315094	−0.059323	0.1
GEAR: leverage ratio	0.4455241	0.2611073	0.1103	0.8871
SVOL: stock price volatility	1.288725	0.3862368	0.4352113	2.104425
LOGCP: firm size	7.023048	0.4399864	5.9884	8.2009

Panel B: distribution of disclosed topics by firm industries

Industries	Economic factor (EF)	Laws and regulations (LR)	Pollution standards (POLL)	Sustainable development (SD)	Restoring sites (RS)	Environmental management (EM)	ENVDINDX
Basic materials	4	2,222	8,111	6,556	2,667	5	28,556
Healthcare	4,333	2,833	9.5	6,667	2,833	5.75	31,917
Manufacturing	4,125	2.25	7,917	6,083	2,625	5,542	28,547
Technology	4,217	2,261	7,913	6,565	2,565	5,696	29,217
Construction and building materials	4,667	2	8,167	6,667	2,667	5.5	29,668
Gas oil	4,667	2,444	9	6,111	2,556	5,778	30,556
Trade	3,778	2,444	7,222	5,889	2,556	4,667	26,556
Other services	4,667	2.2	8.2	6,267	2,333	5.4	29,067
Total	4.28	2,327	8,196	6,336	2,589	5.47	29,206

Notes: The sample period is 2011-2013. The sample consists of 108 firm-years. $ENVDINDX_{i,t}$ is the level of environmental disclosure based on proxy for environmental disclosure index. $HW_{i,t}$ is the total amount of hazardous waste produced in tons divided by net sales. A lower value for $HW_{i,t}$ would reflect better environmental performance. $TCS_{i,t} = 1$ for firms that adopt such environmental initiatives and reflect environmental awareness and $TCS_{i,t} = 0$ otherwise. $CAPSP_{i,t}$ is equal to capital spending scaled by total revenues at the end of the year. $NF_{i,t}$ is the amount of debt or equity capital raised by the firm. $NF_{i,t}$ is equal to common and preferred shares, less any stock repurchase, plus long-term debt, less any debt reduction, scaled by total assets at the end of the year. $BS_{i,t}$ is a dummy variable that proxies for industry classification. $SVOL_{i,t}$ is measured as standard deviation of monthly stock returns. $ROA_{i,t}$ is income before extraordinary items scaled by total assets at the end of the year. $GEAR_{i,t}$ is total debt scaled by total assets at the end of the year. $LOGCP_{i,t}$ is the logarithm of total assets at the end of the year, and distribution of disclosed topics by sector

Table II.
Descriptive statistics

environmental information. Overall, firms in healthcare and gas oil sector tend to provide more information on pollution standards and environmental management of business operation which is more evident in terms of environmental disclosures and strategies than firms of the other sector.

ENVDINDX scores range from 23 (five observations) to 37 point (three observations). In total, 42 percent of assessed companies achieved ENVDINDX score higher than the sample median. Indeed, the high number of companies in each sector provides results which

are generalized; it reflects that the level of environmental disclosure of top 40 French companies is complementary and rich. Table II summarizes the frequency of disclosed information pertaining to the environmental aspects of performance based on segmentation of French firms. Such types of disclosed information have been regrouped by Daub (2007) as the "hard facts," since a firm needs to invest resources in that direction in order to integrate and optimize its accountability effort.

In Table III, the correlation matrix (conducted with the Pearson correlation coefficient) between all the variables integrated in the model are provided. Capital spending (0.269), stock price volatility (0.461) and the ROA (0.473) are significantly correlated with the level of environmental disclosure. Table III presents correlation between the ENVDINDX with amount of hazardous waste produced in tones, firm sensitivity, capital spending and business sector as attributes of environmental performance. Correlations investigating the links between ENVDINDX and firm size, profitability, stock price volatility and leverage are used for the exploration of financial attributes of the study. The results of the Pearson correlation analysis indicate that the highest correlation coefficient is 0.369 between capital spending and ROA. Farrar and Glauber (1967) suggest that correlation between independent variables should not be considered as harmful until the correlation coefficients reach 0.8 or 0.9. In this sense, it is possible to say that there is no unacceptable coefficient of multicollinearity between the independent variables introduced in the model.

5.2 The results of the regression analysis

Table IV supports *H1* and shows that environmental disclosure level is positively linked with environmental performance of sample firms. As predicted, firms that display smaller total amounts of HW and take on initiatives to reduce toxic chemicals or substances (TCS) exhibit higher environmental disclosure index (ENVDINDX). In fact the requirement to disclose the TCS emissions provides an incentive for firms to reduce emissions. Firms belonging to industries which have a high effect on environment will face more strict government requirements as these companies are more likely to damage the environment. In other words, this hazards are associated with the use of materials and practices giving rise to hazardous substances and/or discharge HWs and effluents. Likewise, firms with high capital spending (CAPSP) would be expected to possess environment-friendly equipment and that will reflect a high level of environmental performance, and contributes to disclosing more environmental information in the annual reports. Firms with newer, cleaner technologies are likely to have a high level of environmental performance and it is reasonable to assume that they will disclose more information about this superior environmental performance measure to stakeholders. Firms with higher sustaining capital expenditures, as proxied by CAPSP, are expected to have newer equipment, which is less

	ENVDINDX	HW	TCS	CAPSP	NF	BS	ROA	GEAR	SOLV	LOGCP
ENVDINDX	1.000									
HW	−0.141	1.000								
TCS	0.186	−0.309	1.000							
CAPSP	0.269	0.024	0.200	1.000						
NF	0.177	0.054	0.148	0.078	1.000					
BS	0.056	0.060	−0.005	0.239	0.034	1.000				
ROA	0.473	0.098	0.106	0.369	0.078	0.180	1.000			
GEAR	0.050	0.062	0.034	−0.129	0.221	0.119	0.124	1.000		
SVOL	−0.461	0.118	−0.023	−0.326	0.003	−0.064	−0.352	0.009	1.000	
LOGCP	0.165	−0.333	−0.010	−0.108	0.049	−0.134	−0.087	−0.2287	−0.082	1.000

Table III.
Correlation matrix

ENVDSCOR	Coef.	t	$p > \|t\|$
HW	−10.05264	−0.76	0.051*
TCS	0.6699727	1.09	0.079*
CAPSP	0.3533265	0.38	0.003***
NF	1.529978	1.51	0.134
BS	−0.1458506	−0.21	0.833
ROA	36.51747	3.89	0.000***
GEAR	0.0029418	0.27	0.787
SOLV	−2.567061	−3.43	0.001***
LOGCP	1.11234	1.70	0.093*
R^2	= 0.3922		
Adj. R^2	= 0.3364		
$F(9, 98)$	= 7.03		
Prob > F	= 0.0000		

Note: *,**,***Significant at 10, 5 and 1 percent levels (one-tailed), respectively

Table IV.
Regression

polluting and may want to signal their environmental type through more discretionary disclosures regarding their environmental performance.

A positive coefficient of the amount of debt or equity capital raised by a company (NF) indicates that companies that seek capital in money and stock markets have a higher propensity for significant disclosures in order to positively influence financing terms. It is well known that firms that rise financing in debt and equity markets have a higher propensity of voluntary disclosures (Frankel *et al.*, 1995) to reduce their cost of capital.

Similarly, the regression results show a significant positive relationship between industry membership and the extent of environmental disclosure. This result is also in line with the previous research and suggests that companies operating in environmentally sensitive industries disclose more environmental information than companies operating in non- environmentally sensitive industries. In fact, the companies in question belong to the healthcare, gas oil, construction and building materials, technology and manufacturing sectors which disclose more environmental information than companies operating in other sector.

The results of the regression analysis do not provide statistical support for the relation expected, relating to variable leverage. Indeed, the coefficient for leverage is positive but not statistically significant, which means that there is no statistically significant relationship between leverage and the level of environmental disclosure. This result is consistent with previous findings of Clarkson *et al.* (2011) and Sutantoputra *et al.* (2012).

Healy and Palepu (2001) and George (2013) claim that companies would seek to reduce information asymmetry, and subsequently the cost of capital, by reporting difficult-to-verify information of high quality. Here, the proxy of information asymmetry is the stock price volatility (SVOL). The value of coefficient of the variable stock price volatility implies a negative association between informative environmental disclosures, uncertainty and agency costs.

As shown by the positive ROA, firms that display higher profitability would be inclined to report higher environmental disclosure index in order to provide a signal of their effective decisions and actions (Lang and Lundholm, 1993). The same conclusion was reached by several studies that documented a positive relationship between the environmental disclosure level and the firm profitability such as the study by Cormier and Magnan (2003). The firm size is introduced with an expectation of a positive relation with disclosure, prior evidence consist to show a positive relationship between the extent of corporate disclosure and firm size. The results indicate that, as expected, the company size has a significant and positive relation with the extent of environmental disclosure.

6. Discussion and conclusions

This study focuses on French companies: a common-law country, which is classified in advanced developed market. The purpose of this study is to examine the association between environmental disclosure, financial attributes and firms' environmental performance with different environmental disclosure sub-categories. The findings drawn from this study provide that environmental disclosure index is positively associated with firms' environmental performance. Firms that display smaller amounts of HW or take on initiatives to reduce toxic chemicals exhibit higher environmental disclosure index. Similarly, the findings provide supporting evidence for the *H1* that there is a significant positive relationship between environmental performance proxy and environmental disclosure level. These findings are consistent with the previous research works and provide empirical support for the argument that firms belonging in environmentally sensitive sector disclose more environmental information than those belonging non-environmentally sensitive sectors.

With the existence of a need for capital in money and stock markets or large size and market visibility, companies must be motivated to report environmental disclosures of higher quality in order to reduce level of information asymmetry and the capital cost. Higher environmental disclosure index are also displayed by firms that exhibit high profitability and high capital spending, which would further improve their level of environmental performance. Environmental disclosure index and the adoption of environment-friendly policies are positively associated with investor perceptions. Firms that display higher environmental disclosure index are found to belong to healthcare, gas oil, and industrial metals and mining. A high-quality environmental disclosures and effective environmental performance, such as lower levels of HW produced or the reduction of toxic chemicals, provide investors with incremental information that is value relevant and increase stock valuation.

The paper established how environmental disclosures index shed light on the impact of financial attributes and environmental performance on the environmental disclosures field. The findings of the study reveal that most out of the relationship expected is supported with a high level of significance. The results of regression analysis provide empirical evidence that there is a positive relationship between environmental performance proxies, financial attributes and the level of environmental disclosure. The suggestion in previous literature that French companies had a greater concern with environmental matters was reinforced in the sample studied in this research. Survey studies in similar context provide that the number of sub-categories addressed increased over the business sector, with topics such as healthcare and gas oil added to the disclosed content. For example, Eurostat (2005) and Jordan and Lenschow (2000) found that in British context companies generated around 200 kgs of waste per head more than those Germans in 2003. But these facts are not supported by the content of the annual reports publically disclosed, suggesting that British companies are better at "spin" than their German counterparts, who could be more transparent in reflecting their focus on technological and environmental solutions (Frondel *et al.*, 2007).

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Appendix 1

Industry	Code	Number of firms in the sample per country and industry
Basic materials (BM)	1	3
Healthcare (Health)	2	4
Manufacturing (Manf)	3	8
Technology (Tech)	4	8
Trade (Trad)	5	2
Construction and building materials (CBM)	6	3
Other services (OS)	7	8
Total	7	36

Table AI. A segmentation of CAC 40 French companies

Appendix 2. List of items per sub-categories

Sub-categories

Economics factor (EF)

- The costs incurred to prevent the consequences of the company's activity on the environment
- Investment in equipment for pollution control
- Funding for equipment for pollution control
- Environmental debt
- Total environmental expenditures by type
- The amount of provisions and guarantees for risks to the environment or risk of pollution

Laws and Regulations (LR)

- Disputes
- Penalties for non-compliance of environmental law
- The measures taken to ensure compliance of the activity of the company in legislation
- Compensation paid by court order environmental

Pollution standards (POLL)

- Description of key impacts on biodiversity of activities and /or the company's products or services
- Use and emissions of substances that deplete the ozone layer in tons of CFC-11 equivalent
- CO2 Emissions
- Emissions of NOX, SOX
- Significant releases of chemicals, oils and fuels
- Environmental impacts of business activities
- Environmental impacts of vehicles
- Changes to natural habitats resulting from activities and percentage of protected or restored
- Water sources and related ecosystems/habitats significantly affected by discharges and runoff
- Total amount of waste by type and destination
- Compliance with law
- Noise and odors

Sustainable development (SD)

- Conservation of natural resources
- Water consumption
- Water supply sources and ecosystem/habitat
- Total volume of water recycled and reused
- Raw material consumption or total consumption of raw materials by type
- Percentage of materials used that are wastes
- Terms of use of land
- Location and size of land owned, leased or managed in biodiversity-rich habitats
- Production units within or around protected or sensitive areas
- Information on the protection of fauna and flora

Restoring sites (RS)

- The measures taken to limit damage to the biological balance, natural environments and protected animal and plant species
- Objectives, programs and targets for protecting and restoring native ecosystems and species in degraded areas
- Potential liability related to the restoration
- Number and type of spills

Environmental management (EM)

- Environmental and awareness of the company to environmental protection policies
- Existence of internal environmental management services
- Objectives set for foreign subsidiaries
- Environmental audits
- Award for environmental
- Evaluation or certification steps taken on the environment
- The company's participation in the development of environmental standards
- Joint projects with other companies on environmental management

Total score of environmental disclosure

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