

Environmental Reporting and Firm Performance

Evidence from Thailand*

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The Porter hypothesis posits that a properly designed environmental standard can enhance productivity and competitiveness. Using a unique data set from the Thailand Institute of Directors' Corporate Governance Benchmarking Survey, this study provides indirect support to the Porter hypothesis. Specifically, the empirical results reveal that there is no significant relation between environmental reporting and accounting performance, suggesting that disclosure of good environmental policies does not negatively affect short-term profitability. However, there is a significant positive, non-linear relation between environmental reporting and market valuation. This result implies that reporting of good environmental policies affects long-term performance but that the marginal positive effect on firm value declines at high levels, indicating an optimal level of environmental reporting. The results highlight the complexity of the relation between socially responsible actions and firm performance. The finding also indirectly supports the Porter hypothesis that an optimally designed regulatory standard can increase competitiveness and maximise shareholder wealth.

- ④ Disclosure
- ④ Environmental reporting
- ④ Porter hypothesis
- ④ Corporate governance
- ④ Environmental performance
- ④ Market value
- ④ Accounting performance

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RECENTLY, ENVIRONMENTAL ISSUES HAVE RECEIVED CONSIDERABLE ATTENTION from the general public in Thailand. This is a result of several high-profile conflicts between businesses and local communities (e.g. relating to coal power plants and gas pipeline projects in Southern Thailand¹). These conflicts elevate public attention on the issue of corporate governance and social responsibility.

One key element in any corporate governance framework is the role of stakeholders. A good corporate governance framework should recognise the rights of stakeholders, as established by law, and encourage co-operation in creating financially sound enterprises (OECD 1999). Furthermore, the Organisation for Economic Co-operation and Development (OECD 1999) contends that a corporate governance framework should ensure timely and accurate disclosure of all material matters regarding the corporation, including issues regarding other stakeholders. In summary, corporations have an obligation not only to act responsibly towards stakeholders but also to disclose their actions to other stakeholders. As a result, the government has been quite active in imposing new rules and standards covering environmental disclosure in Thailand. The other reason for the heightened attention to the issue is that many experts believe that lack of good corporate governance is one of the causes of the financial crisis in Thailand (Zhuang *et al.* 2000).

In this study, we examine the relation between corporate environmental reporting (CER) and firm performance. The trade-off between ecology and economy is probably one of the most contentious issues among business scholars and practitioners (Porter and van der Linde 1995). Although there is empirical evidence on the issue in developed countries, evidence from developing countries is scant. This study represents an initial step, examining the issue of corporate environmental responsibility and firm performance in South-East Asia.

1 The Porter hypothesis

It is widely believed that society benefits from environmental controls imposed on business by government. However, the trade-off view contends that social benefits derived through environmental control drive up costs primarily through pollution prevention and environmental clean-up. In the end, increased costs lead to higher prices and reduced competitiveness.

The research effort to examine the link between environmental regulation and competitiveness is substantial. For example, Jaffe *et al.* (1995) review more than 100 surveys examining the effect of environmental regulation on manufacturing firms in the USA. Leonard (1988) formulated the 'industrial flight' and 'pollution haven' hypotheses after observing the trend for industries to shift from industrialised to developing countries. However, he concluded that the shift is not significantly influenced by environmental regulations. Low (1992) offers a tentative conclusion that in most industries pollution abatement and control expenditures by firms do not appear to have a significant effect on competitiveness.

In their seminal paper, Porter and van der Linde (1995) contend that carefully designed environmental regulation can encourage innovation and research productivity, which, in turn, increases competitiveness. They argue that the belief of a fixed trade-off between ecology versus economy is false and that if environmental standards can be correctly devised the resulting standards will spur innovation and actually increase productivity, making firms more competitive. Companies should shift their frame of

1 As reported in the *Bangkok Post*.

reference and choose to view pollution as an indicator of inefficiency. Specifically, pollution is, in fact, resource inefficiency resulting from production and management inefficiencies. The argument of Porter and van der Linde is that, with proper management, quality improvements lower costs, improve productivity and reduce or eliminate resource inefficiencies. In the end, Porter and van der Linde conclude that regulators and company managers should stop thinking about environmental protection and competitiveness as a trade-off. By encouraging innovation and research productivity, regulation can play a productive and proactive role.

The Porter hypothesis has generated a significant amount of interest and criticism. Economists argue that this hypothesis amounts to a 'free lunch'. From the neoclassical economic perspective, *x*-efficient economic agents are already operating on the production possibility frontier. Therefore, the opportunities for economic efficiency are exhausted independent of the introduction of any kind of environmental regulation (Jaffe *et al.* 1995). In contrast, Altman (2001) derives a theoretical model in support of the Porter hypothesis. His behavioural model of the firm suggests that there need not be any economic advantage accruing to firms in becoming 'greener'. Consequently, private economic agents cannot be expected to adopt environmentally friendly policies independent of regulations, suggesting that environmental regulations can be cost-competitive and profitable.

Although supporters of the Porter hypothesis have largely relied on an impressive and growing collection of anecdotes, there is some supporting empirical evidence. Albrecht (1998) finds that countries that are proactive in adapting to the international regulations on chlorofluorocarbons (CFCs)—that is, to the Montreal Protocol—experienced better export growth than did countries that reacted passively to the regulations. Using product-level data (standard industrial classification [SIC] codes), he finds benefits for industries that are first to deal with new environmental restrictions through innovation and adaptation. Berry and Rondinelli (1998) note that investors and consumers alike are seeing the connection between environmental quality and business performance. With cumulative compliance costs for US laws estimated to be in excess of US\$1 trillion from 1973 to 1998, and estimates of annual pollution control spending in excess of US\$120 billion, the additional costs for business are striking. Despite these high costs, Berry and Rondinelli highlight several success stories where firms have reduced total costs, improved productivity or created new market opportunities through pollution control efforts.

Florida (1996) identifies links between innovative firms employing advanced manufacturing processes and improved environmental performance and productivity. In his study he found that more than 75% of firms surveyed felt pollution prevention was important to corporate performance. The survey results also show that firms are spending capital on new technologies and manufacturing systems. The firms expect to achieve improved industrial performance as well as improved environmental performance.

There are also other parallel views to that of Porter and van der Linde (1995). Lovins *et al.* (1999) propose the idea of 'natural capitalism' as a means to recognise the value of the 'natural capital' provided by the ecosystem. To recognise this value, business should dramatically increase productivity of natural resources, change to production models that are biologically inspired, shift to business models based on solutions not products and reinvest in natural capital. The four interlinked paradigm shifts offer ideas for managers to uncover and capture added value, a radical departure from the 'pollution reduction is costly' viewpoint. Halal (2001) posits that business should redefine its strategy to serve both capital and society by integrating stakeholders into a more productive whole. He contends that stakeholders should be viewed as partners who create both economic value and social value through collaborative problem-solving.

11 Environmental and financial performance

Research into the connection between financial performance and environmental performance has produced contradictory evidence. It would initially seem that environmental compliance is costly, reducing firm profits through expenditures on pollution control. With profit as their motive, firms would choose to invest as little as possible in environmental compliance so as to meet the legally required minimum standards. Environmental performance would seem to be negatively related to financial performance: the more profitable firms would spend less on environmental controls. Yet there are other possible explanations for the relation between financial performance and environmental performance. The debate surrounding compliance costs versus competitiveness has changed, as noted by Cohen *et al.* (1997). Perhaps firms that can effectively reduce pollution may be more efficient in their production methods, thus securing a cost advantage compared with their competitors, leading to superior profits. This notion may be especially true as firms shift their focus away from 'end-of-pipe' abatement measures and toward re-designing production methods so that sources of pollution are minimised or eliminated. It may also be true that more profitable firms simply have more money to spend on environmental control than do their less profitable competitors.

Cohen *et al.* (1997) address whether 'green investing' (investing in companies that are environmental leaders in their respective industries) yields superior returns compared with a neutral investment strategy. By comparing 'high-polluter' with 'low-polluter' portfolios, Cohen *et al.* discovered that the 'low-polluter' portfolio does as well as—or better than—the 'high-polluter' portfolio. However, they are careful to caution that the direction of the relation between financial and environmental performance remains as uncertain as ever. Rather than concluding that firms could improve financial performance by improving their environmental responsibility, perhaps profitable firms are more environmentally responsible because they have superior financial performance.

Russo and Fouts (1997) pose the hypotheses that environmental performance and financial performance are positively linked and that industry growth moderates this relation. They propose a model from a resource-based perspective. In their study they examined firms' environmental ratings, provided by an independent organisation, composed of a range of criteria. A variety of control variables (growth rate, firm size, capital and advertising intensities, and several other industry characteristics) were also employed. Russo and Fouts found a positive relation between firm performance, as measured by return on assets, and environmental rating. Industry growth rate is a significant moderating influence as well.

To complicate matters, a number of studies document a negative relation between environmental performance and financial performance. King and Lenox (2001) examined the nature of the relation between environmental performance and financial performance for 652 US firms during the period 1987–96 and found an inverse relation between financial valuation and pollution. They concluded that fixed characteristics of the firm (such as firm size and research and development [R&D] intensity) could be causing this negative relation. Mathur and Mathur (2000) used an event study methodology to analyse stock price reactions to the green marketing strategies of 73 companies during the period 1989–95. They documented negative price reactions to announcements of green marketing strategies. They found, from a review of advertising literature, that consumers are often confused by firms' promotional efforts, which in turn leads to negative effects on stock prices. However, announcements of green products, recycling efforts and appointment of environmental managers result in insignificant stock price reactions. As in the case of the study by King and Lennox (2001), Mathur and Mathur (2000) also found that firm size moderates the relationship.

The connection between environmental compliance and/or disclosure and firm performance has also come under closer scrutiny from researchers. Gray *et al.*, (1995), in their study of social disclosure among UK companies, offer one possible reason. The connection between disclosure and performance has not yet been fully explored because disclosure is often voluntary. The literature provides some evidence of the disclosure of environmental compliance and firm performance. Stanwick and Stanwick (2000) classified US *Forbes* 500 firms into three categories, depending on the firms' level of environmental policies and/or descriptions of their environmental commitment. Financial performance was measured by using net income divided by total firm assets. Measures of environmental policy and/or commitment were obtained through a survey of the firms. The results showed significant differences between performance and environment policy and/or commitment. Interestingly, firms classified as medium performers had the highest levels of environmental policy and/or commitment. This may suggest that the relation between firm performance and environmental policy and/or commitment is not linear or as simple as originally assumed in previous studies.

1.2 Corporate governance

At the core of good corporate governance stands disclosure and transparency. The OECD (1999) recognises that no universally correct or appropriate model of corporate governance exists, and its principles identify several common elements, grouped into five areas: (1) the rights of shareholders, (2) equitable treatment of shareholders, (3) the role of stakeholders in corporate governance, (4) disclosure and transparency and (5) responsibilities of the board.²

Market demand for information has often prompted companies to voluntarily disclose information above and beyond what is legally required. Why would firms disclose more than the legally required minimum amount of information? The OECD principles note many benefits accruing through disclosure, including maintaining confidence in the capital markets and providing a way to attract capital. Disclosure can play an important role in helping the public understand company performance, ethical standards, policies and the relationship between a firm and the communities in which it operates. The OECD principles recognise that disclosure is not costless, yet disclosure regimes should not place any unreasonable costs or administrative burdens on companies. A company should also not be expected to disclose information that would compromise its competitive position.

The issue of disclosure is an especially sensitive topic for Asian firms. As Iu and Batten (2001) note, Asian firms do not have a tradition of disclosure, since insiders often control the operating and reporting systems. This attitude is changing, in part as a result of the 1997 Asian financial crisis, where poor corporate governance practices were 'fingered' as one of the causes of the financial crisis (Zhuang *et al.* 2000). Companies are now recognising that disclosure plays a pivotal role in moving to greater corporate accountability.

1.3 Environmental reporting and firm performance

In this paper we hypothesise that there is a significant relation between environmental reporting and firm performance. However, the relation may not be the same in the short term compared with in the long term. In the short run, firms may suffer high costs and

2 Specific principles (OECD 1999) describe the important roles of disclosure: stakeholder access to information (Principle III, D); timely and accurate disclosure (Principle IV, A6) and timely and cost-effective communication channels (Principle IV, D).

reduced competitiveness as a result of the increased costs of environmental protection. The increased costs lead in turn to a negative relation between environmental performance and accounting (current) performance. In the long run, however, investors should favour companies that report environmentally responsible activities, perhaps because the positive effects of environmental activities tend to be realised in the long run. Consequently, an empirical approach must take into account the temporal effect of the relationship and utilise a performance measure that can capture long-term performance.

More importantly, we also investigate the possibility that the relationship is non-linear with a concave function. A non-linear concave function can reconcile the opposing views on the impact of environmental activities; both views may be correct. There is evidence in the literature that firm performance is a non-linear function of governance factors. For example, Morck *et al.* (1988) found that at low levels of managerial ownership there exists a positive relation between managerial ownership and firm valuation, indicating the alignment of interest between managers and shareholders. At moderate levels of managerial ownership, however, they found that the relation becomes negative, indicating that managers become entrenched. McConnell and Servaes (1990) also observed a non-linear relation between managerial ownership and firm valuation.

1.4 Environmental reporting and firm market valuation

We further hypothesise that the relation between environmental reporting and firm market valuation is not linear. Porter and van de Linde (1995) contend that carefully designed environmental regulations can yield optimal results. In other words, there is a benefit in having environmental standards, but the standards should encourage long-term, sustainable competitiveness. Consequently, the relation may be positive at low levels of regulation, when environmental regulations benefit all parties concerned, but it may become insignificant or even negative at higher levels of regulation, when the regulations become too restrictive. The existence of an optimal point implies that the government should not impose regulations that are too strict or too lenient.

In summary, short-term and long-term return measures are examined. The short-term or accounting return model uses return on assets as the return measure, whereas the long-term return or market return model uses Tobin's Q as the return measure (see Lindenberg and Ross 1981; see also Section 2). Two variations for each model are also tested, giving a total of four separate models. For each return measure, the environmental disclosure variable measures the degree of environmental performance and/or compliance disclosed by companies. In addition, models of each return measure include the disclosure variable and the square of the disclosure variable, to examine if a non-linear relation exists.

2 Data and methodology

Since 2001 the Thai Institute of Directors (IOD), with support from the World Bank, has conducted an annual systematic evaluation of corporate governance practices among firms listed on the Stock Exchange of Thailand (SET). The objective is to promote good governance among listed firms and to evaluate the current status of corporate governance in the kingdom.

In the annual corporate governance study, corporate governance practices are analysed based largely on publicly disclosed information. Governance practices are benchmarked against a set of criteria developed from the SET's best-practice guidelines

and global standards, which are based on the OECD Principles of Corporate Governance (OECD 1999). The evaluation criteria cover the five main OECD principles detailed in Section 1.2. In 2002 the sample included more than 200 public companies representing the largest market capitalisation and most active trading volume during the preceding 12 month period. The IOD benchmarking study utilises information from annual reports, minutes of shareholder meetings, articles of association, bylaws and official documents filed with the SET and the Securities and Exchange Commission of Thailand. The overall governance ratings are developed from publicly available data such as annual reports and stock exchange filings.³

In one section of the governance practices survey, firms are evaluated based on the degree of information disclosure. We extracted data from the annual corporate governance survey to examine the environmental compliance and disclosure practices (OECD Principle III) for each firm in the survey. We also evaluated the degree of environmental responsibility of each firm. Firms reporting that they merely comply with environmental regulations received a moderate score whereas firms reporting that they go beyond the legally required minimum received higher scores. The ratings become our 'report' variable, described further in Section 3.

The environmental compliance and disclosure ratings were developed from publicly available data such as annual reports and stock exchange filings. The ratings also reflect significant differences in firms' approaches to disclosure. Low-rated firms disclosed little if any information about environmental awareness or their activities. In contrast, top-rated firms showed their environmental awareness through more complete disclosure. For example, one energy firm specifically noted its commitment to a range of environmental activities, including environmental impact assessments, risk assessments, quality audits and monitoring programmes, and community attitude surveys. A paper producer highlighted its use of environmentally friendly manufacturing processes as well as its planned spending for water treatment and pollution control projects. Companies awarded the internationally recognised ISO 14000 series designation (e.g. on the ISO 14001 environmental management system, see ISO 1996) naturally earn high environmental reporting ratings.

Financial data was extracted from the database compiled by the SET. From the financial data, we calculated two types of performance measure: current (accounting) and long-term (market). Previous researchers utilised accounting measures (Russo and Fouts 1997) and market measures (King and Lenox 2001). We believe that both measures are meaningful because accounting measures indicate the current performance of the firm whereas the market valuation should represent the long-term performance as viewed by investors. We use return on assets (ROA) as our measure of current performance.

The market performance measure is a proxy for Tobin's Q , the ratio of the market value of equity plus the book value of debt to the book value of assets (Lindenberg and Ross 1981). This variable is used to gauge how the market assesses the current ongoing value of a firm's assets. A Tobin's Q value greater than one indicates that investors assess the current value of assets as being higher than the replacement costs of the same assets (Lee and Tompkins 1999). Consequently, a firm with a high Tobin's Q value is considered to have superior performance because a firm's average Tobin's Q measures investors' beliefs about the collective net present value (NPV) of ongoing activities (Morck

3 The corporate governance evaluation criteria, totalling more than 50 individual items, are compiled and scored with use of ratings for each category. To determine the composite governance score for each firm, the individual items and composite categories are weighted based on relative importance. Though the ratings could be deemed as being quite subjective, the research team uses different raters to cross-check for consistency. Last, an auditor checks the results to ensure reliability and internal consistency.

et al. 2000). If a firm has an abundance of negative NPV projects, the Tobin's Q value will be less than one. Because of its theoretical soundness, the Tobin's Q measure has been widely used in finance literature (e.g. in studies of public companies in the USA and in Asia) as a measure of long-term market performance (e.g. for a study on Japan, see Morck *et al.* 2000; for a study on Thailand, see Wiwattanakantang 2001; for a study of US companies, see Morck *et al.* 1988).

3 Empirical results⁴

Results and statistical analyses are summarised in Tables 1–4.

Industry ^a	Statistic ^b				
	MEAN	MEDIAN	STANDARD DEVIATION	MAXIMUM	MINIMUM
Agribusiness	0.437	0.400	0.069	0.600	0.400
Building and furnishing	0.391	0.400	0.085	0.500	0.250
Chemicals	0.375	0.333	0.093	0.500	0.250
Commerce	0.250	0.200	0.094	0.400	0.167
Computer	0.427	0.414	0.065	0.500	0.333
Electrical components	0.430	0.500	0.109	0.500	0.250
Energy	0.393	0.375	0.057	0.500	0.333
Entertainment	0.300	0.300	0.141	0.400	0.200
Food processing	0.363	0.375	0.105	0.500	0.250
Hotel	0.347	0.333	0.106	0.500	0.250
Household goods	0.367	0.367	0.047	0.400	0.333
Machinery	0.292	0.292	0.059	0.333	0.250
Packaging	0.400	0.400	0.000	0.400	0.400
Property development	0.351	0.388	0.079	0.500	0.200
Pulp and paper	0.410	0.354	0.128	0.600	0.333
Textiles	0.457	0.464	0.051	0.500	0.400
Transportation	0.385	0.400	0.048	0.429	0.333
Vehicles and parts	0.361	0.333	0.127	0.500	0.250

a Industry classification is based on the SET industry codes.

b Firms were rated based on the reporting quality of their disclosure of environmental policies and activities. The maximum score is 1.00 (best quality). The minimum score is 0.00 (lowest quality).

Note: the sample consists of the 120 largest companies (based on market capitalisation) listed on the Stock Exchange of Thailand (SET) in 2001.

Table 1 AUTHORS' SURVEY: SUMMARY STATISTICS FOR THE ENVIRONMENTAL DISCLOSURE QUALITY SCORES, BY INDUSTRY, FOR THE COMPANIES STUDIED

4 For readers interested in the technical aspects of the methodology the authors will be pleased to provide details.

Variable ^a	Statistic				
	MEAN	MEDIAN	STANDARD DEVIATION	MAXIMUM	MINIMUM
Environmental reporting (Report) ^b	0.375	0.400	0.091	0.600	0.167
Return on assets (ROA) ^c	0.047	0.045	0.092	0.355	-0.221
Tobin's Q (Q) ^d	0.602	0.572	0.299	1.723	0.063
Firm size (Size) ^e	8.274	8.134	1.252	12.059	6.232
Asset turnover (Turnover) ^f	0.673	0.595	0.502	2.174	0.009
Fixed assets (Assets) ^g	0.358	0.318	0.241	0.885	0.001
Financial leverage ^h (Leverage)	0.879	0.320	1.436	7.514	0.001

- a Financial statement data was obtained from the database compiled by the Stock Exchange of Thailand (SET).
b Firms were rated based on the reporting quality of their disclosure of environmental policies and activities. The maximum score is 1.00 (best quality). The minimum score is 0.00 (lowest quality).
c Return on assets is the ratio between net income and the book value of total assets.
d Tobin's Q is the ratio between the market value of equity plus book value of long-term liabilities to the book value of total assets.
e Firm size is measured as the natural logarithm of the book value of total assets.
f Asset turnover is the total revenue divided by total assets.
g The fixed asset ratio is the net fixed assets divided by total assets.
h Financial leverage is the ratio of the book value of long-term liabilities to total equity.

Note: see Table 1.

Table 2 AUTHORS' SURVEY: DESCRIPTIVE STATISTICS FOR VARIABLES INCLUDED IN THE STUDY

Variable ^a	Variable ^a						
	REPORT	ROA	Q	SIZE	TURNOVER	ASSETS	LEVERAGE
Report	1.00	-0.08	-0.22**	-0.14	0.08	0.07	-0.02
ROA		1.00	0.11	0.03	0.07	-0.31***	-0.34***
Q			1.00	0.28***	-0.14	-0.01	0.20**
Size				1.00	0.19**	-0.02	0.34***
Turnover					1.00	0.16*	-0.07
Assets						1.00	0.21**
Leverage							1.00

* Statistically significant at the 10% level

** Statistically significant at the 5% level

*** Statistically significant at the 1% level

a For the source of financial data, see footnote a to Table 2; for definitions of variables, see footnotes b-h to Table 2.

Note: see Table 1.

Table 3 AUTHORS' SURVEY: CORRELATION MATRIX FOR VARIABLES INCLUDED IN THE STUDY

Variable ^a	Return on assets ^b		Tobin's Q ^b	
	MODEL 1	MODEL 2	MODEL 1	MODEL 2
Intercept	0.07 (0.08)	-0.01 (0.14)	0.58 (0.29)	-0.19 (0.48)
Environmental reporting (Report):				
Report	-0.09 (0.10)	0.34 (0.64)	-0.67 (0.35)	3.74* (2.19)
(Report) ²	N.A.	-0.57 (0.83)	N.A.	-5.84** (2.87)
Firm size	0.01 (0.01)	0.01 (0.01)	0.04 (0.03)	0.03 (0.03)
Asset turnover	0.01 (0.02)	0.01 (0.02)	-0.09 (0.07)	-0.09 (0.07)
Fixed assets	-0.09** (0.04)	-0.09** (0.04)	-0.02 (0.15)	0.02 (0.14)
Financial leverage	-0.02*** (0.01)	-0.02*** (0.01)	0.04* (0.02)	0.04* (0.02)
Industry dummy variable ^c	Yes	Yes	Yes	Yes
Adjusted R ² statistic	0.21	0.21	0.06	0.09
F-statistic	2.69***	2.57***	1.42	1.60*
Sample size, N	120	120	120	120

N.A. = not applicable

* Statistically significant at the 10% level

** Statistically significant at the 5% level

*** Statistically significant at the 1% level

a For the source of financial data, see footnote a to Table 2; for definitions of variables, see footnotes b-h to Table 2.

b Model 1: regarding environmental reporting, only the Report variable is included; Model 2, regarding environmental reporting, both Report and (Report)² are included in the model.

c Industry dummy variables (based on SET industry classifications) are included in the regression model. Results for individual industries are not reported.

Note: see Table 1; results for the industry and year dummy variables are not reported; figures in parentheses are *t* statistics.

Table 4 AUTHORS' SURVEY: RESULTS OF LEAST SQUARES REGRESSION OF THE ACCOUNTING AND MARKET PERFORMANCE OF COMPANIES

In the accounting performance model using ROA as the short-term performance measure (Table 4), the empirical results suggest that there is little relation between environmental reporting and accounting performance. Although the coefficient for the environmental reporting variable is negative, implying that increased disclosure has a negative impact on performance in the short run, the magnitude is not statistically significant. Further, when testing for the non-linear nature of the relation by including the squared term of environmental reporting variable in the model, the results do not change much. Neither environmental reporting term is statistically significant. If we equate accounting variables to short-term performance measures, the results indicate that environmental reporting does not negatively affect the firm in the short run.

For the market performance model we use Tobin's Q as the long-term performance measure (Table 4). The results show a negative relation between environmental reporting and market performance, although the coefficient is not significant. When the squared term is added to the model, however, both the environmental reporting variable and the squared reporting variable become statistically significant. The benefits of good environmental reporting appear to increase at a decreasing rate.

In order to visualise the relationship, the relation between performance variables and the environmental reporting ratings are presented graphically. In Figure 1(a), the trend line shows a slight negative relation between ROA and environmental reporting rating. The slope of the fitted line is quite flat, indicating that the relationship is not strong. In Figure 1(b), however, the fitted line is curved, showing the non-linear relation between the rating of firms' environmental reporting efforts and Tobin's Q . The curved trend line suggests what the regression results demonstrate: some level of environmental reporting is perhaps perceived as optimal by investors.

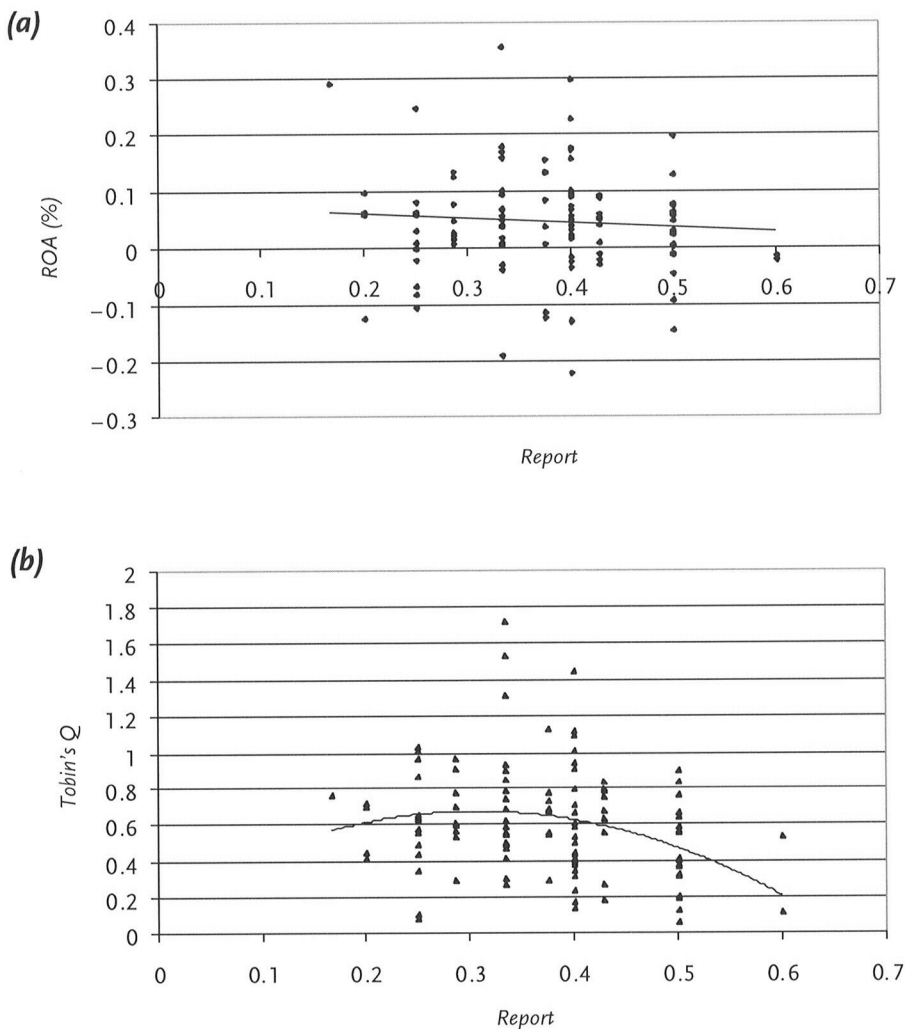


Figure 1 RELATIONSHIP BETWEEN (a) ACCOUNTING PERFORMANCE (RETURN ON ASSETS [ROA]) AND (b) MARKET PERFORMANCE (TOBIN'S Q) AND ENVIRONMENTAL REPORTING RATING (REPORT)

The significance of the quadratic term in the Tobin's Q regression makes for some interesting interpretations. One possible explanation for this finding is that investors recognise the benefits from environmental policies and commitment, at least initially. Although environmental compliance does carry costs, the firm's commitment to stakeholders (a tenet of good corporate governance) is recognised and valued. However, investors view high levels of disclosure less positively, perhaps because investors may be concerned that excessive environmental responsibility will drive up the firm's costs. The implication of the non-linearity is quite significant for the government because it implies that there exists an optimal point for environmental reporting. In support of the Porter hypothesis (Porter and van der Linde 1995), the government has to be very careful in designing regulations and standards that will allow firms to be 'green' and competitive. In the end, an optimally designed environmental disclosure standard will allow firms to gain competitiveness and to realise shareholder wealth maximisation.

A limitation of this study arises from the focus on firm-reported environmental activities rather than on direct observation of the firms' environmental activities. Given heightened scrutiny by the government, however, it is unlikely that firms would intentionally disclose more than they have actually achieved or implemented because verification is possible. At the same time, firms would choose to disclose at least the minimum level they have achieved because legal compliance with environmental regulations is required. Obviously, moving beyond reported disclosure data to examine actual environmental activities would yield deeper insights.

4 Conclusions

Overall, the results provide indirect support to the Porter hypothesis. Empirical results also reveal that there is no relation between environmental activity reporting and accounting performance. The study also finds that the effect on long-term performance is more complex than originally assumed in previous studies. On the surface, it appears that the relation is not significant. By assuming the nature of the relation is quite complex, however, the study documents that the relation between environmental reporting and a long-term performance measure takes the form of a non-linear concave function. The implication is that there may be an optimal level of environmental activities that maximises firm value. As a result, from this viewpoint, firms should not take an extreme position on environmental issues. The government should also devise environmental regulations and environmental disclosure standards carefully in order to increase productivity and innovation. As suggested by the Porter hypothesis, the government should take a proactive role in devising regulatory standards that enhance competitiveness which, in turn, lead to value maximisation.

In conclusion, the connections between environmental policy and responsibilities to stakeholders implied under good corporate governance practices remain contentious. Although the links between actual environmental performance and financial performance is an open issue for scholars, this study adds an insight into the issue by focusing on the reporting of such activities. The finding also highlights the crucial role of the government in designing environmental disclosure standards. Finally, it is hoped that results from Thailand, a developing country, may constitute a first step toward a more complete examination of the relation between corporate environmental responsibility and firm performance in South-East Asia.

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