

Firm Characteristics and Corporate Environmental Disclosure Practices in India

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The growing global concern towards corporate environmental disclosure has led to the voluntary reporting of environmental information by Indian companies as well. However, the nature and content of disclosure vary across industries and firms, and these variations can be attributed to various firm specific factors. The present study therefore aims at identifying the influence of firm-specific factors on environmental disclosure made by select Indian companies. The firm-specific characteristics identified for the study are firm size, profitability, leverage, effective tax rate and liquidity. Environmental disclosure is measured by developing an environmental disclosure index based on prior literature. The sample for the study comprises select companies chosen from ten environmentally sensitive industries, viz., distillery, sugar, fertilizer, pulp and paper, chlor alkali, pharmaceuticals, dyes and dye intermediates, pesticides, oil and refinery and petrochemicals. Consequently, a multiple regression analysis has been conducted to assess the relationship between the corporate characteristics and environmental disclosure. The findings of the study show that the influential variables for explaining firms' variation in environmental disclosure are effective tax rate, liquidity and leverage.

Introduction

Living in a world of limited resources, business must concern itself with issues such as environmental damage, treatment of workers, and product safety (Ho and Taylor, 2007). With the increase in global competitiveness, organizations are bound to be socially more accountable for both environmental performance and its public disclosure. It may appear that greater attention to environmental issues may lead to an increase in cost and hence lower profits, but in reality, environmental reporting practices have numerous advantages (Fortes, 2002). The disclosure of environmental information attracts attention, as the information itself involves the living quality, despite the fact that such reporting is voluntary in nature (Ahmad *et al.*, 2003). Environmental reporting is essential for corporations, as it serves as an indicator for corporate consciousness through a moral disclosure on environmental issues (Sumiani *et al.*, 2007).

Environmental reporting is defined as the disclosure of information relating to environmental risks, impacts, policies, strategies, targets, costs and liabilities, for those who have an interest

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in such information. Environmental reporting can also be described as an umbrella term that describes the various means by which companies disclose information on their environmental activities (Brophy and Starkey, 1996). This information may be reported through annual reports, a stand-alone corporate environmental report, an environmental statement or some other medium like videos, Internet or staff newsletter (United Nations, 1997). Corporate Environmental Reports (CERs) represent only one form of environmental reporting. CERs are publicly available stand-alone reports issued voluntarily by companies on their environmental activities (Brophy and Starkey, 1996).

Voluntary disclosures diminish informational asymmetries between the firm and external agents, primarily agents in the investment community. However, not all firms choose to make such disclosures, and those disclosures that are made are of varying quality. Empirical studies have shown that environmental disclosure activities vary across companies, countries, industries and time. They have also shown this behavior to be importantly and systematically determined by a variety of firm and industry characteristics (Brammer and Pavelin, 2008). Indian companies are also practicing voluntary environmental disclosure, as there are no comprehensive guidelines relating to environmental accounting and reporting, apart from a few amendments and acts.

Thus, the present study attempts to explain environmental disclosure made by Indian companies with the help of observable firm-specific characteristics. This study analyzes the quality of environmental disclosure in the annual reports of the sample companies using content analysis. The relationship between the corporate characteristics and environmental disclosure is examined by conducting a multiple regression analysis.

The remaining paper is structured as follows: the following section presents a selective review of literature and provides the theoretical basis for environmental disclosure; the next section deals with the determinants of environmental disclosure considered for the study; the succeeding section discusses the research methodology adopted for the study; and the final section presents the results and analysis of the study.

Review of Literature

A diverse body of academic literature is available which incorporates different theoretical perspectives in support of corporate environmental disclosure, such as the agency theory, the legitimacy theory, the stakeholder theory and the voluntary disclosure theory, among others. This section presents the various theories relating to environmental disclosure and a selective review of literature in context to only determinants of environmental disclosure.

Theoretical Perspective

The essence of all the theories related to environmental disclosure arises from the concept of corporate accountability, which, on the other hand, is derived from the notion of equity and fairness. Benston (1982) opined that the means by which corporations could be more accountable is through reports of financial position and performance.

Extending beyond, Holland and Foo (2003) contended that the qualitative and non-financial information provided by an organization is also related to disclosure and, consequently, to the notion of accountability. Thus, disclosure can be thought to be an alternative to government intervention, which would be designed to force actions by organizations. Environmental disclosure worldwide is largely voluntary in nature, thereby having a degree of accountability.

Agency theory (or positive accounting theory) became an appealing proposition as a rationale for environmental disclosure (Cormier *et al.*, 2005). It views firm as a nexus of contracts between various economic agents who act opportunistically within efficient markets and is consistent with environmental disclosure being useful in determining managerial compensation contracts, debt contractual obligations or implicit political costs. The Legitimacy theory, on the other hand, provides a more comprehensive perspective on environmental disclosure, as it explicitly recognizes that businesses are bound by the social contract in which the firms agree to perform various activities in accordance with the values of society, and this ultimately guarantees their continued existence (Guthrie and Parker, 1989; and Deegan, 2002).

The stakeholder theory emerges from the view that corporate disclosure is a management tool for managing the informational needs of the various powerful stakeholder groups (employees, shareholders, investors, consumers, government and others). Managers use information to manage or manipulate the most powerful stakeholders in order to gain their support which is required for survival (Gray *et al.*, 1996). Both legitimacy and stakeholder theory can be said to be overlapping when viewed from a broader perspective, but the small difference that is important is that the legitimacy theory looks at society as a whole, whereas stakeholder theory recognizes particular groups within society (stakeholder groups). The notion of voluntary disclosure theory stems from the work of Verrecchia (1983) and Dye (1985). Verrecchia (1983) identified that there exists proprietary costs associated with disclosure and a company can follow a policy of full disclosure only in the absence of proprietary cost. However, if there is some cost to disclosing information, then only a firm with sufficiently good news finds it worthwhile to incur the cost and disclose. In particular, the firm's performance must exceed some threshold value before it warrants incurring the cost to disclose, and the more sensitive a firm is to the perceptions of outsiders, the more it will disclose (Lang and Lundholm, 1992). Thus, superior environmental performers will disclose information by pointing to objective environmental performance indicators which are difficult to mimic by inferior type firms (Clarkson *et al.*, 2007). Inferior performers will choose to disclose less or to be silent on their environmental performance, preferring to portray themselves as firms not possessing any information, as also suggested by Dye (1985). An extension to this theory is the innovator view, which recognizes that companies may seek to have excellent environmental records and will make environmental disclosures appropriate to their perception of such excellence (Burrill, 1997).

Thus the different theories, despite providing distinct perspective on corporate environmental disclosure, should be viewed not as competing perspectives, but rather as alternative ways of providing the rationale behind corporations' decision to disclose environmental information.

Related Empirical Studies

Bowman and Haire (1976) studied the relationship between corporate profitability and corporate social responsibility disclosures in food processing business companies in US. Cowen *et al.* (1987) studied the relationship between a number of corporate characteristics and specific types of social responsibility disclosures, based on an extensive sample of US corporate annual reports, and found that corporate size and industry category correlate with certain types of disclosures, while the existence of a corporate social responsibility committee appears to correlate with one particular type of disclosure. Hackston and Milne (1996) provided an up-to-date description of corporate social disclosure practices by New Zealand companies. The paper also examined some potential determinants of social disclosures in New Zealand companies and found that size-disclosure relationship is much stronger for the high-profile industry companies than for the low-profile industry companies.

The interaction between size and industry is interesting because it suggests relative size alone is not a sufficient indicator of disclosure amount. Adams *et al.* (1998) examined corporate social reporting practices for a sample of 150 annual reports from six European countries. The study divided social disclosures into three categories: environmental reporting, reporting on employee issues and ethical reporting. The findings of the study indicate that the amount and nature of social disclosure varied significantly across countries. The German firms, in particular, disclosed the most information across all three categories. The Netherlands had the lowest disclosure level in terms of environmental information. However, the overall results show that firm size and industry membership are important determinants of the level of social disclosures in all the six European countries. Cormier and Magnan (1999) made an attempt to identify the determinants of environmental disclosure by Canadian companies and found that information costs and firm's financial conditions are key determinants of environmental disclosure. It was also observed that firm size, the regulatory regime governing corporate disclosure and industry characteristics as well contribute to explaining environmental disclosure.

Gray *et al.* (2001) made an attempt to identify and model a recognizable relationship between social and environmental disclosure on the one hand and surrogate measures of firm characteristics on the other hand in context to UK firms and found that corporate social and environmental disclosure is related to corporate characteristics like size, profit and industry affiliation. Ahmed *et al.* (2003) empirically examined the incentives that motivate Malaysian listed companies to disclose environmental information in their annual reports. The study explained the occurrence of environmental information with reference to some company-specific characteristics from the contracting and political cost perspective.

The study revealed that the voluntary disclosure of environmental information in the annual reports is negatively related to firms' financial leverage. Brammer and Pavelin (2006) found that the quality of environmental disclosure in large UK firms is determined by a firm's size and the nature of its business activities. Specifically, they found that high quality disclosure is primarily associated with larger firms and in sectors most closely related to environmental concerns.

Ho and Taylor (2007) investigated Triple Bottom-Line (TBL) disclosures of 50 of the largest US and Japanese companies and found that for total TBL disclosure (combining economic, social and environmental categories), the extent of reporting is higher for firms with larger size, lower profitability, lower liquidity, and for firms with membership in the manufacturing industry. Also the extent of overall TBL reporting is higher for Japanese firms, with environmental disclosure being the key driver. Reverte (2009) studied the relation between firm characteristics and environmental disclosure by Spanish listed firms. The findings of the study revealed that firms with higher Corporate Social Responsibility (CSR) disclosure ratings have a statistically significant larger size and a higher media exposure, and belong to more environmentally sensitive industries, as compared to firms with lower CSR ratings.

Thus it is observed that the literature adequately finds empirical works on determinants of environmental disclosure in context to developed countries like USA, UK, Japan, Germany, New Zealand and others. Very little attention has been devoted to developing countries in general and India in particular. There are some empirical studies describing the current status, extent and nature of environmental disclosure in Indian companies (Chauhan, 2005; Pahuja, 2007; Parmanik *et al.* 2007; and Chatterjee and Mir, 2008). Singh (2007) studied the potential determinants of environmental disclosure by analyzing the annual reports of top 200 Indian companies and found a positive association of financial performance and size of the firm with environmental disclosure. The study also identified that there is a negative relationship of systematic risk and no relationship for outsider influence with environmental disclosure. The present paper extends beyond previous studies by identifying the firm-specific determinants of environmental disclosure made by polluting industries in India.

Determinants of Environmental Disclosure

The discussion so far has concentrated on the main theories of environmental disclosure. In addition, numerous empirical studies that aim to examine the influence of certain specific variables on environmental disclosure have been identified. In this section, an attempt has been made to discuss the firm-specific factors considered for the present study in order to explain the differences in environmental disclosure practices across Indian firms.

Size

Numerous empirical studies reported positive association between the level of environmental disclosure and the company size (Trotman and Bradley, 1981; Watts and Zimmerman, 1990; and Hamid, 2004). A number of reasons have been cited in the literature supporting the positive association between company size and environmental disclosure. Firstly, the disclosure of information is a costly affair and perhaps the larger firms are better placed to afford this extra cost. In addition, the management of large firms requires more information to manage their operations more effectively. Large firms are under severe pressure from various government and non-governmental agencies to legitimize their existence, for easy marketability of their securities and easy availability of funds. On the other hand, the smaller firms do not raise funds frequently from the market and therefore do not expect benefits from better disclosure of information. In fact, the managements of smaller companies are of the view that disclosure of more information can endanger their existence (Singh, 2007).

Profitability

The relationship between Corporate Social Disclosure (CSD) and corporate profitability has been postulated to reflect the view that social responsiveness requires the same managerial style as that necessary to make a firm profitable (Bowman and Haire, 1976). Empirical research on the profitability and environmental disclosure relationship, however, has produced very mixed results. While Roberts (1992) found evidence for a positive relationship between lagged profits and corporate social disclosure, Patten (1991), using multiple measures of profitability, including lagged measures, fails to find any relationship between profitability and environmental disclosure. In the context of the agency and political cost theories, Giner (1997) points out that managements of very profitable corporations provide more detailed information in order to support their own position and compensation. However, from a legitimacy theory perspective, profitability can be either regarded to be positively or negatively related to environmental disclosure (Neu *et al.*, 1998). When the organization is making profits, adequate environmental disclosures would provide confirmation to the stakeholders who value the environment that profit has not been at the expense of the environment. On the contrary, when the company is unprofitable, the environmental information is reported to convince financial stakeholders that current environmental investments will result in long-term competitive advantages or at least to divert the attention from the poor financial performance (Reverte, 2009).

Leverage

Jensen and Meckling (1976) and Myers (1977) assert that in a principal-agent setting, potential transfers of wealth from bondholders to shareholders can take place in highly leveraged firms. Agency theory predicts that restrictive covenants may be written into debt contracts to protect firms' economic interests. Management may also voluntarily disclose information in financial reports for monitoring purposes. Thus, agency theory predicts that the level of voluntary disclosure increases as the firm's leverage grows. Moreover, companies with high leverage may disclose more information to satisfy the needs of long-term creditors (Malone *et al.*, 1993) and to remove suspicions of debt-holders regarding wealth transfer (Myers, 1977). However, Purushothaman *et al.* (2000) argue that companies with high leverage may have closer relationships with their creditors and hence may use other means to disclose social responsibility information rather than disclosing environmental information in the annual reports. Thus, they predict a negative relationship between leverage and environmental disclosure.

Effective Tax Rate

The taxation system provides the most direct means by which wealth transfers can be made from companies to the government. Income tax can be viewed as one of the components of political costs borne by a company (Watts and Zimmerman, 1990). This suggests that a company that is liable to pay relatively higher levels of taxation may be seen to be presently subject to high levels of the political costs. A company which is subjected to high taxation burden may be motivated to employ techniques that reduce these costs (Deegan and Carroll, 1993). One way to achieve this is by disclosing environment-related activities performed by the company.

Liquidity

Wallace and Naser (1995), Owusu-Ansah (1998) and Oyelere *et al.* (2003) suggest that firm liquidity is an important determinant of corporate disclosure. Wallace *et al.* (1994) argued that firms with a low liquidity position might disclose more information to justify their liquidity status. Thus in the light of legitimacy theory, there exists a negative relationship between environmental disclosure and liquidity of a firm. On the other hand, Ho and Taylor (2007) state that according to signaling theory, highly liquid companies may have stronger incentives to provide more details in their corporate disclosures about their abilities to meet short-term financial obligations. Thus, it predicts a positive association between disclosure and firm's liquidity position.

Research Methodology

Sample and Data Source

The industries identified by Ministry of Environment and Forests, Government of India as heavily polluting and covered under Central Action Plan are considered for the present study, as they are widely recognized as being among those with greatest environmental impacts and expected to disclose more information relating to pollution problems and other environmental issues. In addition, the environmental sensitivity of the industry has been argued to influence the level of environmental reporting (Deegan and Gordon, 1996). A total of 17 industries have been identified by the ministry and put under 'Red Category' industries. The present work however is confined to only the first 10 industries based on the availability of information relating to study variables. The top 10 companies under each industry are selected for the study based on their total size. 'Total assets' has been taken as the proxy for measuring the company size in our study, as it has also been used as a representative of firm size in previous empirical studies on environmental disclosure (Cormier *et al.*, 2005; Brammer and Pavelin, 2006; Singh, 2007; and Brammer and Pavelin, 2008). Thus we started with 100 companies, but after eliminating companies with incomplete information for some of the explanatory variables, the final sample comprises 80 companies across the 10 industries. The list of the above-mentioned 10 industries along with the number of sample companies in each industry is provided in Table 1.

| S. No. | Name of Industries | No. of Sample Companies |
|--------|---|-------------------------|
| 1. | Distillery (including fermentation) | 8 |
| 2. | Sugar (excluding khandsari) | 6 |
| 3. | Fertilizer | 8 |
| 4. | Pulp and paper (paper manufacturing with or without pulping) | 9 |
| 5. | Chlor alkali | 5 |
| 6. | Pharmaceuticals (basics excluding formulation) | 9 |
| 7. | Dyes and dye intermediate | 8 |
| 8. | Pesticides (technical) (excluding formulation) | 10 |
| 9. | Oil and refinery (mineral oil or petro refinery) | 8 |
| 10. | Petrochemicals (manufacture of and not merely use of raw materials) | 9 |

The aim of this study is to identify the potential determinants of environmental disclosure by Indian companies across the selected 10 industries. Thus, in order to accomplish this objective, information from the annual reports has been collected for each of the companies in the sample for the year ending March 2009, obtained from the corporate database 'Capital Line' of Capital Market. There are a number of other ways in which Indian companies have started disclosing their environmental information to its stakeholders, such as newsletters, annual reports, company websites and separate sustainability reports. However, in this study, the annual reports are selected as the source for corporate environmental disclosures, as it is widely recognized as the principal means for corporate communication to shareholders and is the primary source of environmental reporting by corporations (Wiseman, 1982). In addition, corporate annual report is seen as an important channel for financial communication between management and stakeholders (Barlett and Chandler, 1997; and Savage, 1998)

Environmental Disclosure Measurement

Voluntary environmental disclosure in annual reports of firms is measured by computing a disclosure index using content analysis¹. The present study adopts a methodology in consonance with the study of Tuwajri *et al.* (2004) for environmental disclosure measurement.

Content analysis has been done based on certain criteria or themes related to environmental information. A total of 20 themes have been identified for the study and the list of the identified themes is provided in Table 2.

These themes are chosen based on previous empirical literature (Wiseman, 1982; Blacconiere and Patten, 1994; Burritt, 1997; Holland and Foo, 2003; Dixon *et al.*, 2005; Clarkson *et al.*, 2007; and Chatterjee and Mir, 2008) and also on the basis of the items mentioned in the announcement made by Government of India, 1991 and Companies Bill, 1997. Finally, the information is collected from the annual reports of the sample companies on the basis of these 20 identified themes. If any information exists in the annual report related to the identified themes then its occurrence is reflected by showing 'yes' and is given a score of (+ 1). If there is no information, it is denoted by 'no' and assigned a score of (0). As per previous literature, quantitative disclosure is more objective and informative to stakeholders than qualitative and physical or general information. Hughes *et al.* (2001), using quantitative disclosure measures, have assigned weights to different disclosure items based on the perceived importance of each item to various user groups. Tuwajri *et al.* (2004) also followed the same technique and thus assigned a score of (+ 3) for quantitative information, a score of (+ 2) for qualitative information and a score of (+ 1) for general or physical information. Thus, based on previous studies, we have also assigned similar scores for quantitative, qualitative and general/physical information derived from content analysis. Final disclosure score is calculated by summing up the total

¹ Content analysis refers to a set of procedures for collecting and organizing information in standardized format (GAO, 1982). As stated in Holland and Foo (2003), "Content analysis is defined as the method of a research technique for the objective, systematic and quantitative description of the manifest content of communication (Berelson, 1971)." According to Krippendorff (1980), "Content analysis is a research technique for making replicable and valid inferences from data according to their context."

| S. No | Themes |
|--------------|---|
| 1. | Implementation of ISO 14000 series at the plant and/or firm level |
| 2. | Adoption of GRI sustainability reporting guidelines or provisions of a CERES report |
| 3. | Energy conservation |
| 4. | Health and safety |
| 5. | Adoption of environment-friendly technology |
| 6. | Information relating to environmental costs and liabilities |
| 7. | Future estimates related to environmental costs |
| 8. | Awards for environmental protection |
| 9. | Training/education for environmental protection |
| 10. | Internal environmental audit |
| 11. | Information on reduction of greenhouse gas emission or CO ₂ emission |
| 12. | Air emission information |
| 13. | Noise emission information |
| 14. | Water discharge information |
| 15. | Solid disposal information |
| 16. | Information on spills |
| 17. | Land contamination, restoration and remediation |
| 18. | Legal proceedings for violating environmental laws |
| 19. | Accidents |
| 20. | Details of corrective action |

quality score and then dividing it with sum total of occurrence score. Table 3 provides an illustrative example of an environmental disclosure score computation.

Explanatory Variable Measurement

The variables used in the study and their measurement are largely adopted from the existing literature. As discussed in the previous section, five firm-specific characteristics, viz., size, profitability, leverage, effective tax rate and liquidity, are taken into consideration for explaining the variation in environmental disclosures across firms. The proxy measures of the firm-specific characteristics along with their notation and references are presented in Table 4.

Empirical Model

The relationship between environmental disclosure score and each of the five explanatory variables is estimated using multiple regression analysis. A general linear regression model can be written as:

| Table 3: Example of Environmental Disclosure Score Computation | | | | |
|---|------------|-----------|-----------------------|-----------|
| Environmental Themes | Occurrence | | Quality of Disclosure | |
| | Yes/No | Score | Type | Score |
| Implementation of ISO 14000 series at the plant and/or firm level | Yes | 1 | Qualitative | 2 |
| Adoption of GRI sustainability reporting guidelines or provisions of a CERES report | Yes | 1 | Quantitative | 3 |
| Energy conservation | No | 0 | No | 0 |
| Health and safety | No | 0 | No | 0 |
| Adoption of environment-friendly technology | Yes | 1 | Physical | 1 |
| Information relating to environmental costs and liabilities | Yes | 1 | Qualitative | 2 |
| Future estimates related to environmental costs | Yes | 1 | Qualitative | 2 |
| Awards for environmental protection | Yes | 1 | Qualitative | 2 |
| Training/education for environmental protection | No | 0 | No | 0 |
| Internal environmental audit | No | 0 | No | 0 |
| Information on reduction of greenhouse gas emission or CO ₂ emission | Yes | 1 | Physical | 1 |
| Air emission information | No | 0 | No | 0 |
| Noise emission information | Yes | 1 | Qualitative | 2 |
| Water discharge information | Yes | 1 | Qualitative | 2 |
| Solid disposal information | Yes | 1 | Qualitative | 2 |
| Information on spills | No | 0 | No | 0 |
| Land contamination, restoration and remediation | No | 0 | No | 0 |
| Legal proceedings for violating environmental laws | Yes | 1 | Physical | 1 |
| Accidents | Yes | 1 | Qualitative | 2 |
| Details of corrective action | Yes | 1 | Quantitative | 3 |
| Total | | 13 | | 25 |
| Final Disclosure Score = Quality Score/Occurrence Score = 25/13 | 1.92 | - | - | - |

$$Y_i = \alpha + \sum_{i=1}^n \beta_i X_i + \varepsilon_i$$

where Y_i represents the dependent variable,
 X_i correspond to the independent variables,
 β_i is the regression coefficient,
 α is the intercept,
 ε_i is the error term and n is the number of independent variables.

| Firm Characteristics | Proxy Measurement | References |
|--------------------------------------|---|---|
| Size (<i>SIZE</i>) | Natural logarithm of total assets = $\ln(\text{Total Assets})$ | Trotman and Bradley (1981), Hackston and Milne (1996) and Ho and Taylor (2007) |
| Profitability (<i>PRFTBLTY</i>) | Return on Assets = $\frac{\text{Profit After Tax}}{\text{Total Assets}}$ | Cowen <i>et al.</i> (1987), Hackston and Milne (1996) and Cormier <i>et al.</i> (2005). |
| Leverage (<i>LEVRG</i>) | Debt Asset Ratio = $\frac{\text{Total Debt}}{\text{Total Assets}}$ | Ahmad <i>et al.</i> (2003) |
| Effective Tax Rate (<i>ETR</i>) | Income tax expenses divided by income before tax = $\frac{\text{Tax Expenses}}{\text{Profit Before Tax}}$ | Deegan and Carroll (1993) and Ahmad <i>et al.</i> (2003) |
| Liquidity (<i>LQDTY</i>) | Current ratio = $\frac{\text{Current Assets}}{\text{Current Liability}}$ | Wallace <i>et al.</i> (1994) and Oyelere <i>et al.</i> (2003) |

Results and Analysis

Descriptive Statistics

It is observed that almost all the sample companies disclosed most of their environmental information in their Director's Report² and a few other information is disclosed in Chairman's Report. As discussed in the methodology, the total environmental disclosures across all the 20 themes are analyzed separately for all the 80 sample companies by computing their environmental disclosure score. The descriptive statistics for the environmental disclosure across the 10 industries are presented in Table 5.

The maximum mean environmental disclosure score is found in the petrochemical industry, followed by distilleries industry. Pulp and paper industry comes next in terms of disclosing environmental information with a mean score of 1.788 and a standard deviation of 0.186. Then comes the pesticides industry with a mean score of 1.692. Surprisingly, lower disclosure score is observed in sugar, chlor alkali and oil and refinery industry, but this does not suggest that there is low disclosure for all sample companies in these industries, as the variability is quite large relative to their mean scores (a standard deviation of 0.793, 0.311 and 0.631 for sugar, chlor alkali and oil and refinery industry respectively). The overall mean disclosure score for all the 80 sample companies is 1.701 with a standard deviation of 0.295, which thereby indicates that the level of voluntary environmental disclosure by the polluting industries is not very satisfactory.

Descriptive statistics for all the explanatory variables are presented in Table 6. All explanatory proxies are averaged over the five year period (2005-2009) to reduce the measurement error

² As per the announcement made by the Central Government in 1991, and the Companies Bill, 1997, the Indian companies are required to disclose environment-related information in their Board of Director's Report.

| S. No. | Name of Industries | Environmental Disclosure | |
|--------|---|--------------------------|--------------------|
| | | Mean Score | Standard Deviation |
| 1. | Distillery (including fermentation) | 1.812 | 0.372 |
| 2. | Sugar (excluding khandsari) | 1.587 | 0.793 |
| 3. | Fertilizer | 1.634 | 0.642 |
| 4. | Pulp and paper (paper manufacturing with or without pulping) | 1.788 | 0.186 |
| 5. | Chlor alkali | 1.521 | 0.311 |
| 6. | Pharmaceuticals (basics excluding formulation) | 1.685 | 0.242 |
| 7. | Dyes and dye intermediate | 1.625 | 0.385 |
| 8. | Pesticides (technical) (excluding formulation) | 1.692 | 0.218 |
| 9. | Oil and refinery (mineral oil or petro refinery) | 1.429 | 0.631 |
| 10. | Petrochemicals (manufacture of and not merely use of raw materials) | 1.857 | 0.223 |
| | Total Sample | 1.701 | 0.295 |

due to random year to year fluctuation in variables. The mean and standard deviation figures are shown in Table 6.

| S. No. | Independent Variables | Mean | Standard Deviation |
|--------|-----------------------|-------|--------------------|
| 1. | Size | 6.271 | 1.523 |
| 2. | Profitability | 0.088 | 0.062 |
| 3. | Leverage | 0.431 | 0.198 |
| 4. | Effective tax rate | 0.191 | 0.010 |
| 5. | Liquidity | 0.526 | 0.629 |

The natural logarithm of total assets, which is taken as proxies for size, has a mean of 6.271. The Return on Assets for the sample companies over the period of study is 8%. The mean of leverage indicates that total liabilities, on an average, account for approximately 43% of the book value of total assets of the firms taken in our sample. The tax payment on an average is 19% of its profit and the mean current ratio is 0.526 for the sample companies.

Regression Analysis

Consequently, we run a regression of environmental disclosure on the five explanatory variables, viz., size, profitability, leverage, effective tax rate and liquidity, to test the statistical significance of the variables and to explain the variation in the environmental disclosure. The regression model used is specified as:

Regression Model

$$ENVDISCLR = \alpha + \beta_1 SIZE + \beta_2 PRFTBLTY + \beta_3 LEVRG + \beta_4 ETR + \beta_5 LQDTY + \zeta_k$$

Multicollinearity is a problem that needs to be dealt with in multiple regression analysis, i.e., regression coefficients become less reliable, as the degree of correlation between the independent variables increases. Table 7 shows the correlation coefficients among the set of all variables considered for the study.

| | <i>ENVDISCLR</i> | <i>SIZE</i> | <i>LEVRG</i> | <i>ETR</i> | <i>LQDTY</i> | <i>PRFTBLTY</i> |
|------------------|------------------|-------------|--------------|------------|--------------|-----------------|
| <i>ENVDISCLR</i> | 1 | – | – | – | – | – |
| <i>SIZE</i> | –0.000 | 1 | – | – | – | – |
| <i>LEVRG</i> | 0.056 | 0.052 | 1 | – | – | – |
| <i>ETR</i> | 0.127 | 0.187 | 0.695 | 1 | – | – |
| <i>LQDTY</i> | –0.241 | 0.156 | –0.338 | 0.095 | 1 | – |
| <i>PRFTBLTY</i> | –0.140 | 0.014 | –0.543 | –0.395 | 0.121 | 1 |

It can be seen that the correlations among the explanatory variables are statistically not significant and hence it can be said that multicollinearity is not a problem in the present study. Results of the regression analysis are presented in Table 8.

| Variables | Coefficients | | | | |
|---|----------------------|----|-------------|---------|----------|
| <i>SIZE</i> | 0.004 (0.184) | | | | |
| <i>LEVRG</i> | –0.467* (–1.741) | | | | |
| <i>ETR</i> | 6.818* (1.729) | | | | |
| <i>LQDTY</i> | –0.143** (–2.531) | | | | |
| <i>PRFTBLTY</i> | –0.854 (–1.359) | | | | |
| F-Ratio | 2.865** | | | | |
| Adj. R^2 | 0.335 | | | | |
| Durbin Watson <i>D</i> -Statistic | 2.870 | | | | |
| Analysis of Variance | | | | | |
| Source | Sum of Squares | df | Mean Square | F-Ratio | <i>p</i> |
| Regression | 0.771 | 5 | 0.154 | 2.865 | 0.011 |
| Residual | 6.118 | 74 | 0.083 | – | – |
| Note: *and ** significant at the 10% and 5% level respectively. t-values are shown in parentheses. | | | | | |

An examination of *F*-value reveals that the regression model as a whole has a good fit and has a reasonable explanatory power. The significant *F*-ratio (2.865) shows that all the variables taken together significantly explain the variability observed in environmental disclosure. The regression coefficients show that leverage, effective tax rate and liquidity are significant explanatory variables for environmental disclosure. The positive coefficient of effective tax rate shows that the more is the tax rate, the more is the disclosure. The positive association can be explained by the fact that firms with more tax burden may be interested in disclosing more information to reduce the political cost. This observation is also in accordance with the study undertaken by Ahmed *et al.* (2003). Liquidity is also a significant variable and has a negative coefficient, suggesting that companies with lower liquidity disclose more information to justify their liquidity position (Wallace *et al.*, 1994). This result is consistent with the legitimacy theory of environmental disclosure. Leverage is found to be a significant variable showing a negative coefficient with environmental disclosure. The rationale behind the negative relationship can be that companies with high leverage may have closer relationships with their creditors and may use other ways to disclose information rather than disclosing environmental information in the annual reports (Purushothaman *et al.*, 2000). However, size and profitability fail to explain the variations in environmental disclosure practices across the companies chosen for the study.

Conclusion

The paper aims to analyze the influence of a number of firm characteristics on environmental disclosure practices by Indian polluting firms. This study is a preliminary attempt to measure and evaluate voluntary environmental disclosures made by Indian companies in their annual reports. A content analysis is used to measure the extent of disclosure in 80 companies across ten polluting industries with the help of certain themes. It can be seen that all the environmental disclosure items are spread in several sections of the Annual Report. However, most of the information is clubbed under the 'Director's Report' and 'Chairman's Speech' sections. The study identifies that the extent of environmental disclosure varies across the 10 industries as well as across sample companies. Environmental reporting across industries also indicates a wide variation in terms of emphasis on themes and the type of disclosure made. The findings of the study show that the influential variables for explaining firms' variation in environmental disclosure are effective tax rate, liquidity and leverage. Therefore, to conclude, it can be said that the legitimacy, stakeholder and agency theory act together in explaining environmental disclosure practices of Indian companies. The Indian firms disclose environmental information mainly to act within the bounds of what is considered acceptable and according to the expectations of the stakeholders. ■

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