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Corporate Environmental Responsibility and financial Results: Evidence from large Indian Firms

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Abstract:

Large enterprises have been at the forefront of environmental management with active participation in industrywide programs and adoption of a „beyond compliance" approach. The present study revisits the premise of environmental–financial linkage in an Indian context with a focus on large listed enterprises. We develop a comprehensive dataset of 459 large listed Indian companies covering major manufacturing and service sectors of the economy over an eleven-year period from 2008–09 to 2018–19. Static and dynamic regression models are used to gauge the impact of environmental management practices on firm profitability (Return on Assets and Return on Equity) and market valuation (Tobin *Q*, Market to Book Value Ratio and Excess Valuation to sales ratio). Empirical results suggest a positive impact of environmental management on firm profitability and market valuation. These results are of interest to corporate and policy makers for recognizing the financial implications of corporate environmental management.

Keywords: environmental management practices; dynamic panel data models; firm valuation; firm profitability; large enterprises; India

Introduction:

Large corporations are progressively making organizational changes to integrate environmental concerns into their manufacturing decisions. With increased pressure from customers, regulators, employees and investors to assume environmental responsibility, they are shifting from a regulation driven reactive approach to a proactive beyond- compliance approach toward environmental management (Khanna and Damon 1999; Ervin et al. 2013). Indian companies have been increasingly adopting a formalized set of environmental management practices (*EMPs*). The number of ISO 14001 certified companies in India has soared from a meager 400 in 2001 to 8,446 in 2019 (ISO2019; CPCB 2001).

Related literature:

The relationship between environmental management and firm performance remains a perplexing issue in the literature. Porter"s „win-win" argument states that improved environmental performance backed by properly designed environmental policy leads to enhanced economic benefits due to cost reduction and increased sales (Porter 1991; Porter and Van der Linde 1995). Although this hypothesis is intuitively attractive empirical studies measuring the impact of environmental management on firm performance are inconclusive. Sinkin, Wright, and Burnett (2008) examined the relation- ship between eco-efficient business strategies and firms" value in an American context and found that improved environmental efficiency resulted in better financial perform- ance. Fujii et al. (2013) studied the relationship between environmental performance and economic performance in the Japanese manufacturing sector. The results show a positive impact of environmental performance, as measured by CO_2 emissions, on firms" overall economic performance and profitability. Similar results have been reported by other studies (Dowell, Hart, and Yeung 2000; King and Lenox 2001; Konar and Cohen 2001; Melnyk, Sroufe, and Calantone 2003; Hourneaux *et al.* 2014; Lucas and Noordewier 2016).

Conceptual framework and hypotheses construction:

The objective of this paper is to study the impact of environmental management sys-tems on financial performance in Indian firms. A conceptual relationship between the adoption of *EMP*s and their financial implications is depicted in Figure 1.

Firms can gain sustainable competitive advantage by assuming environmental responsibility for their operations. Pollution is a waste of input and reflects firms" inef- ficiency in product design, choice of inputs and manufacturing processes (Nehrt 1996). A proactive environmental management strategy is expected to enhance firm perform- ance through process innovation and product differentiation (Porter and van der Linde

1995; Reinhardt 1999; Shashi, Centobelli, and Singh 2019). We study the effect of *EMP*s on firm performance using accounting and market value-based measures. Firms adopt voluntary environmental measures in response to external factors such as pressure from customers, investors and regulators, and internal capabilities such as innovation and research and development (R&D). It is Hypothesized that firms with efficient environmental management exhibit improved profitability due to reduced waste, reduced input costs, less public and regulatory pres- sure and improved competitiveness with increased product value (Arora and Cason 1995). Therefore, we **hypothesize that:**

Hypothesis 1- Adoption of *EMP*s has a positive impact on firm profitability

To test the above hypothesis, we choose commonly used accounting-based meas- ures of profitability to evaluate firm performance: Return on Assets (*ROA*) and Return on Equity (*ROE*). Accounting measures are easy to calculate and give a short-term per- spective of firm performance (Hart and Ahuja 1996). *ROA* measures the profit a firm generates with the money invested by its shareholders. Although *ROA* measures a firm‟s financial strength, it fails to indicate whether the firm has excessive debt or is using debt to drive returns. *ROE* overcomes this shortcoming by measuring how effi- ciently a firm is using its shareholders‟ funds to generate profits. *ROE* indicates firms‟ ability to maximize return to its shareholders based on their investment in the firm (Alexander and Nobes 2001; Stickney, Brown, and Wahlen 2007). Together, *ROA* and *ROE* present a clear picture of management effectiveness.

Although accounting measures explain how firm earnings respond to managerial decisions, they fail to give a forecast of its future expectations. Accounting measures are based on past performance of the firm and use the historical cost of assets. Furthermore, they ignore the value of intangible assets and inflationary effects. As a result, their pre- dictive value is quite low (Cochrane and Wood 1984; Keats and Hitt 1988).

On the other hand, market valuation-based measures of performance are forward- looking and measure firms‟ ability to earn profits in the future. They incorporate all relevant information and thus, unlike accounting measures, they are not limited to a single effect of firm performance (Lubatkin and Shrieves 1986). Advanced environ- mental practices can enable a firm to achieve organizational efficiency, thereby leading to improved perception of the firm‟s ability to generate future economic earnings with

Table 1. Descriptive statistics of environmental practices .

Variable	Measurement (YES ¼ 1 NO ¼ 0)	Mean	S.D
GRI	The organization releases GRI certified	0.392	0.441
	sustainability reports.		
ISO 14001	The organization is ISO 14001 certified.	0.752	0.213
Green Buildings	The organization uses green buildings, which are	0.210	0.315
	BEE/LEED certified.		
CDM	The firm is running CDM projects.	0.129	0.325
CDP	The firm is part of CDP	0.219	0.417
Envtexp	The firm is incurring environmental expenditure	0.124	0.286

Notes:
CDM: Clean Development Mechanism; CDP: Carbon Disclosure Project; Envtexp: environmental expenditure; GRI: Global Reporting Initiative.

lower business risks (Dowell, Hart, and Yeung 2000; King and Lenox 2001; Konarand Cohen 2001). Gregory and Whittaker (2013) recommend that market value, accounting earnings and book value should be considered simultaneously in investigat- ing the financial impact of environmental management. Therefore, it is hypothesizedthat firms that adopt environmental management practices send positive signals to the market resulting in higher firm valuation.

Hypothesis 2- Adoption of *EMP*s has a positive impact on the market valuation ofa firm.

A firm‟s market value is generally measured using Tobin *Q*. In the present study, we use two additional measures of firm valuation; market to book value ratio (*MBVR*) and excess valuation to sales (*EV/S)* ratio.

Tobin *Q* is defined as the ratio of firm market value to its replacement cost for assets. Estimation of firm valuation, using *Tobin Q*, is problematic in a developing country such as India with an under-developed capital market due to non-availabilityof data on the market value of debt and the replacement costs for assets (Sarkar and Sarkar 2012). *Tobin Q* suffers from omitted variable bias. Consequently, we use *MBVR* as an alternative measure of firm valuation. Unlike Tobin *Q*, no computational adjustments are required when we use *MBVR*.

Excess valuation to sales ratio, another measure of market valuation, gauges the long-term wealth creation potential of firm. This ratio helps to measure the value of premium or discount accorded by the market to a firm based on evaluation of its future prospects. Spread between market value and book value of the firm is a measure of the

firm‟s perceived ability to return to its stockholders a future amount in excess of their expected return (Connolly and Hirschey 1984; Shalit and Sankar 1977). EV/S controls for size and leverage variation across firms (Errunza and Senbet 1981; Galbraith and Stiles 2008; Thomadakis, 1977).

Description of data:

Sample: This study is based on firm-level data from leading Indian industries. To trace the impact of the manufacturing sector on the environment, we first picked the CPCB list of „most polluting‟ Indian industries. CPCB is a statutory body constituted in 1974 under the Water (Prevention and Control of Pollution) Act. It is the chiefadvisor to the Government of India on matters related to air and water pollution. In 1991, CPCB identified 17 categories of highly polluting industries in India.[4] CPCB along with State Pollution Control Boards (SPCBs) keeps a check on pollution control facilities and compliance in these industries.

To build our sample, we first choose all the major manufacturing and service sec-tor industries in India using the CMIE Prowess database. The chosen manufacturing industries include 17 polluting industries. Next, we calculate their average energy intensity. Energy intensity for an industry has been calculated as the ratio of energycost[5] to net sales (Goldar 2010; Sahu and Narayanan 2011). The average energy inten- sity (in Rs crores) for 25 industries is given in Appendix Table 1. There were some industries which had high energy intensity but were dropped due to small industry size. The small size of an industry might limit its aggregate environmental effect.

Next, we pick all large listed enterprises from each industry.[6] Top industry per- formers are chosen as they are more likely to use a wider variety of environmental practices vis-a-vis smaller firms. Although selection of large and publicly listed firms limits the extent to which we can generalize our findings to smaller firms, there is, in fact, substantial variation in the sample, both within the sector and over time. Thefirms differ in size, products, processes and industries. A final database of 459 largelisted Indian companies was created.[7]

Time Period: In order to understand how the adoption of *EMP*s has impacted firm performance, we form a panel database covering an eleven-year period from 2008-09to 2018-19. The data collected covers publicly traded firms in both manufacturing and service sectors.

Sources of Data: Data on firm-level environmental practices have been extracted from the sustainability and business responsibility report of companies. Data on inde- pendent variables are extracted from the CMIE Prowess database, audited annual reports and business responsibility reports for the companies. Use of a publicly avail-able database removes subjectivity and gives a fair view of the current environmental state in the sample companies.

The study aims to measure the impact of *EMP*s adopted by a firm on its financial performance. The variable *EMP* is the sum of various environmental practices adopted by a firm. It is measured through six environmental practices which cover the pro-active orientation of a firm toward environmental concerns. The **environmental practi- ces include:**

I. ISO 14001 certification – This is an internationally recognized EMS standard released by the International Organization for Standardization (ISO). It provides a comprehensive framework that an organization has to follow to frame an effective environmental management system. In fact, ISO 14001 is the most popular and widely used indicator of EMS for an organization.
II. GRI certified sustainability reports – Global Reporting Initiative (GRI) is an independent organization which releases the world‟s most widely used standards on sustainability reporting and disclosure. It helps firms to understand and communicate the impact of their business on the environment, climate change, human rights etc.
III. BEE/LEED certified green buildings – A green building is one whose construction and operation does not disrupt air, land, plantation and energy. It promotes a healthier and greener environment. The construction and subsequentuse of green buildings exhibit the environmental commitment of a company.
IV. Carbon Disclosure Project – CDP is a global disclosure system that enables companies to measure and manage their environmental impacts. Voluntary participation by a firm in CDP is a way of meaningful steps being taken by themto address their environmental impacts.
V. Clean Development Mechanism (CDM) projects – CDM is a voluntary emission reduction project being operated by a company. This commitment is made underthe Kyoto Protocol to implement an emission reduction project in a developing country. It is an environmental investment and credit scheme, which provides the participating company with a standardized emission offset instrument, Carbon Emission Reductions (CERs).
VI. Environmental expenditure – This variable covers the entire gamut of pollution reduction and pollution control activities undertaken by firms in addition to the above listed practices. It includes efforts made to preserve water,

recycle and treat waste, use clean energy, provide environmental training to staff and hire consultants. A company incurs environmental expenditure in some of these areas.

Empirical results:

Regression results for hypothesis 1, measuring the impact of EMPs on firm profitabil- ity using static fixed effects and dynamic panel regression are presented in Table 4. Specifications 1 and 2 show the impact on ROA while specifications 3 and 4 show the impact on ROE. We find no statistically significant impact of EMP on ROA and ROE under static regression. This finding is consistent with the findings of Cohen, Fenn, and Konar (1997). Under dynamic regression, environmental management shows a sig- nificant positive impact on ROE in the current year (EMP) along with a one-year (EMPt-1) and two-year positive lag (EMPt-2). A similar result is obtained by Angelia and Suryaningsih (2015). However, ROA improves one year post EMP implementa- tion, i.e. adoption of an additional environmental practice in time period t improves a firm‟s profitability in the t 1 and t 2 time period. In the initial years of EMP implementation, a firm undergoes many structural changes which involve financial costs. Subsequently, it is able to optimize resource usage by the adoption of efficient and lean production practices. This leads to cost savings and reduction in waste, thereby enhancing its long term profitability (Cochrane and Wood 1984; Khanna and Damon 1999). Under dynamic analysis, ROA and ROE improve by 0.79% and 0.33% Table 4. Impact Conclusion.

This study sought to establish empirical evidence on the relationship between corporate environmental management and firm performance in a developing country such as India. We use a panel data of 459 Indian companies over a period of eleven years. Use of static panel analysis controls for firm heterogeneity while dynamic panel GMM estimation controls for endogeneity and reverse causality in the environment–financial performance relationship along with heterogeneity.

The study presents new evidence on whether „it pays to be green‟ using five alter- native measures of firm performance: ROA, ROE, Tobin Q, MBVR and EV/S. Empirical results show that environmentally proactive large firms experience improve- ments in profitability and valuation. These firms implement a number of green practi- ces, such as ISO14001 accreditation, sustainability reporting, participating in CDP, adoption of CDM projects and use of green buildings. Such firms are able to convince customers of their superior product offering and differentiate themselves from market competitors. Corporate environmentalism is valued by the market and in the long term such firms exhibit higher profitability and valuation.

The results of this study can be used by firms and policy makers to understand the financial implications of environmental management. Firstly, policy makers need to acknowledge that in a developing country such as India, which is characterized by low compliance and ineffective surveillance, the most effective tool for motivating firms toward environmental responsibility is by making them appreciate the „costs and bene- fits‟ of environmental management. The policy makers should understand the coher- ence of the industry policy and environmental policy. These two policies are inherently intertwined and should be coordinated in their implementation as industrial upgrading can foster greener growth, and in turn green growth can help in industrial upgrading. Implementation of technologically superior processes can lead to cost-effective solutions to environmental problems without undermining economic output. Thirdly, corporate directors need to understand that albeit costly in the short term, *EMP*s can be nurtured as a rare and valuable resource that can be harnessed to give the firm a sustainable competitive advantage over its competitors. Large Indian enter- prises are continuously striving for improvement in performance by adopting varied green practices. This can show the way to small and medium industry players. The government should acknowledge that the key to improving productivity, environmental compliance and maintaining the competitiveness of Indian industries will increasingly rely on innovation and entrepreneurship. More and more skill development program and Industrial Training Institutes should be promoted.

The study is not free of limitations. This study is based on secondary data.

Supplementing it with primary data could provide a deeper insight into motivations and barriers to environmental management at firm level. Lack of data on the environ- mental performance of Indian firms limits our ability to study the effectiveness of the environmental practices adopted. Studying the variation in the financial impact of

*EMP*s across developing countries could be an interesting area for future research.

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