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Market Valuation of Environmental Performance

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MARKET VALUATION OF ENVIRONMENTAL PERFORMANCE

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To: Dean Joyce J. Elam
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This dissertation, written by Islam Elshahat, and entitled Market Valuation of Environmental Performance, having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this dissertation and recommend that it be approved.

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DEDICATION

I dedicate this dissertation to my parents, my sisters, my brother, and my friends. Without their patience, understanding, and support, the completion of this work would not have been possible.

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ABSTRACT OF THE DISSERTATION

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Professor Clark Wheatley, Major Professor

This research investigated the general association between corporate environmental performance and the firms' annual returns independent of any particular environmental event. The association analysis was based on the most recent environmental data for the years 2006, 2007, and 2008. The results indicated that while some environmental variables were significantly associated with firms' returns, the majority were not. The results also indicated that environmental concerns were more likely to be associated with increase in the firm value than were environmental strengths; however, there were no mean differences between firms whose environmental performance increased as compared with those whose performance deteriorated. Overall, the results provided support for the perspective that environmental strengths require firm expenditures that place additional financial burdens on firms, resulting in lower stock returns.

TABLE OF CONTENTS

LIST OF TABLES

TABLE PAGE

Chapter 1

Introduction

At a global level, countries around the world are collectively dealing with environmental crises by formulating and enacting rules and regulations to sustain the environment. The enactment of Kyoto Protocol was designed to control the emission of harmful gases that negatively affect the Ozone layer leading to unsafe climate changes. At the national level, each country involved in any environmental protection agreement has been encouraging as well as enforcing the rules and the regulations, which are both financial and non-financial in nature in order to motivate firms to incorporate environmentally friendly strategies or at least reduce the negative environmental impact to a reasonable amount.

An example of such an effort in the United States was the enactment of the Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA], or what is commonly known as the "superfund" law. This law imposed a tax on the chemical and petroleum industries and empowers the Agency for Toxic Substances and Disease Registry (ATSDR) to directly respond to chemical releases or threatened releases that may endanger the surrounding environment. Some countries assigned the duties of environmental protection to a specialized department within the government structure. In the United States, for example, the Environmental Protection Agency (EPA) (established in the 1970) is responsible for controlling and regulating pollution activities and protecting human health by sustaining the surrounding natural environment: air, water, and land.

At the corporate level, firms have been aggressively trying to redefine their products as environmentally friendly. In the case of energy consumption and gas emissions, the automobile industry made a major shift in the last few years towards the production of more environmentally friendly vehicles that use safer energy such as electricity instead of the traditional fuel engine. The redefinition of products also refers to firm's inclusion of environmental factors in their overall strategies and policies. These may result from the need to comply with the regulatory authorities' rules and regulations or from a desire to serve the new emerging market segment interested in environmentally friendly products. Lastly companies are diligently working to build and maintain the image of being good corporate citizens who protect the environment and remediate the effects of the firms' operations.

At the individual level, the focus on environmental factors can be divided into two different areas. As the result of public awareness, environmentally friendly products are experiencing good sales growth. In other words it can be inferred that individuals will, to a certain extent, favor environmentally friendly products. The second area, according to the capital markets literature, is that investors have responded to environmental events and that they value and respond to environmental disclosures.

Concern over pollution and the potential deterioration of the Earth's environment are of significant concern - particularly to the governments and people of developed nations. Industrial waste and pollutants are seen, by some, as negatively impacting the sustainability of life. Quantification of pollution and the ability to measure environmental liabilities has thus become an area of focus for the accounting profession.

The Financial Accounting Standards Board (FASB) has contributed by setting and shaping accounting rules and regulations which define how companies account for and report events related to the environment. The FASB's statements, such as SFAS 5[1] (Accounting for contingencies), emerging issues task force[2] 89-13 (Accounting for the Cost of Asbestos Removal), emerging issues task force 90-8 (Capitalization of Costs to Treat Environmental Contamination), and emerging issues task force 93-5 (Accounting for Environmental Liabilities) all focus on the measurement of environmental liabilities. The Securities and Exchange Commission [SEC] has also promulgated regulations in this area. For instance, the SEC mandates environmental disclosures (ED) in the 10-k reports (primarily in items 103 and 303).

In 1980, in response to the pollution of the Love Canal[3] and the environmental contamination at the Valley of the Drums,[4] the US congress enacted the Comprehensive

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[1] SFAS 5 defines "loss contingency" as an existing condition, situation or set of circumstances that revolve around the uncertainty of the possible loss or expense that an enterprise may face which may ultimately be resolved when one or more future events occurs or fail to occur. SFAS 5 requires that an estimated loss or expense from a loss contingency will be accrued by a charge to income if it is probable that an asset has been impaired, or a liability incurred, provided that the amount of such an asset impairment or liability incurrence can be reasonably estimated. If a loss is not probable or not estimable, then a footnote disclosure of the contingency shall be made when there is at least a reasonable possibility that a loss may have been incurred, with an estimate of the possible loss or range of loss if it can be made.

[2] The Emerging Issues Task Force (EITF) was formed in 1984 in response to the recommendation of the FASB's task force on timely financial reporting guidance and the FASB Invitation to Comment on those recommendations. The mission of the EITF is to assist the FASB in improving financial reporting through the timely identification, discussion, and resolution of financial accounting issues within the framework of existing authoritative literature.

[3] Hooker Chemical Company dumped 21,800 tons of waste into an abandoned canal in New York between 1942 and 1953. The thick clay walls of the canal seemed to be the perfect place for dumping waste. Eventually, the land was covered with more clay and the dumping ceased. The land slowly developed into a small town, known as, Love Canal. The "impermeable" clay walls of the canal were penetrated and weakened by when the building of streets and plumbing lines occurred. While, the effects of chemical waste dumping were being noticed as early as 1950s, it was not until the 1970s that the public would notice the skin irritation on the children and pets that had played or spent time near the field by the school as well as rocks that would explode when dropped. The Hooker Chemical Company was found responsible for the contamination in Love Canal

[4] This incident took place in Bullitt County, Kentucky, near Louisville. By the mid 1960s 23 acres of land had become a collection point for toxic wastes. The matter caught the attention of state officials after some of the drums that had been strewn there caught fire and burned for more than a week, this was in 1966. I t was not until 1979 that the EPA initialized an emergency clean up of the land. Having realized the dangerous nature of the chemical waste, the

Environmental Response, Compensation, and Liability Act [CERCLA]. The purpose of the act is to protect people, families, communities and others from heavily contaminated toxic waste sites that have been abandoned. In other words, the act provides broad federal authority to clean up releases or threatened releases of hazardous substances that may endanger public health or the environment. Approximately 70% of the Superfund cleanup activities historically have been paid for by firms identified as potentially responsible parties (PRPs). Several attempts were made to reform the Superfund legislation, and in 1986, such an attempt was successful. The resulting 1986 Superfund Amendments and Reauthorization Act increased Superfund appropriations and provided for studies and new technologies to be used. In 1994, the Clinton Administration proposed a new Superfund reform bill, which was seen as an additional improvement to existing legislation by both environmentalists and industry lobbyists. The proposal was, however, not approved by Congress.

In 1996, The American Institute of Certified Public Accountants [AICPA] issued Statement of Position 96-1, Environmental Remediation Liabilities [SOP 96-1]. The AICPA perceived that there was a pervasive lack of understanding on the part of companies and their independent accountants concerning the magnitude of the responsibility associated with environmental remediation. SOP 96-1 referenced the Financial Accounting Standards Board's Statement (FASB) of Financial Accounting Standards No.5, Accounting for Contingencies as the framework for the accounting treatment of environmental liabilities. The Statement of Position 96-1 consists of two parts: part one provides background by describing the various laws that may give rise to

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state reassigned the clean up to more specialized parties in 1983 and lasted for 7 years. However, problems would continue to be reported for several years to come.

environmental liabilities while part two provides an authoritative guide on the recognition, measurement, display, and disclosure of such liabilities. The SOP does not address accounting for pollution control costs for current operations, costs of future site restoration, or closure costs required upon termination of operations or the sale of facilities. The FASB is now considering these issues as a distinct project. The SOP reflects the increasing emphasis on accounting for and disclosure of environmental remediation liabilities. Hence, both public and private companies and their accountants should be increasingly vigilant in both areas as to protect themselves from the possibility of litigation.

According to Dunlap and Scarce (1991), public opinion poll results indicate that the "public views business and industry as the major contributors to environmental problems," and "that business and industry will not voluntarily protect the environment." Opinion polls also indicated that "sizable minorities report having at least occasionally avoided buying products from companies with poor environmental records." Epstein and Freedman (1994) found, for instance, that 82.17% of investors desired environmental disclosures. Those individual investors considered annual report information about the environmental activities more desirable than information about any other social activity.

In March of 2009 Chairman Henry A. Waxman of the U.S. House of Representatives' Energy and Commerce Committee and Chairman Edward J. Markey of the Energy and Environment Subcommittee and Select Committee on Global Warming released a draft of clean energy legislation. The Waxman-Markey discussion draft, "The American Clean Energy and Security Act of 2009," is comprehensive energy legislation. The authors claim that the legislation will create millions of new clean energy jobs, save

consumers hundreds of billions of dollars in energy costs, enhance America's energy independence, and cut global warming pollution. Opponents of the legislation claim that passage of the bill will cost hundreds of billions of dollars in taxes, harm America's energy independence and result in the loss of millions of jobs, all without having any measurable impact on the global environment. The legislation has four titles: (1) a "clean energy" title that promotes renewable sources of energy and carbon capture and sequestration technologies, low-carbon transportation fuels, clean electric vehicles, and the smart grid and electricity transmission; (2) an "energy efficiency" title that increases energy efficiency across all sectors of the economy, including buildings, appliances, transportation, and industry; (3) a "global warming" title that places limits on the emissions of heat-trapping pollutants; and (4) a "transitioning" title that protects U.S. consumers and industry and promotes green jobs during the transition to a clean energy economy.

Worldwide efforts to preserve the surrounding environment have taken the form of collective actions. Air pollution that leads to the green house effect (world rising temperature) caught the world's attention and motivated countries, especially the developed ones, to come together and address possible solutions to this problem. In 1992, in Rio de Janeiro, Brazil, an international environmental treaty was drafted at the United Nations Conference on Environment and Development (UNCED), most commonly known as the "Earth Summit." The treaty was intended to achieve "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic changes with the climate system." In 1997 at Kyoto, Japan, the treaty was

codified as the KYOTO protocol[5] to be in force by February 2005. The Protocol establishes legally binding commitments on the reduction of four greenhouse gases (carbon dioxide, methane, nitrous oxide and sulphur hexafluoride), and two groups of gases (hydrofluorocarbons and perfluorocarbons) produced by "Annex I" countries, as well as general commitments for all member countries. These binding commitments target a reduction in greenhouse gas emissions of an average of five per cent of 1990 levels. The period for achievement of this target is over the five-year period 2008-2012. National limitations range from 8% reductions for the European Union and some others to 7% for the United States, 6% for Japan, and 0% for Russia. The treaty permitted an increase of the green house gases mission by 8% for Australia and by 10% for Iceland.

In the environmental performance literature there has been a vigorous debate about the association between the corporate environmental performance and the financial performance. One school within the literature supports the traditional perspective, which suggests that the expenditures on environmental improvements present additional costs that, generally, create no additional value to the firm. Another school supports the relatively newer perspective, which suggests that expenditures on environmental improvements and pollution controls would lead to additional value to firms. A third school suggests that corporate environmental performance and financial performance do not have any association.

This research addresses the overall association between firms' environmental performance and capital market valuations. Unlike prior studies that have examined the capital market's response to environmental events, this study is aimed at investigating the

[5] The distinction between the Protocol and the Convention is that while the Convention encouraged industrialized countries to stabilize GHG emissions, the Protocol committed them to doing so.

long term association between corporate environmental performance and firms' annual returns independent of any particular environmental event. The sample is based on publicly traded firms valued by United States' capital markets.

The environmental performance measures are based on the KLD database which provides information about firms' environmental performance based on 13 variables. Six variables, referred to as environmental strength variables, are related to firms activities and efforts to preserve the surrounding environment or to reduce/control pollution, the remaining seven variables, referred to as environmental concern variables, are related to the negative impact on the environment caused by the firms operations. The longitudinal association analysis is based on the most recent environmental data for years 2006, 2007, and 2008.

I have addressed environmental performance by using both single variables and an overall index. First, individual environmental performance measures are regressed against the sample firm's annual returns; second, these individual measures were added together making an overall environmental profiling measure. The interaction between independent measures when combined to make this index was investigated using principal component analysis and independent measures results and overall environment profiling measure results are compared. Furthermore, I examine the association between changes in firms' environmental performance and security returns.

This research contributes to the environmental performance literature by, first, presenting evidence on the nature of the general association between environmental performance and firm market value rather than focusing on the short term effects of particular environmental events. Second, this research provides evidence of how

environmental attributes interact when combined into a single overall measure. The results of this study may provide guidance to the regulators and standard setters with respect to identifying the way that capital markets respond to corporate environmental performance.

The remainder of this dissertation is organized as follows. Chapter Two reviews the current literature on environmental disclosure and corporate performance as well as the capital market reaction to environmental events. Chapter Three addresses the hypotheses and the methodology employed in testing the hypotheses. The results are analyzed in Chapter Four, while Chapter Five offers a discussion of the findings and the resulting conclusions.

Chapter 2

Literature Review

Annual reporting is one of the primary means through which firms communicate information to stakeholders. These annual disclosures are of such great importance that the Financial Accounting Standard Board (FASB) mandates that publicly traded firms are required to report any valuable information to the investors - the full disclosure principle. Information is considered valuable if it could affect investors' decisions regarding whether to buy, hold, or sell their ownership in the organization. Knowing how valuable the disclosures are, firms engage in various activities to affect the policy making process in order to serve their own interests and to enhance their chances for economic survival and success. For example, unlike prior studies that investigated why the U.S. public accounting profession would promote legislation reform, Roberts, Dwyer, and Sweeney (2003) studied the detailed analysis of how the public accounting industry gained political power by focusing on the strategies it utilized to successfully influence a reduction in legal liability. They examined the AICPA and Big 6 Political Action Committee (PAC) contributions to individuals; senators from 1988 to 1996; and to individual members of the House of Representatives from 1994 to 1996. The general objective of the corporation's political strategy is to influence the policy outcomes such that the firms' chances for economic survival and success are enhanced.

Dominant firms, such as the big 4 accounting firms, rely on federal regulations for economic survival; therefore they tend to maintain a proactive political strategy. This analysis is based on the Hillman and Hitt (1999) model of corporate political strategy. The model presents the proactive political strategy as a sequential three stage decision

process, which are: general approach; level of participation; and strategies and tactics. The analysis started by searching through multiple electronic sources, such as issues of the Journal of Accountancy and the CPA Journal from 1988 to mid 2000, and through the reference lists of all the source materials found to obtain a comprehensive set of data sources. They then analyzed the information by comparing specific case items with the Hillman and Hitt model's descriptions and quantitatively categorized documents, records, statements, and actions in terms of the components of the model. Finally, they organized the results by mapping out the findings into the structure of the model. The data are consistent with Hillman and Hitt's description of a relational approach to general political strategy that is long term and spans multiple issues.

Mixed results are reported, however, regarding firms' levels of participation. The authors find that the AICPA and the Big 6 firms engaged both individually and collectively in the process of securities legislation reform, appearing to lead to a coalition-building strategy. Hillman and Hitt (1999) suggest that highly credible firms employing a relational approach are more likely to adopt informational and constituency building strategies and tactics. Although they find evidence consistent with the informational and constituency building approach, they also find evidence that the AICPA and the Big 6 firms utilize financial incentive strategies and tactics.

They also examined the AICPA and Big 6 PACs' contributions to individual senators from 1988 to 1996 and to individual members of the House of Representatives from 1994 to 1996. Two empirical tests were performed, the first test, regression analysis, investigated the rationality of the AICPA and the Big 6 PAC contributions; the second test, logistic regression, assessed the effectiveness of the contributions in helping

to gain passage of the reform act. Results suggest that the profession's PACs appear to contribute rationally in their efforts to affect the passage of the Private Securities Legislation reform. The AICPA and the Big 6 PACs contributed to the Senators and House members who were assigned to committees that directly influence the design of legislation. Furthermore, the significant association between those contributions and the voting behavior in both the Senate and the House provides evidence of the rationality of the profession's PAC contribution expenditures as well as a measure of their effectiveness.

Over the past few years environmental disclosure practices increased significantly in firms' annual reports and the fact that some regulatory agencies, such as the Securities and Exchange Commission (SEC), are mandating environmental disclosures, has made environmental disclosure an essential part of firms' reporting activities. Niskala and Pretes (1995) investigated the changes in corporate environmental disclosure practices among large Finnish firms. Specifically, they investigated the willingness of firms to disclose environmental information in the years 1987 and 1992. They selected 1987 because it was the first year the Brundtland Report[6] was published, and thus is considered to be the beginning of the environmental movement of the late 1980s. They selected 1992 because it was the most current data available at the time of the study. Niskala and Pretes used a content analysis approach developed by Guthrie (Guthrie & Parker, 1989) to determine whether or not the disclosures contained any qualitative, quantitative or

[6] The Brundtland Commission, formally known as the World Commission on Environment and Development (WCED) was convened by the United Nations in 1983. The commission was created for the purpose of addressing the growing concern "about the deterioration of the human environment as well as the natural resources and the consequences of that deterioration for economic and social development." The commission main objective was: (1) to propose long-term environmental strategies for achieving sustainable; (2) To recommend ways and means of co-operation among countries to deal with the global environmental concerns.

financial reporting. Qualitative information includes verbal disclosures. Quantitative information refers to environmental measures such as emission levels and forest materials consumed in production by volume. Financial information includes environmental information expressed in monetary terms. The aforementioned was done in an effort to standardize the data collection to facilitate analyzing general environmental disclosures; environmental policy disclosures; and disclosures of financial environmental information in the annual reports. Based on the Finnish business magazine classification, Niskala and Pretes identified nine industrial categories: chemicals and plastics; construction; energy production; electricity and electronics; forestry and forest products; industrial conglomerates; metals and metal products; oil trading, and transportation, with direct or significant environmental impact. The largest 100 firms in these categories (based on sales), were selected for the initial sample, of which 75 were included in the final sample.

The results of this study indicate that there is a significant increase in environmental reporting practices between 1987 and 1992. Most of the disclosure increases are in qualitative, rather than quantitative (financial) form. Also, financial environmental disclosure seems to be the most effective method concerning the reporting of environmental investments and operating expenditures resulting from environmental protection activities. The results are consistent with prior research that indicates environmental reporting is associated with industry classification (polluting versus non/less polluting industries).

Harte and Owen (1991) studied voluntary environmental disclosure in the annual reports of British companies. Their analysis of the annual reports was performed in two steps. The first step was to determine whether or not environmental matters were

mentioned within the statements of objectives. The second step was to determine whether the disclosures were financial/nonfinancial in nature, or specific narratives. Their overall sample was composed of 30 firms, 24 of which were surveyed by questionnaire (Harte et al., 1991). The questionnaire requested a list of five companies perceived as consistently good at disclosing ethical and environment information. Respondents identified 24 companies, and the other six were added by the researchers based on their findings that these six firms were considered to be innovators of green reporting practices. They conducted a comparison of disclosures within firms' annual reports where the latest annual reports available by the end of June 1990 were compared to previous year's annual reports. Results indicate that there is a general increase in firms' environmental disclosure over time; firms are willing to shed light upon their own standards, without going into details; and some companies are willing to emphasize external industry standards, again without any specific details.

The second part of Hart and Owen's analysis focused on firms in the water industry. The water industry is heavily regulated by external bodies, so beside the basic requirements of environmental accountability, external standards are independently required. The analysis focused on 10 newly privatized water companies of which eight provided their 1990 financial reports. Four aspects of environmental performance were considered: the quality of drinking water, the quality of rivers, the quality of bathing water, and the use of water assets.

Overall, the results indicate that firms report environmental performance information pertaining to the quantity rather than the quality of water. However, the analysis suggests that the need to comply with external standards influenced firms'

environmental disclosures since the reporting of environmental information was greater than some years prior.

Campbell (2004) studied the volume of voluntary environmental disclosure, specifically the voluntary reporting "attitude," of 10 companies in five industries over a period of 27 years (1974 through 2000). Environmental disclosure was defined as a company's attitude, policy or behavior towards its environmental impact in terms of emissions, pollution, cleaning up, and re-landscaping or energy efficiency. Environmental disclosure was measured using the word count technique which is thought to encounter fewer errors than other counting techniques such as sentence count or page proportion count. The sample was chosen from the FTSE 100 index[7] by selecting two companies from five industrial sectors: retail, brewing, petrochemicals, chemicals and intermediates, and aggregates. After excluding six observations due to the unavailability of annual reports, the longitudinal sample was composed of 264 firm-year observations.

Using regression analysis, the study yielded results showing that the mean volume of environmental disclosure increased by the late 1980s. Campbell conducted a cross-sectional analysis to address the differences in voluntary environmental disclosure across industries by comparing environmental disclosures of environmentally sensitive industries to those of less sensitive industries. The results reveal a positive association between the extent of environmental disclosure and industry classification. Campbell (as well as Berthelot, Cormier and Magnan, 2003) suggest that the variability in both

[7] FTSE 100 is an index of the 100 most highly capitalized UK companies, representing about 81% of the market capitalization of the whole London Stock Exchange. Even though the FTSE All-Share Index is more comprehensive, the FTSE 100 is the most widely used UK stock market indicator.

longitudinal and cross-sectional disclosure behaviors can be explained by the firms' need for social legitimacy.

Pollution incidents have also been found to be positively associated with an increase in the level of environmental disclosure. Walden and Schwartz (1997) investigated changes in the levels of environmental disclosures, in four industries: the chemical, consumer products, forest products, and oil industries, subsequent to the 1989 Exxon Valdez oil spill[8]. Environmental disclosures were categorized as either financial or nonfinancial disclosures. Environmental disclosure changes were measured using content analysis where levels of disclosures were tested using a quantity score (QS), to measure differences in the frequency of environmental disclosures, and a disclosure score (DS), to measure differences in the quality of environmental disclosures within various sections of the annual report. The sample was drawn from the list of firms analyzed in the CEP reports[9] for years 1988, 1989, and 1990. The final sample included 53 firms. Eleven of the sample firms were from the chemical industry, eleven from the consumer products industry, sixteen from the forest products industry, and fifteen from the oil industry.

The authors conducted comparative statistical analysis of the data for 1988 and 1989, and for 1989 and 1990. Their findings suggest that significant positive differences exist in the levels of environmental disclosures from year 1988 to 1989 and from year

[8] The Exxon Valdez oil spill, one of the most devastating human-caused environmental disasters ever to occur at sea, occurred in the Prince William Sound, Alaska, on March 23, 1989. The vessel spilled 10.8 million U.S. gallons (about 40 million liters) of crude oil into the sea, and the oil eventually covered 1,300 square miles (3,400 km2) of ocean.

[9] Firms in this study are chosen from industries previously analyzed through reports published by the Council on Economic Priorities' (CEP) Corporate Environmental Data Clearinghouse (CEDC). The CEDC monitors, gathers, and analyzes information on corporate environmental performance for firms in the Fortune 500.

1989 to 1990, in both financial and nonfinancial disclosures using both assessment measures.

An industry comparison conducted for years 1988 and 1989 also indicates that a significant increase took place in the quantity and quality of environmental disclosure in across all four industries. The levels of nonfinancial environmental disclosures, however, significantly increase in 1990 over 1989 only in the oil and consumer products industries. The financial environmental disclosures increased in the oil and forest products. All four industries have significant increases in their levels of financial environmental disclosures (in terms of both quantity and quality). The findings of this study contribute to the understanding of the nature of environmental disclosures in the following respects: first, 71% to 96% of the environmental disclosures appear in the nonfinancial section of the annual reports for years 1989 and 1990 and are not audited. Their content is thus left to the discretion of management. Second, the environmental disclosures appear to be time and event specific, as firms reacted to public policy pressures in response to the 1989 Exxon Valdez oil spill.

Fry and Hock (1976) investigated the content of and reasons for, firm's environmental disclosures. They investigated whether or not firms reporting on their social performance are those ones receiving the most public pressure to do so. They also investigated which industries are more likely to emphasize social responsibility in their annual report, and whether there is an association between social responsibility and profitability. A sample of 135 firms, drawn from fifteen industries ranging from banking to consumer products to mining, was analyzed to measure three general variables. Those variables are: social responsibility, social responsiveness and public image. Social

responsibility was measured by an analysis of photographs or text, where an overall rating was provided to each report which consisted of 1 point for each paragraph and half a point for each photograph related to social responsibility. Social responsiveness factors were identified as assets, earnings, sales, equity, and return on investment. Public image, was assessed by performing a ranking survey addressed to business students.

The results show that sales, net income, return on assets, and public image are all significantly related to the extent of social responsibility disclosures in the annual reports but return on investment is not. The results also indicate that larger firms (in terms of sales) tend to make more social responsibility disclosures. Public Image is found to be the second most important variable in determining the level of social responsibility disclosure and industry classification tends to affect the degree of social responsibility disclosures positively. In other words, firms operating in industries that adversely affect the environment tend to be under higher public scrutiny, which positively influences their social responsibility disclosures.

2.1 Environmental Disclosure

Environmental disclosures can be communicated, via a number of methods: through mandatory, voluntary, or external non-firm environmental disclosures. Each of these methods has its advantages and disadvantages relative to the information value to stakeholders. Each method also has its own interpretation and design in the body of research that has studied this issue. Grossman (1981) and Milgrom (1981) for example, propose that an unjustified negative market reaction results when investors believe that management has not revealed all available information. More specifically, Milgrom

(1981) addresses the notion of news favorableness within the context of information economies, which refers to the study of situations in which different economic agents have access to different sets of information.

Milgrom highlights the importance of information disclosure through four modeling applications. The first is the security market model, where more favorable news regarding firms' future earnings leads to higher stock prices for the firm. The second is the principal-agent model, where the principal designs the compensation for his agent and more favorable evidence (news) about agents' efforts leads to larger compensation (bonuses). The third application model is the "games of persuasion" model, where decision-makers (buyers) expect that any product information withheld by the interested party (salesman) is unfavorable for the product and thus that withholding information dissuades buyer from making purchases. The fourth model is an auction model highlighted by the notion that winning an auction at a low price (i.e. low bids by competitors) signals a low value for the object being sold.

Grossman (1981) studied the consequent effect of withholding information and concludes that a negative market response will result. He argues that prices, to some extent, reflect and transmit information to market participants. In some situations, however, such price mechanisms don't exist, such as when product quality is unknown. In these cases it is in the interest of sellers of good quality products to distinguish themselves from sellers of poor quality products because if sellers are unable to communicate quality to buyers, all products will be sold at the same (low) price. This is commonly known as the "lemons problem."

Grossman considered two cases to address the importance of information in a monopoly context. He suggested that monopolists have an incentive, as a function of the product's true quality, to reveal the quality even when it is poor. The first case is when the seller himself can make statements about product quality that can be verified ex-post (after the sale). The results indicate that monopolists won't be able to mislead consumers about the quality of the product because consumers will assume that the monopolist's product is of the worst quality if there is less than full disclosure. The second case is when the product quality statements are too costly to communicate or to verify. In this case, where the quality statements cannot be guaranteed, Grossman assumed that monopolists would offer a warranty as a proof of product quality. The results indicate that because consumers are risk-averse, if the seller provides less than a full warranty, consumers will assume a low-quality product and may not make the purchase.

Dye (1985) studied why management might withhold information that is not proprietary in nature. Proprietary information is defined as any information whose disclosure potentially alters the firm's future earnings or senior management's compensation. According to the prior literature, firms can make credible statements about their private information in such a way as to compensate for withholding that private information. Dye, however, suggests that even when such credible announcements of private information are possible, there are distinctions regarding the amount of information disclosed to the public.

Dye highlighted three perspectives that explain managements' disclosure failure. The first perspective is based on investors' imperfect knowledge where managers may successfully choose not to disclose adverse information. The second perspective flows

from the observation that nonproprietary information may not be disclosed if it is part of the private information array. The third perspective stems from the principal-agent problem. The model supporting the third perspective indicates that disclosures may actually increase the principal-agent problems between management and shareholders. Dye suggests that investors cannot determine whether information is being withheld by management, and in the absence of this determination the expected unjustified negative market reaction may not take place.

In a similar vein, Verrecchia (1983) investigated managers' attempts to exercise discretion in disclosing information that may negatively affect their firm's value. Investors, however, have rational expectations about managers' motivation to withhold unfavorable information. Thus, investors will seek information from external sources which creates disclosure-related costs that lead to information-noise by extending the range of possible interpretations of withheld information (whether favorable or unfavorable).

Verrecchia concludes that since investors are unable to interpret withheld information unambiguously as 'bad news', then they will discount the value of the firm to the point that the managers are better off disclosing all information investors may need. Acquiring external sources of information, such as external non-firm environmental disclosures, requires investors to devote time and effort which, in turn, leads to what Lev (1988) refers to as inequality in capital markets. Inequality in capital markets is defined as the inequality of opportunities and/or the existence of systematic and significant information asymmetries across investors which lead to an "information imbalance." Information imbalance results in higher transaction costs, lower trading volume, and

fewer participants in the capital market - or what can be referred to as greater market inefficiency. Lev suggest that in order to reduce information asymmetries, a public policy mandating the disclosure of financial information should be designed and implemented to mitigate the inequality in capital markets. Lev concludes that mandating a disclosure policy should be aimed at improving the effectiveness of accounting bodies as well as providing a justification for the regulation of information disclosure.

We can conclude from the above, that more, rather than less disclosure is the optimal choice. Indeed, the primary focus of research in the area of environmental accounting has been to assess the association between firm characteristics and environmental disclosures.

Cormier and Magnan (1999) identified the determinants of voluntary corporate environmental disclosure using a cost benefits framework. These determinants are: information costs; financial conditions; and environmental performance. Environmental disclosure was measured using the Wiseman environmental disclosure index. Information costs were measured using five variables: risk (market beta); reliance on capital markets (a dichotomous variable coded 1 if the firm issued securities in the prior three years, otherwise coded 0); trading volume (measured by dividing annual trading volume by the total number of shares outstanding); concentrated ownership (a dichotomous variable coded 1 if the firm is controlled by an individual or family, otherwise coded 0); and subsidiary of another firm (a dichotomous variable coded 1 if the firm is a subsidiary for another firm, otherwise coded 0). Financial Conditions were measured with three variables: accounting return (the return on assets ratio); markets return (the market adjusted annual stock return); and financial leverage (the debt-to-equity ratio).

Environmental performance was measured by four dichotomous variables: fines and/or penalties, orders to conform or remediation, lawsuits, and violation of pollution emission standards.

Their sample is composed of 33 firms, and data was collected for the eight year period 1986 through 1993. The sample contains firms within three industrial sectors: pulp and paper; oil refining and petrochemicals; steel, metals, and mines. The analysis was conducted using several techniques.

Regressions were run for each individual year as well as for the entire eight year period. Tobit analysis was used to permit dependent variables equal to zero. Logit analysis was also used because the dependent variable relies on subjective judgment and thus errors may exist in the measurement. Results using Logit and Tobit are consistent with the results obtained using regression analysis. The results indicate the following: first, there are patterns towards more environmental disclosure; second, information costs, risk, reliance on capital markets, and trading volume are positively associated with firm environmental disclosure and concentrated ownership is negatively associated with disclosure; third, the evidence reveals a positive association between financial conditions, when measured by ROA or leverage, and environmental disclosures; fourth, environmental disclosure is positively influenced by firms' environmental performance; fifth, firms in the pulp and paper industry disclose more environmental information than do firms in the other two industries; and sixth, large firms with newer fixed assets tend to report more environmental information while firms subject to SEC regulation disclose less.

Patten (1991) examined whether firms' voluntary social environmental disclosures are related to either public pressure or firm profitability. It is argued that firms use social disclosure as a mean to address public pressure towards environmental responsibilities. Based on the annual surveys of Ernst and Ernst (1977) and (1978), disclosures are considered to be socially related if they fall within one or more of seven categories: environment, energy, fair business practices, human resources, community involvement, products, and other disclosures.

Patten were measured disclosures, using the page proportion count technique (1/100th of page intervals, included in the annual report). Twenty-eight firms with social disclosures ranging between 1/10 to a quarter-page were excluded. 47 firms with disclosures of a quarter-page or more were classified as high disclosure firms, while 81 firms with disclosures less than 1/10 of a page were classified as low disclosure firms. Size and industry classification were used as explanatory variables; where industry classification was used as a proxy for public pressure, and size was measured using the log of revenues. Profitability of firms was measured using 5 proxies: return on assets; return on equity; five-year average ROE; one-year lagged ROA; and a dichotomous variable assessing the decrease in current year net income from the previous year, coded 1 if yes or 0 if otherwise. Based on the 1985 Fortune 500 listing, a sample of 156 companies was drawn from eight different industries, namely, petroleum refining, chemical, forest and paper products, electronics, industrial and farm machinery, metal products, and computer and rubber products. The sample selection process was intended to include firms from high-profile and medium- or low- profile industries. In addressing the association between social disclosures and profitability, independent models were

used to assess profitability based on the five measures. The regression analysis reveals a significant positive association between both size and industry classification and the level of social disclosure, while no significant association exists between social disclosures and any of the profitability measures.

Alnajjar (2000) proposed that social responsibility disclosures may be made by firms that are not held responsible for environmental damages or contaminations; rather, they have a more sophisticated understanding of how to control and affect public opinion to secure a good social image for the firm. He examines the association between individual corporate characteristics and social responsibility disclosures (SRDs). In order to enhance the understanding of the underlying forces for SRDs, the analysis investigated the areas, as well as, the types of SRDs. More specifically, he investigated the association between firm characteristics, namely corporate size, profitability, and industry classification in different areas of SRDs (i.e. community, employees, environment, product related activities, and the type of SRDs, whether monetary, quantitative, or narrative). The study addresses five main hypotheses: first, corporate SRD is a function of corporate size; second, corporate SRD is a function of corporate profitability; third, corporate SRD is a function of industry category; fourth, the explanatory variables influence variations in the major areas of disclosure; and finally, the explanatory variables influence variations in the types of disclosures.

The Fortune 500 database was used to identify the sample for the analysis. Annual reports were obtained for 451 firms. Industry classification was based on Fortune's industrial index for 1990 which provides a list of 27 industries. Content analysis was used to quantify the social responsibility disclosures in firms' annual reports using a total of 47

disclosure items, 32 items were based on the disclosure items used by the National Association of Accountants, while 25 items were based on Beresford's 1974 survey. The 47 disclosure items were reclassified into four major areas of disclosures, 17 items were related to community; 17 items were related to employees; 10 items were related to environment; and 3 items were related to product activities. Three corporate characteristics were used in the analysis: corporate size (measured using 2 proxies: the log of assets and the log of revenues); profitability (also measured using 2 proxies: return on equity and return on assets); and industry classification. Disclosure types, whether monetary, quantitative, or narrative disclosure, were assessed by assigning 1 point for each type of disclosure found in the annual reports, otherwise 0.

The results indicate that a significant positive association exists between SRD and firm size, using both proxies, which supports the first hypothesis. The results fail, however, to support the second hypothesis, where a significant but negative association exists (using both proxies) between SRD's and profitability. The third hypothesis is partially supported, in that only one industry group shows a significant association between SRD and the industry group category. The fourth hypothesis, proposing that the power of corporate characteristic variables that influence the amount of disclosures vary significantly among the four disclosure areas is supported. Specifically, firm size is significantly associated with all areas of disclosure; the influence of the remaining corporate characteristics, profitability and industry classification, on SDRs depends, however, on the area of disclosure.

Corporate size is the only variable affecting environmental protection disclosures; corporate size and industry classification affects community involvement and product

safety disclosure; size and corporate profitability affects the human resources area. The results also support the fifth hypothesis since monetary and quantitative disclosures showed significant differences based on corporate size while narrative disclosures do not.

Blaconniere and Patten (1994) examined the market reaction to chemical firms after the Bhopal incident.[10] They define regulatory costs as costs incurred by firms in response to or as a result of proposed or enacted government regulations. In their analysis, two firm specific factors were used to proxy for expected changes in regulatory costs: significant involvement in the chemical industry, which was measured as the ratio of chemical segment revenues to the total revenues off of the firm, and the extent of environmental disclosure in the 10K report. Particularly, they addressed three main hypotheses: first, that firms in the chemical industry, other than Union Carbide, experienced a negative market reaction following the Bhopal incident; second, that firms with larger segment involvement experienced a more negative market reaction following the Bhopal incident; and third, that firms with more extensive environmental disclosures experienced a less negative market reaction subsequent to the Bhopal incident.

Content analysis was used to determine the extent of environmental disclosure in the 10Ks based on the presence, or absence of statements relating to five areas of environmental concern, namely, current or proposed regulations, environmental standards compliance, current or past environmental controls expenditures, future environmental controls expenditures, and lawsuits. Environmental disclosures were assessed by assigning 1 point for each disclosure area presented or discussed in the annual report,

[10] Bhopal, Madhya Pradesh, India 1984, A pesticide facility release tons of toxic methyl isocyanate gases that led to a huge death toll in the surrounding area. The Bhopal incident is frequently cited as the world's worst environmental disaster because the death toll was 8,000 - 10,000 within the first 72 hours of toxic gas emission.

otherwise 0. A sample, of 47 firms, is used in the analysis. Each and every firm in the sample met the following criteria: industrial membership (firms within SIC chemical industry codes); availability of stock price data; financial statement disclosure (the firm must have disclosed chemical or industrial gas segment revenues of at least 10% of total revenues in the footnotes of the 10K report prior to the incident); and no confounding events (earnings, dividends announcements). An event-study methodology was used to test the first hypothesis where cumulative abnormal returns were calculated for a five day window (0 - +4) as well as "Pseudo CARs" for a randomly selected five day window within the period from January 3, 1984 to December 31, 1985 (this is because the Bhopal chemical leak was not anticipated and thus the market reaction would occur only after the event).

Overall results show a significant negative market reaction within the chemical industry following the Bhopal environmental incident. Cross-sectional analysis was used to test the second and third hypotheses. The results indicate that a significant positive association exists between segment involvement and the severity of the market reaction while a significant negative association exists between environmental disclosure and market reaction. The results are robust to several sensitivity tests such as using multivariate regression and eliminating litigation disclosure.

Blaconniere and Northcut (1997) investigate the impact of the Superfund amendments and reauthorization act[11] known as SARA on firms' stock prices. Two types

[11]In response to the love Canal environmental crisis in New York the comprehensive environmental response, compensation and liability act (commonly known as superfund act) was enacted in 1980. In light of environmental protection concerns the act was designed and authorizes the EPA to identify parties (firms) responsible for contaminating sites, and compel them to clean up these sites. The superfund act was amended in 1986 by the Superfund amendments and the authorization act (SARA) which increased superfund funding, direct taxes affecting chemical firms, and expanded disclosure requirements for firms releasing hazardous wastes into the environment.

of environmental information are considered in the analysis: the extent of environmental disclosure in the financial statements prior to SARA and the firm-specific estimates of Superfund liabilities based on EPA data. They investigate the impact of legislative events on stock prices. They propose two hypotheses: first, that firms with more environmental disclosure in their financial statements experience a smaller negative market reaction to SARA events that do firms with less environmental disclosure; and second, that firms with more exposure to future superfund cleanup obligations experience larger negative market reactions to SARA events. Content analysis was conducted to assess the extent of environmental disclosure in the financial statements by observing the presence or absence of statements related to disclosure areas such as current or proposed disclosure; compliance to environmental standards; current or past environmental control expenditures; estimates of future environment control expenditures; and actions or lawsuits against the company. The Control variables in the model are: the sensitivity of firm returns to chemical industrial returns; the ratio of chemical-related revenues to total revenues; and firm size.

A sample of 72 firms was collected based on the following four conditions: the firms must belong to the chemical and allied products industry or at least be involved in chemical operations; security price data must be available; Superfund data must be available, and financial data must be available. An event study methodology was employed where returns were cumulated over a 3 day window. Two sets of legislative events leading to the amendment of the Superfund act were considered. The first set was composed of 26 events from February 22nd 1985 to October 20th 1986. The second was composed of 17 events that involved legislative actions. The second set was used to

increase the power of the tests. The authors assess the market reaction to the legislative events by calculating abnormal returns around both sets of event dates. They further examine the effect of environmental disclosures in the financial statements that may have affected the impact of the legislative events. The results indicate that: chemical firms experience an overall negative reaction to the announcements of specific legislative actions leading to the SARA; more environmental disclosures included in firms financial statements reduces the severity of negative market reaction; and firms identified as a potentially responsible party (PRP) experience more negative market reactions. Overall the results indicate that environmental disclosures included in the financial statements and estimates of environmental costs based on EPA announcements are value relevant in explaining firm-specific market reactions, however, environmental disclosures in financial statements are value relevant only in the presence of environmental information from the EPA.

Barth, McNichols, and Wilson (1997) examine factors influencing firms' environmental liability disclosure decisions in industries with substantial Superfund site involvements. They hypothesize that environmental disclosures are associated with five factors: regulations, which include enforcement activities; management's information, which include site and location uncertainty; litigation and negotiation concerns; capital market concerns; and other regulatory influences. Environmental disclosure was measured using content analysis composed of 13 disclosure items related to four areas. The first three items are related to the number of Superfund and other environmentally impaired sites on which a firm had been named a PRP. The next three items are related to firms' estimates of remediation costs. The next 4 items are related to accruals for

environmental liabilities, and the final 3 items are related to possible insurance recovery. All items are dichotomous in nature, if the item was mentioned in the firms' annual reports it was coded as 1, otherwise 0.

Based on the content analysis, four dependent variables were constructed, "d_total", which represents a comprehensive disclosure measure that equally weights the 13 disclosure variables; "d2", which represents the statement of whether or not the firm is considered a PRP on one or more of the Superfund sites; "d4", which represents the firms range or qualitative assessment about the remediation cost estimates; and "d7", which represents the statement of whether or not the firm accrues environmental liabilities. The fifth dependent variable, "VOLDIS", was set equal to 1 if the firm voluntarily disclosed its accrued environmental liability, otherwise 0.

The sample was obtained from Haz-Site reports provided by Environmental Data Resources Inc. and the Records of Decision filed with the EPA. The final sample of 257 firms was composed of firms from four different industries: utilities, automotive, chemicals, and appliances. These industries are identified by Barth and McNicolas (1994) as industries with the greatest number of firms named as PRPs. The results, using regression analysis, indicate that all of the proposed factors, except site uncertainty, are significantly associated with firm environmental disclosure decisions.

Freedman and Patten (2004) studied whether or not the toxic release inventory system [TRI][12], used as a pollution performance measure, would affect stock market prices in response to President Bush's 1989 proposal for amendments to the 1970 Clean

[12]The Toxic release inventory system contains information regarding more than 650 toxic chemicals and compounds that are used, manufactured, treated, transported, or released by, certain covered industry groups as well as federal facilities, into the environment, as required by Section 313 of the Emergency Planning and Community Right-to-Know Act (1986). TRI contains release-transfer data by facility, year, chemical, and medium of release, as well as treatment and source reduction data.TRI data are available at the EPA.

Air Act. The authors hypothesize that firms with worse air pollution performance suffered more negative marketing reactions to the announcement of President Bush's proposal than companies with better air pollution performance. Using the toxic air releases reported by the TRI in 1987, a sample of 112 firms was selected. Cumulative abnormal returns (CAR) were calculated around the press conference on June 12th 1989 when the proposal was announced. The results indicate that firms with higher toxic air releases tend to suffer more negative market reactions, which indicate a significant positive association between the amount of air pollution and the reduction in stock prices. The authors conclude e that TRI serves as a regulatory mechanism affecting stock market prices.

Freedman and Patten also investigate whether or not firms' environmental disclosures reduce the market's negative reaction to pollution disclosures. They hypothesize that the level of firm specific environmental disclosure is not significantly associated with market reactions to the announcement of President Bush's proposal for changes to the Clean Air Act. Similar to prior studies, content analysis was conducted to identify the extent of disclosure in firms' annual reports. Each firm was assessed in terms of eight disclosure areas, "1" point was awarded for each disclosure area included in the 10-K report. Disclosure scores were expected to range from 0 to 8, however, actual content analysis scores ranged from 0 to 7 with a mean of 2.39 and a median of 2. The results demonstrate that firms with lower levels of environmental disclosure in their annual reports tended to experience more negative market reactions to the clean air act proposal. Furthermore, the study provides evidence that the market rewards higher environmental disclosure at times of poor environmental performance. This finding also

suggests that firms may use environmental disclosure as a mechanism to manipulate negative market reactions to poor environmental performance.

Karpoff, Lott, Rankine (1999) examined the association between firm size and determinants of fines; damage awards; remediation costs; and market value losses imposed on companies that violate environmental laws. Their analysis was conducted using an event study methodology and regression analysis. They examine 283 cases in which publicly traded firms were investigated, accused, or settled charges of environmental violations from 1980 through 1991. Their sample was obtained from a search of The Wall Street Journal Index under its "Environment" and "Environmental Crime" listings. Using the 77 events in which firms were investigated, convicted, or cited for environmental violations, they investigated the association between legal penalties and firm size. Their results indicate that no significant association exists between size and legal penalties. The paper fails, however, to explain the variation in the legal penalties, consistent with the arguments that such penalties are highly variable and not predictable in nature. The results also suggest that firms investigated or charged with environmental violations experience statistically significant and economically meaningful decreases in their common share values. The response to environmental violations is an abnormal stock return of –1.58%, while announcements that charges had been filed caused an average abnormal stock return of –1.92%. On average, firms violating environmental laws suffer statistically significant losses in their market value. The losses are of a magnitude similar to the legal penalties imposed, indicating that legal penalties and reputational losses are the most important variables in disciplining and preventing environmental violations.

Given these concerns regarding market efficiency and the continuous increase in environmental disclosure importance, the Securities and Exchange Commission (SEC) mandates a minimum level of environmental disclosure, Item 103 and 303 in the 10-k annual report[13]. The SEC requirements are designed to ensure the disclosure of basic environmental information that may affect stakeholders' decisions as well as help alleviate information asymmetry.

2.2 Environmental Performance

McGuire, Sundgren, and Schneeweis (1988) provide a brief summary of three theoretical relationships between corporate social responsibility (CSR) and financial performance. Their first argument suggests a negative relationship between social responsibility and financial performance since high social responsibility results in additional costs that put the firm at an economic disadvantage compared to other less socially responsible firms. Their second argument suggests a positive association between social responsibility and financial performance where improved employee and customer goodwill is considered an important outcome of social responsibility. Their third argument suggests that, although the costs of improving environmental performance can be significant, other costs may be reduced and/or revenues may increase.

McGuire, Sundgre and Schneeweis investigated the extent to which social responsibility predicted financial performance as well as whether or not prior financial

[13]Item 103 "Legal Proceedings" contains two exceptions: (1) losses resulting from any administrative or judicial proceeding involving federal, state, or local environmental laws, if the amount of the losses exceeds 10 percent of the company's current assets and (2) monetary sanctions greater than $100,000, if a governmental authority is a party to the proceeding. Item 303, "Management Discussion and Analysis" that requires companies to discuss in their filings with the SEC any known material trends, events, and uncertainties that would cause the companies' liquidity, capital resources, and results of operations, as reported, to not be indicative of future operating results or financial condition.

performance predicted social responsibility. Using Fortune magazine's ratings[14] of corporate reputations, environmental performance was measured using accounting and stock market based measures as well as measures of risk. Two sets of CSR ratings are used, first, the average results of a ranking survey for the period from 1983 to 1985 for 98 firms and second, the 1983 CSR rating for 131 firms. This was done to facilitate the analysis of the relationship between corporate social responsibility and previous and subsequent financial performance. Financial performance variables were averaged over two periods: 1982-1984 and 1977-1981. The nature of the relationship between CSR and financial performance is investigated by comparing the 1982-1984 financial performance ratings to the average Fortune rating for 1983-1985. Analysis of 1983 ratings in relation to the both 1977-1981 and 1982-1984 financial performance variables permitted an evaluation of the relationship between prior financial performance (1977-1981) and subsequent financial performance (1982-1984), relative to CSR.

The results show that firms' prior performance, assessed by both stock market returns and accounting based measures, is more closely related to corporate social responsibility than subsequent performance. The results also indicate that measures of risk are more closely associated with social responsibility than previous studies have suggested.

In other studies of environmental performance, Klassen and McLaughlin (1996) studied the association between environmental management efforts, “environmental reward” and “environmental crises”, and the firm financial performance. They also

[14]Fortune has conducted the survey since 1982 and summary results were published each January. The survey covers the largest firms in 20-25 industry groups. Over 8,000 executives, outside directors, and corporate analysts are asked to rate the ten largest companies in their industry on eight attributes: financial soundness, long-term investment value, use of corporate assets, quality of management, innovativeness, quality of products or services, use of corporate talent, and community and environmental responsibility. Ratings are on a scale of 0 (poor) to 10 (excellent).

investigate the market valuation of environmental performance over time. This study addressed three hypotheses: the first hypothesis proposes that environmental performance affects financial performance in the market valuation firms; the second hypothesis proposes that the importance of strong environmental management varies across industries, more specifically, strong environmental performance has a stronger positive impact on firms' financial performance for historically clean industries than dirty industries; and the third hypothesis proposes that environmental management is becoming an increasingly important dimension of firms' management and operating strategy.

The NEXIS database of newswire services was searched for positive events using keywords such as "environment" within five words of "award" while environmental crises were identified using keywords such as "oil", "chemical", "gas leak", or "explosion" along with the words "spill" and "environment". Data were collected for publicly traded firms on NYSE or AMEX, for the period 1985 to 1991. The authors employed an event-study methodology, using 3 day windows (the day prior to the event date, the event date, and the day after the event), to evaluate the market response to different types of events. They find a significant positive stock return following strong environmental performance. Using environmental awards as a proxy, the average market valuation of the firms rose by approximately $80.5 million following the award announcement. This indicates that a significant positive association exists between environmental performance and firms' market values. On the other side, significant negative returns were reported following weak environmental performance when environmental crises were used as a proxy. For spills and other mishaps, the average

market valuation of firms declined by approximately $390 million, indicating a significant negative association between environmental performance and firms' market value.

The authors performed an analysis of covariance (ANCOVA) using cumulative abnormal returns for the dependent variable and industry classification, and the SIC code as the classification variables. None of the covariates were statistically significant, indicating that the market reaction to positive environmental events has not changed significantly over time. First-time award announcements are associated with greater increases in the market value, although smaller increases are observed for firms in more environmentally polluting industries, possibly indicative of market skepticism.

Rao (1996) addressed the debatable relationship between ethics and profitability by investigating the association between companies' unethical behavior-in terms of environmental pollution-by publicly traded U.S. and multinational firms, and their stock performance. He hypothesizes that the expected stock prices adjust negatively to firms' unethical behavior and that the adjustment will persist for an appreciable period of time. A sample, of 14 firms, was obtained from the Wall Street Journal Index that considered firms with public announcements of environmental pollution during the period 1989 to 1993. An event-study methodology was used for the analysis. Once the event was identified, holding period returns (HPRs) were calculated on a monthly basis for periods both before and after the event. Forty nine months of HPRs were calculated for each sample firm and the thirty earliest observations before the event were used to estimate the regression parameters. Rao's results indicate that actual stock performance for companies with unethical environmental performance is lower than the expected market adjusted

returns, 12 months before the announcement to six months after the announcement, indicating the existence of a significant negative reaction to the announcement of unethical environmental behavior.

Lorraine, Collison and Power (2004) examined the effect of environmental performance publicity, such as fines for environmental pollution, as well as, commendations for good environmental achievements, on companies' share prices. Four hypotheses were addressed, first, that there is a relationship between environmental news and firms' stock price; second, that good environmental news is associated with an increase in the firms' share price; third, that bad environmental news is associated with a decrease in share price; and fourth, that the cross-sectional variation in unexpected returns is related to environmental news; the size of the fine to sales ratio; and/or the industry classification.

The companies involved in the study were selected form articles in the Financial Times, The Times, and press releases from the Environment Agency (EA) in the UK. The final sample included 32 firms with environmental events of which 9 had good news and 23 had bad news. Using the DATASTREAM database, daily stock prices were obtained for each of the 32 events from the 31st of December 1993 to the 31st of August 2000. The authors employed an event-study methodology to analyze the firms' stock returns.

Unexpected returns were calculated for the 21 day period, starting 10 days before the official announcement date of the event and lasting until 10 days after. The results indicate that there are no significant abnormal returns, either positive or negative, on the event announcement date. Significant negative abnormal returns were revealed, however, a week after the announcement date. To assess the individual impact of good and bad

news events, the sample was divided and t-tests were carried out for the subsamples of good news versus bad news. The results indicate that no significant abnormal returns are associated with good news. This suggests that the market does not respond to this type of information. The results for bad news indicate, however, that the market reaction is consistent with the overall sample analysis where negative significant abnormal returns are observed one week after the announcement date.

One possible explanation for the delayed market reaction is that stock market participants may have needed more time to respond to the environmental performance news contained in announcements. Another factor was that many of the fines imposed by the EA were on unquoted companies and the impact of this news could not be considered in the study. Hypothesis 4 was examined using regression analysis. The cross-sectional results lend support to the activities of EA: the relative size of the fines negatively impacts the firms' market value. However, according to Craig Deegan (2004), the study presents limited evidence and low power due to the small sample, and this limits the generalization of the results.

Muoghalu, Robinson and Glascock (1990) study the deterrent effect of the Resource Conservation and Recovery Act (RCRA)[15] and the Superfund act on firms' stock returns. The deterrent effect of both acts stems from the potential for lawsuits against firms engaged in environmental violations; mandates for site cleanup; and reimbursements for expenditures and/or damages related to pollution. The authors

[15]The Resource Conservation and Recovery Act was enacted in 1976, as an amendment to the Solid Waste Disposal Act of 1965, and is considered as the principal U.S. Federal law governing the growing volume of municipal and industrial disposal of solid waste and hazardous waste. The objective of the RCRA is to limit environmental damage by providing a system for controlling hazardous waste, which can be achieved by focusing on protecting human health and the environment from the potential hazards of waste disposal; conserving energy and natural resources; reducing the amount of waste generated; and ensuring that wastes are managed in an environmentally-sound manner.

propose that firms perceive illegal disposals as retaining an expected positive net present value however penalties reduce the profitability of these illegal disposal activities. Thus a necessary condition for a lawsuit is to generate deterrence, in other words the penalties must outweigh the benefits obtained from waste mismanagement. The sample used in the analysis was composed of 128 firms experiencing lawsuits against them, as well as 74 case settlements announced between 1977 and 1986.

Based on Moody's industry classification, the sample was partitioned into three main groups: 68 firms in the petrochemicals group, 11 firms in the pollution management and control group, and 49 firms in the "others" group. The others category was comprised of firms from the full sample that were not in the petrochemical and pollution management subsample. The authors use an event-study methodology to measure the abnormal returns and expectedly negative returns suffered by stockholders between 1977 and 1986. Abnormal returns for each firm are computed on the basis of a 121 day event window (-60, 0, 60).

The results indicate that negative abnormal returns are associated with the incidence of lawsuits being filed, however that abnormal returns at the disposition of the suits are statistically insignificant. This suggests that lawsuits impose a lump-sum penalty on firms when information about the suit becomes publicly available.

Hamilton (1995) investigated whether pollution data released by the EPA, in the Toxic release Inventory (TRI) reports, are considered of value to both journalists and investors. TRI data published by the EPA was used as a metric to measure companies' waste generation and pollution reduction activities. Specifically, he investigates the extent to which TRI data provided news to investors by examining whether or not its

release generated abnormal returns associated with changes in the expectation of pollution costs. Hamilton also explores the degree to which the release of the data is treated as news by investors. This was done by examining whether or not firms' TRI figures were mentioned in newspapers. TRI data published in 1989 included 893 publicly traded companies that were linked with facilities reporting TRI data, of which 436 firms were used in the final sample.

An event-study methodology was used following the model developed by Dodd and Warner (1983). Abnormal daily returns were calculated for the TRI release date, June 19, 1989. Also, logistic regression analysis was used to assess the second hypothesis. The results reveal significant negative abnormal returns on the day of the TRI announcement where firms reporting to the EPA lost an average of $4.1 million in stock values. Firms with prior disclosure and/or external disclosure sources of poor environmental performance, however, experience a smaller negative effect at the TRI announcement. The study provides weak results regarding the relevance of TRI information to the media indicating that the majority of publicly traded firms reporting TRI to the EPA don't receive media coverage.

Lanoie, Laplante, and Roy (1998) investigate the role that capital markets may play in creating an incentive or appling pressure on firms to improve their environmental performance. Since July 1990, the Ministry of Environment of British Columbia has published a list of polluters classified into two categories: firms out of compliance regarding environmental standards or permits and firms of concern to the Ministry because their environmental performance is near the regulatory threshold, or because their level of pollution is abnormally high in a sector of activity which is not regulated.

The authors investigate how investors react to firms that appear successively on more than one environmental pollution list. They examined the impact of the first five lists of polluters on the equity value of 19 firms appearing on any of these first five lists. Firms were identified either as “out-of compliance” or as “of concern”. The selected sample also allows for firms with several plants to appear more than once on the same list if many of their plants are either non-complying or of concern. A standard event-study technique was used. A three day event window (-1, 0, +1) was considered, where DAY 0 refers to date the lists were published.

In their analysis, Lanoie, Laplante, and Roy first consider the entire sample of firms appearing on each list. Their results indicate that there are no statistically abnormal losses on any day of the event window. They then examine the firms that are of concern versus those that are out-of-compliance. Again the results show no statistically significant abnormal losses in either category. Furthermore, they examined firms that appeared only once versus those appearing several times. In this instance, the results reveal statistically significant abnormal losses on day -1 and day +1 for firms appearing more than once. Finally, they investigate how investors react to successive appearances on different lists, that is, firms that appeared on all lists whether being of concern or out-of compliance. For these firms, significant abnormal losses are found for the second list on day +1. These results indicate that investors require strong signals about firm’s environmental performance before revising the expected value attributed to the firm.

Konar and Cohen (1997) study the validity of environmental disclosure as a regulatory mechanism. They specifically examine firms’ subsequent environmental performance after experiencing a significant negative abnormal stock market reaction due

to new information on toxic chemical emissions. They hypothesize that a change in the financial performance of a firm as a result of the provision of new pollution information will provide incentives that will affect the attitude of the firm towards environmental performance. The authors used 2 measures of TRI related performance: the absolute level of emissions per thousand dollars revenue in order to control for size differences, and firm rank within its industry category, normalized by the number of firms in the industry, where ranks were determined by the level of emissions per dollar revenue. Based on the Investor Responsibility Research Center (IRRC) dataset, environmental performance was assessed using two measures: oil and chemical spills and government-imposed fines for environmental violations. Both variables are measured as the average of two time periods, 1988-1990 and 1991-1993. The study identified all firms with significant negative abnormal returns associated with the EPA announcement of TRI emissions in 1989. The sample is composed of 130 firms with available stock prices on the CRSP database. “Top 40” refers to the 40 firms in the sample that experienced the largest negative abnormal returns. To conduct the comparison between the “Top 40” firms and industry peers, an industry matched control sample of 455 firms was selected. A TRI emission level comparison was then conducted for 1989 and 1992. The three year time gap was intended to allow for firms’ investment in pollution abatement programs to take effect. The average TRI emissions for two time periods: 1988-1990 and 1991-1992 were also compared.

The results of this study indicate that firms experiencing significant negative market reactions due to the disclosure of poor environmental performance tend to reduce their toxic emissions more than industry peers; make significant attempts at improving

their environmental performance by reducing the number and severity of oil and chemical spills; and have a lower chance of receiving higher fines from the government in subsequent years. They conclude that environmental disclosure and consequent financial market responses serve as a market based regulatory mechanism for improving firms' environmental performance. Thus, providing information to the public may be an effective way to reduce environmental externalities beyond a regulatory standard.

Bosch, Eckard and Lee (1998) study the association between EPA enforcement activities and firms' stockholders returns. They address the issue of firms recovering pollution control costs from customers and whether it is affected by foreign competition or not. Firms subject to EPA enforcement will proceed in one of four ways: the firm becomes the target of an investigation and is possibly penalized by the EPA, a "targeted firm"; the outcome of the investigation may be that firms lose to the EPA and accept their decisions, "losers", or firms will win and get cleared from the charges, thus becoming "winners"; however firms who lose may choose to challenge the EPA decision, "challengers." The initial sample was drawn from the Wall Street Journal index for the period 1970 to 1990. Searching for EPA announcements yielded a total of 525 cases involving 244 firms. The final sample was composed of 77 firms with 171 observations. An event-study methodology was used to assess market reactions to the EPA enforcement activities over a 21 day event window (-10, 0, 10). The results reveal a negative market reaction to EPA announcements. "Losers" experience a negative market reaction, however they benefit from compliance with the EPA decisions in several ways such as facing lower costs, greater ability to recover costs from customers, and the ability to negotiate more favorable settlements. For "challengers", no significant negative

abnormal returns are found, which is explained by the fact that firms challenging EPA decisions might be signaling information regarding a high probability of winning their challenge. Surprisingly, no positive returns are reported for “winners”, which may be due to market expectations. The second part of the analysis concerns firms' abilities to recover costs from customers. The results reveal that losses are weakly associated with the presence of foreign competition. The authors conclude that untargeted domestic competitors may hinder firms’ cost recovery.

2.3 Association between Environmental Disclosure and Environmental Performance

Another focus of research in this area has been on the association between environmental disclosure and environmental performance. The results of these studies, however, are mixed. Voluntary disclosure theory suggests that firms with superior environmental disclosures will disclose more performance indicators so as to distinguish themselves from average or low performers, at the same time poor performers will disclose less information, if any, in an effort to avoid negatively affecting their market value. This suggests a positive association between environmental performance and the level of discretionary (voluntary) environmental disclosure. The legitimacy theory, however, suggests the opposite. Here, social disclosure is a function of social and political pressures facing the corporation. Poor performers are subject to more political and social pressure, and tend to increase their environmental disclosures to reduce the negative impact of the poor performance.

According to Chan-Fishel (2002) environmental disclosure rules and regulations formulated by accounting standard setters and the Securities and Exchange Commission

(SEC), are not yet comprehensive enough to fully reflect firms' environmental performance. This is because firms may choose not to report important environmental facts as long as they are not required to do so. This study reviews the SEC's filings of publicly traded companies in 4 industrial sectors: automobile, insurance, oil & gas, petrochemicals and utilities, in the United States and conducts a survey and analysis of those companies' climate change related disclosures. A sample of 87 publicly traded companies was reviewed in the survey. The sample is composed of 23 automobile and truck manufacturing firms, 14 property and casualty insurance firms; 18 integrated oil and gas firms; 15 firms in the plastics and rubber-based chemical industry; and 14 electric utilities firms. Some of the firms surveyed were not based in the United States, however, they were all publicly traded in the United States capital markets.

The study examined firms' 2001 10-K filings or, for foreign companies, 20-F filings. With the exception of the insurance industry, companies were surveyed as classified by YahooFinance. Firms were classified as reporting companies if they specifically mentioned the words climate change or global warming. Firms that mentioned greenhouse gas or carbon dioxide emissions, but failed to discuss them in the context of climate change, were not deemed to be providing climate change disclosure. The survey examined the climate change related disclosures with firms' annual reports. The survey examined specific regulations (in which the company describes specific climate change related regulations); the impact on markets (in which the company provides an analysis of the potential impact of climate change on its market); the impact on the firm (in which the company provides an analysis on the potential impact of climate

change on its operations); and the firm's response (in which the company reports on its potential or actual responses to climate change).

The results indicate that 26% of the companies surveyed provide climate change reporting, but most climate reporters are European-based companies. European, Japanese, and Canadian firms report at a rate of 56% as compared to a 15% rate for U.S firms. About half of all electric utilities and integrated oil & gas companies' discuss climate change in their most recent annual SEC filings. Among automobile and truck manufacturers, less than 20% of companies discuss the impact of climate change on their businesses, although many firms inform investors about matters involving carbon dioxide emissions. The petrochemical and insurance sectors provide the least disclosure (only one out of 15 petrochemical companies, and one of the 14 property and casualty insurance companies discuss global warming in their annual SEC filings). Reflecting the materiality of climate change policies, the utilities industry has the most climate disclosure amongst the five sectors surveyed. About half, 9 out of 17, companies provide climate change related reporting in their most recent SEC annual report. Disclosure in this sector also tends to be of relatively high quality. Approximately 26% of companies surveyed report on climate change, but very few of them provide quantitative information. Common types of qualitative information that are provided in the SEC filings included discussions of climate legislation/regulations; the financial impact of these policies on the industry sectors; the impact of climate change on the business operations; and firm responses to these policies.

Belkaoui (1976) investigates the impact of pollution control expenditure disclosures on stock market prices. A sample of 100 firms from different industries was

collected. The sample is composed of two groups of 50 firms each. The group of interest contains firms that disclosed pollution control information in their 1970 annual report, while the other group represents a control group matched by industrial classification and firm size. Belkaoui proposes that the impact of pollution control expenditures on stock market prices can be explained by two competing theories: the first is the efficient markets theory, which suggests that pollution control expenditure disclosures might be followed by both changes in the expected earnings as well as changes in the risk class and discount rates; the second theory is the naive investor theory, which suggests that investors consider changes in the earnings per share and accounting data to be more important than other specific information such as pollution control expenditures and consequently do not respond to that information.

An event-study methodology was employed to test these conjectures, using a 24 month window comprised of 12 months before (T-12) and 12 months after (T+12) the annual report filing date. The results of the study reveal that during the period when pollution control expenditures are disclosed, firms underperform the market. These same firms, however, outperform the market for a period of 4 months after the expenditure disclosure. The results also indicate that the advantage (outperformance) over the market decreases from T+2 to T+4 then becomes a disadvantage (underperformance) indicating an immediate but temporary response to the pollution control expenditure disclosure. This final decline in stock performance is explained by the two hypotheses noted above. Based on the efficient markets hypothesis, stock prices decrease when investors holding the shares find it profitable to sell their stock (extra supply) leading to a decrease in stock prices. Based on the naive investor hypothesis, the short term effect of the expenditure

disclosure attracts ethical investors seeking shares with better social images, however, such a predisposition is only temporary.

Jaggi and Freedman (1982) investigate the informational content of pollution disclosures in annual financial statements for the years 1973 and 1974. Their null hypothesis is that there is no difference in investor reactions to firms with or without pollution disclosures included in the financial statements. They suggested that the results could be interpreted in light of two hypotheses, the “ethical investor hypothesis”, which maintains that investors are governed by ethical conditions and act favorably to pollution abatement expenditures, or the “rational investor hypothesis,” which suggests that investors are likely to respond negatively to the pollution abatement expenditures since they assume that firms using their resources to discharge social responsibilities are likely to experience reduced profitability. The rejection of the null hypothesis would suggest that pollution disclosures are of information value to investors. If the investors’ reaction is negative, it would support the “rational investor hypothesis.” If, however, the reaction is positive, it would support the ethical investor hypothesis.

In 1973, as a result of the national environmental policy act of 1969, the SEC required firms materially affected by pollution regulations to include pollution information in their 10K reports. All firms, in the chemical; paper and pulp; oil refining; and steel industries available in the COMPUSTAT database were studied. Only 84 firms disclosed environmental information. Twenty-one firms did not. T-tests were conducted to determine whether the two groups differed with regard to size, structure, asset turnover, or profitability. The results indicate no significant differences between the

groups except for firm size (measured by either total assets or sales). The results, however, reveal significant differences in investor reactions to the groups.

An event-study methodology was then used to assess investor reactions. The Wall Street Journal Index was screened to verify the month in which pollution information was disclosed. Prior studies such as Belkaoui (1976), Ingram (1978), and Anderson and Frankel (1980) used the last month of the fiscal year as the event month. Jaggi and Freedman, however, defined the event month as the month the firms filed their 10K reports with the SEC. The results provide support to the alternative hypothesis that investors' reactions to the disclosing group are different from their reactions to the non-disclosing group. Since the reaction was positive (consistent with Belkaoui, 1976), the results provide support to the ethical investor hypothesis.

Freedman and Jaggi (1988) investigate whether pollution disclosures are influenced by the economic performance of firms and whether the association between pollution disclosures and economic performance differs based on size as well as across industries. They suggest that the pollution disclosure decision is a complicated process that is influenced by numerous factors that could be financial or nonfinancial in nature, however, only the financial variables were considered as reflecting on the economic health of the firm. An index was developed to assess the pollution disclosure. Firms' annual reports for the years 1973 and 1974 were examined for the amounts of emissions and the capital expenditures for pollution abatement regarding past, current, and future activities. Higher weights were assigned to items if they provided more information about firms' compliance with the regulatory requirements. The weights were 2.5 for EPA standards for pollution emissions and firms' performance; 2 for future capital

expenditures; 1.5 for current capital expenditures; 1.5 for past capital expenditures; 0.5 for descriptive with percentage; and 0.5 for descriptive. ROA, ROE, Cash Based ROA, Cash Based ROE, operating ratio based on total assets, and operating ratio based on total equity were used as economic performance indicators. The sample was drawn from industries recognized by the Council of Environmental Quality in 1977 as highly polluting industries. These industries were paper and pulp, oil refining, steel, chemical, and electric utilities. Firms from the utilities industry are not, however, included in the final sample since it is a highly regulated industry and publicly disclosed economic performance is guided by special regulations. All firms belonging to these industries and having financial information available on the COMPUSTAT database are part of the sample. Pearson product-moment correlation as well as Spearman rank correlation techniques are used in the analysis.

This study reveals no significant association between pollution disclosures and economic performance. Each industry subgroup is tested individually to assess the degree of the correlation across industries. Results indicate that only two economic indicators are significantly correlated with pollution disclosure, ROA within the oil refining industry and Cash Based ROE within the paper industry. The sample was regrouped based on firm size, using both total assets and sales, where firms falling within the top quartile were considered to be "large" and those in the bottom quartile "small." firms. The authors concluded that there is no association between economic performance and pollution disclosure for small firms but a significantly negative association exists for large firms.

Ingram and Frazier (1980) also study the relationship between firms' environmental performance and environmental disclosure contained in the annual reports.

They argue that for disclosures to be useful there should be a correspondence between the disclosures and the actual events. Thus their hypothesis proposes that the content of firms' environmental disclosure is associated with the firms' environmental performance. Firm environmental performance was assessed using the performance index constructed by the Council on Economic Priorities (CEP) assessing the level of harmful emissions. The CEP index covers 50 firms in four different industries, electric utilities, iron and steel, petroleum refining, and pulp and paper. Forty of the firms were selected and evaluated. Environmental disclosure was measured using content analysis based on 20 categories in four main dimensions: evidence; time; specificity; and theme.

The relationship between firms' environmental performance, using CEP index scores, and the content of the firms' environmental disclosures, using the content analysis scores, is first estimated by product-moment correlation. The results reveal a weak positive correlation for all activities except litigation, which has a negative (weak) correlation. Multiple-regression analysis is then used to determine the multivariate association between content analysis scores and the CEP index scores. Again, the authors find no significant association between environmental performance and any of the categories of environmental disclosures.

Following the environmental performance research design of Ingram and Fazier (1980), Wiseman (1982) examines the quality of environmental disclosure in the annual reports by investigating the association between voluntary environmental disclosure and environmental performance. Voluntary environmental disclosure is measured using content analysis constructed by Wiseman covering 18 items related to four categories: 5 items related to the economic factors category, 2 items related to the environmental

litigation category, 5 items related to the pollution abatement activities category, and 6 items related to the environmental disclosures that did not fall into the other three categories. A score was assigned to each item based on whether the disclosure was quantitative (3 points), qualitative (2 points), or mentioned in general terms (1 point). Firm environmental performance is measured based on the CEP published environmental performance. The sample is based on the CEP index that was composed of 50 firms in four different industries: electric utilities, iron and steel, petroleum refining, and pulp and paper. No significant association between environmental performance and the Wiseman environmental disclosure index is found.

The same association and research design was employed by Freedman and Wasley (1990) and Bewley and Li (2000). Freedman and Wasley (1990) investigate the relationship between pollution performance and pollution disclosures made in annual reports and in the 10-K reports filed with the SEC. The association between environmental performance and environmental disclosure in the annual reports addressed the association between environmental performance and voluntary environmental disclosures. The association between environmental performance and environmental disclosure in the 10K reports addressed the association between environmental performance and mandatory environmental disclosures. Two hypotheses are investigated, first, that there is no association between the environmental disclosures made by firms in their annual reports and their actual environmental performance and second, that there is no association between the environmental disclosures made by firms in their 10-K reports and their actual environmental performance.

Environmental performance is measured using the disclosure index developed by the CEP. The CEP evaluated the environmental performance of firms from four highly polluting industries: steel; oil; electric utilities; and paper and pulp, on a plant-wide basis. Environmental disclosures are measured by using the Wiseman indexing procedure developed in 1982. The sample is based on the CEP environmental performance report regarding 50 firms in the previously mentioned four industries. The Spearman rank correlation technique is used in the analysis. The results indicate that neither voluntary environmental disclosures nor mandatory 10-K disclosures are significantly representative of actual environmental performance. The authors conclude that for environmental disclosures to be useful to financial statements users, more environmental disclosures need to be made in the annual reports and that mandatory 10-K disclosures should be improved.

Bewley and Li (2000) investigate the influence of firm-specific factors such as: outsiders' knowledge about the firm's environmental problems; pollution propensity; political exposure; auditor quality; and financial performance on corporate environmental disclosures. The voluntary disclosure theory suggests that firms disclose 'good' news and withhold 'bad' news. The authors argue that different groups of stockholders use environmental information differently, thus it is reasonable to assume that management targets different audiences by reporting specific/customized environmental disclosures. The study distinguishes between disclosures of general environmental information and financial environmental disclosures. Financial environmental disclosures refer to either specific dollar amounts of environment-related items or accounting policies for environment related activities. Financial disclosures are measured in two ways: the first

measure assesses the extent of financial disclosure while the second measure is a simple indicator of the presence or the absence of such disclosures. General environmental disclosures include qualitative aspects of corporate environmental performance and attitudes and actions towards environmental pollution controls. This type of disclosure is also measured in two ways. The first measure is the total number of disclosures and the second is non- financial disclosures only. Total environmental disclosures are measured using content analysis developed by Wiseman in 1982. Financial performance is measured using return on assets (ROA). The sample, composed of 188 firms, was drawn from the 863 Canadian firms used in the Canadian Institute of Chartered Accountants' study, Environmental reporting in Canada: A survey of 1993 reports.

This study focused mainly on manufacturing firms, since manufacturing activities consume natural resources and energy more than other type of firms and thus may cause more environmental damage. Ordinary least squares regression analysis is used as well as Logit analysis. Consistent with the voluntary disclosure theory, the results suggest that both financial and general environmental disclosures are associated positively with pollution propensity and political exposure. Only general environmental disclosures are, however, positively associated with outsiders' knowledge of the firm's environmental exposure. Control variables, auditor quality, and financial performance, are not found to have any significant association with either type of disclosure. Audit quality and general environmental disclosures are not significantly associated while a modest positive association is found between audit quality and the extent of financial disclosure.

Fekrat, Inclan and Pertoni (1996) studied the scope and the accuracy of environmental disclosures made in corporate annual reports. The scope addressed

whether a significant difference in mean disclosure scores exists among firms within different industries and/or countries. The accuracy addressed whether or not environmental disclosures are associated with environmental performance. Two hypotheses are addressed, the first hypothesis proposes that there is no significant difference in the mean disclosure scores among different industries; the second hypothesis proposes that there is no significant difference in the mean disclosure scores among different countries. The entire 222 firms on the UN data base were contacted. Of these, 168 major international companies replied and are included in the analysis. The sample covers six industries operating in 18 countries. The six industries are chemicals, forestry and related products, metals, motors, petroleum and petrochemicals, and pharmaceuticals; these industries are considered to be the ones with the most environmental problems. Environmental disclosures were quantified using a coding procedure similar to Wiseman environmental disclosure index (1982). The CEP ranking was generated, based on the toxic release data and the Superfund Potentially Responsible Party (PRP), as a proxy for firms' environmental performance. A subsample of 26 firms monitored and ranked by the CEP is used to investigate the association between environmental disclosure and environmental performance. Mean ED scores are compared across industries and countries using analysis of Variance (ANOVA). Also, the association between environmental disclosure and environmental performance is examined using Spearman rank correlations.

The results of the study reveal significant variations among companies in different industries and countries regarding the amount of environmental performance information they disclose in their annual reports to shareholders. Consistent with Wiseman (1982),

firms' disclosure does not seem to correlate with actual environmental performance. The previous results suggest that contrary to the voluntary disclosure hypothesis, an environmental disclosure gap exists amongst international firms in environmentally sensitive industries. In other words, international firms are not competing to match one another in providing comparable environmental disclosures in their annual reports. This can be explained by the fact that some firms do not use the financial markets as a primary source of capital, so they tend to be less concerned with the effects of information disclosure on financial markets. These findings are consistent with Feltham and Xie (1992).

Hughes, Anderson, and Golden (2001) examine whether or not environmental disclosures can be used as a valid indicator in determining firms' environmental performance and whether or not the disclosure differences can be used to differentiate between actual environmental performance levels. They also address how additional disclosure standards, such as Staff Accounting Bulletin No.92,[16] affect disclosure within the notes section of the annual report between 1992, Pre-SAB 92, and 1993, Post-SAB 92, as well as affecting disclosures in other sections. Four hypotheses are addressed. First, that the annual report disclosures within the president's letter, the Management's discussion and analysis, and notes sections differ between firms ranked as good, mixed, and poor environmental performers; second, that environmental disclosures can be used to distinguish good, mixed, and poor environmental performers; third, that due to additions of disclosure requirements, annual report disclosures within the notes section

[16]SAB 92 includes 8 disclosure examples that may be required under SFAS No. 5 for contingencies related to environmental or product liability. SAB 92 cautions registrants that "a statement that the contingency is not expected to be material does not satisfy the requirements SFAS 5.

are greater in 1993 than they were in 1992; and fourth, that environmental disclosures increase from 1992 to 1993 in annual report sections that are not subject to changes in disclosure requirements.

In 1991 the CPE published evaluations of 100 US-based corporations in the Better World Investment Guide. Fifty-one of these firms are included in the sample. To measure firms' disclosure within the president's letter, MD&D and the financial statements notes Wiseman's content analysis was used. A disclosure is coded 4 if the environmental impact is clearly defined in terms of monetary or actual physical quantity, 3 if the impact on the company or its policies is clearly defined, 2 if disclosure is limited to passing comment of environmental effects within discussions of other topics, and 1 if the disclosures are immaterial to the financial conditions and results of operations. CEP ranking of firms' environmental performance was coded as good, mixed, and poor. Good if positive environmental programs are applied, mixed if positive programs are applied but the firm still faced environmental problems, and poor if the firm has major environmental violations or had a history of opposing environmental policies.

The first hypothesis is tested, using one way ANOVA for each category and topic for each year. Section disclosure scores were computed using the weighted disclosures and performances groups. Significant differences are limited to disclosures within categories of economic factors, litigation, and their related topics. Furthermore, least significant difference (LSD) and Tukey's honestly significant difference (HSD) are used to check for the source of the differences. The results of both tests indicate that significant disclosure differences occur between good and bad environmental performers, as well as, between mixed and poor performers, however no significant disclosure

differences are reported between good and mixed environmental performers. Finally, step-wise discriminant analysis is used to determine whether environmental disclosure levels distinguish firms with different environmental performance. No significant association is found between firms' environmental disclosure and actual environmental performance. There is no significant increase in environmental disclosure within the notes section for good performers, but there is for both mixed and poor performers. There is no significant disclosure increase in either the president's letter or the MD&D.

To further test the fourth hypothesis, disclosure topics most likely to be affected by SAB No.92 were identified, the topics include future expenditures for environmental equipment; facilities and remediation; future estimates of operating costs for environmental equipment; facilities and remediation; accrued liabilities; and estimated costs of litigation. The results suggest that companies faced with additional required disclosures in one section of the annual report tend to increase disclosure only in other areas to maintain disclosure consistency.

Patten (2002) examines the association between environmental performance and the extent of environmental disclosure in firms' 1990 annual reports. Environmental performance is measured by company specific toxic releases, as reported by TRI. The extent of the environmental disclosure is measured in 2 ways: quantity wise (using lines count), and content wise (using content analysis). The content analysis measured the extent to which eight different aspects of environmental concern were discussed or mentioned within the environmental disclosure section. Environmental concern aspects are environmental regulations; firms' attempts to attain the reduction of environmental degradation; firms' concerns for the environment; firms' environmental compliance

status; current or past pollution control or abatement expenditures; future pollution control or abatement expenditures; current or past operating costs for pollution control or abatement; and future operating costs for pollution control or abatement. Litigation related disclosures are not included as they tend to be less discretionary than other environmental disclosures. The final sample is composed of 131 observations. Ordinary lease squares regression analysis is used in the analysis.

The first interaction variable is designed to capture potential differences in the impact of the TRI variable across larger and smaller firms (Big*TRI). The second interaction variable captures differences in the impact of the TRI variable across firms from environmentally sensitive as opposed to non-environmentally sensitive industries (IND*TRI). The results indicate a significant positive association exists between both the size and industry classification variables and the extent of disclosure, and a significant positive association exists between toxic release levels and environmental disclosure. This suggests a negative association between environmental performance and environmental disclosure. Big*TRI was not statistically significant, however, a significant negative association was found for IND*TRI. This indicates that the firms from environmentally sensitive industries show less variation in disclosure scores than the firms from less environmentally sensitive industries. The results of the regression analysis using environmental disclosure line counts as the dependent variable yield the same results.

Al-Tuwaijri et al. (2004) provides an integrated analysis of how management's overall strategy affects environmental disclosure, environmental performance, and economic performance. They address the following questions: how are the firms'

environmental performance, environments disclosure, and economic performance interrelated, and does the joint estimation of these relations significantly differ from independent ordinary least squares estimations? Environmental disclosures are assessed using content analysis that incorporates disclosures of four key environmental indicators: total amount of toxic wastes generated and transferred or recycled; financial penalties from environmental law violations; potential responsible party designation; and instances of oil and chemical spills. Weights were assigned for different levels of precision such that quantitative disclosures are coded 3, non-quantitative but specific disclosures are coded 2, and quantitative disclosures are coded 1. Environmental performance is measured using the ratio of toxic waste recycled to total toxic waste generated. Economic performance is measured using industry adjusted annual returns. A cross sectional sample of 198 U.S. Standard & Poor's 500 firms, are employed in the study. In their analysis, the authors compare independent OLS estimations of the relation between the three corporate functions with the joint estimations using two-stage least squares (2SLS) and three stage least squares (3SLS) simultaneous equation models.

The results of the analysis reveal statistically significant differences in estimating the interrelations between environmental disclosure; environmental performance; and economic performance. The OLS results suggest that only the association between economic performance and environmental performance is significant while the other interrelations are not. The joint estimation, however, reveals a significant positive association between good environmental performance and good economic performance, and also with more extensive quantifiable disclosure of environmental disclosures of specific pollution measures and occurrences.

Cho, Roberts, and Patten (2009) investigate whether or not self-serving biases are present in the language and verbal tone in corporations' environmental disclosures. They argue that the degree of bias in the disclosure narratives is based on firms' environmental performance. Two hypotheses are addressed: the first hypothesis proposes that optimism exhibited in 10K report environmental disclosures is negatively related to firms' environmental performance. The second hypothesis proposes that certainty exhibited in 10K report environmental disclosures is positively related to firms' environmental performance.

The hypotheses are developed based on Merkl-Davies and Brennan's (2007) impression management framework which divides corporate impression management strategies into two broad categories: concealment and attribution. In this framework, disclosures accomplish concealment by emphasizing good news and hiding bad news. Merkl-Davies and Brennan define attribution as a "defensive framing tactic that shifts the blame for negative outcomes away from firms' themselves." Which in a corporate context, "entails managers attributing positive organizational outcomes to internal factors ("entitlements") and negative organizational outcomes to external factors ("excuses").

Environmental performance is measured using environmental concern ratings provided by KLD research and Associates, Inc. Environmental disclosures are assessed based on two criteria, optimism and certainty. Content analysis software DICTION[17] is used to determine optimism and certainty scores for the disclosures. Optimism refers to a

[17]DICTION was developed by Hart, communication researcher, and focuses on the subtotal power of word choice and verbal tone (Hart, 1984). Similar to other content analysis software is DICTION relies on word frequency count, however, it is unique from several perspectives: first, DICTION relies on word counts based on linguistic theory; uses elements of artificial intelligence that have been underutilized in the accounting literature; falls within the scope of systematic linguistics; and is automated (making it more valid and reliable than other software packages) It has its theoretical basis in linguistic semantics and its independently attested establishments in the applied linguistic literature.

language “endorsing some person, group, concept or event, or highlighting the positive entailments”. Certainty refers to language that indicates “resoluteness, inflexibility, completeness, a tendency to speak ex cathedra.” To be included in the sample, firms had to meet four criteria: first, they must be listed in the KLD corporate social and environmental performance database for year 2002; second, they must have their fiscal year ending between June 30, 2002 and December 31, 2002; third, they must be listed in Standard & Poor’s 500 index for fiscal year 2002; and finally, firms must have 10K reports for the year 2002 and these reports must include section-one environmental disclosures.

The final sample is composed of 190 firms, of which 43 are from environmentally sensitive industries, namely, oil and gas extraction, chemicals, paper, primary metals, petroleum refining, metal mining. Control variables used in the analysis are firm size, capital intensity, profitability and company age. Ordinary least squares multiple regressions are used in the analysis. The authors find a negative association between firms’ environmental performance and the optimism score of the firms’ environmental disclosures. They also find a positive association between firms’ environmental performance and the certainty score of the firms’ environmental disclosures. These results support the argument that poor environmental performers use a more optimistic tone and less certain language in the wording of their environmental disclosures.

In summary, the prior literature studying the association between environmental disclosure and environmental performance provides mixed results. Several reasons may be cited for such discrepancies. As identified by Patten (2002), these reasons may include inadequate sample selection and/or inadequate measures of environmental performance.

The use of the Wiseman Index may also be problematic since the CEP assessed only a small group of companies in only four industries. Also, the CEP didn't use the same criteria and methodology to assess corporate environmental performance across industries.

2.4 Association between Environmental Performance and Stock Prices (financial performance)

The association between environmental performance and financial performance, measured by stock price changes, has been addressed by several studies. This line of research supports the perspective that the cost of having a high level of corporate social responsibility is more than offset by the increased benefits in employee morale and productivity (Solomon and Hansen, 1985). A positive association has been identified in a number of studies such as Anderson and Frankle (1980) and Belkaoui (1976). However, additional studies such as Ingram and Frazier (1980) and Jaggi and Freedman (1982), have found a negative relationship. Fryxell and Wang (1994) argue that an inaccurate measure for a construct may lead to this kind of conflicting result. They reported that the strong association between the Corporate Reputation Index (CRI), a commonly used measure for assessing social performance, and the firm's financial performance results stem from the fact that the Corporate Reputation Index is heavily weighted by the financial position of the firm.

Anderson and Frankle (1980) study the capital markets reaction to voluntary environmental disclosure. Specifically, they analyze the capital markets' response to firms' voluntary disclosures reported in the 1972 annual reports of Fortune 500 firms.

They hypothesize that equally risky portfolios have equal expected returns and that information produced by voluntary social disclosure does not change investors' expectations or the allocation of economic resources. Their sample is obtained from a survey conducted by Beresford (1974) that was addressed to firms from the Fortune 500 for years 1971 and 1972. The final sample is composed of 314 firms and is grouped by whether the firms did (201 firms), or did not (113 firms) disclose environmental information.

Beresford's survey attempts to categorize firms' social disclosure. He describes various areas of disclosure made by firms disclosing social information. These areas are environmental control, minority rights, personnel responsibility, community activities, and product improvement. These areas coincide with the areas defined by the NAA Community Report on social reporting. The returns of portfolios composed of securities for socially disclosing firms are compared to the returns of portfolios of equivalent risk composed of the securities of non-disclosing firms. The results indicate that firms that disclose social events outperform those that do not disclose. Anderson and Frankle conclude that social disclosure has information content and that the market reacts to these disclosures positively, however, the market doesn't anticipate social disclosure prior to its release in the annual reports.

Another perspective suggests that the costs of being socially responsible force firms into an unfavorable financial position as compared to firms that are not socially responsible. Aupperle, Carroll, and Hatfield (1985) investigate the relationship between corporate social responsibility and profitability. They initially aim at developing an instrument to measure the degree of orientation to social responsibility and then use that

instrument to assess how CEOs view their firm's social responsibilities. They use Carroll's (1979) definition of corporate social responsibility that is composed of four main components: economic, legal, ethical, and discretionary concerns. They employ a survey instrument to assess corporate social responsibility. They use a forced choice methodology survey to minimize the social desirability of responses. Respondents were asked to allocate up to 10 points for each of 20 sets of statements made using corporate social responsibility where each set contains four statements, each of which corresponded to one of Carroll's 4 components. Non-economic components of the survey were derived from previous studies such as Eilbirt and Parket (1973), Corson and Steiner (1974), Paluszek (1976), Holmes (1977), and Ostlund (1977). Only items rated as important by respondents in the former studies were considered, also industry-specific items were omitted to facilitate the generalizability of results.

To test the reliability of the survey, Cronbach alphas were calculated for each of the four categories of social responsibility and were all higher than 0.8. The final questionnaire included two additional questions that asked whether or not the respondent's organization was engaged in social forecasting and whether or not the respondent's organization had a corporate social responsibility committee on its corporate board. The questionnaire was sent to the 818 CEOs listed in Forbes 1981 annual directory and resulted in 241 usable responses.

Factor analysis is conducted for the 80 items in the survey. The resulting pattern and structure of factors supports the validity of the four-part corporate social responsibility construct. It produces, however, an unexpected inverse relationship between economic and ethical dimensions implying that the emphasis (loadings) on one

of the factors came at the expense of the other one. The relative weights of each of the components, assigned by the surveyed executives, were: economic = 3.5, legal= 2.54, ethical = 2.22, and discretionary concerns = 1.3. Afterwards the four components are rearranged into two categories to assess corporate social responsibility: “concerns for the society” (the three non-economic components) and “concern for economic performance” (one-year and five-year ROA).

No significant association is found between concerns for society and financial performance using either long-term or short-term ROA. In regards to long-term profitability, no significant differences are reported between firms that employ social forecasting and firms that do not. Also, no statistically significant differences are found between firms with a corporate social responsibility committee on their boards and firms without such a committee.

Spicer (1978) also tests the association between firms’ economic and financial indicators and firms’ corporate social performance. The economic and financial indicators of investment value are measured using 5 different measures, which are profitability, size, total and systematic risk, and the price/earnings ratio. Firms’ social performance is assessed based on firms’ pollution control activities which are measured using CEP's ratings. The CEP ratings are based on the efficiency of air and water pollution control systems. The ratings provided by the CEP studies for years 1970 and 1972 are used to develop two pollution indices. The first index is a pollution index based on the percentage of the companies’ pulp and paper productive capacity (tons/day) with adequate pollution-controls. The second index is a pollution index based on the percentage of a companies' pulp and paper mills with adequate pollution controls. Spicer

proposes that better pollution control records are positively associated with profitability, firm size, and price/earnings ratios, while negatively associated with total risk and systematic risk.

The final sample is composed of 18 firms in the pulp and paper industry. These 18 firms were listed on the New York Stock Exchange and are representative of the larger firms in the pulp and paper industry (13 firms have 50 to 100 percent of their sales from the paper industry while the other 5 firms have between 25 and 50 percent). The hypotheses are investigated using two non-parametric statistical techniques: the Spearman rank correlation coefficient, which provides a measure of the association between two variables measured in or transformed into ranks; and the Mann-Whitney U test, which provides a test for determining whether two independent samples are drawn from the same population.

Two time periods are utilized in the analysis. The first is a six-year period from 1968 to1973 and the second consists of two overlapping three-year periods from 1969 to 1971 and from 1971 through 1973. The results, using the Spearman's Rank Correlation Coefficient, indicate that firms with better pollution control records tend to have higher profitability, larger size, lower total risk, lower systematic risk, and higher price/earnings ratios than companies with poorer pollution control records. However, it was reported that there is a marked reduction in these associations over time which suggests that such associations may be a relatively short-lived phenomena under situations where public pressure leads to legislative mandates with respect to pollution abatement.

Freedman and Jaggi (1988) examine the association between pollution and economic and market performance of pulp and paper firms after the clean water act

amendments were enforced. They address two main hypotheses: the first hypothesis proposes that there is no association between pollution and the economic performance of pulp and paper firms over a short-term period, while the second hypothesis proposes that, there is no association between pollution and the market performance of pulp and paper firms over a short period of time. Pollution is measured in terms of water quality. Three measures are used in determining water quality: biochemical oxygen demand, total suspended solids, and pH water acidity-alkalinity. These three measures are used to build a pollution index that measured the changes in pollution emissions.

Economic and market performance is assessed using five indicators: net income; return on equity; return on assets; cash flow/equity; and cash flow/assets. The sample consists of 13 firms included in the CEP study for the year 1978, whose primary product was pulp and paper. The EPA pollution reports were filed on a plant basis. 81 plant locations were identified for the sample firms. Pearson correlations were used to assess the degree of association over the different time periods. First, the pollution performance of 1978 is correlated with the 1978 economic performance of the firm; second, the 1978 pollution performance is correlated with an average of economic performance for the 3 year period 1975 through 1977; third, the 1978 pollution performance is correlated with an average of economic performance for the 3 year period 1978 through 1980.

The authors find no significant associations for the 1978 to 1978 comparisons except for net income (negative and marginally significant at the 0.09 level). For the 1978 to 1975-1977 period, net income and cash flow are negative and significant (0.05 level). The 1978 comparisons reveal a significant (negative) association only for net income.

The results also indicate that firms with high pollution levels are associated with higher risk as well as a lower price-to-earnings (PE) ratio.

Mahapatra (1984), and Jaggi and Freedman (1992) find, however, no correlation between firm environmental performance and firm financial performance. Mahapatra (1984) investigates the long term market response to pollution control expenditures and corporate social responsibility performance. Pollution control expenditures are perceived as negative financial events because while they don't generate income, they increase production costs, increase the non-productive asset base and increase financing needs. Two scenarios are constructed addressing this association, the "ethical investor" and the "rational economic investor." Mahapatra argues that it is possible to assume that social responsibility and any form of social awareness behavior arise from the transition of organizations from rational, means-oriented, efficiency-guided process of administration to a value-laden, adaptive response process of institutionalization. Four main hypotheses are proposed: the first hypothesis is that industries spending more on pollution control activities, as a percentage of overall capital expenditures, have low systematic risk. The second hypothesis is that industries spending more on pollution control activities, as a percentage of overall capital expenditures, have higher profitability. The third hypothesis is that industries spending more for pollution control, as a percentage of operating cash flows, have low systematic risk. The fourth hypothesis is that industries spending more for pollution control, as a percentage of operating cash flows, have higher profitability.

A sample of 67 firms was drawn from the chemicals, iron and steel, paper, petroleum refining, primary non-ferrous metals, and textile industries. One major constraint of the sample selection methodology is that the author required all firms to be

listed on the New York exchange continuously over the period 1967 through 1978. A random sample of 60 companies was selected from COMPUSTAT as a control group. The Spearman rank correlation test was used to conduct the analysis. The results indicate that a significant negative association exists between pollution control expenditures and systematic risk, providing support for the first hypothesis. The association in regard to profitability, however, is insignificant, which is inconsistent with the results of Spicer (1978) and Bragdon and Marlin (1972).

Pollution control expenditures and operating cash flows appear to have no correlation. Freedman and Jaggi (1992) study the long term relationship between the economic performance and the pollution performance of pulp and paper firms. Pollution is measured at the plant level while economic performance is measured using both company performance as a whole and segment performance for the segment specifically affected by pollution abatement. Two hypotheses are proposed; the first hypothesis is that there is no association between long-term pollution and economic performance of firms in the pulp and paper industry, while the second hypothesis is that there is no association between long-term pollution and economic performance of the pulp and paper segment of firms in the pulp and paper industry.

Pollution performance is measured in terms of water pollution. Water pollution was gathered from EPA pollution reports. The EPA consistently uses three measures of pollution in determining pollution performance of pulp and paper mills: biochemical oxygen demand (BOD), total suspended solids (TSS), and pH (water acidity - alkalinity). Economic performance is assessed based on the profitability and cash flows of the firms

where five ratios were used as proxies for firms' economic performance: return on equity; return on assets; cash flow to assets; cash flow of equity; and debt-to-equity.

The initial sample is composed of 13 firms whose primary product is pulp and paper. Three of these firms were, however, acquired by other pulp and paper companies after 1983. In light of the changes in the sample size, two time horizons are considered in the analysis: years 1978 through 1983, and years 1978 through 1986. The relationship between pollution performance and economic performance is first examined by determining the association between the percentage change in pollution measures and the percentage change in accounting ratios for the firms as a whole over the period of 1978 through 1983. The association between the percentage change in pollution measures and the percentage change in return on assets and return on sales for the pulp and paper segments of these firms is then assessed. Better pollution performance is not found to be associated with negative economic performance for either the firm as a whole or for the pulp and paper segment.

Yamashita et al. (1999) examines the relationship between environmental conscientiousness scores (EC) and stock returns. EC refers to the legal environmental obligations as well as corporations' environmental policies and similar "progressive" activities. Fortune magazine assigned a score to each company ranging from zero (poor performers) to 10 (good performers) based on 20 key environmental issues including, not only toxic release production and/or violation of environmental laws, but also environmental programs and ratings by credible environmental groups such as the CEP. Fortune reported 10 leaders, 10 most improved, and 10 laggard firms from 130 U.S. based manufacturing companies. Initially, the authors conduct an event study of the stock

price reaction to the published EC scores. The S&P 500 index is used as a benchmark to estimate normal returns. The results indicate that the capital markets weakly reward environmentally conscientious companies. However, companies with the worst EC scores also had lower average performance. Further, the release of information about a company's EC has no significant impact on stock price. In the short term, these results suggest that environmental performance is not a very important concern for stock investors but that improvement in EC scores can result in small positive gains.

The second part of this study involves an examination of the relationship between companies' environmental performance and their capital market performance in the long-term. The authors conduct a correlation analysis of long-term EC scores and stock returns. EC scores are measured using two sources: "The Better World Investment Guide" (1991) by the CEP as well as the CEP SCREEN Service (1995). Forty-nine of the firms given environmental progress scores by the CEP are used in this analysis. A rank of 1 was obtained by companies that had positive programs for recycling, alternative energy sources, and waste reduction. A rank of 2 was assigned to companies with mixed records of positive environmental programs and regulatory infractions, fines, complaints, etc. A rank of 3 was given to companies that had poor public records of regulatory violations and/or they had major accidents and/or lobbying against sound environmental policies. The CEP SCREEN ranks are provided based on evaluating 13 areas of firms' environmental performance. Long term ranks are assigned based on how the ranks changed from the CEP GUIDE to CEP SCREEN. In the long term, there is an insignificant positive association between EC and stock returns. There is, however, a strong tendency for companies with poorer EC scores to have lower stock returns. It

appears that the EC of companies is not strongly related to their financial condition as there is no association between EC scores and company size, debt/asset ratio, and earnings growth. Dividends yield and volatility of stock returns, however, have some relationship with companies' EC scores. Rewards for improving the EC score by one rank are associated with a 2.66% increase in the 10 year average of risk adjusted return.

Kreander et al. (2005) examines the financial performance differences between "ethical investment funds" and "non-ethical investment funds". Ethical investment funds are funds that steer securities selection away from firms that operate in the alcohol, pornography and tobacco industries, while non-ethical traditional investment funds are investment funds without any restrictions on securities selection. The authors address three main questions in this study. First, do the selected funds provide the same financial return as an international benchmark portfolio? Second, are there any significant financial performance differences between ethical and non-ethical investments funds? And third, does the timing ability differ between ethical and non-ethical investment funds?

Financial performance was measured using 3 financial ratios: the Jensen measure, which evaluates the returns earned by a fund relative to the risk adjusted return achieved on a benchmark portfolio; the Sharpe ratio, which is the reward for total risk ratio; and the Treynor measure, which is the market reward to market risk ratio. The sample includes 80 investment funds from seven different countries and is composed of 36 UK funds, 22 Swedish funds, 8 German funds, 4 Dutch funds, 4 Norwegian funds, 4 Swiss funds, and 2 Belgian funds. The 40 ethical funds are matched based on four criteria; age, size, country, and investment universe. This matching process is similar to the strategy

adopted by Mallin et al. (1995) and Gregory et al. (1997), with the exception that these studies do not match consistently for investment universe.

The financial performance of the 80 funds is examined from January 1996 through December 1998. 156 observations are studied for 40 ethical and 40 non-ethical matched pairs of funds. Financial performance measures are calculated for all funds and then T-tests are conducted to compare the performance of the ethical and non-ethical groups. The results demonstrate that there is no statistical difference in performance between ethical funds and the market benchmark, or between ethical funds and their matched group of non-ethical funds. The evidence suggests, however, that ethical funds are less risky than non-ethical funds. Hence, there is no support for the hypothesis that ethical funds are worse at timing the market movements than non-ethical funds. The authors conclude, therefore, that there is no statistically significant difference in the financial performance of the different groups.

Only few studies, such as Sauer (1997), Dibartolomeo and Kurtz (1999), Garz et al. (2002), and Statman (2000) investigate the performance of SRI indices. SRI funds are comprised of stocks that were selected applying a social and ethical environmental criterion, which means that securities selection is subject to limitations. Statman (2000) investigates the performance of the Domini 400 Social-index and reports that the Domini 400 performance index is comparable to the S&P 500-index. Garz et al. (2002) analyzes the Dow Jones Sustainability Index (DJSI) for Europe and reports a slightly significant but small out-performance compared to the DJ STOXX 600-index.

Schröder (2004) assesses and evaluates the performance of socially responsible investments funds (SRI), from the U.S., Germany, and Switzerland, as well as SRI equity

indices. The performance analysis conducted for the SRI funds jointly tests the performance of the underlying assets as well as the quality of the fund management, however, the performance analysis of the SRI indices avoids this and other methodological problems and shows clearly whether SRI equities have a better or worse outcome than traditional investments that use the whole investment universe. The data was collected using the Thomson Financial DataStream database. Investment funds are composed of 30 U.S. funds and 16 funds from Germany and Switzerland. SRI indices are drawn primarily from the database. Some, however, are provided by the suppliers of these entities such as the Calvin and Dow Jones sustainability indices. The performance of the SRI investment funds and indices is evaluated using Jensen's alpha via three different regression approaches. Jensen's alpha is measured to assess the extra return that is not explained by the risk exposure of the firm.

The first approach employs benchmark indices comprised of a blue chip index and a small-cap index. The second approach expands the first by adding the market timing activities of the fund management. The third approach includs instrumental variables for conditional performance estimation. Results of the analysis indicate that most German, Swiss, and US SRI investment funds do not significantly underperform the benchmark, the SRI indices also exhibit a positive Jensen's alpha and they do not underperform their benchmark indices. Schroder reported that the difference between funds in the US versus those in Germany and Switzerland is that the former are more invested in blue chip stocks while those in the latter seem to be focused on smaller companies. Overall, the results indicate that socially screened funds seem to have no clear disadvantage in performance when compared to conventional funds.

As discussed above, Muoghalu et al. (1990), Hamilton (1995), Konar and Cohen (1997), and others, study the immediate market reaction regarding particular environmental incidents. Ziegler et al., (2007), however, points out deficiencies inherent in those prior studies. In regards to the portfolio comparison approach, the influence of sustainability performance variables on economic performance can hardly be separated from the influence of other variables since the latter are not considered in these approaches. In reference to event studies, it should be emphasized that short-term reactions can become weaker or more severe due to many other variables that conjointly affect the firm's stock prices within the event window.

Ziegler et al, examine the effect of different sustainability performance variables of European corporations on the average monthly stock returns over the period 1996 through 2001. Sustainability performance is based on evaluating the environment and social risk of the industry. Environmental risk is seen as stemming from the use of natural resources and the emission of air pollutants and hazardous wastes that do not result from energy use. Social risk is based on evaluating the burdens for social stability and the damage to individual rights and values, including workplace conditions, production of unhealthy goods, and the violation of ethical norms. They conduct cross-sectional regressions of the average monthly stock returns of environmental and social performance based on 2 approaches: the first approach is based on the parameter of the asset pricing model while the second approach is based on the multifactor model of Fama and French (1996). Sustainability performance is measured in two ways, as the average sustainability performance (in terms of environmental and social risks) of the industry in which a corporation operates, and as the relative sustainability performance (in terms of

environmental and social activities) of a corporation within a given industry relative to other peer companies and industries.

The sustainability performance data was provided by the Swiss bank Sarasin & Cie in Basle. Sarasin & Cie has evaluated the environmental and social criteria of approximately 300 European corporations comprising approximately 80% of the MSCI stock index for Europe. The technique developed by Sarasin & Cie use criteria that conform with international standards of sustainability reporting, such as the guidelines developed by the Global Reporting Initiative (2000). The results of this research indicate that the environmental performance of the industry has a significant positive impact on firms' monthly stock returns. In contrast, social performance has a significantly negative influence on stock returns. Relative sustainability performance concerning both environmental and social activity variables within a given industry is found to have no significant effect on stock performance.

Based on the above literature, I conclude the following:

1- The impact of ED on stock valuation is inconclusive.

2- The association between EP and stock valuation is questionable.

3- The Environmental disclosure area is not well structured as to reflect the true/actual financial performance which is demonstrated by the weak association between EP and ED.

Hence, in this dissertation, I address the association between environmental performance and stock prices in a broad perspective, in an attempt to avoid the problems with sampling and research design that are evident in prior studies. A general association

between environmental performance and stock prices is examined in individual variables and overall rating variables. The results of the study highlight the relative importance of independent factors as well as the conjoint effect when considering an overall rating effect. The study provides guidance that may be useful to regulators as they attempt to improve/implement environmental disclosures that are of relevance to stakeholder concerns.

Chapter 3

Methodology and Hypothesis

Based on the discounted cash flow model, a company's stock price is defined as the present value of all future cash flows. The efficient markets hypothesis suggests that capital markets respond quickly to impound new information into stock prices. If accounting earnings are seen as a proxy for cash flows then, together, these constructs suggest that the stock market will respond to any information that alters expectations of future earnings. Information considered to be "bad news" by the capital markets, i.e., information seen as indicative of a reduction in expected future earnings will cause a decrease in stock price. Similarly, information considered to be "good news" (indicative of increased income) leads to an increase in stock price.

Prior research documents capital markets responses to environmental events, environmental disclosures, and environmental performance measures such as: Blaconniere and Patten (1994), Walden and Schwarte (1997), Klassen and McLaughlin (1996), Lorraine, Collison and Power (2004), and Freedman and Jaggi (1988). Consistent with the efficient markets hypothesis, these market responses are limited to the particular time horizon around the event date or the environmental information announcement. Prior literature has also assessed environmental performance via a single variable, such as: Lorraine, Collison and Power (2004), Patten (2002), and Al-Tuwaijri et al. (2004), or a number of variables combined to construct an index, such as: Ingram and Frazier (1980), Wiseman (1982), and Fryxell and Wang (1994). The results of these investigations are, however, inconclusive with respect to the impact of environmental performance of firm valuation. This may be due to the single variable's inability to proxy

for overall environmental performance. On the other hand, the use of number of variables to construct an index may lead to misleading results since some variables may outweigh or offset the effect of other variables.

In this study, I address the methodological gap in the prior literature by investigating whether stock market valuation (measured in terms of annual stock returns) is associated with environmental performance on an ongoing basis rather than simply in response to unique events. I do this by testing whether individual environmental performance variables and comprehensive environmental performance ratings are cross-sectionally associated with stock returns. The association of firm value with both individual and comprehensive measures provides a unique depiction of how environmental variables combine to influence investor perceptions. The two levels investigation shed light on the influence of individual environmental constructs, the relative importance of some vis-a-vis others, and demonstrates how certain constructs outweigh others when combined into a comprehensive measure.

The results of this study are of significant value to regulators and investors since they provide guidance as to the kind of environmental performance information that is considered most important by capital markets. This may direct regulators in deciding whether to impose new environmental disclosure requirements and, if so, what kinds of disclosures are most informative. Similarly, these results are of value to investors in that they identify those environmental factors having the greatest influence on security valuation.

I employ six "environmental strength" [ES] measures and seven "environmental concerns" [EC] measures in this investigation. Each ES measure (ESi, where "i" ranges

from 0 to 6) is regressed against annual stock returns and then combined into a total strength rating variable (TES) which, in turn, is regressed against annual stock returns. Likewise, each environmental concern measure (EC_i, where "i" ranges from 0 to 7) is regressed against the annual stock and then, similar to TES, combined into a total concern rating (TEC). This variable is then regressed against annual stock returns.

I then construct a company profile by combining the total strength rating variable [TES] and total concern rating variable [TEC] into an overall environmental rating variable [OER]. This rating is used to test the association between firms' overall environmental position and firms' annual stock returns.

Combining individual variables into an index or rating variable is a process that depends essentially on the nature of the variables that will be combined; two main characteristics of these variables, namely weights and independency, are of interest in the current context. All environmental rating variables are assumed independent and equally weighted. Thus, the combination process was performed by simply adding the scores of both individual environmental strength variables and environmental concern variables into total environmental strength rating and total environmental concern rating variables and then adding the scores of both total rating variables into one overall environmental rating variable.

I also investigate the association between the changes in firms' annual returns and the changes in firms' overall environmental rating (environmental profile scores). This analysis is conducted employing data for the 2006 to 2008 period to facilitate the development of inferences regarding whether improvement (deterioration) in the environmental ratings are associated with positive (negative) changes in firm's value.

Previous studies investigating corporate social responsibility/environmental performance have used different approaches to assess this construct. These approaches include: Fortune magazine's ratings (an index comprised of financial soundness, long-term investment value, use of corporate assets, quality of management, innovativeness, quality of products or services, use of corporate talent, and community and environmental responsibility) such as: McGuire, Sundgren, and Schneeweis (1988). These attributes are rated on a scale of 0 to 10. Ratings of 0 represent poor environmental performance while a rating of 10 represents excellent environmental performance. A "toxic release inventory" measure, which is a quantitative measure regarding more than 650 toxic chemicals and compounds that are used, manufactured, treated, transported, or released by certain industry groups as well as federal facilities has also been used (see Hamilton (1995) and Freedman and Patten (2004)), as has the CEP index, which is based on a series of industry studies, published by the CEP, which examine the pollution control records regarding 50 firms in four different industries: petroleum refining; steel; pulp and paper; and electric utility industries (see Ingram and Frazier (1980) and Freedman and Wasley (1990)).

In this research I employ the environmental performance measures from the KLD database. The KLD database is a data set that provides an annual snapshot of the environmental, social, and governance performance as assessed by KLD Research & Analytics, Inc. KLD covers approximately 80 indicators in seven major qualitative issue areas including community, corporate governance, diversity, employee relations, environment, human rights and product. The data are gathered from several research processes, which results in a full profile of companies' performance. Based on the criteria

used for environmental performance measurement, the data is classified either as a "strength" or as a "concern." Whenever a strength activity is performed by the firm it is coded "1," otherwise "0." Similarly whenever a concern activity is performed by the firm it is coded "1," otherwise will be coded "0." The firm's overall environmental performance is assessed by using both the strengths score and concerns score and then by using the overall combined scores of both strengths and concerns.

3.1 Methodology and Hypothesis Development

I assess the general capital market response to environmental performance apart from any particular event or incidence. The market valuation of firms' environmental performance is measured using annual stock market returns from the CRSP database. Thus, I examine the association between environmental performance and the annual stock market returns [levels of environmental performance]. The levels study is conducted in three stages, while a fourth stage assesses the association between stock market valuation and changes in firms' environmental performance.

Stage I involves testing whether individual environmental performance measures are, indeed, associated with firms' annual stock returns. Since the efficient markets hypothesis suggests that all information regarding a firm is impounded into price, the individual environmental variables (ES_i and EC_i) should be significantly associated with stock prices if they are viewed by market participants as impacting future cash flows. Thus my initial hypotheses are (in alternative form):

H1: Individual environmental strength variables [ES_i] are associated with firms' annual stock returns.

H2: Individual environmental concern variables [EC_i] are associated with firms' annual stock returns.

Stage II involves investigating the association between the total strength rating variable (TES) and firms' annual stock returns and the association between the total concern rating variable (TEC) and firms' annual stock returns. TES represents the accumulation of all environmental strength variables. Since these variables are dichotomous in nature, TES will range from 0 (in the case where a firm does not perform any strength activities), to 6 (in the case where a firm performs all of the identified strength activities). TEC represents the accumulation of all environmental concern variables. As with the ES measures, these variables are dichotomous in nature. TEC will thus range from 0 (in the case where a firm does not have any environmental concerns), to 7 (in the case where a firm is deemed to have all of the identified environmental concerns). As above, I hypothesize that each of these constructs will be significantly associated with stock returns. My third and fourth hypotheses, in alternative form, are thus:

H3: The total strength rating [TES] is associated with annual stock returns

H4: The total concern rating [TEC] is associated with annual stock returns.

Stage III involves investigating the association between the overall environmental rating variable [OER] and firms' annual stock returns. A firm's overall environmental rating is the sum of the total strength rating score [TES] and total concern rating score [TEC] where OER= TES - TEC. The OER scores will range from +6 to -7. A +6 OER score will be achieved if the firm performs all strength activities while imposing no

environmental concerns. A -7 OER score will result if the firm does not perform any environmental strength activities while its operations evidence all 7 environmental concerns. The overall environmental profile score is regressed against firms' annual stock returns.

The process of combining the strength and the concern variables is performed by the simple addition of the strength variables and the concern variables since they are all equally weighted. However, the interaction between these individual variables may affect the extent of the association. Factor analysis is used to highlight the interaction and association between the environmental performance variables.

Factor analysis reduces the number of variables to "factors" where it is possible. For example, variations in three or four observed variables may be reflecting the variation in a single unobserved variable, or in a reduced number of unobserved variables. Factor analysis searches for the joint variations in response to unobserved latent variables. The observed variables are modeled as linear combinations of the potential components plus the error terms. In addition to factor analysis, the association between the environmental components and the annual stock returns is assessed using ordinary least square regression.

If environmental concerns are seen as evidence of increased future costs (negative future cash flows) then it is possible to predict the direction of the association between stock returns and OER. When OER is negative (concerns outweigh strengths), and positive (strengths outweigh concerns), the association between stock returns and OER should be positive. My fifth hypothesis, in alternative form, is thus:

H5: Overall environmental rating [OER] is positively associated with annual stock returns.

The final stage of this investigation entails assessing the market response to changes in firms' overall environmental ratings. Firms are partitioned into those with overall environmental performance improvement, firms with overall environmental performance deterioration, and firms with no change in environmental performance. This categorization is applied using the following coding procedure: any firm with environmental performance improvement, regardless of the number of points increased, is coded "1"; Any firm with environmental performance deterioration , regardless of the number of points decreased, is coded "-1"; Any firm with no environmental performance changes is coded "0".

This association is investigated two ways: First, using analysis of variance (ANOVA) to detect any significant differences between the three groups. Then second, the association between the changes in the firm's overall environmental rating and the changes of the firm's annual stock returns over the 2006 to 2008 period is investigated using ordinary least square regression. Again, the efficient markets hypothesis leads to the prediction that changes in environmental ratings (new information impacting future cash flows) will lead to changes in stock prices. My sixth hypothesis, in alternative form, is thus:

H6: A change in the overall environmental rating score [OES] is positively associated with the change in annual stock returns.

3.2 Variables

3.2.1 Environmental Performance Variables

I use the KLD database to identify the environmental performance measures employed in this research. The measure assesses environmental performance based on 6 environmental strength variables and 7 environmental concern variables. The environmental strength variables are: beneficial products and services, which will be considered an environmental strength only if the company derives substantial revenues from innovative remediation products, environmental services, or products that promote the efficient use of energy, or it has developed innovative products with environmental benefits; pollution prevention, which will be considered an environmental strength only if the company has notable strong pollution prevention programs including both emissions reductions and toxics-use reduction programs; recycling, which will be considered an environmental strength only if the company is either a substantial user of recycled materials as raw materials in its manufacturing processes , or a major factor in the recycling industry; clean energy, which will be considered an environmental strength only if the company has taken significant measures to reduce its impact on climate change and air pollution through the use of renewable energy and clean fuel or through energy efficiency; management systems strength, which will be considered an environmental strength only if the company includes environmental objectives as part of the firm's overall plans; other strengths, which will be considered an environmental strength only if the company has demonstrated a superior commitment to management systems, voluntary programs, or other environmentally proactive activities.

The environmental concern variables are: hazardous wastes, which will be considered an environmental concern only if the company's liabilities for hazardous waste sites exceed $50 million, or the company has recently paid substantial fines or civil penalties for waste management violations; regulatory problems, which will be considered an environmental concern only if the company has recently paid substantial fines or civil penalties for violations of air, water, or other environmental regulations, or it has a pattern of regulatory controversies under the clean air act, Clean Water Act or other major environmental regulations; ozone depletion chemicals, which will be considered an environmental concern only if the company is among the top manufacturers of ozone pollution chemicals such as HCFCs, Methyl chloroform, methylene chloride, or bromines; substantial emissions, which will be considered as environmental concern only if the company's legal emissions of toxic chemicals from individual plants into the air and water are among the highest of the companies within the KLD database; agricultural chemicals, which will be considered an environmental concern only if the company is a substantial producer of other cultural chemicals such as pesticides or chemical fertilizers; climate change, which will be considered an environmental concern only if the company derives substantial revenues from the sale of coal or oil and its derivative products, or the company derives substantial revenues indirectly from the combustion of coal or oil and its derivative fuel products; other concerns, which will be considered an environmental concern only if the company has been involved in any environmental controversy that is not covered bythe other EC variables.

3.2.2 Annual Stock Returns

Monthly stock returns for the sample companies were obtained from the CRSP data base then transformed into annual [Cum_Ret] returns in the following fashion:

$$Cum\_Ret = [1 * (1 + Ret_1) * (1 + Ret_2) * (1 + Ret_3) * (1 + Ret_4) * (1 + Ret_5) * (1 + Ret_6) * (1 + Ret_7) * (1 + Ret_8) * (1 + Ret_9) * (1 + Ret_{10}) * (1 + Ret_{11}) * (1 + Ret_{12})] - 1$$

The cumulative annual returns are thus calculated by compounding the monthly returns where the initial base is 100% or 1, which corresponds to Cum_Ret at T=0. After one month, Cum_Ret will take the value $1*(1+Ret_1)$, which is the accumulation of the initial base 100% and Ret_1. After the second month, Cum_Ret will take the value $1*(1+Ret_1)*(1+Ret_2)$. This process is repeated until the twelve months are compounded.

3.2.3 Control Variables

Prior research has documented that a number of firm-specific factors appear to be related to environmental performance. In order to more carefully investigate the association between firms' environmental performance and stock returns, I control for these factors. Specifically, I control for firm size, environmentally sensitive industry membership, profitability, financial leverage, capital intensity, and return on assets.

3.2.3.1 Firm Size (LnAs) and Environmentally Sensitive Industry Membership (SIC)

Prior studies, such as: Blacconiere and Patten (1994) and Cho, Roberts, and Patten (2009), have indicated that a significant association exists between firm size and

environmental performance, with larger companies performing different environmentally, than smaller companies. My proxy for firm size is the natural log of total assets.

Similarly, various studies have indicated that companies in industries whose activities have a significant impact on the surrounding environment performed differently, with respect to the environment, than firms in other industries. I control for industry membership by employing a dichotomous variable coded “1” for firms that belong to environmentally sensitive industries and otherwise coded “0.”

Patten (2002), Cho and Patten (2007), and Cho, Roberts, and Patten (2009) conclude that environmentally sensitive industries include firms that operate within the chemical (SIC code 28XX), metals (SIC code 33XX), mining (SIC code 10XX), oil exploration (SIC code13XX), paper and pulp (SIC code 26XX), and petroleum (SIC code 2911) industries. I follow this classification in coding industry membership.

3.2.3.2 Capital Intensity (Cap_Int), Return on Assets (ROA), and Profit Margin (Prf_Mrgn)

Although not as consistently documented as firm size and industry, in some cases, capital intensity (Aerts & Cormier, 2009; Clarkson et al, 2008; Reitenga, 2000) and profitability (Bewley & Li, 2000; Magness, 2006; Al-Tuwaihri et al,2004) are found to be significantly related to firm environmental performance. Capital intensity is measured by dividing total assets by total revenues. Profitability is measured using return on assets (net income divided by total assets), and profit margin (net income divided by sales revenue).

3.2.3.2 Financial Leverage (Fin_Lev)

Several studies have also employed financial leverage as one of the financial position control variables (Freedman and Jaggi, 1992; Cormier and Megnan, 1999). Financial leverage indicates the extent to which the business relies on debt financing and is measured by dividing long-term debt by stockholders equity.

3.3 Models

Inclusion of the control variables (above) yields the following empirical test models. All variables are illustrated in Exhibit 1. The models used to test hypotheses 1 and 2 are:

$$\text{Cum\_Ret} = \alpha_0 + \alpha_1\,\text{ES}_\text{i} + \alpha_2\text{LnAs} + \alpha_3\text{SIC} + \alpha_4\,\text{ROA} + \alpha_5\,\text{Fin\_Lev} + \alpha_6\,\text{Prf\_Mrgn} + \alpha_7\,\text{Cap\_Int} + \text{e} \;\ldots\ldots\ldots\ldots \text{(M1)}$$

$$\text{Cum\_Ret} = \alpha_0 + \alpha_1\,\text{EC}_\text{i} + \alpha_2\,\text{LnAs} + \alpha_3\,\text{SIC} + \alpha_4\,\text{ROA} + \alpha_5\,\text{Fin\_Lev} + \alpha_6\,\text{Prf\_Mrgn} + \alpha_7\,\text{Cap\_Int} + \text{e} \;\ldots\ldots\ldots\ldots \text{(M2)}$$

The tests of total environmental Strengths and Concerns (hypotheses 3 and 4) employ the following empirical models:

$$\text{Cum\_Ret} = \alpha_0 + \alpha_1\,\text{TES} + \alpha_2\,\text{LnAs} + \alpha_3\,\text{SIC} + \alpha_4\,\text{ROA} + \alpha_5\,\text{Fin\_Lev} + \alpha_6\,\text{Prf\_Mrgn} + \alpha_7\,\text{Cap\_Int} + \text{e} \;\ldots\ldots\ldots\ldots \text{(M3)}$$

$$\text{Cum\_Ret} = \alpha_0 + \alpha_1\,\text{TEC} + \alpha_2\,\text{LnAs} + \alpha_3\,\text{SIC} + \alpha_4\,\text{ROA} + \alpha_5\,\text{Fin\_Lev} + \alpha_6\,\text{Prf\_Mrgn} + \alpha_7\,\text{Cap\_Int} + \text{e} \;\ldots\ldots\ldots\ldots \text{(M4)}$$

The test model for the Overall Environmental Profile variables (hypothesis 5) is:

$$\text{Cum\_Ret} = \alpha_0 + \alpha_1 \text{ OEP} + \alpha_2 \text{ LnAs} + \alpha_3 \text{ SIC} + \alpha_4 \text{ ROA} + \alpha_5 \text{ Fin\_Lev} + \alpha_6 \text{ Prf\_Mrgn} + \alpha_7 \text{ Cap\_Inv} + e \text{ ………… (M5)}$$

Lastly, the empirical model used to test hypothesis 6 regarding changes in ratings and changes in returns is:

$$\Delta \text{ Cum\_Ret} = \alpha_0 + \alpha_1 \Delta \text{ OER} + \alpha_2 \Delta \text{ LnAs} + \alpha_3 \text{ SIC} + \alpha_4 \Delta \text{ ROA} + \alpha_5 \Delta \text{ Fin\_Lev} + \alpha_6 \Delta \text{ Prf\_Mrgn} + \alpha_7 \Delta \text{ Cap\_Int} + e \text{ ………. (M6)}$$

Exhibit 1		
Variables Definition		
Dependent Variable		
Cum_Ret	=	Cumulative annual stock market returns, which represents the accumulation of monthly returns for each firm year. For model 6, Δ Cum_Ret = Annual return_{2008} – Annual $\text{return}_{2006.}$
Control Variables		
LnAs	=	Natural logarithm of Total Assets;
SIC	=	1 In case the firm operates in industries classified as environmentally unsafe, 0 otherwise;
ROA	=	Net Income / Average Total Assets;
Fin_Lev	=	(Debt in current liabilities + Debt in long term Liabilities) / Total Shareholder's Equity;
Prf_Mrgn	=	Net income / Total sales;
Cap_Int		Total Assets / Total Revenues.
e	=	Error term

Exhibit 1 (continued)			
Variables of Interest in each Model			
M1	ESi	=	Different environmental strength measures. "i" ranges from 1 to 6 where, i = 1 refers to clean energy, i = 2 refers to beneficial (green) products and services, i = 3 pollution prevention, i = 4 refers to recycling, and i = 5 management systems, i = 6 is other strengths. These variables will be employed in dichotomous manner where If a firm performs any of these environmental activities, it be coded 1 otherwise 0;
M2	ECi	=	Different environmental concerns. "i" ranges from 1 to 7, i = 1 refers to climate changes concern, i = 2 refers to regulatory problems, i = 3 refers to substantial emissions, i = 4 refers to ozone depletion chemicals concern, i = 5 refers to hazardous waste, i = 6 refers to agricultural chemicals, and i = 7 refers to other concerns. These variables will be employed in dichotomous manner where If a firm activities impose any of these concerns on the environment, it be coded 1 otherwise 0;
M3	TES	=	Total environmental strength rating variable. It represents the simple addition of all environmental strength variables. TES = ∑ (ESi)
M4	TEC	=	Total environmental concern rating variable. It represents the simple addition of all environmental concern variables. TEC = ∑ (ECi)
M5	OER	=	Overall environmental rating variable. Total environmental strength rating - total environmental concern rating
M6	ΔOER	=	Change in overall environmental rating = $OEP_{2008} - OEP_{2006}$

3.4 Sample Selection

To be included in the study, the sample firms have to meet the following criteria:

1. They must be listed in the ratings of corporate social and environmental performance compiled by KLD Research and Analytics, Inc.
2. They must have the required financial accounting information available in the Standard & Poors' COMPUSTAT database.

3. They must have stock prices data available on the CRSP Monthly Returns database.

I collected the most recent environmental performance data available on the KLD database (years 2006, 2007, and 2008). Earlier years could not be included in the sample as prior to 2006 some of the environmental performance variables were not available thus limiting the comparability of environmental performance. A total of 6680 firm-years met the sample criteria and constituted the final sample as illustrated in Table 1.

Comparison of environmental performance over the 2006 through 2008 period requires an identical sample set for each year. Data for 1654 firms were available for this analysis.

Table1

The overall cross-sectional sample set obtained for each year and the matched sample for years 2006 and 2008

	2006	2007	2008	Total
Environmental data	2,962	2,937	2,923	8,822
(-) firms with no annual returns	236	218	44	498
Environmental data and annual returns	2,726	2,719	2,879	8,324
(-) firms missing some or all of the accounting data	544	477	623	1,644
Final sample set	2,182	2,242	2,256	6,680
Match sample: 2006 and 2008				1,654

Table 2 presents selected descriptive information for the sample of 6,682 firm-year observations. More specifically, the table presents the minimum, maximum, mean, standard deviation, and variance of the variables used in the model. The table demonstrates, on average, that firms reported -0.055 annual returns. The low mean of the environmental variables indicates that most firms did not report any environmental activities, i.e. more firms reported 0 rather than 1 in regard to both environment strength and concern variables. Also it appears that most firms do not belong to environmentally sensitive industries.

Table 2

Descriptive Statistics for the variables used in the models

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
lnAs	6680	1.231	14.598	7.593	1.647	2.713
SIC_01	6680	0	1	0.149	0.356	0.127
Fin_Lev	6680	-782.545	1726.896	1.498	30.871	953.006
Prf_Mrgn	6680	-29319.000	21.846	-7.653	405.096	164103.117
Cap_Int	6680	-164.092	54344.300	16.767	692.937	480161.619
ROA	6680	-2.096	3.018	0.021	0.151	0.023
Cum_Ret	6680	-0.980	7.952	-0.055	0.453	0.205
Beneficial products and services	6680	0	1	0.024	0.153	0.023
Pollution prevention	6680	0	1	0.013	0.114	0.013
Recycling	6680	0	1	0.017	0.128	0.016
Clean energy	6680	0	1	0.043	0.202	0.041
Management system strength	6680	0	1	0.055	0.227	0.052
Other strengths	6680	0	1	0.007	0.084	0.007
Strength total	6680	0	4	0.158	0.532	0.283

Table 2 (continued)

Hazardous waste	6680	0	1	0.043	0.203	0.041
Regulatory problems	6680	0	1	0.069	0.254	0.065
Ozone depletion chemicals	6680	0	1	0.001	0.024	0.001
Substantial emissions	6680	0	1	0.055	0.227	0.052
Agricultural chemicals	6680	0	1	0.006	0.077	0.006
Climate change	6680	0	1	0.057	0.232	0.054
Other concerns	6680	0	1	0.019	0.137	0.019
Concern total	6680	0	5	0.250	0.693	0.480
OEP	6680	-5	4	-0.092	0.690	0.476
Valid N	6680					

Chapter 4

Results and Discussion

4.1 Stage I Results

The models' goodness of fit and the R-square for each environmental strength model as well as the analysis of variance results are presented in table 3. ANOVA provides information about the variation accounted for as well as the residual variation not accounted for by the environmental strength models and the overall model significance in predicting the annual returns based on the variables included. The R-square is the proportion of variation in the dependent variable explained by the regression model. While the adjusted R-square adjusts for the number of explanatory terms in a model to more closely reflect the goodness of fit of the model. The R-square for the 6 models ranges from 0.0668 to 0.0670 which indicates that approximately seven percent of the variability in annual stock returns can be explained by the model. The adjusted R-square for the 6 models ranges from 0.0658 to 0.0670. All models reported high residual sum of squares in comparison to regression sum of squares. However, the F statistic for all models was significant (the p-value was 0.000), which indicates that the independent variables significantly explained the variation in the dependent variable.

Table 4 presents the coefficients of the environmental strength regression models. The unstandardized coefficients are the coefficients of the estimated regression model. The results indicate that, across all strength models, both industry classification and the ROA, as a measure of profitability, are positively associated with the sample firms' annual returns while the coefficient on firm size is negative. Of the environmental strength variables, only Recycling ($p = 0.075$) and Other Strengths ($p = 0.0037$) are

significant at conventional levels. It is interesting to note, however, that while the coefficient on recycling is positively associated with returns, the coefficient on Other Strengths is negative. None of the other environmental strength variables would be significantly associated with returns, even if a one-tailed test could be justified. However, unlike the other strength variable it is positively related to firms' annual returns. Thus, based on these results illustrated, H1 is rejected for all environmental strength variables except for Other Strengths and Recycling.

The mixed results for the environmental strength variables are not conclusive. The association results are not significant for beneficial products and services, pollution prevention, clean energy, and management system strengths variables which is consistent with the findings of Mahapatra (1984), Aupperle, Carroll, and Hatfield (1985), Jaggi and Freedman (1992), and Kreander et al. (2005) who report no association between firms' environmental performance and the firms' financial performance (expressed by the stock prices performance). The Positive association of recycling with returns (consistent with the results reported by Spicer 1978, Anderson and Frankel 1980; Ziegler et al. 2007) seems to support one perspective of McGuire, Sundgren, and Schneeweis (1988), which perceives environmental activities as an investment opportunity which yields positive net present values. The negative coefficient of Other Strengths seems (consistent with the results of Ingram and Frazier 1983 and Freedman and Jaggi 1982) to support another perspective of McGuire, Sundgren, and Schneeweis (1988): that environmental activities place an additional financial burden on firms and thus lead to an economic disadvantage. This disadvantage is ultimately expressed as reduced profitability and lower returns.

Given the mixed results and competing theoretical perspectives, it is not possible to make any conclusive assessments from the regression results for the uncombined ES variables.

The ANOVA results of the tests for an association between the uncombined EC variables and returns are presented in Table 5. Similar to the ES results, the R-square for the 7 models range from 0.067 to 0.071 which indicates that approximately seven percent of the variability in the annual returns variable can be explained by the model. The adjusted R-square for the 7 models ranges from 0.066 to 0.070. All models reported high residual sum of squares in comparison to regression sum of squares. However, the F statistic for all models was significant, p-value = 0.000, which indicates that the independent variables did significantly explain the variation in the dependent variable.

Table 6 presents the regression results of the tests for an association between the uncombined EC variables and returns. As in the ES regressions, these results indicate that both industry classification and the ROA, as a measure of profitability, are positively associated with firms' annual returns while the coefficient on firm size is negative. The hazardous waste concern variable (p = 0.032), substantial emissions concern variable (p = 0.008), and the agricultural chemicals concern variable (p = 0.000) are all significantly associated with returns. Interestingly, the coefficients on each of these are positive which is consistent with the results of Ingram and Frazier (1980) and Freedman and Jaggi (1982) who report a negative association between environmental and financial performance. Thus, it appears as though hazardous waste concerns, substantial emissions and the use of agricultural chemicals may translate into greater profitability.

The positive association between Hazardous waste, substantial emission, and agricultural chemicals variables are consistent with the results reported by Spicer (1978),

Anderson and Frankel (1980), Ziegler et al. (2007). The regression results with respect to Regulatory problems, Ozone depletion chemicals, climate changes, and other concerns variables are consistent with Mahapatra (1984), Aupperle, Carroll, and Hatfield (1985), Jaggi and Freedman (1992), and Kreander et al. (2005) who report no association between environmental and financial performance. Overall, the findings are consistent with McGuire, Sundgren, and Schneeweis' (1988) conjecture that there may be a negative association between social responsibility activities and firms' financial performance.

4.2 Stage II Results

The models' goodness of fit and the R-square for the firms' total environmental strength rating model are illustrated in Table 7 - Panel A. The total environmental strength rating model R-square is 0.067, which indicates that approximately seven percent of the variability in annual returns can be explained by the model. The adjusted R-square for the model is 0.066. Even though a high residual sum of squares in comparison to regression sum of squares is reported, the overall regression model appears to be statistically significant with a p-value of 0.000. This indicates that the independent variables significantly explain the variation in the dependent variable.

Panel B of Table 7 presents the regression results for the TES model. The results indicate that both industry classification and the ROA as a measure of profitability are positively associated with annual returns (p-values of 0.001 and 0.000 respectively), while the coefficient on firm size is, again, negative ($p = 0.000$). The total environmental strength rating variable is not significantly associated with firms' annual returns at

conventional levels (p = 0.6866). From a comprehensive perspective, it appears that firm activities which are deemed environmental strengths do not translate into positive financial performance. Thus, Hypothesis 3 is rejected.

Table 8 - Panel A presents the models' goodness of fit and the R-square for the firms' total environmental concern ratings model. The total environmental concern ratings model yields an R-square of 0.068 (indicating that approximately seven percent of the variability in annual returns variables can be explained by the model). The adjusted R-square is virtually identical at 0.067. Even though high residual sum of squares in comparison to regression sum of squares is reported, the overall regression model appears to be statistically significant with a p-value of 0.000. This indicates that the independent variables did significantly explain the variation in the dependent variable. Panel B of Table 8 presents the results of the regression model. These results indicate, once again, that both industry classification and ROA as a measure of profitability, are positively associated with the firms' annual returns (p-values of 0.011 and 0.000 respectively), while firms' size is negatively associated (p = 0.000).

The coefficient on the total Environmental Concern Rating variable is positive and significantly different from zero (p = 0.021). This finding is again consistent with the negative association perspective. Hypothesis 4 is supported.

The evidence presented above indicates that, cross-sectionally, firms' attempts to perform in an environmentally sensitive fashion are not associated with improved financial performance. Indeed, these results indicate that environmental disregard may be associated with higher returns which is consistent with the results reported by Ingram and Frazier (1980) and Jaggi and Freedman (1982). This could be because conducting

operations that may have a negative environmental affect without establishing clean up or pollution reduction activities could result in considerable future cost savings. Even if clean up or pollution reduction activities are ultimately mandated, pushing those costs into future periods would result in greater near term cash flows and a higher net present value of firm earnings.

4.3 Stage III Results

Although the overall environmental Rating (OER) could, theoretically, range from +6 to -7, the actual sample results ranged from +4 to -5. The models' goodness of fit and the R-square for the firms' overall environmental rating model are presented in Table 9, Panel A. The overall environmental profile model R-square is 0.068 which, consistent with all of the prior models tested, indicates that approximately seven percent of the variability in annual returns variables can be explained by the model. The adjusted R-square for the model is 0.067. The overall regression model appears to be statistically significant with a p-value of 0.000 indicating that the independent variables did a significant job explaining the variation in the dependent variable.

The regression results for the overall environmental rating model are presented in Panel B. Once again, the results indicate that both industry classification and the ROA, as a measure of profitability, are positively associated with annual returns (p-values of 0.005 and 0.000 respectively), while firms' size is negatively associated ($p = 0.000$). The coefficient on the overall environmental rating variable is negative and statistically significant in association with the firms' annual returns ($p = 0.014$) which is consistent

with the results reported by Ingram and Frazier (1980) and Jaggi and Freedman (1982). This supports hypothesis 5.

The OER is calculated by subtracting TEC from TES to create a measure of overall environmental performance. The higher the TES score the better a firm performs environmentally, while the higher the TEC score, the worse a firm's environmental performance. The results of my test indicate that the better a firm performs environmentally, the lower its annual returns, and that the poorer it's environmental performance, the greater its profitability.

The hazardous waste variable; substantial emissions variable; and agricultural chemicals variable are all positively associated with annual returns indicating that when these concerns exist for a firm, the firm tends to have higher returns. On the other side of the spectrum, only recycling is positively associated with returns. This may be explained by the fact that recycling can lead to increased revenues or decreased costs for a firm, resulting in greater profitability. The other environmental strengths: pollution prevention, clean energy, etc. may only lead to increased costs.

These results, consistent with other studies and conjecture in the literature, suggest the existence of a negative association between firms' annual returns and environmental performance. This would imply that the costs of being socially responsible may place firms in unfavorable financial or competitive positions as compared to firms that are not socially responsible.

To further explore this phenomenon, I use Factor Analysis (FA) to address the interactions between the entire set of 13 environmental variables. Although the majority of the model variables were statistically insignificant in association with firms' annual

returns, the OER variable was significantly associated with returns which indicates that the few significant variables (other strengths; recycling variable; hazardous waste; substantial emissions, and the agricultural chemicals variable, outweighed all other insignificant variables.

Table 10 presents the extraction communalities. Extraction communalities are estimates of the variance in each variable accounted for jointly by all factors (or components) in the factor solution. These range from a low of 0.1587 to a high of 0.6245. Communalities must be interpreted in relation to the interpretability of the factors rather than entirely on the absolute value of the commonality coefficient. In other words, what is critical is not the communality coefficient, but rather the extent to which the item plays a role in the interpretation of the factor (although this role is often greater when communality is high).

Table 11 provides the eigenvalues, variance explained, and cumulative variance explained by the factor solution. The "Total" column gives the amount of variance in the observed variables accounted for by each component or factor. The "% of Variance" column gives the percent of variance accounted for by each specific factor or component, relative to the total variance in all the variables. The "Cumulative %" column gives the percent of variance accounted for by all factors or components up to and including the current one. I employed a Varimax rotation, which is an orthogonal rotation of the factor axes, in an attempt to maximize the variance of the squared loadings of a factor (column) on all the variables (rows) in a factor matrix, which has the effect of differentiating the original variables by extracted factor. Factor rotations do not affect the total variance accounted for by the model but do change how the variance is distributed among the

retained components. Each factor will tend to have either large or small loadings of any particular variable instead of having average loadings on 2 or more factors. The factor analysis results indicate that only 3 factors (with eigenvalues greater than one) should be used in the analysis (replacing the 13 environmental variables). The factor solution indicates that, based on the Rotation Sums of Squared Loadings, factor 1 accounted for 16.6007 of the variance in all variables, factor 2 accounted for 14.9182 of the variance in all variables, and finally, factor 3 accounted for 9.6704 of the variance in all variables while the cumulative variance accounted for is 41.1929% .

Panel A of Table 12 presents the factor loadings for each variable on the un-rotated factors where each number represents the correlation between the item and the un-rotated factor. The un-rotated component matrix doesn't show a clear block structure for the variables which would be the case if each and every variable had a high loading on one factor and a low loading on the other factor (i.e., no cross loading). Instead, almost all variables have cross loading in regards to the proposed three factor structure.

The rotated component matrix, (Panel B of Table 12), presents the correlations between the items and the rotated factor. This provides a better factor loading block structure not just from the statistical point of view but also from the logical point of view, as all strength variables loaded to the second component accounted for 14.9182% of the variance. All non chemical concern variables such as the hazardous waste concern variable; the regulatory problems concern variable; the substantial emission concern variable; the climate changes concern variable; and the other concerns variable loaded to the first component accounted for 16.6007% of the variance. Both agricultural and ozone depletion chemical concern variables loaded together on the third component which

accounted for 9.6740% of the variance. Based on the rotated loading structure, I labeled factor one the environmental strengths factor, factor two the non-chemical concern factor, and the third factor, the chemical concern factors.

Table 13 presents the reproduced correlations and residuals for the factor analysis solution. In other words, it shows the predicted pattern of the relationships, if the factor analysis solution is correct. Residuals show the difference between the predicted and observed values. If the solution is a good one, the reproduced correlations will be close to the observed values which will consequently lead to small residuals. The residuals reported are all within the acceptable range for accepting (technically: *not rejecting*) the proposed factor structure.

Table 14, the factor transformation matrix, describes the specific rotation applied to the factor solution. If the off-diagonal elements are close to zero, the rotation was relatively small. If the off-diagonal elements are large (greater than ±0.5), a larger rotation was applied. The results indicate that a large rotation was applied between the environmental strength factor and the non-chemical concern factor while a small one was applied between the non-chemical concern factor and the chemical concern factors and between the environmental strengths factor and Chemicals concern factors.

Factors Regression Analysis

4.3.1 Factor One: Non Chemical Concern Factor

The models' goodness of fit and the R-square for the firms' non-chemical concern factor model are presented in Table 15, Panel A. The overall regression model appears to be statistically significant with a p-value of 0.000 indicating that the independent

variables and factor one provide a statistically significant explanation of the variation in the dependent variable. Panel B in Table 15 presents the regression coefficients. Consistent with all previous models, the results indicate that both industry classification and the ROA as a measure of profitability are positively associated with annual returns (p-values of 0.005 and 0.000 respectively), while the coefficient on firm size is negative ($p = 0.000$). The non-chemical concern factor is, however, not significantly associated with the firm returns. Factor one is composed of 5 concern variables, 3 of which are positively correlated with annual stock returns while the other 2 are negatively correlated. The substantial emissions concern variable, along with the other non-significant variables appear to dominate the sign of coefficient of factor one over the other 2 insignificant variables. The insignificant association reported is consistent with the results reported with Mahapatra (1984), Aupperle, Carroll, and Hatfield (1985), Jaggi and Freedman (1992), and Kreander et al. 2005.

4.3.2 Factor Two: Environmental Strengths Factor

The models' goodness of fit and the R-square for the firms' environmental strengths factor model are illustrated in Table 16, Panel A. The overall regression model appears to be statistically significant with a p-value of 0.000 indicating that the independent variables and factor two did significantly explain the variation in the dependent variable. Panel B of Table 16 presents the coefficients of the regression model. The results indicate that both industry classification and the ROA, as a measure of profitability, are positively associated with returns while firm size is negatively associated. The environmental strengths factor is not statistically significant in the model

(p-value of 0.626). Based on both methods of constituting the strengths index, simple addition and factor analysis, I conclude that the process of combining variables into one index may lead to the insignificant variables diluting the significance of the significantly correlated variables. The insignificant association reported is consistent with the results reported with Mahapatra (1984), Aupperle, Carroll, and Hatfield (1985), Jaggi and Freedman (1992), and Kreander et al. (2005).

4.3.3 Factor Three: Chemicals Concern Factor

The models' goodness of fit and the R-square for the firms' chemicals concern factor model are presented in Table 17, Panel A. The overall regression model appears to be statistically significant with a p-value of 0.000. This indicates that the independent variables and factor three did significantly explain the variation in the dependent variable. Panel B in Table 17 presents the regression coefficients for this model. Industry classification and the ROA are positively, and firm size negatively, associated with returns (p-values of 0.003, 0.000 and 0.000 respectively). Unlike the other two factors, however, the chemicals concern factor is positive and statistically significant in the model (p-value = 0.000). The positive association results of the concern rating variable are consistent with the negative association results reported be Ingram and Frazier (1980) and Jaggi and Freedman (1982).

The overall results suggest a negative relationship between social responsibility and financial performance. This may be due to the additional costs of better environmental performance which places such firms at a cost or competitive disadvantage. The positive association of poor environmental performance (expressed by

more environmental concerns and/or a higher environmental concern rating) and the firms' annual returns can be explained, according to Muoghalu, Robinson and Glascock (1990), as retaining an expected positive present value while the negative association of good performance (expressed by more environmental strengths and/or higher environmental strength ratings) and the firms' annual returns can be explained by the extra costs the firms need to incur to improve their environmental performance.

As stated earlier this study investigates the effects of combining variables together to build an overall rating or a comprehensive measure. The direct combination of variables indicates that significantly correlated variables may outweigh insignificant variables. This occurs in case of the TEC as well as OER, where both variables are composed of significant and insignificant components. Both comprehensive variables are, however, significantly associated with annual returns. The insignificance of the TES rating variable may, however, be explained by the possibility that insignificant variables outweighed significant variables.

The factors structure is, to an extent, consistent with the logical grouping of environmental variables where nonchemical environmental concern variables loaded together in the first factor, all strength variables loaded together in the second factor, and the chemical environmental concern variables loaded in the third factor. The overall factor analysis results are consistent with the previous environmental profiling methodology applied by combining individual environmental variables into a comprehensive environmental measure. The environmental strength factor is statistically insignificant just like the TES rating variable. The breakdown of the concern variables

into 2 factors did not allow for a clear comparison between both the nonchemical concerns factor and the chemical concerns factor and the TEC.

4.4 Stage IV Results

Table 18 displays the nature of the change in the environmental performance scores for the matched sample firms over the 2006 to 2008 period. Changes in environmental performance ranged from -3 to +3. If the change was between -3 and -1, the observation was categorized as "Deterioration." If the change was equal to 0 either because of equivalent but opposite changes or no changes at all then the observation was categorized as "No Change." If the change was between 1 and 3 then the observation was categorized as "Improvement." As discussed earlier, the match between 2006 and 2008 yielded a total of 1654 firm-year observations. Around 5.01% of the sample, 83 firms, experienced deterioration in their environmental ratings score. More than 86.09% of the sample, 1424 firms, experienced no change at all, while 0.6%, 10 firms experienced an equivalent but opposite change with no overall change in the environmental rating score. One-hundred-thirty-seven firms, or 8.28% of the sample, had an improvement in the environmental rating score.

The mean differences of the annual return change variable (CH_Cum_Ret) are investigated amongst the three groups in the sample. The one way ANOVA results are presented in Table 19. These results show no significant mean differences between the three groups (p-value = 0.61).

The Pearson correlations show no significant correlation ($p = 0.42$) between the annual return change variable and the OER change variable (Table 20). The models'

goodness of fit and the R-square for the firms' overall environmental changes model are presented in Table 21, Panel A. The overall environmental changes model appears to be statistically significant with a p-value of 0.000. This indicates that the independent variables did significantly explain the variation in the dependent variable. Panel B of Table 21 presents the coefficients of the regression model. The results indicate that profitability using profit margin, ROA, and capital intensity are all positively correlated to annual returns (p-values of 0.061, 0.070, and 0.000 respectively), while firm size is negatively correlated (p-value = 0.000). The overall environmental change variable is statistically insignificant in the model. Thus, Hypothesis 6 is rejected.

I further investigate the association between the overall environmental change variable and the firms' annual return changes for individual groups rather than in total. More specifically, I investigate the deterioration and the improvement group changes in association with the firm's annual return changes. The results of these tests, presented in Table 22, Panel A indicate that the individual group's model is also not significant. The deterioration group had a p-value of 0.128 while the improvement group had a p-value of 0.276. Likewise, each group's environmental change variable was not significantly associated with annual return changes (a p-value of 0.2980 and a coefficient of -0.1168 for the deterioration group (Table 22, Panel B), and a p-value of 0.3259 and a coefficient of -0.1173 for the improvement group (Table 22, Panel C). I thus conclude that the capital markets did not respond to changes in the sample firms' environmental performance.

Chapter 5

Sensitivity Tests

I performed 6 sets of tests to check the sensitivity of the results. The sensitivity tests include employing the variables all together in one model (instead of addressing them in different models); using alternative dependent variables; and utilizing different models to assess the sensitivity of the association results obtained in the previous analysis.

The first set of sensitivity tests includes (1) all environmental variables which were tested individually in Models 1 and 2, in one regression model with annual returns as the dependent variable and (2) the total environmental strength rating variable and the total environmental concern rating variable together in one regression model. Third, the variables which loaded on the chemical concern factor were added together into a chemical concerns rating variable and then regressed against the firms' annual returns and likewise for the variables which loaded on the nonchemical concern factor. Finally, both chemical and nonchemical concern rating variables were included in one regression model.

Table 23 illustrates the association between the firms' annual returns and the firms' environmental variables. Panel A displays the model's goodness of fit, the R-square, and the ANOVA results for the model. The environmental variables model yields an R-square of 0.075 (indicating that approximately eight percent of the variability in annual returns can be explained by the model). The adjusted R-square was 0.072. The overall regression model appeared to be statistically significant with a p-value of 0.000. Panel B of Table 23 presents the results of the regression model which indicates that both

industry classification and ROA are positively, significantly associated with annual returns (p-values of 0.016 and 0.000 respectively), while firms' size was negatively associated with returns (p-value = 0.000). The coefficients of the environmental variables were negative and significant for management systems strength (p-value = 0.043) and other strengths (p-value = 0.004), while positive and significant for recycling (p-value = 0.032), substantial emissions (p = 0.027), and agricultural chemicals (p = 0.000).

The results are not consistent with the results of Models 1 and 2. Besides the other strengths variable, which was the only significant environmental strength variable, two environmental strength variables (management systems strength and recycling) are reported significant. The environmental concern variables previously had hazardous waste, substantial emissions, and agriculture chemicals as significant variables; however, in this test only substantial emissions and agricultural chemicals are significant.

Table 24 illustrates the results of the association between both the total environmental strength and concern rating variables and the firms' annual returns. Panel A displays the model's goodness of fit, the R-square, and the ANOVA results. The environmental rating variables model yields an R-square of 0.068 (indicating that approximately seven percent of the variability in annual returns can be explained by the model). The adjusted R-square is 0.067. The overall regression model appears to be statistically significant with a p-value of 0.000. Panel B of Table 24 presents the results of the regression model which indicate that both industry classification and ROA are positive and significantly associated with annual returns (p-values of 0.011 and 0.000 respectively), while firms' size was significant and negatively associated (p = 0.000). The coefficient of the total environmental strength rating variable was insignificant (p-value =

0.239) while the coefficient of the total environmental concern rating variables was significant (p-value = 0.010). These results are consistent with the results of Models 3 and 4.

Table 25 presents the association between the chemical concern rating variable (composed of the agricultural concern variable and the ozone depletion chemical concern variable) and the firms' annual returns. Panel A displays the model's goodness of fit, the R-square, and the ANOVA results. The chemical concern rating model yields an R-square of 0.070 (indicating that seven percent of the variability in annual returns variables can be explained by the model). The adjusted R-square is 0.069. The overall regression model appears to be statistically significant with a p-value of 0.000. Panel B of Table 25 illustrates the results of the regression model. The chemical concern rating variable is positive and significant (p-value = 0.000) which was consistent with the results reported previously for the chemical concern factor (p = 0.000). Industry classification and return on assets are significant and positively associated with annual returns while firm size is significant but negatively associated with the annual returns. These results are also consistent with the original tests.

Table 26 presents the association between the non-chemical concern rating variable (composed of the hazardous and waste concern variable, regulatory problems concern variable, substantial emission concern variable, climate changes concern variable, and other concerns variable) and the firms' annual returns. Panel A displays the model's goodness of fit, the R-square, and the ANOVA results. The non-chemical concern rating variables model yielded an R-square of 0.067 (indicating that approximately seven percent of the variability in annual returns variables can be

explained by the model). The adjusted R-square is 0.066. The overall regression model appears to be statistically significant with a p-value of 0.000. Panel B of Table 26 presents the results of the regression model which indicates that the non-chemical concern rating variable is insignificant (p = 0.096). This is consistent with the results reported for the chemical concern factor (p = 0.122). The industry classification and return on assets variables are significant and positively associated with the firms' annual returns while firms' size was significant but negatively associated with annual returns. These findings are consistent with previous results.

Table 27 presents the results of the association between the concern rating variables (chemical concern rating variable and the non-chemical concern rating variable) and the firms' annual returns. Panel A displays the models' goodness of fit, the R-square, and the ANOVA results. The environmental rating variables model yields an R-square of 0.070 (indicating that seven percent of the variability in annual returns variables can be explained by the model). The adjusted R-square is 0.069. The overall regression model appears to be statistically significant with a p-value of 0.000. Panel B of Table 27 presents the results of the regression model. These results are consistent with the prior individual associations for the chemical concern rating variable and the non-chemical concern variable. The non-chemical concern rating variable was not significantly associated with annual returns while the chemical concern rating variable was positive and significantly associated with annual returns (p-value = 0.000). The control variables are consistent, with both the industry classification and return on assets significant and positively associated with annual return while firm size is significant and negatively associated with returns.

The second set of sensitivity analyses includes addressing the association between the environmental variables and the annual returns for each individual year rather than the 3-year cross-sectional sample set. For each year, the individual environmental variables and the environmental rating variables are regressed against the year's annual return.

Table 28 illustrates the results of tests for the year 2006, between the environmental strength variables and firms' annual returns. Panel A displays the models' goodness of fit, the R-square, and the ANOVA results for the models. The environmental strengths model yields an R-square of 0.015 (indicating that one and one half percent of the variability in annual returns is explained by the model). The adjusted R-square ranged from 0.011 to 0.012. The overall regression models are statistically significant with p-values of 0.000. Panel B of Table 28 illustrates the results of the regression models which indicate, again, that firm size is negative and significantly associated with annual returns (p-values of 0.000) while return on assets variable is positive and significantly associated with returns (p-values of 0.000). All environmental strength variables, including the other strengths variable, are not significantly associated with annual returns. This is consistent with the results of Model 1 (except for the other strengths variable which was significant in Model 1).

Table 29 illustrates the results of the association, for the year 2006, between the environmental concern variables and annual returns. Panel A displays the models' goodness of fit, the R-square, and the ANOVA results. The environmental concern variables model yields an R-square that ranges from 0.015 and 0.019 (indicating that approximately 2 percent of the variability in annual returns variable is explained by the

models). The adjusted R-square ranges from 0.012 to 0.016. The overall regression model is statistically significant with a p-values of 0.000. Panel B of Table 29 presents the results of the regression model. Firms size is negatively associated with annual returns (p-value = 0.000) while the return on assets variable was positive and significantly associated with the firms' annual returns (p-values of 0.000). In regard to the environmental concern variables, the regression results are not consistent with the results of Model 2. Only the coefficient on the agricultural chemicals concern variable, which was positive, is significantly associated with annual returns (p-value =0.002).

Table 30 illustrates the results of the association, for the year 2006, between the environmental rating variables and firms' annual returns. Panel A displays the models' goodness of fit, the R-square, and the ANOVA results. The environmental rating variable models yield R-squares that range from 0.014 and 0.015 (indicating that approximately one and one-half percent of the variability in the annual returns variable can be explained by the models). The range of the adjusted R-squares is 0.011 to 0.012. The overall regression models are statistically significant with p-values of 0.000. Panel B of Table 30 presents the results of the regression models. Firm size is negative and significantly associated with annual returns (p-value of 0.000) while the return on assets variable is positive and significantly associate with the returns (p-value of 0.000). In regard to the environmental rating variables, the regression coefficients were not consistent with the results of Models 4 and 5 where both the total environmental concern rating variable and the overall environmental rating variable were not significantly associated with annual returns. However, consistent with the results of Model 3, the total environmental strength rating variable is not significantly associated with the firms' annual returns.

Table 31 illustrates the results of the association, for the year 2007, between the environmental strength variables and firms' annual returns. Panel A displays the models' goodness of fit, the R-square, and the ANOVA. The environmental strength variable models yield R-squares that range from 0.057 to 0.063 (indicating that approximately six percent of the variability in current year annual returns variable can be explained by the models). The adjusted R-squares ranged from 0.054 to 0.060. The overall regression models are statistically significant with a p-value of 0.000. Panel B of Table 31 presents the results of the regression models which indicate that firm size is negatively associated with annual returns (p-values less than 1%) while the return on assets and the industry classification variables are positively associated with returns (p-values of 0.000). Beneficial products and services, recycling, clean energy, and management system strength variables are positive and significantly associated with the firm's annual returns (p-values = 0.004, 0.000, 0.000, and 0.002 respectively) while pollution prevention and other strengths variables were insignificant. These results were not consistent with the results of Model 1 where the other strengths variable was the only significant environmental variable.

Table 32 illustrates the results of the association, for the year 2007, between the environmental concern variables and the firms' annual returns. Panel A displays the models' goodness of fit, the R-square, and the ANOVA results. The environmental concern variable models yield R-squares that range from 0.056 to 0.077 (indicating that six to seven percent of the variability in annual returns variable can be explained by the models). The range of the adjusted R-squares is between 0.054 and 0.074. The overall regression models are statistically significant with p-values of 0.000. Panel B of Table 32

illustrates the results of the regression models which indicate that firm size variable is negative and significantly associated with the annual returns (p-values less than 1%) while return on assets and the industry classification variables are positively associated with annual returns (p-values of 0.000). In regard to the environmental concern variables: hazardous waste, regulatory problems, substantial emissions, agricultural chemicals, and climate change variables are all positively associated with returns (p-values = 0.001, 0.000, 0.000, 0.000, and 0.011 respectively), while ozone depletion chemicals and other concerns variables are insignificant. These results are not consistent with the results of Model 2 where only hazardous waste, substantial emissions, and agriculture chemicals were significantly associated with the annual returns

Table 33 illustrates the results of the association, for the year 2007, between the environmental rating variables and firms' annual returns. Panel A displays the models' goodness of fit, the R-square, and the ANOVA results. The environmental rating variable models yields R-squares that range from 0.064 to 0.076 (indicating that approximately seven percent of the variability in annual returns variable can be explained by the models). The adjusted R-squares range from 0.061 to 0.073. The overall regression models are statistically significant with p-values of 0.000. Panel B of Table 33 presents the results of the regression models which indicate that firm size is negative and significantly associated with annual returns (p-values = 0.000) while the return on assets and the industry classification variables are positive and significantly associated with annual returns (p-values of 0.000). In regard to the environmental rating variables, the regression coefficient results are consistent with the results of Models 4 and 5 where both the total environmental concern rating variable and the overall environmental rating

variable are positive and significantly associated with the annual returns (p-values = 0.000). However, the total environmental strength rating variable is positive and significantly associated with the firms' annual returns (p-value =0.000) which is inconsistent with the results of Model 3.

Table 34 illustrates the results of the association, for the year 2008, between the environmental strength variables and firms' annual returns. Panel A displays the models' goodness of fit, the R-square, and the ANOVA results. The environmental strength variable models yield R-squares that range from 0.087 to 0.090 (indicating that approximately nine percent of the variability in annual returns variable can be explained by the models). The adjusted R-squares range from 0.084 to 0.087. The overall regression models are statistically significant with p-values of 0.000. Panel B of Table 34 illustrates the results of the regression models which indicate that the significance of firm size is inconclusive. It is significant in the beneficial products and services model (p-value = 0.036), pollution prevention model (p-value = 0.041), clean energy model (p-value = 0.037), and other strengths model (p-value = 0.043), but not significant in the recycling model and the management systems model. The return on assets variable is positive and significantly associated with the firms' annual returns (p-values of 0.000). Management system strength variable is negative and, unlike the results of Model 1 where the other strengths variable was the only significant variable, management systems is the only strength variable that is significantly associated with the firm's annual returns (p-value = 0.010).

Table 35 illustrates the results of the association, for the year 2008, between the environmental concern variables and the firms' annual returns. Panel A displays the

models' goodness of fit, the R-square, and the ANOVA results. The environmental concern variable models yield an R-square that ranges from 0.087 to 0.089 (indicating that approximately nine percent of the variability in annual returns variable can be explained by the models). The range of the adjusted R-squares is between 0.084 and 0.086. The overall regression models are statistically significant with p-values of 0.000. Panel B of Table 35 illustrates the results of the regression models which indicate that the significance of the firm size variable is inconclusive. It was only significant in the ozone depletion chemicals model (p-value = 0.036), agricultural chemicals model (p-value = 0.038), and other concerns model (p-value = 0.048). Return on assets is positively, significantly associated with annual returns (p-values of 0.000). In regard to the environmental concern variables, none of the environmental concern variables is significantly associated with annual returns. This is inconsistent with the results of Model 2 where hazardous waste, substantial emission, and agriculture chemicals concern variables are positive and significantly associated with the firms' annual returns.

Table 36 illustrates the results of the association, for the year 2008, between the environmental rating variables and firms' annual returns. Panel A displays the models' goodness of fit, the R-square, and the ANOVA results. The environmental rating variable models yield R-squares that range from 0.088 to 0.089 (indicating that approximately nine percent of the variability in annual returns variable can be explained by the models). The adjusted R-squares range from 0.085 to 0.086. The overall regression models are statistically significant with p-values of 0.000. Panel B of Table 36 presents the results of the regression models which indicate that return on assets is positively, significantly associated with annual returns (p-values of 0.000). In regard to the environmental rating

variables, the regression coefficient results are consistent with the results of Models 3 and 5 where the total environmental strength rating variable is insignificant while the overall environmental rating variable is positively, significantly associated with annual returns (p-value =0.041). The total environmental concern rating variable was, however, not significantly associated with the annual returns variable which is inconsistent with the results of Model 4.

The third set of sensitivity tests employs earning levels as the dependant variable instead of the annual returns. Net income is used to measure the firms earning levels, thus; the regression analysis will include the firms' net income as the dependent variable; also, unlike the other regression models, ROA was not used as a control variable.

Table 37 illustrates the results of the association between the environmental strength variables and the firms' net income. Panel A displays the models' goodness of fit, the R-square, and the ANOVA results. The environmental strength variable models yield R-squares that range from 0.052 to 0.063 (indicating that five to six percent of the variability in annual returns variables can be explained by the models). The range of the adjusted R-squares is almost identical (0.051 and 0.062). The overall regression models are statistically significant with p-values of 0.000. Panel B of Table 37 presents the results of the regression models which indicate that both of industry classification and firms' size are positive and significantly associated with the earning levels (p-values of 0.000 for both variables). The regression coefficient results are, however, opposite to the results of Model 1. All the environmental strength variables appear to be positive and significantly associated with earnings levels except the other strengths variable which is insignificant.

Table 38 illustrates the results of the association between the environmental concern variables and firms' net income. Panel A displays the models' goodness of fit, the R-square, and the ANOVA results. The environmental concern variable models yield R-squares that ranged from 0.052 to 0.071 (indicating that five to seven percent of the variability in annual returns variables can be explained by the models). The adjusted R-squares ranged from 0.051 to 0.070. The overall regression models are statistically significant with p-values of 0.000. Panel B of Table 38 presents the results of the regression models which indicate that both industry classification and firm size are positive and significantly associated with earnings levels (p-values of 0.000 for both variables). All environmental concern variables are positive and significantly associated with earning levels except the Ozone Depleting Chemicals Concern and Agricultural Chemicals Concern. These regression results are different from the results of Model 2 where only hazardous waste, substantial emissions, and agriculture chemicals concern variables were significant.

Table 39 illustrates the results of the association between the environmental rating variables and firms' net income. Panel A displays the models' goodness of fit, the R-square, and the ANOVA results. The environmental rating variable models yield R-squares that range from 0.065 to 0.078 (indicating that seven to eight percent of the variability in earning levels variable can be explained by the models). The adjusted R-squares range from 0.064 to 0.07). The overall regression models are statistically significant with p-values of 0.000. Panel B of Table 39 presents the results of the regression models which indicate that both industry classification and firms' size are positive and significantly associated with earnings (p-values of 0.000 for both variables).

The regression coefficient results are consistent with the results of Models 4 and 5 in that both the total environmental concern rating variable and the overall environmental rating variable are positive and significantly associated earnings earning levels ($p = 0.000$ for both variables). Unlike the results of Model 3, however, the total environmental strength rating variable was positive and significantly associated with earnings ($p = 0.000$).

The fourth set of sensitivity tests includes the use of the firms' year-end stock prices instead of the firms' annual returns. The individual environmental variables and the environmental rating variables are regressed against the year-end stock prices as the dependent variable.

The results of the association between the environmental strength variables and firms' yearend stock prices are displayed in Table 40. Panel A displays the models' goodness of fit, the R-square, and the ANOVA results. The environmental strength variable models yields an R-square of 0.051 (indicating that approximately five percent of the variability in yearend stock prices variables can be explained by the models) and an adjusted R-square of 0.049. The regression models appear to be statistically significant with a p-value of 0.000. Panel B of Table 40 presents the results of the regression models which indicate that firm size and return on assets are positive and significantly associated with year-end price (p-values of 0.000 for both variables). Unlike the previous models, however, industry classification was not significant. The regression results, also, indicate that none of the environmental strength variables were significantly associated with year-end price.

Table 41 illustrates the results of the association between the environmental concern variables and firms' year-end stock price. Panel A displays the models' goodness

of fit, the R-square, and the ANOVA results. The environmental concern variable models yield R-squares that range from 0.051 to 0.064 (indicating that five to six percent of the variability in yearend stock prices variable can be explained by the models). The adjusted R-squares ranged from 0.049 to 0.063. The regression models appear to be statistically significant with p-values of 0.000. Panel B of Table 41 presents the results of the regression models which indicate that firm size and return on assets are positively associated with year-end price (p-values of 0.000 for both variables); however, Industry classification was not a significant variable in the models. These regression results are different from the results of Model 2. No environmental concern variables were significantly associated with year-end stock prices except for the regulatory problems and other concerns variables which were significant at $p = 0.000$ for both variables.

Table 42 illustrates the results of the association test between the environmental rating variables and firms' yearend stock prices. Panel A displays the models' goodness of fit, the R-square, and the ANOVA results. The environmental rating models yield R-squares that range from 0.051 to 0.052 (indicating that approximately five percent of the variability in the yearend stock prices variables can be explained by the models). The adjusted R-squares ranged from 0.049 to 0.051. The overall regression models are statistically significant with a p-value of 0.000. Panel B of Table 42 presents the results of the regression models which indicate that firm size and return on assets are positively associated with the year-end stock price (p-values of 0.000 for both variables). These regression results are consistent with the results of Models 3 and 4.

The fifth set of sensitivity tests includes the use of a one year lag annual return as the dependant variable instead of the current year annual returns. Thus, the regression

analysis included the annual return of ‘07 regressed against the environmental variables of ‘06, the annual return of ‘08 regressed against the environmental variables of ‘07, and the annual return of ‘09 regressed against the environmental variables of ‘08.

The results of the association between the environmental strength variables and firms’ following year annual returns are displayed in Table 43. Panel A displays the models’ goodness of fit, the R-square, the ANOVA results. The environmental strength variable models yield R-squares that range from 0.020 to 0.021 (indicating that approximately two percent of the variability in following year annual returns can be explained by the model) and adjusted R-squares that range from 0.018 to 0.020. The regression models appear to be statistically significant with a p-value of 0.000. Panel B of Table 43 presents the results of the regression models which indicate that industry classification and capital intensity are positive and significantly associated with the following year's annual returns (p-values less than 0.01 and p-values less than 0.034 respectively). Return on assets is negatively associated with the following year returns (p-values = 0.000). The results for firms size are inconclusive as the coefficients on that variable are insignificant in all strength models except in the models of the clean energy strength variable (p-values= 0.002) and management system strength variable (p-value = 0.022). Only the management system strength variable is significant in association to the following year annual returns (p-value = 0.007).

Table 44 displays the results of the association between the environmental concern variables and firms’ following year annual returns. Panel A displays the models’ goodness of fit, the R-square, and the ANOVA results. The environmental concern variable models yields R-squares that range from 0.020 to 0.021 (indicating that

approximately two percent of the variability in following year annual returns can be explained by the models) and adjusted R-squares that range from 0.018 to 0.020. The regression models appear to be statistically significant with p-values of 0.000. Panel B of Table 44 illustrates the results of the regression models which indicate that industry classification and capital intensity are positively associated with the following year annual returns (p-values less than 0.012 and 0.035 respectively). Return on assets is negative and significantly associated with the following year returns (p-values = 0.000). Firm size is not significant except in the models of the hazardous waste concern (p-value = 0.029), regulatory problems concern (p-value = 0.028), and substantial emissions concern (p-value = 0.017). The regression results also reveal that only the substantial emission concern variable is positive and significant (p-values = 0.006).

Table 45 illustrates the results of the association between the environmental rating variables and firms' following year annual returns. Panel A displays the models' goodness of fit, the R-square, and the ANOVA results. The environmental rating variable models yield R-squares that range from 0.021 to 0.022 (indicating that approximately two percent of the variability in the following year annual returns can be explained by the models). The adjusted R-squares range from 0.020 to 0.021. The overall regression models are statistically significant with p-values of 0.000. Panel B of Table 45 presents the results of the regression models which indicate that firms' size and return on assets variables are negative and significant (p-values less than 0.014 and 0.000 respectively). The industry classification is positive and significant (p-value less than 0.044). The regression coefficient results are consistent with the results of Models 4 and 5 where both the total environmental concern rating variable and the overall environmental rating

variable are positive and significantly associated with the firms' following year annual returns (p = 0.003 and 0.000 respectively). Unlike the results of Model 3, however, the total environmental strength rating variable is positive and significantly associated with the firms' following year annual returns (p = 0.005).

The sixth set of the sensitivity tests involves employing Ohlson's clean surplus model. The environmental variables and then the environmental ratings were regressed individually against the firms' year-end stock price. The financial data are standardized by book value per share.

The results of the association between the environmental strength variables and year-end stock prices are displayed in Table 46. Panel A displays the models' goodness of fit, the R-square, and the ANOVA results. The environmental strength variable models yield R-squares that range from 0.810 to 0.811 (indicating that approximately eighty percent of the variability in year-end stock prices can be explained by the models) and the adjusted R-square ranged from 0.0810 to 0.811. The regression models are statistically significant with a p-value of 0.000. Panel B of Table 46 presents the results of the regression models. Both book value per share and earnings per share, are positively associated with year-end stock prices (p-values of 0.000) across all environmental strength models. All environmental strength variables, with the exception of other strengths variable, are positive and significantly associated with the firms' year-end stock price (p-values less than 0.02). The results are different from those of the results of Model 1 where only the other strengths variable is significant.

Table 47 presents the results of the association between the environmental concern variables and firms' year-end stock prices. Panel A displays the models'

goodness of fit, the R-square, the ANOVA results. The environmental concern variable models yield R-squares of 0.90 (indicating that ninety percent of the variability in yearend stock prices can be explained by the model). The adjusted R-square ranges from 0.810 to 0.811. The regression models are statistically significant with a p-value of 0.000. Panel B of Table 47 presents the results of the regression models which indicate that both book value per share and the earnings per share are significant across all environmental concern models at p-values of 0.000. The regression results also reveal that only the hazardous waste concern variable (p-value = 0.003), substantial emission concern variable (p-value = 0.001), and other concerns variable (p-value = 0.001) are positivey associated with the firms' year-end stock prices.

Table 48 illustrates the results of the association between the environmental rating variables and firms' year-end stock prices. Panel A displays the models' goodness of fit, the R-square, and the ANOVA results. The environmental rating variable models yield R-squares ranging from 0.810 to 0.811 (indicating that approximately eighty one percent of the variability in year-end stock prices can be explained by the model). The range of the adjusted R-squares is virtually identical (0.810 to 0.811). The overall regression models are statistically significant with p-values of 0.000. Panel B of Table 48 presents the results of the regression models which indicate that both book value per share and earnings per share are positive and significant across the environmental rating models with p-values of 0.000. The regression coefficient results are consistent with the results of Models 4 and 5 where both the total environmental concern rating variable and the overall environmental rating variable are positive and significantly associated with firms' year-end stock prices at p-values = 0.008 and 0.000 respectively. However, unlike the

results of Model 3, the total environmental strength rating variable was positively associated with yearend stock price (p-value = 0.000).

The results of the association between the environmental strength variables and the firms' year-end stock prices standardized by the book value per share are displayed in Table 49. Panel A displays the models' goodness of fit, the R-square, and the ANOVA results. The environmental strength variable models yield an R-square and adjusted R-square of 0.92 (indicating that ninety two percent of the variability in standardized yearend stock prices can be explained by the models). The regression models are statistically significant with p-values of 0.000. Panel B of Table 49 presents the results of the regression models where the standardized earnings per share variable is positive and significantly associated with the firms' stock prices at p-value of 0.000 across all environmental strength models. No environmental strength variables were significantly associated with the standardized year-end stock price, which is inconsistent with the results from Model 1.

Table 50 displays the results of the association between the environmental concern variables and firms' yearend stock prices standardized by the book value per share. Panel A displays the models' goodness of fit, the R-square, and the ANOVA results. The environmental concern variable models yield an R-square and an adjusted R-square of 0.92 (indicating that ninety two percent of the variability in the standardized year-end stock prices can be explained by the model). The regression models are statistically significant with a p-value of 0.000. Panel B of table 50 presents the results of the regression models which indicate that the standardized earnings per share variable is significant across all environmental concern models at p-values of 0.000. The regression

results also reveal that none of the environmental concern variables were associated with the standardized year-end stock price. Again this is inconsistent with results from Model 2.

Table 51 illustrates the results of the association between the environmental rating variables and firms' standardized year-end stock prices. Panel A displays the models' goodness of fit, the R-square, and the ANOVA results. The environmental rating variable models yield an R-square and an adjusted R-square of 0.92 (indicating that ninety two percent of the variability in standardized yearend stock prices can be explained by the models). The overall regression models are statistically significant with a p-value of 0.000. Panel B of Table 51 presents the results of the regression models which indicate that the standardized earnings per share were significant across all environmental rating models at p-value = 0.000, however, no environmental rating variables were significantly associated with the firms' standardized year-end stock prices. This result is inconsistent with the results previously obtained from Models 4 and 5.

The final set of the sensitivity tests involves investigating the association between the changes in the firms' earning levels and changes in the firms' overall environmental rating. The investigation was performed at the total level, where the entire sample was used to test for the association, and at the group level, where the sample was partitioned by groups ("improvement" environmental performance group and "deterioration" environmental performance group).

The results of the tests for an association between the changes in the firms' earning levels and changes in the firms' overall environmental rating are displayed in Table 52. The regression model is not significant (p-value of 0.112). Panel B of Table 52

presents the results of the regression models which indicate that firms' size is positive and significant while profit margin and capital intensity are negative and significant. The change in changes in the firms' overall environmental rating is not significantly associated with the changes in the firms' earning levels. The association test result was consistent with the results of Model 6.

The results of the test for an association between the changes in the firms' earning levels and group changes in the firms' overall environmental rating are displayed in Table 53. The regression models are significant with a p-value of 0.000 for the deterioration model and a p-value of 0.025 for the improvement model. Panel B of Table 53 presents the results of the regression models which indicate that, out of all the control variables, only profit margin is positive and significant in, only, the improvement model. The changes in the improvement group are insignificant and consistent with prior results; however, the deterioration group results are positive and significantly associated with the changes in the firms' earning levels which is inconsistent with the results obtained in the main analysis.

In summary, the control variables as well as the rating variables show relatively more consistent results than the individual environmental variables. ROA, as a measure of profitability, is the most consistent control variable across the sensitivity tests which reflects the notion belief that environmental performance and profitability are connected. The significance of the results of the environmental performance measures are not, however, consistent across the sensitivity tests. This can be explained, partially, by the dichotomous nature of the variables where any partitioning of the full sample may significantly affect the variability in the performance measures that may lead to changes

in the results; also, the majority of the sample observations reported no environmental performance (expressed as more “0s” than “1s”) which magnifies the inconsistencies in the results when partitioned. The nature of the environmental rating variables, as a combination of variables, can be seen as a step closer to variability of continuous variables, which leads to a more structured variation that is not affected greatly by partitioning of the sample. Thus, it appears that the use of the rating variables yield more reliable results than the individual variables which yield results that are sample sensitive. The steady performance of the profitability measure highlights one side of the nature of the environmental performance which indicates that firms, as profit maximizing institutions, view the environmental efforts in light of making more profits rather than incurring extra costs that would reduce their profitability.

Chapter 6

Conclusion

In this research, I have investigated whether measures of firms' environmental performance are associated with those firms' annual returns independent of any particular environmental event. The association analysis was based on the most recent environmental data for years 2006, 2007, and 2008. The individual environmental performance measures were extracted from the KLD database which provides 13 different measures/variables regarding firms' environmental performance. Six variables, herein referred to as environmental strength variables, are related to firms' activities and efforts to preserve the surrounding environment and/or reduce/control pollution. The remaining seven variables, herein referred to as environmental concern variables, are related to the negative impact of the firms' operations on the environment.

Prior research has provided no definitive guidance as to whether environmental strengths or concerns should be positively or negatively associated with firms' value. The relationship between environmental performance and the firms' value can be viewed in 3 theoretical perspectives. Their first perspective suggests a negative relationship since higher environmental performance would results in additional costs that put the firm at an economic disadvantage. The second perspective suggests a positive association where better environmental performance may lead ultimately to costs reduction and/or improved profitability such as waste management or recycling. The third perspective suggests that an overall positive association that results from more gains than losses, in other words, even though the costs of improving environmental performance can be significant, other costs may be reduced and/or revenues may increase. I provide evidence shedding light on

this issue in that the underlying factors in the associations I discovered, are likely related to increased revenues or decreased costs, and only tangentially related to environmental concerns. My results support one of the alternatives suggested by McGuire, Sundgren, and Schneeweis (1988), in that environmental activities place an additional financial burden on firms which thus leads to an economic disadvantage.

The results of my first stage tests indicate that only five out of the thirteen environmental variables, i.e. the other strengths variable; the recycling variable; the hazardous waste concern variable; the substantial emissions concern variable; and the agricultural chemicals concern variable, are significantly associated with the firms' annual returns. The coefficients of the individual measures support the perspective of the negative association between environmental and financial performance. This is logical given the nature of the constructs. However, the positive association between firms' value and the recycling activities supports the positive association suggested by McGuire, Sundgren, and Schneeweis (1988). Firms that engage in recycling activities would reap the additional revenues associated with selling recyclable bi or waste products, or the reduced costs associated with incorporating recycled materials into their products. Similarly, profit maximizing firms that choose to deal with hazardous wastes, emissions and agricultural chemicals in a manner that does not neutralize their environmental impact, would only do so -ceteris paribus - because alternative, environmentally friendly measures are more costly. Both perspectives can be integrated into a framework that suggests that profit maximization, as a primary objective for firms, will be sought either by engaging in environmental strength activities that increase the profitability (such as recycling) or by performing environmental concern activities (such as hazardous waste)

since it is the cheaper option as compared to other options that reduce or eliminates the negative impact of these activities.

The results of my second stage analysis, when I test whether the individual environmental indicators are informative when combined into a single metric, reveal a negative association between the total environmental concerns rating and firms' annual returns. This result is consistent with the stage one results and leads to similar conclusions. The total environmental strength rating was not, however, significantly correlated to annual returns. A look at the components of the environmental strength measure shows that other than recycling, none of the others are easily tied to increased revenues or decreased costs.

The results of the third stage analysis demonstrate the interaction between the significant and insignificant variables that yield an overall environmental rating measure that was significantly associated with firms' annual returns. Principle component analysis was conducted to further investigate the interaction between the environmental variables. All the strength variables were loaded onto one factor which, consistent with previous results, was not significantly associated with returns. Concern variables were loaded to two factors, the chemical concern factor and the non-chemical concern factor. Only the chemical concern factor was statistically significant in its association with firm's annual returns. The fact that the concern variables were loaded onto two factors rather than a single factor did not allow for the direct comparison between the concern factors regression results and the total environmental concern rating regression results. Nevertheless, these results suggest that chemical pollution may be more costly to correct,

and that minimizing corrective actions may yield more significant cost savings than the other environmental concerns.

The final stage of my analysis investigated the association between changes in the firms' annual returns and changes in the firms' environmental performance measures. The results reveal no significant differences between the various groups (deterioration, no improvement, and improvement). It is also important to note that no significant associations were found between the changes in annual returns and the changes in the environmental performance variable for either the deterioration group or the improvement group. This finding is significant for a number of reasons. First the result seems counterintuitive to the efficient markets hypothesis. It may be, however, that the markets anticipated these changes and thus no association is revealed by my tests. The result is also important from a regulatory standpoint because the lack of an association could be an artifact of investors' reluctance to spend the time an effort necessary to assess environmental performance in the absence of uniform environmental disclosures.

Together, these results suggest that individual environmental protection or remediation activities impose additional costs on firms that in turn lead to an economic disadvantage. The Stage II and Stage III analyses leads me to further conclude that indices and/or comprehensive measures may need further consideration and perhaps weighting before they can be applied in a meaningful sense as depictions of corporate behavior. Future research is required to develop and model the constructs regarding environmental performance, as there is some level of vagueness which raises the question of whether or not a component index assesses the same constructs that the individual measures address. In the case of the total environmental concern rating and the overall

environmental rating, significant factors outweighed insignificant variables, while in the case of the total strength rating insignificant factors may have outweighed significant variables.

The results of the combination process do, however, provide evidence of the negative association between environmental and financial performance. Overall, the results provide support for the view that environmentally friendly activities place an additional financial burden on firms which often, if not always, lead to an economic disadvantage.

The sensitivity tests reveal that the use of the rating variables delivers more reliable results than the individual variables which could deliver results that are sample sensitive. The steady performance of the return on assets as a profitability measure highlights that firms, as profit maximizing institutions, perceive the environmental efforts as a way to maximize profits and/or reduce costs.

The limitations of the dissertation are related to the research design, data, and period of the analysis. The use of environmental variables in a dichotomous manner affects the stability of the results. Also, the majority of the observations didn't report environmental activities engagement which magnifies the sensitivity of the results to any partitioning of the sample. The use of 3 years time period between 2006 and 2008, which could be affected by the current market conditions, could be a bad timing to test the firms' willingness to engage in environmental activities when they are struggling to survive. So including more years and/or different time periods in the analysis may provide more power to results. The use of factor analysis doesn't offer any flexibility in the variables loading on various factors which limited the comparison of results.

The future work would be as follows: first, I plan to conduct the same research design for different time periods and then compare the results to my dissertation results which would provide insight into how the existing market conditions affect the firms environmental attitude and behavior; second, I will calculate cumulative abnormal returns for firms that reported environmental activities and firms that didn't report any environmental activities then compare the results from more groups which would shed light on the extent to which environmentally responsible firms out/underperform other firms; finally, a validation test could be conducted by comparing of the results of the chemical concern variables and other commonly used chemical concern measures such as the TRI.

This research contributes to the environmental performance literature by presenting evidence on the nature of the general association between environmental performance and firms' market value instead of just focusing on the immediate effect of a particular environmental event. It also illuminates our understanding of how environmental performance variables interact together when combined into summary measures.

Understanding how these environmental activities affect capital markets likewise is important to how regulatory agencies motivate and enforce environmentally sensitive regulations. This study provides some additional guidance for regulators and standard setters as they contemplate the nature and level of future environmental disclosures.

References

Aerts, W., & Cormier, D. (2009). Media legitimacy and corporate environmental communication. Accounting, Organizations and Society, 34(1), 1–27.

Alnajjar, F. K. 2000. Determinants of social responsibility disclosures of U.S. Fortune 500 firms: An application of content analysis. Advances in Environmental Accounting & Management, 1: 163-200.

Al-Tuwaijri, S. A., Christensen, T. E., and Hughes, K. E. 2004. The relations among environmental disclosure, environmental performance, and economic performance: A simultaneous equations approach. Accounting, Organizations and Society, 29(5-6), 447–471.

Anderson, J. C., and A. W. Frankle. 1980. Voluntary social reporting: An Iso-Beta portfolio analysis. The Accounting Review: Vol. 55, No. 3, pp. 467-479 467-79.

Aupperle, K. E., Carroll, A. B., & Hatfield, J. D. 1985. An empirical examination of the relationship between corporate social responsibility and profitability. Academy of Management Journal, 28(2): 446-463.

Barth, M. E. and M. F. McNichols. 1994. Estimation and market valuation of environmental liabilities relating to Superfund sites. Journal of Accounting Research 32 (Supplement), 177-209.

Barth, M., McNichols, M., and Wilson, P. 1997. Factors influencing firms' disclosures about environmental liabilities. Review of Accounting Studies, 2, 35–64.

Belkaoui, A. 1976. The impact of disclosure of the environmental effects of organizational behavior on the market. Financial Management, (winter): 26-31.

Beresford, Dennis R., 1974. How companies are reporting social performance. Management Accounting, pp. 41-44.

Berthelot, S., Cormier D., and Magnan, M. 2003. Environmental disclosure research: Review and synthesis. Journal of Accounting Literature, 22(1): 1–44.

Bewley, K. and Y. Li. 2000. Disclosure of environmental information by Canadian manufacturing companies: A voluntary disclosure perspective. Advances in Environmental Accounting & Management, 1: 201-226.

Blacconiere, W.G. and Patten, D.M. 1994. Environmental disclosures, regulatory costs, and changes in firm value. Journal of Accounting and Economics 18, 357–377.

Blacconiere, W.G. and W. D. Northcut. 1997. Environmental information and market reactions to environmental legislation. Journal of Accounting, Auditing and Finance, 12 (Spring): 149-178.

Bosch, Jean, E. Eckard Woodrow, and Insup Lee. 1998. EPA enforcement, firm response strategies, and stockholder wealth: An empirical examination. Managerial and Decision Economics, 19(3), pp. 167-177.

Bragdon, J. and Marlin, J. 1972. Is pollution profitable"? Risk Management 19 (2): 9-18

Campbell, D. 2004. A longitudinal and cross-sectional analysis of environmental disclosure in UK companies--a research note. The British Accounting Review, Vol.36.No.1, pp.107-117.

Carroll, A. B. 1979. A three-dimensional conceptual model of corporate performance. Academy of Management Review, 4: 497-505.

Chan-Fishel, Michelle. 2002. Survey of climate change disclosure in SEC filings of automobile, insurance, oil & gas, petrochemical, and utilities companies. Friends of the Earth – U.S., September.

Cho, C. H., & Patten, D. M. (2007). The role of environmental disclosures as tools of legitimacy: A research note. Accounting, Organizations and Society, 32(7–8), 639–647.

Cho, C. H., Roberts R.W., and Patten, D. M. (2009). The language of the US corporate environmental disclosure. Accounting, Organizations and Society.

Clarkson, P. M., Li, Y., Richardson, G. D., & Vasvari, F. P. (2008). Revisiting the relation between environmental performance and environmental disclosure: An empirical analysis. Accounting, Organizations and Society, 33(4/5), 303–327.

Cormier, D. and Magnan, M. 1999. Corporate environmental disclosure strategies: Determinants, costs and benefits. Journal of Accounting, Auditing and Finance, 14(4): 429-451.

Corson, J. J., and Steiner, G. A. 1974. Measuring business' social performance: The corporate social audit. New York: Committee for Economic Development.

Deegan, C. 2004. Environmental disclosures and share prices – a discussion about efforts to study this relationship. Accounting Forum, Nr. 28, pp 87-97.

Dibartolomeo, D. and Kurtz, L. 1999. Managing risk exposures of socially screened portfolios. Northfield Information Services, Boston, www.northinfo.com.

Dodd, P. and J. B. Warner. 1983. On corporate governance: A study of proxy contests. Journal of Financial Economics 11: pp 401-438.II, 401

Dunlap, R., Scarce, R., 1991. Environmental problems and protection. Public Opinion Quarterly 55 (4), 651-672.

Dye, R. A. 1985. Disclosure of nonproprietary information. Journal of Accounting Research, 23(1): 123-145.

Eilbirt, H. and Parket, R. I. 1973. The practice of business: The current status of corporate social responsibility. Business Horizons, 16 (4): 5-14.

Epstien, J., Freedman, M., 1994. Social disclosure and the individual investor. Accounting, Auditing and accountability Journal 7 (4), 94- 109.

Ernst and Ernst 1977. Social responsibility disclosures: 1977 survey. Cleveland: Ernst and Ernst.

Ernst and Ernst 1978. Social responsibility disclosures: 1978 survey. Cleveland: Ernst and Ernst.

Fama, E., French, K., 1996. Multifactor explanations of asset pricing anomalies. Journal of Finance 51, 55D84.

Fekrat, M. A., C. lnclan, and D. Petroni. 1996. Corporate environmental disclosures: Competitive disclosure hypothesis using 1991 annual report data. The International Journal of Accounting, 31(2): 175-195.

Feltham, G.A. and J.Z. Xie. 1992. Voluntary financial disclosure in an entry game with continua of types. Contemporary Accounting Research 9, 4680.

Freedman, M. and C. Wasley. 1990. The association between environmental performance and environmental disclosure in annual reports and 10Ks. Advances in Public Interest Accounting, 3: 183-193.

Freedman, M. and Jaggi, B. 1988. An analysis of the association between pollution disclosure and economic performance. Accounting, Auditing & Accountability Journal.

Freedman, M. and Jaggi, B. 1992. An investigation of the long-run relationship between pollution performance and economic performance: The case of pulp-and-paper firms. Critical Perspectives on Accounting, 3(4), 315–336.

Freedman, M. and Patten, D. M. 2004. Evidence on the pernicious effect of financial report environmental disclosure. Accounting Forum, 28(1), 27–41.

Fry, F. L. and Hock, R. J. 1976. Who claims corporate responsibility? The biggest and the worst. Business and Society Review, 18, 62-65.

Fryxell, G. E., & Wang, J. 1994. The Fortune corporate reputation index: Reputation for what? Journal of Management, 20: 1-14.

Garz, H., Volk, C., and Gilles, M. 2002. More gain than Pain – SRI: Sustainability pays off. WestLB Panmure, http://www.westlbpanmure.com/sri/pdf/sri_nov2002.pdf

Gregory, A., Matatko, J., and Luther, R. 1997. Ethical until trust financial performance: Small company effects and fund size effects. Journal of Business Finance and Accounting, 24: 705–725.

Grossman, S. 1981. The role of warranties and private disclosure about product quality. Journal of Law and Economics, 24(3): 461-483.

Guthrie. J. and Parker, L. D. 1989. Corporate social disclosure practice: A comparative international analysis. Advances in Public Interest Accounting, pp. 67-93.

Hamilton, J. T. 1995. Pollution as news: Media and stock market reactions to toxics release inventory data. Journal of Environmental Economics and Management, 28:98-113.

Harte, G. and D. Owen. 1991. Environmental disclosure in the annual reports of British companies: A research note. Accounting Auditing & Accountability Journal, 4(3): 51-61.

Harte, G., Lewis, L., and D. Owen. 1991. Ethical investment and the corporate reporting function. Critical Perspectives on Accounting, 2, 227–253.

Hillman, A., & Hitt, M. 1999. Corporate political strategy formulation. Academy of Management Review, 24: 825- 842.

Holmes, S. L. 1977. Corporate social performance: Past and present areas of commitment. Academy of Management Journal, 20: 433-538.

Hughes, S.B., A. Anderson, and S. Golden. 2001. Corporate environmental disclosures: Are they useful in determining environmental performance? Journal of Accounting and Public Policy, 20: 217-240.

Ingram, R. W. (1978) An investigation of the information con-tent of (certain) social responsibility disclosures. Journal of Accounting Research, 16, 270-285.

Ingram, R. W. and K. B. Frazier. 1980. Environmental performance and corporate disclosure. Journal of Accounting Research, 18 (2): 614-621.

Jaggi, B. and Freedman, M. 1982. An analysis of the informational content of pollution disclosures. The Financial Review, 142-152.

Jaggi, B. and Freedman, M. 1992. An examination of the impact of pollution performance on economic and market performance: pulp and paper Firms. Journal of Business Finance & Accounting, 19(5) 697-713.

Karpoff, J., J. Lott, and G. Rankine. 1999. Environmental violations, legal penalties, and reputation costs. John M. Olin Law & Economics working paper No. 71, The Law School, University of Chicago.

Klassen, R. and C. McLaughlin. 1996. The impact of environmental management on firm performance. Management Science, 42 1199-1214.

Konar, S. and M. Cohen. 1997. Information as regulation: The effect of community right to know laws on toxic emissions. Journal of Environmental Economics and Management 32: 109-124.

Kreander, N., Gray, R. H., Power, D. M., and Sinclair, C. D. 2005. Evaluating the performance of ethical and non-ethical funds: A matched pair analysis. Journal of Business Finance & Accounting, 32(7 & 8): 1465–1493.

Lanoie, P., B. Laplante and M. Roy. 1998. Can capital markets create incentives for pollution control? Ecological Economics July, 26, pp. 166. Journal of Economic Perspectives 31–41.

Lev, B. 1988. Toward a theory of equitable and efficient accounting policy. The Accounting Review, LXIII (1): 1-22.

Lorraine, N. H. J., Collison, D. J., and Power, D.M. 2004. An analysis of the stock market impact of environmental performance information. Accounting Forum, 28 (1), 7–26.

Magness, V. (2006). Strategic posture, financial performance and environmental disclosure: An empirical test of legitimacy theory. Accounting, Auditing and Accountability Journal, 19(4), 540–563.

Mahapatra, S. 1984. Investor reaction to corporate social accounting. The Journal of Business Finance and Accounting, 11(1), 29-40

Mallin, C. A., Saadouni, B., and Briston, R. J. 1995. The financial performance of ethical investment funds. Journal of Business Finance and Accounting, 22: 483–496.

McGuire, J. B., Sundgren, A., and Schneeweis, T. 1988. Corporate social responsibility and firm financial performance. Academy of Management Journal, 31: 354-372.

Merkl-Davies, D. M. and Brennan, N. M. 2007. Discretionary disclosure strategies in corporate narratives: Incremental information or impression management? Journal of Accounting Literature, 26, 116–194.

Milgrom, P. 1981. Good news and bad news: Representation theorems and applications. Bell Journal of Economics, 12:380-391.

Muoghalu, M. I., H. D. Robison, and J. L. Glascock. 1990. Hazardous waste lawsuits, stockholder returns and deterrence. Southern Economic Journal, 57:357-370.

Niskala, M. and M. Pretes. 1995. Environmental reporting in Finland: A note on the Use of annual reports. Accounting Organizations and Society, 20 (6): 457-466.

Ostlund, L. E. 1977. Attitudes of managers toward corporate social policy. California Management Review, 19 (4): 35-49.

Paluszek, J. L. 1976. Business and society: 1976-2000, an AMA report. New York: AMACOM**.**

Patten, D. M. 1991. Exposure, legitimacy, and social disclosure. Journal of Accounting and Public Policy, 10:297-308.

Patten, D.M. 2002. The relation between environmental performance and environmental disclosure: A research note. Accounting, Organizations and Society, 27: 763-773.

Rao, S. M. 1996. The effect of published reports of environmental pollution on stock prices. Journal of Financial and Strategic Decisions, Vol. 9 No. 1, pp. 25-32.

Reitenga, A. L. (2000). Environmental regulation, capital intensity, and cross-sectional variation in market returns. Journal of Accounting and Public Policy, 19(2), 189–198

Roberts, R. W., Dwyer, P. D. and Sweeney, J. T. Political strategies used by the U.S. public accounting profession during auditor liability reform: The case of the private securities legislation act of 1995. Journal of Accounting and Public Policy, Vol. 22, No. 5, 2003.

Sauer, D. A. 1997. The impact of social responsibility screens on investment performance: Evidence from the Domini 400 social index and Domini equity fund. Review of Financial Economics 6, pp. 23–35.

Schröder, M. 2004. The performance of socially responsible investments: Investment funds and indices. Financial Markets and Portfolio Management 18(2):122–142

Soloman, R., & Hansen, K. 1985. It's good business. New York: Atheneum.

Spicer, B. H. 1978. Investors, corporate social performance and information disclosure: An empirical study. The Accounting Review, 53, 94-111, 1978.

Statman, M. 2000. Socially responsible mutual funds. Financial Analysts Journal, May/June, pp 30– 39.

Verrecchia, R.E. 1983. Discretionary disclosure. Journal of Accounting and Economics, 5:179-194.

Walden, D. W. and Schwarte B. N. 1997. Environmental disclosures and public policy pressure. Journal of Accounting and Public Policy, 16: 125-154.

Wiseman, J. 1982. An evaluation of environmental disclosures made in corporate annual reports. Accounting, Organizations and Society, 7 (1): 53-63.

Yamashita, M., Sen, S., and Roberts, M.C. 1999. The rewards for environmental conscientiousness in the U.S. capital markets. Journal of Financial Strategic Decisions 12(1):73–82

Ziegler, A., Schröder, M., and Rennings, K. 2007a. The effect of environmental and social performance on the stock performance of European corporations. Environmental and Resource Economics 37, 661-680.

Appendix

Table 3

Model Summary and ANOVA Results of the Association between the Environmental Strength Variables and the Firms' Annual Returns

$$\text{Cum\_Ret} = \alpha_0 + \alpha_1 \text{ES}_i + \alpha_2 \ln\text{As} + \alpha_3 \text{SIC} + \alpha_4 \text{ROA} + \alpha_5 \text{Fin\_Lev} + \alpha_6 \text{Prf\_Mrgn} + \alpha_7 \text{Cap\_Int} + e$$

Table 3							
	Environmental strength variable	Model Summary		ANOVA			
		R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Model 1_1	Beneficial products & services strength (ES1)	0.0668	0.0658	91.549	1278.603	0.000
Model 1_2	Pollution prevention strength (ES_2)	0.0669	0.0659	91.647	1278.504	0.000
Model 1_3	Recycling strength (ES_3)	0.0669	0.0659	92.083	1278.069	0.000
Model 1_4	Clean energy strength (ES_4)	0.0668	0.0658	91.511	1278.641	0.000
Model 1_5	Management systems strength (ES_5)	0.067	0.066	91.742	1278.410	0.000
Model 1_6	Other strengths (ES_6)	0.0679	0.067	93.093	1277.059	0.000

Table 3 (continued)

Where:

ES "i" range from 1 to 6 indicating different environmental strength measures. i = 1 refers to clean energy, i = 2 refers to beneficial (green) products and services, i = 3 pollution prevention, i = 4 refers to recycling, and i = 5 management systems, i = 6 is other strengths;

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder's equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues)

and e is an error term.

Table 4

Regression Results of the Association between the Environmental Strength Variables and the Firms' Annual Returns $Cum\_Ret = \alpha_0 + \alpha_1 ES_i + \alpha_2 lnAs + \alpha_3 SIC + \alpha_4 ROA + \alpha_5 Fin\_Lev + \alpha_6 Prf\_Mrgn + \alpha_7 Cap\_Int + e$

Table 4												
Model1	Model 1_1		Model 1_2		Model 1_3		Model 1_4		Model 1_5		Model 1_6	
Environmental strength variable	Beneficial products and services (ES1)		Pollution prevention (ES2)		Recycling (ES3)		Clean energy (ES4)		management system strength (ES5)		Other strengths (ES6)	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
(Constant)	0.0701	0.0070	0.0673	0.0100	0.0741	0.0050	0.0721	0.0070	0.0643	0.0150	0.0636	0.0150
lnAs	-0.0198	0.0000	-0.0193	0.0000	-0.0204	0.0000	-0.0201	0.0000	-0.0188	0.0000	-0.0187	0.0000
SIC_01	0.0506	0.0010	0.0518	0.0010	0.0494	0.0010	0.0504	0.0010	0.0524	0.0010	0.0527	0.0000
ROA	0.7898	0.0000	0.7914	0.0000	0.7887	0.0000	0.7905	0.0000	0.7920	0.0000	0.7913	0.0000
Fin_lev	0.0000	0.8540	0.0000	0.8560	0.0000	0.8490	0.0000	0.8520	0.0000	0.8690	0.0000	0.8590
Prf_Mrgn	0.0000	0.7620	0.0000	0.7670	0.0000	0.7570	0.0000	0.7620	0.0000	0.7710	0.0000	0.7680
Cap_Int	0.0000	0.6540	0.0000	0.6590	0.0000	0.6490	0.0000	0.6540	0.0000	0.6630	0.0000	0.6610
ESi	0.0215	0.5401	-0.0448	0.3457	0.0749	0.0753	0.0115	0.6745	-0.0286	0.2396	-0.1872	0.0037

Table 4 (continued)

Where:

ES "i" range from 1 to 6 indicating different environmental strength measures. i = 1 refers to clean energy, i = 2 refers to beneficial (green) products and services, i = 3 pollution prevention, i = 4 refers to recycling, and i = 5 management systems, i = 6 is other strengths;

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder's equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues)

and e is an error term.

Table 5

Model Summary and ANOVA Results of the Association between the Environmental Concern Variables and the Firms' Annual Returns

$$Cum\_Ret = \alpha_0 + \alpha_1 EC_i + \alpha_2 lnAs + \alpha_3 SIC + \alpha_4 ROA + \alpha_5 Fin\_Lev + \alpha_6 Prf\_Mrgn + \alpha_7 Cap\_Int + e$$

Table 5							
	Environmental concern variable	Model Summary		ANOVA			
		R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Model 2_1	Hazardous and waste concern (EC_1)	0.067	0.066	92.358	1277.794	0.000
Model 2_2	Regulatory problems concern (EC_2)	0.067	0.066	91.905	1278.246	0.000
Model 2_3	Ozone depletion chemicals concern (EC_3)	0.067	0.066	91.629	1278.522	0.000
Model 2_4	Substantial emission concern (EC_4)	0.068	0.067	92.806	1277.345	0.000
Model 2_5	Agricultural chemicals concern (EC_5)	0.071	0.070	96.840	1273.312	0.000
Model 2_6	Climate changes concern (EC_6)	0.067	0.066	91.704	1278.448	0.000
Model 2_7	Other concerns (EC_7)	0.067	0.066	91.540	1278.611	0.000

Table 5 (continued)

Where:

EC "i" range from 1 to 7, indicating different environmental concerns. i = 1 refers to climate changes concern, i = 2 refers to regulatory problems, i = 3 refers to substantial emissions, i = 4 refers to ozone depletion chemicals concern, i = 5 refers to hazardous waste, i = 6 refers to agricultural chemicals, and i = 7 refers to other concerns;

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder's equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues)

and e is an error term.

Table 6

Regression Results of the Association between the Environmental Concern Variables and the Firms' Annual Returns

$$Cum\_Ret = \alpha_0 + \alpha_1 EC_i + \alpha_2 \ln As + \alpha_3 SIC + \alpha_4 ROA + \alpha_5 Fin\_Lev + \alpha_6 Prf\_Mrgn + \alpha_7 Cap\_Int + e$$

Table 6														
Model2	Model 2_1		Model 2_2		Model 2_3		Model 2_4		Model 2_5		Model 2_6		Model 2_7	
Environmental variable	Hazardous and waste concern (EC_1)		Regulatory problems concern (EC_2)		Ozone depletion chemicals concern (EC_3)		Substantial emission concern (EC_4)		Agricultural chemicals concern (EC_5)		Climate changes concern (EC_6)		Other concerns (EC_7)	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
(Constant)	0.084	0.002	0.079	0.003	0.070	0.007	0.085	0.001	0.074	0.004	0.067	0.010	0.068	0.009
lnAs	-0.022	0.000	-0.021	0.000	-0.020	0.000	-0.022	0.000	-0.020	0.000	-0.019	0.000	-0.020	0.000
SIC_01	0.046	0.003	0.046	0.003	0.050	0.001	0.043	0.006	0.041	0.007	0.054	0.000	0.052	0.001
ROA	0.789	0.000	0.788	0.000	0.790	0.000	0.785	0.000	0.784	0.000	0.790	0.000	0.791	0.000
Fin_lev	0.000	0.845	0.000	0.870	0.000	0.854	0.000	0.907	0.000	0.856	0.000	0.857	0.000	0.859
Prf_Mrgn	0.000	0.752	0.000	0.754	0.000	0.763	0.000	0.747	0.000	0.756	0.000	0.765	0.000	0.765
Cap_Int	0.000	0.643	0.000	0.645	0.000	0.655	0.000	0.638	0.000	0.646	0.000	0.659	0.000	0.658
ECi	0.059	0.032	0.033	0.135	0.195	0.373	0.066	0.008	0.370	0.000	-0.026	0.277	-0.023	0.565

Table 6 (continued)

Where:

EC "i" range from 1 to 7, indicating different environmental concerns. i = 1 refers to climate changes concern, i = 2 refers to regulatory problems, i = 3 refers to substantial emissions, i = 4 refers to ozone depletion chemicals concern, i = 5 refers to hazardous waste, i = 6 refers to agricultural chemicals, and i = 7 refers to other concerns;

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder's equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues)

and e is an error term.

Table 7

Model Summary, ANOVA, and Regression Results of the Association between the Total Environmental Strength Rating Variable and the Firms' Annual Returns

$$\text{Cum\_Ret} = \alpha_0 + \alpha_1 \text{ TES} + \alpha_2 \text{ lnAs} + \alpha_3 \text{ SIC} + \alpha_4 \text{ ROA} + \alpha_5 \text{ Fin\_Lev} + \alpha_6 \text{ Prf\_Mrgn} + \alpha_7 \text{ Cap\_Int} + \text{e}$$

Table 7					
Panel A					
	Model Summary		ANOVA		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Model 3	0.067	0.066	91.508	1278.643	0

Panel B

Regression coefficients		
	B	Sig.
(Constant)	0.068	0.011
lnAs	-0.019	0.000
SIC_01	0.052	0.001
ROA	0.791	0.000
Fin_lev	0.000	0.858
Prf_Mrgn	0.000	0.766
Cap_Int	0.000	0.658
TES	-0.004	0.687

Where:

TES (total environmental strength rating) = clean energy + beneficial (green) products & services + pollution prevention + recycling + and environmentally friendly management systems;

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

Table 7 (continued)

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder’s equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues)

and e is an error term.

Table 8

Model Summary, ANOVA, and Regression Results of the Association between the Total Environmental Concern Rating Variable and the Firms' Annual Returns

$$Cum\_Ret = \alpha_0 + \alpha_1 \text{ TEC} + \alpha_2 \text{ lnAs} + \alpha_3 \text{ SIC} + \alpha_4 \text{ ROA} + \alpha_5 \text{ Fin\_Lev} + \alpha_6 \text{ Prf\_Mrgn} + \alpha_7 \text{ Cap\_Int} + e$$

Table 8

Panel A

	Model Summary		ANOVA		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Model 4	0.068	0.067	92.500	1277.651	0.000

Panel B

Regression coefficients		
	B	Sig.
(Constant)	0.088	0.001
lnAs	-0.023	0.000
SIC_01	0.040	0.011
ROA	0.787	0.000
Fin_lev	0.000	0.870
Prf_Mrgn	0.000	0.746
Cap_Int	0.000	0.635
TEC	0.020	0.021

Where:

TEC (total environmental concern rating) = climate changes concern + regulatory concern + emission concern + ozone depletion concern + hazardous and waste concern + agricultural chemical concern + other concerns variable, and all other control variables are as defined above.

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

Table 8 (continued)

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder's equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues)

and e is an error term.

Table 9

Model Summary, ANOVA, and Regression Results of the Association between the Overall Environmental Rating Variable and the Firms' Annual Returns

$$Cum\_Ret = \alpha_0 + \alpha_1\,OER + \alpha_2\,lnAs + \alpha_3\,SIC + \alpha_4\,ROA + \alpha_5\,Fin\_Lev + \alpha_6\,Prf\_Mrgn + \alpha_7\,Cap\_Int + e$$

Table 9

Overall Environmental rating variable analysis

Panel A

	Model Summary		ANOVA		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Model 5	0.068	0.067	92.630	1277.520	0.000

Panel B

Regression coefficients		
	B	Sig.
(Constant)	0.077	0.003
lnAs	-0.021	0.000
SIC_01	0.043	0.005
ROA	0.789	0.000
Fin_lev	0.000	0.887
Prf_Mrgn	0.000	0.759
Cap_Int	0.000	0.648
OER	-0.020	0.014

Where:

OER (Overall Environmental rating) = total environmental strength rating (TES) - total environmental concern rating (TEC);

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

Table 9 (continued)

SIC (Industry classification) = “1” In case the firm operates in industries classified as environmentally unsafe, “0” otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder’s equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues)

and e is an error term.

Table 10

Factor Analysis Commonalties (Variances Extracted by the Proposed Factor Structure)

$$\text{Cum\_Ret} = \alpha_0 + \alpha_1 \text{OER} + \alpha_2 \text{lnAs} + \alpha_3 \text{SIC} + \alpha_4 \text{ROA} + \alpha_5 \text{Fin\_Lev} + \alpha_6 \text{Prf\_Mrgn} + \alpha_7 \text{Cap\_Int} + e$$

Table 10		
Commonalities		
	Initial	Extraction
Beneficial products & services	1	0.15867883
Pollution prevention	1	0.39929481
Recycling	1	0.24684652
Clean energy	1	0.38259151
Management systems	1	0.56129573
Other strengths	1	0.18302204
Hazardous and waste	1	0.4876325
Regulatory problems	1	0.55792777
Ozone depletion chemicals	1	0.59319513
Substantial emission	1	0.46839297
Agricultural chemicals	1	0.6244549
climate changes	1	0.48624233
other concerns	1	0.20549935

Where:

OER (Overall Environmental rating) = the factors created by factor analysis;

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = “1” In case the firm operates in industries classified as environmentally unsafe, “0” otherwise;

ROA (Return on Assets) = net income/ average total assets;

Table 10 (continued)

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder's equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues)

and e is an error term.

Table 11

Total Variance Explained by the Three Factor Structure

$$Cum\_Ret = \alpha_0 + \alpha_1\, OER + \alpha_2\, lnAs + \alpha_3\, SIC + \alpha_4\, ROA + \alpha_5\, Fin\_Lev + \alpha_6\, Prf\_Mrgn + \alpha_7\, Cap\_Int + e$$

Table 11									
Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.8333	21.7943	21.7943	2.8333	21.7943	21.7943	2.1581	16.6007	16.6007
2	1.2968	9.9752	31.7695	1.2968	9.9752	31.7695	1.9394	14.9182	31.5189
3	1.225	9.4234	41.1929	1.225	9.4234	41.1929	1.2576	9.674	41.1929
4	0.9712	7.4709	48.6638						
5	0.9555	7.3503	56.0142						
6	0.8961	6.8932	62.9073						
7	0.8494	6.5341	69.4414						
8	0.8272	6.3633	75.8046						
9	0.7484	5.7566	81.5613						
10	0.697	5.3612	86.9225						
11	0.6258	4.8141	91.7366						
12	0.5619	4.3226	96.0591						
13	0.5123	3.9409	100						

Table 11 (continued)

Where:

OER (Overall Environmental rating) = the factors created by factor analysis;

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = “1” In case the firm operates in industries classified as environmentally unsafe, “0” otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder’s equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues)

and e is an error term.

Table12

Factor Analysis Component Matrix and Rotated Component Matrix

$$Cum\_Ret = \alpha_0 + \alpha_1 OER + \alpha_2 lnAs + \alpha_3 SIC + \alpha_4 ROA + \alpha_5 Fin\_Lev + \alpha_6 Prf\_Mrgn + \alpha_7 Cap\_Int + e$$

Table 12							
Panel A				Panel B			
Component Matrix				Rotated Component Matrix			
	Component				Component		
	1	2	3		1	2	3
Beneficial products & services	0.2663	-0.2795	0.0981	Beneficial products & services	0.0087	0.398	0.0141
Pollution prevention	0.5096	-0.337	0.1612	Pollution prevention	0.138	0.6116	0.0784
Recycling	0.3141	-0.3831	0.0375	Recycling	0.006	0.491	-0.0755
Clean energy	0.6001	-0.1369	-0.0608	Clean energy	0.3939	0.4754	-0.0378
Management systems	0.6485	-0.3641	0.0905	Management systems	0.2507	0.7057	0.0195
Other strengths	0.2875	-0.303	0.0922	Other strengths	0.0133	0.4276	0.0022
Hazardous and waste	0.649	0.2389	-0.0971	Hazardous and waste	0.6563	0.2254	0.0785
Regulatory problems	0.6342	0.3674	-0.1441	Regulatory problems	0.7339	0.1117	0.0829
Substantial emission	0.6739	0.1124	-0.0403	Substantial emission	0.5842	0.3462	0.085
climate changes	0.2783	0.4848	-0.4168	climate changes	0.6239	-0.265	-0.1637
other concerns	0.3733	0.2355	-0.1034	other concerns	0.4491	0.0477	0.0392
Agricultural chemicals	0.2125	0.3521	0.6748	Agricultural chemicals	0.1348	0.0308	0.778
Ozone depletion chemicals	0.034	0.3098	0.7043	Ozone depletion chemicals	-0.0333	-0.0477	0.768

Where:

OER (Overall Environmental rating) = the factors created by factor analysis;

Table12 (continued)

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = “1” In case the firm operates in industries classified as environmentally unsafe, “0” otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder’s equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues)

and e is an error term.

Table 13

Reproduced and Residual Matrix

$$Cum\_Ret = \alpha_0 + \alpha_1\, OER + \alpha_2\, lnAs + \alpha_3\, SIC + \alpha_4\, ROA + \alpha_5\, Fin\_Lev + \alpha_6\, Prf\_Mrgn + \alpha_7\, Cap\_Int + e$$

Table 13													
Reproduced Correlation matrix													
	Beneficial products & services	Pollution prevention	Recycling	Clean energy	Management systems	Other strengths	Hazardous and waste	Regulatory problems	Ozone depletion chemicals	Substantial emission	Agricultural chemicals	climate changes	other concerns
Beneficial products & services	0.159	0.246	0.194	0.192	0.283	0.17	0.097	0.052	-0.008	0.144	0.024	-0.102	0.023
Pollution prevention	0.246	0.399	0.295	0.342	0.468	0.264	0.235	0.176	0.026	0.299	0.098	-0.089	0.094
Recycling	0.194	0.295	0.247	0.239	0.347	0.21	0.109	0.053	-0.082	0.167	-0.043	-0.114	0.023
Clean energy	0.192	0.342	0.239	0.383	0.434	0.208	0.363	0.339	-0.065	0.391	0.038	0.126	0.198
Management systems	0.283	0.468	0.347	0.434	0.561	0.305	0.325	0.264	-0.027	0.392	0.071	-0.034	0.147
Other strengths	0.17	0.264	0.21	0.208	0.305	0.183	0.105	0.058	-0.019	0.156	0.017	-0.105	0.026
Hazardous and waste	0.097	0.235	0.109	0.363	0.325	0.105	0.488	0.513	0.028	0.468	0.156	0.337	0.309
Regulatory problems	0.052	0.176	0.053	0.339	0.264	0.058	0.513	0.558	0.034	0.474	0.167	0.415	0.338
Ozone depletion chemicals	-0.008	0.026	-0.082	-0.065	-0.027	-0.019	0.028	0.034	0.593	0.029	0.592	-0.134	0.013

Table 13 (continued)

	Beneficial products & services	Pollution prevention	Recycling	Clean energy	Management systems	Other strengths	Hazardous and waste	Regulatory problems	Ozone depletion chemicals	Substantial emission	Agricultural chemicals	climate changes	other concerns
Substantial emission	0.144	0.299	0.167	0.391	0.392	0.156	0.468	0.474	0.029	0.468	0.156	0.259	0.282
Agricultural chemicals	0.024	0.098	-0.043	0.038	0.071	0.017	0.156	0.167	0.592	0.156	0.624	-0.051	0.092
climate changes	-0.102	-0.089	-0.114	0.126	-0.034	-0.105	0.337	0.415	-0.134	0.259	-0.051	0.486	0.261
other concerns	0.023	0.094	0.023	0.198	0.147	0.026	0.309	0.338	0.013	0.282	0.092	0.261	0.205
Residual													
Beneficial products & services		-0.152	-0.146	-0.021	-0.101	-0.125	-0.014	0.04	0.005	-0.044	0.002	0.081	0.012
Pollution prevention	-0.152		-0.147	-0.08	-0.114	-0.116	-0.033	-0.037	-0.029	-0.078	-0.005	0.111	0.014
Recycling	-0.146	-0.147		-0.093	-0.111	-0.151	-0.056	0.049	0.078	0.007	0.033	0.107	0.027
Clean energy	-0.021	-0.08	-0.093		-0.112	-0.066	-0.068	-0.096	0.06	-0.132	0.013	0.023	-0.054
Management systems	-0.101	-0.114	-0.111	-0.112		-0.12	-0.049	-0.027	0.021	-0.033	-0.012	0.048	-0.008
Other strengths	-0.125	-0.116	-0.151	-0.066	-0.12		0	0.032	0.017	-0.05	0	0.092	0.027
Hazardous and waste	-0.014	-0.033	-0.056	-0.068	-0.049	0		-0.088	-0.003	-0.076	-0.068	-0.187	-0.129
Regulatory problems	0.04	-0.037	0.049	-0.096	-0.027	0.032	-0.088		-0.041	-0.107	-0.012	-0.168	-0.114

Table 13 (continued)

	Beneficial products & services	Pollution prevention	Recycling	Clean energy	Management systems	Other strengths	Hazardous and waste	Regulatory problems	Ozone depletion chemicals	Substantial emission	Agricultural chemicals	climate changes	other concerns
Ozone depletion chemicals	0.005	-0.029	0.078	0.06	0.021	0.017	-0.003	-0.041		-0.008	-0.356	0.128	-0.016
Substantial emission	-0.044	-0.078	0.007	-0.132	-0.033	-0.05	-0.076	-0.107	-0.008		-0.038	-0.08	-0.124
Agricultural chemicals	0.002	-0.005	0.033	0.013	-0.012	0	-0.068	-0.012	-0.356	-0.038		0.032	-0.018
climate changes	0.081	0.111	0.107	0.023	0.048	0.092	-0.187	-0.168	0.128	-0.08	0.032		-0.15
other concerns	0.012	0.014	0.027	-0.054	-0.008	0.027	-0.129	-0.114	-0.016	-0.124	-0.018	-0.15	

Where:

OER (Overall Environmental rating) = the factors created by factor analysis;

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = “1” In case the firm operates in industries classified as environmentally unsafe, “0” otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder’s equity;

Table 13 (continued)

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues)

and e is an error term.

Table 14

Component Transformation Matrix

$$Cum\_Ret = \alpha_0 + \alpha_1 OER + \alpha_2 lnAs + \alpha_3 SIC + \alpha_4 ROA + \alpha_5 Fin\_Lev + \alpha_6 Prf\_Mrgn + \alpha_7 Cap\_Int + e$$

Table 14			
Component	Non chemical concern factor	Environmental strengths factor	Chemicals concern factors
Non chemical concern factor	0.7522	0.6485	0.1171
Environmental strengths factor	0.5683	-0.7283	0.3829
Chemicals concern factors	-0.3336	0.2214	0.9164

Where:

OER (Overall Environmental rating) = the factors created by factor analysis;

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = “1” In case the firm operates in industries classified as environmentally unsafe, “0” otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder’s equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues)

and e is an error term.

Table 15

Model Summary, ANOVA, and Regression Results of the Association between the Non-Chemical Concern Factor and the Firms' Annual Returns

$$Cum\_Ret = \alpha_0 + \alpha_1\, OER + \alpha_2 \ln As + \alpha_3\, SIC + \alpha_4\, ROA + \alpha_5\, Fin\_Lev + \alpha_6\, Prf\_Mrgn + \alpha_7\, Cap\_Int + e$$

Table 15					
Non-Chemical concern factor					
Panel A					
	Model Summary		ANOVA		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Model 5	0.067	0.066	91.935	1278.22	0.000
Panel B					
Regression coefficients					
	B	Sig.			
(Constant)	0.085	0.002			
lnAs	-0.022	0.000			
SIC_01	0.044	0.005			
ROA	0.789	0.000			
Fin_lev	0.000	0.862			
Prf_Mrgn	0.000	0.753			
Cap_Int	0.000	0.643			
Non-Chemical concern factor	0.009	0.122			

Where:

OER = Non-Chemical concern factor;

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

Table 15 (continued)

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder's equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues)

and e is an error term.

Table 16

Model Summary, ANOVA, and Regression Results of the Association between the Environmental Strengths Factor and the Firms' Annual Returns

$$\text{Cum\_Ret} = \alpha_0 + \alpha_1 \text{ OER} + \alpha_2 \text{ lnAs} + \alpha_3 \text{ SIC} + \alpha_4 \text{ ROA} + \alpha_5 \text{ Fin\_Lev} + \alpha_6 \text{ Prf\_Mrgn} + \alpha_7 \text{ Cap\_Int} + e$$

Table 16					
Environmental strengths factor					
Panel A					
	Model Summary		ANOVA		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Model 5	0.067	0.066	91.522	1278.629	0.000
Panel B					
Regression coefficients					
	B	Sig.			
(Constant)	0.067	0.011			
lnAs	-0.019	0.000			
SIC_01	0.051	0.001			
ROA	0.791	0.000			
Fin_lev	0.000	0.857			
Prf_Mrgn	0.000	0.766			
Cap_Int	0.000	0.658			
Environmental strengths factor	-0.003	0.626			

Where:

OER = Environmental strengths factor;

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

Table 16 (continued)

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder's equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues)

and e is an error term.

Table 17

Model Summary, ANOVA, and Regression Results of the Association between the Chemicals Concern Factors and the Firms' Annual Returns

$$\text{Cum\_Ret} = \alpha_0 + \alpha_1\,\text{OEP} + \alpha_2\,\text{lnAs} + \alpha_3\,\text{SIC} + \alpha_4\,\text{ROA} + \alpha_5\,\text{Fin\_Lev} + \alpha_6\,\text{Prf\_Mrgn} + \alpha_7\,\text{Cap\_Int} + e$$

Table 17					
Chemicals concern factors					
Panel A					
	Model Summary		ANOVA		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Model 5	0.069	0.068	94.52	1275.631	0.000
Panel B					
Regression coefficients					
	B	Sig.			
(Constant)	0.072	0.006			
lnAs	-0.020	0.000			
SIC_01	0.046	0.003			
ROA	0.786	0.000			
Fin_lev	0.000	0.861			
Prf_Mrgn	0.000	0.760			
Cap_Int	0.000	0.651			
Chemicals concern factors	0.021	0.000			

Where:

OER = Chemicals concern factors;

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

Table 17 (continued)

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder's equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues)

and e is an error term.

Table 18

Changes of Environmental Performance between 2006 and 2008

$$\Delta\,\text{Cum\_Ret} = \alpha_0 + \alpha_1\,\Delta\,\text{OER} + \alpha_2\,\Delta\,\text{lnAs} + \alpha_3\,\text{SIC} + \alpha_4\,\Delta\,\text{ROA} + \alpha_5\,\Delta\,\text{Fin\_Lev} + \alpha_6\,\Delta\,\text{Prf\_Mrgn} + \alpha_7\,\Delta\,\text{Cap\_Int} + e$$

Table 18		
Changes of Environmental performance between 2006 and 2008		
Magnitude of change	Number of firms	Categories
-3	2	
-2	5	
-1	76	Deterioration
0	10	Equivalent opposite changes
0	1424	No changes
1	125	
2	11	
3	1	Improvement

Where:

ΔOER (change in overall environmental rating) = $OER_{2008} - OER_{2006}$;

Δ Cum_Ret = Cumulative annual $return_{2008}$ – Cumulative annual $return_{2006}$;

Δ LnAs (Size) = $LnAs_{2008} - LnAs_{2006}$;

SIC (Industry classification) = “1” In case the firm operates in industries classified as environmentally unsafe, “0” otherwise;

Δ ROA (Return on Assets) = $ROA_{2008} - ROA_{2006}$;

Δ Fin_Lev (Financial leverage) = Fin_Lev_{2008} - Fin_Lev_{2006};

Δ Prf_Mrgn (Profit margin) = Prf_Mrgn_{2008} - Prf_Mrgn_{2006};

Δ Cap_Int (Capital Intensity) = Cap_Int_{2008} - Cap_Int_{2006};

and e is an error term.

Table 19

Mean Differences in Annual Returns among Environmental Change Groups

$$\Delta\,\text{Cum\_Ret} = \alpha_0 + \alpha_1\,\Delta\,\text{OER} + \alpha_2\,\Delta\,\text{lnAs} + \alpha_3\,\text{SIC} + \alpha_4\,\Delta\,\text{ROA} + \alpha_5\,\Delta\,\text{Fin\_Lev} + \alpha_6\,\Delta\,\text{Prf\_Mrgn} + \alpha_7\,\Delta\,\text{Cap\_Int} + e$$

Table 19					
One way ANOVA					
Δ Cum_Ret					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.21	2	0.11	0.49	0.61
Within Groups	355.89	1651	0.22		
Total	356.11	1653			

Where:

ΔOER (change in overall environmental rating) = $OEP_{2008} - OEP_{2006}$;

Δ Cum_Ret = Cumulative annual $return_{2008}$ – Cumulative annual $return_{2006}$;

Δ LnAs (Size) = $LnAs_{2008} - LnAs_{2006}$;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

Δ ROA (Return on Assets) = $ROA_{2008} - ROA_{2006}$;

Δ Fin_Lev (Financial leverage) = Fin_Lev_{2008} - Fin_Lev_{2006};

Δ Prf_Mrgn (Profit margin) = Prf_Mrgn_{2008} - Prf_Mrgn_{2006};

Δ Cap_Int (Capital Intensity) = Cap_Int_{2008} - Cap_Int_{2006};

and e is an error term.

Table 20

Person Correlation Coefficient

$$\Delta\, Cum_{Ret} = \alpha_0 + \alpha_1\, \Delta OER + \alpha_2\, \Delta\, lnAs + \alpha_3\, SIC + \alpha_4\, \Delta\, ROA + \alpha_5\, \Delta\, Fin\_Lev + \alpha_6\, \Delta\, Prf\_Mrgn + \alpha_7\, \Delta\, Cap\_Int + e$$

Table 20			
Correlations		Δ Cum_Ret	Δ OER
Δ Cum_Ret	Pearson Correlation	1	-0.02
	Sig. (2-tailed)		0.42
	N	1654	1654
Δ OER	Pearson Correlation	-0.02	1
	Sig. (2-tailed)	0.42	
	N	1654	1654

Where:

ΔOER (change in overall environmental rating) = $OEP_{2008} - OEP_{2006}$;

Δ Cum_Ret = Cumulative annual $return_{2008}$ – Cumulative annual $return_{2006}$;

Δ LnAs (Size) = $LnAs_{2008} - LnAs_{2006}$;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

Δ ROA (Return on Assets) = $ROA_{2008} - ROA_{2006}$;

Δ Fin_Lev (Financial leverage) = Fin_Lev_{2008} - Fin_Lev_{2006};

Δ Prf_Mrgn (Profit margin) = Prf_Mrgn_{2008} - Prf_Mrgn_{2006};

Δ Cap_Int (Capital Intensity) = Cap_Int_{2008} - Cap_Int_{2006};

and e is an error term.

Table 21

Model Summary, ANOVA, and Regression Results of the Association between the Change in the Overall Environmental Rating Variable and the change in the Firms' Annual Returns

$$\Delta \text{ Cum\_Ret} = \alpha 0 + \alpha 1\, \Delta \text{OER} + \alpha 2\, \Delta \text{lnAs} + \alpha 3 \text{ SIC} + \alpha 4\, \Delta \text{ROA} + \alpha 5\, \Delta \text{Fin\_Lev} + \alpha 6\, \Delta \text{Prf\_Mrgn} + \alpha 7\, \Delta \text{Cap\_Int} + e$$

Table 21					
Overall environmental rating change					
Panel A					
	Model Summary		ANOVA		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Model 6	0.037	0.032	13.001	343.106	0.000
Panel B					
Regression coefficients					
	B	Sig.			
(Constant)	-0.5152	0.000			
Δ lnAs	-0.196	0.000			
SIC	0.0099	0.755			
Δ ROA	0.5474	0.000			
Δ Fin_Lev	-0.0001	0.708			
Δ Prf_Mrgn	0.0006	0.061			
Δ Cap_Int	0.0009	0.070			
Δ OER	-0.0355	0.1873			

Where:

ΔOER (change in overall environmental rating) = $OEP_{2008} - OEP_{2006}$;

Δ Cum_Ret = Cumulative annual $return_{2008}$ – Cumulative annual $return_{2006}$;

Δ LnAs (Size) = $LnAs_{2008} - LnAs_{2006}$;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

Table 21 (continued)

Δ ROA (Return on Assets) = $ROA_{2008} - ROA_{2006}$;

Δ Fin_Lev (Financial leverage) = Fin_Lev_{2008} - Fin_Lev_{2006};

Δ Prf_Mrgn (Profit margin) = Prf_Mrgn_{2008} - Prf_Mrgn_{2006};

Δ Cap_Int (Capital Intensity) = Cap_Int_{2008} - Cap_Int_{2006};

and e is an error term.

Table 22

Model summary, ANOVA, and Regression Results of the Association between the Change of the Overall Environmental Rating Groups (Deterioration and Improvement Groups) and the change in the Firms' Annual Returns

$$\Delta\, Cum_{Ret} = \alpha_0 + \alpha_1\, \Delta OER + \alpha_2\, \Delta\, lnAs + \alpha_3\, SIC + \alpha_4\, \Delta\, ROA + \alpha_5\, \Delta\, Fin\_Lev + \alpha_6\, \Delta\, Prf\_Mrgn + \alpha_7\, \Delta\, Cap\_Int + e$$

Table 22					
Overall environmental rating change by groups					
Panel A					
	Model Summary		ANOVA		
Model 6_DET / Model 6_IMP	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Improved Environmental performance	0.082	0.032	1.904	21.309	0.128
Deteriorated Environmental performance	0.106	0.023	1.252	10.544	0.276
Panel B					
Regression coefficients					
	B	Sig.			
(Constant)	-0.467	0.001			
Δ lnAs	-0.1282	0.316			
SIC	-0.0899	0.251			
Δ Fin_lev	-0.0028	0.476			
Δ Prf_Mrgn	0.7312	0.006			
Δ Cap_Int	0.0148	0.461			
Δ ROA	-1.0461	0.016			
Δ OEP_IMP	-0.1168	0.298			
Panel C					
Regression coefficients					
	B	Sig.			
(Constant)	-0.6332	0			

Table 22 (continued)		
Δ lnAs	-0.2866	0.007
SIC	-0.028	0.757
Δ Fin_lev	0	0.89
Δ Prf_Mrgn	0.0269	0.857
Δ Cap_Int	0.0263	0.461
Δ ROA	0.1633	0.669
Δ OEP_DET	-0.1173	0.3259

Where:

Δ OEP_DET = firms with deteriorated financial performance;

Δ OEP_IMP = firms with improved financial performance;

Δ Cum_Ret = Cumulative annual $return_{2008}$ – Cumulative annual $return_{2006}$;

Δ LnAs (Size) = $LnAs_{2008}$ – $LnAs_{2006}$;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

Δ ROA (Return on Assets) = ROA_{2008} – ROA_{2006};

Δ Fin_Lev (Financial leverage) = Fin_Lev_{2008} - Fin_Lev_{2006};

Δ Prf_Mrgn (Profit margin) = Prf_Mrgn_{2008} - Prf_Mrgn_{2006};

Δ Cap_Int (Capital Intensity) = Cap_Int_{2008} - Cap_Int_{2006};

and e is an error term.

Table 23

Model Summary, ANOVA, and Regression Results of the Association between both Environmental Strength Variables and the Environmental Concern Variables and the firms' Annual Returns

$$\text{Cum\_Ret} = \alpha_0 + \alpha_1 \text{ ECi} + \alpha_2 \text{ ESi} + \alpha_3 \text{ lnAs} + \alpha_4 \text{ SIC} + \alpha_5 \text{ ROA} + \alpha_6 \text{ Fin\_Lev} + \alpha_7 \text{ Prf\_Mrgn} + \alpha_8 \text{ Cap\_Int} + e$$

Table 23

Panel A

	Model summary		ANOVA		
	R Square	Adjusted R Square	Regression Sum of Squares	Residual Sum of Squares	Model significance
All environmental variables model	.075	.072	102.540	1267.611	.000

Panel B

Regression coefficients		
	B	Sig.
(Constant)	.083	0.003
lnAs	-.022	0.000
SIC	.038	0.016
Fin_Lev	.000	0.938
Prf_Mrgn	.000	0.748
Cap_Int	.000	0.638
ROA	.781	0.000
Beneficial Products and Services (ES1)	.021	0.566
Pollution Prevention (ES2)	-.066	0.197
Recycling (ES3)	.093	0.032
Clean Energy (ES4)	.012	0.678
Management Systems Strength (ES5)	-.057	0.043
Other Strengths (ES6)	-.189	0.004
Hazardous Waste Concern (EC1)	.054	0.082
Regulatory Problems (EC2)	.006	0.798
Ozone Depleting Chemicals (EC3)	-.097	0.667
Substantial Emissions (EC4)	.062	0.027
Agriculture Chemicals (EC5)	.367	0.000
Climate Change (EC6)	-.035	0.153
Other concerns (EC7)	-.039	0.333

Table 23 (continued)

Where:

ES "i" range from 1 to 6 indicating different environmental strength measures. i = 1 refers to clean energy, i = 2 refers to beneficial products and services, i = 3 pollution prevention, i = 4 refers to recycling, and i = 5 management systems, i = 6 is other strengths;

EC "i" range from 1 to 7, indicating different environmental concerns. i = 1 refers to climate changes concern, i = 2 refers to regulatory problems, i = 3 refers to substantial emissions, i = 4 refers to ozone depletion chemicals concern, i = 5 refers to hazardous waste, i = 6 refers to agricultural chemicals, and i = 7 refers to other concerns;

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder's equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues);

and e is an error term.

Table 24

Model Summary, ANOVA, and Regression Results of the Association between both Total Environmental Strength Rating Variable and Total Environmental Concern Rating Variable and Firms' Annual Returns

$$\text{Cum\_Ret} = \alpha_0 + \alpha_1 \text{TES} + \alpha_2 \text{TEC} + \alpha_3 \ln\text{As} + \alpha_4 \text{SIC} + \alpha_5 \text{ROA} + \alpha_6 \text{Fin\_Lev} + \alpha_7 \text{Prf\_Mrgn} + \alpha_8 \text{Cap\_Int} + e$$

Table 24

Panel A

	Model summary		ANOVA		
	R Square	Adjusted R Square	Regression sum of Squares	Residual sum of Squares	Model significance
Environmental ratings model	.068	.067	92.766	1277.385	.000

Panel B

Regression coefficients		
	B	Sig.
(Constant)	.084	0.002
lnAs	-.022	0.000
SIC	.040	0.011
Fin_Lev	.000	0.884
Prf_Mrgn	.000	0.752
Cap_Int	.000	0.640
ROA	.788	0.000
TES rating	-.013	0.239
TEC rating	.023	0.010

Where:

TES (Total environmental strength rating) = clean energy + beneficial products and services + pollution prevention + recycling + and environmentally friendly management systems;

Table 24 (continued)

Table 24 (continued)

TEC (Total environmental concern rating) = climate changes concern + regulatory concern + emission concern + ozone depletion concern + hazardous and waste concern + agricultural chemical concern + other concerns variable;

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = “1” In case the firm operates in industries classified as environmentally unsafe, “0” otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder’s equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues);

and e is an error term.

Table 25

Model Summary, ANOVA, and Regression Results of the Association between the Chemical Concern Rating Variable and the Firms' Annual Returns

$$\text{Cum\_Ret} = \alpha_0 + \alpha_1 \text{EC}_{\textbf{Chemical}} + \alpha_2 \text{lnAs} + \alpha_3 \text{SIC} + \alpha_4 \text{ROA} + \alpha_5 \text{Fin\_Lev} + \alpha_6 \text{Prf\_Mrgn} + \alpha_7 \text{Cap\_Int} + \text{e}$$

Table 25					
Panel A					
	Model summary		ANOVA		
	R Square	Adjusted R Square	Regression Sum of Squares	Residual Sum of Squares	Model significance
Chemical concern rating model	.070	.069	96.240	1273.912	0.000

Panel B

Regression coefficients		
	B	Sig.
(Constant)	.074	0.004
lnAs	-.020	0.000
SIC	.042	0.006
Fin_Lev	.000	0.856
Prf_Mrgn	.000	0.756
Cap_Int	.000	0.646
ROA	.784	0.000
$EC_{Chemical}$	.312	0.000

Where:

$EC_{Chemical}$ = agricultural chemicals variable + ozone depletion chemical concern variable;

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

ROA (Return on Assets) = net income/ average total assets;

Table 25 (continued)

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder's equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues);

and e is an error term.

Table 26

Model Summary, ANOVA, and Regression Results of the Association between the Non-Chemical Concern Rating Variable and the Firms' Annual Returns

$$\text{Cum\_Ret} = \alpha_0 + \alpha_1\ \text{EC}_{\text{Non-chemical}} + \alpha_2\ \text{lnAs} + \alpha_3\ \text{SIC} + \alpha_4\ \text{ROA} + \alpha_5\ \text{Fin\_Lev} + \alpha_6\ \text{Prf\_Mrgn} + \alpha_7\ \text{Cap\_Int} + e$$

Table 26					
Panel A					
	Model summary		ANOVA		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Non-chemical concern rating model	.067	.066	92.006	1278.145	.000

Panel B

Regression coefficient		
	B	Sig.
(Constant)	.083	.002
lnAs	-.022	.000
SIC	.043	.006
Fin_Lev	.000	.866
Prf_Mrgn	.000	.751
Cap_Int	.000	.641
ROA	.788	.000
$EC_{\text{Non-chemical}}$	.015	.096

Where:

$EC_{\text{Non-hemical}}$ = hazardous and waste concern variable + regulatory problems concern variable + substantial emission concern variable + climate changes concern variable + and other concerns variable;

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

Table 26 (continued)

SIC (Industry classification) = “1” In case the firm operates in industries classified as environmentally unsafe, “0” otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder’s equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues);

and e is an error term.

Table 27

Model Summary, ANOVA, and Regression Results of the Association between both the Chemical Concern Rating Variable and the Non-Chemical concern Rating Variable and the Firms' Annual Returns

$$\text{Cum\_Ret} = \alpha_0 + \alpha_1\,\text{EC}_{\text{Nonchemical}} + \alpha_2\,\text{EC}_{\text{Chemical}} + \alpha_3\,\text{lnAs} + \alpha_4\,\text{SIC} + \alpha_5\,\text{ROA} + \alpha_6\,\text{Fin\_Lev} + \alpha_7\,\text{Prf\_Mrgn} + \alpha_8\,\text{Cap\_Int} + \text{e}$$

Table 27					
Panel A					
	Model summary		ANOVA		
	R Square	Adjusted R Square	Regression Sum of Squares	Residual Sum of Squares	Model significance
Concern ratings model	.070	.069	96.536	1273.616	.000

Panel B

Regression coefficients		
	B	
(Constant)	.084	0.002
lnAs	-.022	0.000
SIC	.036	0.021
Fin_Lev	.000	0.864
Prf_Mrgn	.000	0.747
Cap_Int	.000	0.635
ROA	.782	0.000
$EC_{Non\text{-}chemical}$	.011	0.213
$EC_{Chemical}$	.305	0.000

Where:

$EC_{Non\text{-}hemical}$ = hazardous and waste concern variable + regulatory problems concern variable + substantial emission concern variable + climate changes concern variable + and other concerns variable;

$EC_{Chemical}$ = agricultural chemicals variable + ozone depletion chemical concern variable;

Table 27 (continued)

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = “1” In case the firm operates in industries classified as environmentally unsafe, “0” otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder’s equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues);

and e is an error term.

Table 28

Model Summary, ANOVA, and Regression Results, for year 2006, of the Association between the Environmental Strength Variables and the Annual Returns

$$\text{Cum\_Ret} = \alpha_0 + \alpha_1 \text{ES}_i + \alpha_2 \text{lnAs} + \alpha_3 \text{SIC} + \alpha_4 \text{ROA} + \alpha_5 \text{Fin\_Lev} + \alpha_6 \text{Prf\_Mrgn} + \alpha_7 \text{Cap\_Int} + e$$

Table 28

Panel A

	Model Summary		ANOVA		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Beneficial Product and Services	.015	.012	4.273	277.040	.000
Pollution Prevention	.015	.012	4.190	277.122	.000
Recycling	.015	.012	4.296	277.017	.000
Clean Energy	.015	.011	4.106	277.206	.000
Management Systems Strength	.015	.012	4.165	277.148	.000
Other Strengths	.015	.012	4.201	277.112	.000

Panel B

Regression Coefficients

	Beneficial Product and Services		Pollution Prevention		Recycling		Clean Energy		Management Systems Strength		Other Strengths	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
(Constant)	.336	.000	.332	.000	.339	.000	.332	.000	.330	.000	.334	.000
lnAs	-.019	.000	-.019	.000	-.020	.000	-.019	.000	-.018	.000	-.019	.000
SIC	-.003	.896	-.002	.939	-.005	.824	-.003	.907	-.001	.951	-.002	.944

Table 28 (continued)

Fin_Lev	.000	.847	.000	.843	.000	.859	.000	.846	.000	.837	.000	.850
Prf_Mrgn	.000	.730	.000	.734	.000	.776	.000	.738	.000	.722	.000	.743
Cap_Int	.000	.801	.000	.806	.000	.850	.000	.810	.000	.793	.000	.814
ROA	.330	.000	.331	.000	.320	.000	.328	.000	.332	.000	.328	.000
ESi	-.064	.200	-.065	.319	.083	.178	-.026	.563	-.033	.374	-.118	.300

Where:

ES "i" range from 1 to 6 indicating different environmental strength measures. i = 1 refers to clean energy, i = 2 refers to beneficial products and services, i = 3 pollution prevention, i = 4 refers to recycling, and i = 5 management systems, i = 6 is other strengths;

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder's equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues);

and e is an error term.

Table 29

Model Summary, ANOVA, and Regression Results, for year 2006, of the Association between the Environmental Concern Variables and the Annual Returns

$$\text{Cum\_Ret} = \alpha_0 + \alpha_1 \text{EC}_i + \alpha_2 \text{lnAs} + \alpha_3 \text{SIC} + \alpha_4 \text{ROA} + \alpha_5 \text{Fin\_Lev} + \alpha_6 \text{Prf\_Mrgn} + \alpha_7 \text{Cap\_Int} + e$$

Table 29

Panel A

	Model Summary		**ANOVA**		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Hazardous Waste	.015	.012	4.216	4.216	.000
Regulatory Problems	.015	.012	4.319	276.993	.000
Ozone Depleting Chemicals	.015	.012	4.354	276.959	.000
Substantial Emissions	.015	.012	4.322	276.990	.000
Agriculture Chemicals	.019	.016	5.335	275.978	.000
Climate Change	.016	.013	4.501	276.811	.000
Other Concerns	.015	.012	4.325	276.988	.000

Panel B

Regression Coefficients

	Hazardous Waste		Regulatory Problems		Ozone Depleting Chemicals		Substantial Emissions		Agriculture Chemicals		Climate Change		Other Concerns	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
(Constant)	.346	.000	.348	.000	.337	.000	.347	.000	.340	.000	.329	.000	.330	.000
lnAs	-.021	.000	-.021	.000	-.020	.000	-.021	.000	-.020	.000	-.018	.000	-.019	.000
SIC	-.007	.737	-.009	.669	-.004	.846	-.009	.672	-.011	.616	.003	.897	.001	.966

Table 29 (continued)

	Hazardous Waste		Regulatory Problems		Ozone Depleting Chemicals		Substantial Emissions		Agriculture Chemicals		Climate Change		Other Concerns	
Fin_Lev	.000	.869	.000	.767	.000	.854	.000	.767	.000	.859	.000	.834	.000	.848
Prf_Mrgn	.000	.794	.000	.811	.000	.760	.000	.808	.000	.783	.000	.712	.000	.726
Cap_Int	.000	.869	.000	.887	.000	.833	.000	.885	.000	.861	.000	.780	.000	.797
ROA	.324	.000	.320	.000	.326	.000	.318	.000	.323	.000	.330	.000	.333	.000
ECi	.044	.274	.047	.157	.381	.132	.050	.154	.329	.002	-.065	.064	-.081	.152

Where:

EC "i" range from 1 to 7, indicating different environmental concerns. i = 1 refers to climate changes concern, i = 2 refers to regulatory problems, i = 3 refers to substantial emissions, i = 4 refers to ozone depletion chemicals concern, i = 5 refers to hazardous waste, i = 6 refers to agricultural chemicals, and i = 7 refers to other concerns;

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder's equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues);

and e is an error term.

Table 30

Model Summary, ANOVA, and Regression Results, for year 2006, of the Association between the Environmental Rating Variables and the Annual Returns

$$\text{Cum\_Ret} = \alpha_0 + \alpha_1\,\text{ER} + \alpha_2\,\text{lnAs} + \alpha_3\,\text{SIC} + \alpha_4\,\text{ROA} + \alpha_5\,\text{Fin\_Lev} + \alpha_6\,\text{Prf\_Mrgn} + \alpha_7\,\text{Cap\_Int} + e$$

Table 30

Panel A

	Model summary		ANOVA		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
TES	.015	.012	4.200	277.113	.000
TEC	.015	.012	4.162	277.151	.000
OER	.014	.011	4.064	277.249	.000

Panel B

	Regression coefficient					
	Total Environmental strength rating variable		Total Environmental Concern rating variable		Overall Environmental rating	
	B	Sig.	B	Sig.	B	Sig.
(Constant)	.328	.000	.346	.000	.336	.000
lnAs	-.018	.000	-.021	.000	-.019	.000
SIC	-.001	.969	-.009	.691	-.003	.881
Fin_Lev	.000	.836	.000	.821	.000	.852
Prf_Mrgn	.000	.712	.000	.802	.000	.756
Cap_Int	.000	.782	.000	.878	.000	.828
ROA	.334	.000	.321	.000	.326	.000
Environmental ratings	-.016	.301	.011	.380	.000	.972

Where:

ER (environmental rating variable) = Total Environmental strength rating variable, or Total Environmental Concern rating variable, or Overall Environmental rating;

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

Table 30 (continued)

SIC (Industry classification) = “1” In case the firm operates in industries classified as environmentally unsafe, “0” otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder’s equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues);

and e is an error term.

Table 31

Model Summary, ANOVA, and Regression Results, for year 2007, of the association between the Environmental Strength Variables and the Annual Returns

$$\text{Cum\_Ret} = \alpha_0 + \alpha_1\,\text{ES}_i + \alpha_2\,\text{lnAs} + \alpha_3\,\text{SIC} + \alpha_4\,\text{ROA} + \alpha_5\,\text{Fin\_Lev} + \alpha_6\,\text{Prf\_Mrgn} + \alpha_7\,\text{Cap\_Int} + e$$

Table 31

Panel A

	Model Summary		ANOVA		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Beneficial Product and Services	.060	.057	27.887	436.753	.000
Pollution Prevention	.057	.054	26.404	438.236	.000
Recycling	.062	.059	28.813	435.827	.000
Clean Energy	.063	.060	29.092	435.548	.000
Management Systems Strength	.061	.058	28.129	436.511	.000
Other Strengths	.057	.054	26.473	438.167	.000

Panel B

Regression Coefficients

	Beneficial Product and Services		Pollution Prevention		Recycling		Clean Energy		Management Systems Strength		Other Strengths	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
(Constant)	.100	.031	.092	.048	.115	.013	.135	.004	.122	.009	.094	.043
lnAs	-.018	.003	-.016	.007	-.020	.001	-.023	.000	-.021	.001	-.016	.006
SIC	.183	.000	.186	.000	.180	.000	.177	.000	.178	.000	.186	.000
Fin_Lev	.000	.497	.000	.502	.000	.506	.000	.511	.000	.512	.000	.502
Prf_Mrgn	.000	.793	.000	.767	.000	.804	.000	.806	.000	.819	.000	.769
Cap_Int	.000	.772	.000	.746	.000	.783	.000	.785	.000	.798	.000	.749

Table 31 (continued)

	Beneficial Product and Services		Pollution Prevention		Recycling		Clean Energy		Management Systems Strength		Other Strengths	
ROA	.571	.000	.579	.000	.577	.000	.575	.000	.571	.000	.580	.000
ESi	.184	.004	-.072	.364	.265	.000	.183	.000	.132	.002	-.171	.279

Where:

ES "i" range from 1 to 6 indicating different environmental strength measures. i = 1 refers to clean energy, i = 2 refers to beneficial products and services, i = 3 pollution prevention, i = 4 refers to recycling, and i = 5 management systems, i = 6 is other strengths;

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder's equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues);

and e is an error term.

Table 32

Model Summary, ANOVA, and Regression Results, for year 2007, of the Association between the Environmental Concern Variables and the Annual Returns

$$Cum\_Ret = \alpha_0 + \alpha_1\,ECi + \alpha_2\,lnAs + \alpha_3\,SIC + \alpha_4\,ROA + \alpha_5\,Fin\_Lev + \alpha_6\,Prf\_Mrgn + \alpha_7\,Cap\_Int + e$$

Table 32

Panel A

	Model Summary		ANOVA		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Hazardous Waste	.061	.058	28.228	436.412	.000
Regulatory Problems	.064	.061	29.518	435.122	.000
Ozone Depleting Chemicals	.056	.054	26.246	438.394	.000
Substantial Emissions	.067	.064	31.014	433.626	.000
Agriculture Chemicals	.077	.074	35.861	428.779	.000
Climate Change	.059	.056	27.523	437.117	.000
Other Concerns	.057	.054	26.517	438.123	.000

Panel B

Regression Coefficients

	Hazardous Waste		Regulatory Problems		Ozone Depleting Chemicals		Substantial Emissions		Agriculture Chemicals		Climate Change		Other Concerns	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
(Constant)	.133	.005	.139	.003	.096	.037	.149	.002	.106	.021	.109	.019	.102	.028
lnAs	-.022	.000	-.023	.000	-.017	.005	-.025	.000	-.018	.002	-.019	.002	-.018	.003
SIC	.171	.000	.161	.000	.184	.000	.158	.000	.161	.000	.173	.000	.180	.000
Fin_Lev	.000	.512	.000	.514	.000	.503	.000	.477	.000	.509	.000	.508	.000	.505
Prf_Mrgn	.000	.826	.000	.853	.000	.774	.000	.865	.000	.823	.000	.810	.000	.787

Table 32 (continued)

	Hazardous Waste		Regulatory Problems		Ozone Depleting Chemicals		Substantial Emissions		Agriculture Chemicals		Climate Change		Other Concerns	
Cap_Int	.000	.806	.000	.833	.000	.753	.000	.845	.000	.803	.000	.791	.000	.767
ROA	.574	.000	.566	.000	.578	.000	.561	.000	.561	.000	.579	.000	.575	.000
ECi	.152	.001	.161	.000	-.062	.889	.215	.000	.811	.000	.107	.011	.082	.236

Where:

EC "i" range from 1 to 7, indicating different environmental concerns. i = 1 refers to climate changes concern, i = 2 refers to regulatory problems, i = 3 refers to substantial emissions, i = 4 refers to ozone depletion chemicals concern, i = 5 refers to hazardous waste, i = 6 refers to agricultural chemicals, and i = 7 refers to other concerns;

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder's equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues);

and e is an error term.

Table 33

Model Summary, ANOVA, and Regression Results, for year 2007, of the Association between the Environmental Rating Variables and the Annual Returns

$$\text{Cum\_Ret} = \alpha_0 + \alpha_1 \text{ER} + \alpha_2 \text{lnAs} + \alpha_3 \text{SIC} + \alpha_4 \text{ROA} + \alpha_5 \text{Fin\_Lev} + \alpha_6 \text{Prf\_Mrgn} + \alpha_7 \text{Cap\_Int} + \text{e}$$

Table 33					
Panel A					
	Model summary		ANOVA		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
TES	.064	.061	29.828	434.812	.000
TEC	.074	.071	34.180	430.460	.000
OER	.076	.073	35.083	429.557	.000

Panel B						
	Regression coefficient					
	Total Environmental strength rating variable		Total Environmental Concern rating variable		Overall Environmental rating	
	B	Sig.	B	Sig.	B	Sig.
(Constant)	.141	.003	.188	.000	.201	.000
lnAs	-.024	.000	-.031	.000	-.033	.000
SIC	.173	.000	.132	.000	.137	.000
Fin_Lev	.000	.512	.000	.510	.000	.516
Prf_Mrgn	.000	.844	.000	.951	.000	.963
Cap_Int	.000	.823	.000	.933	.000	.945
ROA	.568	.000	.556	.000	.553	.000
Environmental ratings	.080	.000	.096	.000	.069	.000

Where:

ER (environmental rating variable) = Total Environmental strength rating variable, or Total Environmental Concern rating variable, or Overall Environmental rating;

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

Table 33 (continued)

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder's equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues);

and e is an error term.

Table 34

Model Summary, ANOVA, and Regression Results, for year 2008, of the Association between the Environmental Strength Variables and the Annual Returns

$$\text{Cum\_Ret} = \alpha_0 + \alpha_1\,\text{ES}_i + \alpha_2\,\text{lnAs} + \alpha_3\,\text{SIC} + \alpha_4\,\text{ROA} + \alpha_5\,\text{Fin\_Lev} + \alpha_6\,\text{Prf\_Mrgn} + \alpha_7\,\text{Cap\_Int} + e$$

Table 34

Panel A

	Model Summary		**ANOVA**		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significan ce
Beneficial Product and Services	.087	.084	20.975	219.435	.000
Pollution Prevention	.087	.084	20.988	219.423	.000
Recycling	.088	.085	21.100	219.311	.000
Clean Energy	.087	.084	20.981	219.430	.000
Management Systems Strength	.090	.087	21.628	218.783	.000
Other Strengths	.087	.084	20.990	219.421	.000

Panel B

Regression Coefficients

	Beneficial Product and Services		Pollution Prevention		Recycling		Clean Energy		Management Systems Strength		Other Strengths	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
(Constant)	-.301	.000	-.302	.000	-.305	.000	-.300	.000	-.317	.000	-.303	.000
lnAs	-.008	.036	-.008	.041	-.008	.051	-.009	.037	-.006	.157	-.008	.043
SIC	-.024	.187	-.024	.195	-.023	.211	-.025	.183	-.020	.277	-.024	.189
Fin_Lev	.000	.524	.000	.523	.000	.527	.000	.523	.000	.572	.000	.524

Table 34 (continued)

	Beneficial Product and Services		Pollution Prevention		Recycling		Clean Energy		Management Systems Strength		Other Strengths	
Prf_Mrgn	.001	.062	.001	.064	.001	.067	.001	.061	.001	.085	.001	.063
Cap_Int	.001	.054	.001	.055	.001	.058	.001	.053	.001	.075	.001	.055
ROA	.565	.000	.565	.000	.566	.000	.565	.000	.566	.000	.565	.000
ESi	.002	.970	-.023	.718	-.058	.259	.007	.816	-.073	.010	-.023	.700

Where:

ES "i" range from 1 to 6 indicating different environmental strength measures. i = 1 refers to clean energy, i = 2 refers to beneficial products and services, i = 3 pollution prevention, i = 4 refers to recycling, and i = 5 management systems, i = 6 is other strengths;

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder's equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues);

and e is an error term.

Table 35

Model Summary, ANOVA, and Regression Results, for year 2008, of the Association between the Environmental Concern Variables and the Annual Returns

$$Cum\_Ret = \alpha_0 + \alpha_1 ECi + \alpha_2 lnAs + \alpha_3 SIC + \alpha_4 ROA + \alpha_5 Fin\_Lev + \alpha_6 Prf\_Mrgn + \alpha_7 Cap\_Int + e$$

Table 35

Panel A

	Model Summary		**ANOVA**		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Hazardous Waste	.087	.084	20.986	219.424	.000
Regulatory Problems	.087	.085	21.006	219.405	.000
Ozone Depleting Chemicals	.087	.084	20.985	219.426	.000
Substantial Emissions	.089	.086	21.342	219.069	.000
Agriculture Chemicals	.087	.085	21.025	219.385	.000
Climate Change	.089	.086	21.280	219.130	.000
Other Concerns	.088	.085	21.038	219.372	.000

Panel B

Regression Coefficients

	Hazardous Waste		Regulatory Problems		Ozone Depleting Chemicals		Substantial Emissions		Agriculture Chemicals		Climate Change		Other Concerns	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
(Constant)	-.304	.000	-.306	.000	-.301	.000	-.315	.000	-.302	.000	-.307	.000	-.304	.000
lnAs	-.008	.053	-.008	.064	-.008	.036	-.006	.129	-.008	.038	-.007	.068	-.008	.048
SIC	-.024	.207	-.022	.238	-.024	.193	-.017	.373	-.023	.221	-.018	.327	-.022	.230

Table 35 (continued)

	Hazardous Waste		Regulatory Problems		Ozone Depleting Chemicals		Substantial Emissions		Agriculture Chemicals		Climate Change		Other Concerns	
Fin_Lev	.000	.523	.000	.527	.000	.523	.000	.514	.000	.520	.000	.516	.000	.540
Prf_Mrgn	.001	.065	.001	.068	.001	.063	.001	.078	.001	.064	.001	.075	.001	.066
Cap_Int	.001	.057	.001	.059	.001	.054	.001	.068	.001	.056	.001	.066	.001	.057
ROA	.565	.000	.565	.000	.565	.000	.567	.000	.566	.000	.563	.000	.566	.000
ECi	-.011	.739	-.015	.576	-.097	.755	-.061	.053	-.063	.474	-.049	.077	-.039	.421

Where:

EC "i" range from 1 to 7, indicating different environmental concerns. i = 1 refers to climate changes concern, i = 2 refers to regulatory problems, i = 3 refers to substantial emissions, i = 4 refers to ozone depletion chemicals concern, i = 5 refers to hazardous waste, i = 6 refers to agricultural chemicals, and i = 7 refers to other concerns;

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder's equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues);

and e is an error term.

Table 36

Model Summary, ANOVA, and Regression Results, for year 2008, of the Association between the Environmental Rating Variables and the Annual Returns

$$Cum\_Ret = \alpha_0 + \alpha_1 ER + \alpha_2 \ln As + \alpha_3 SIC + \alpha_4 ROA + \alpha_5 Fin\_Lev + \alpha_6 Prf\_Mrgn + \alpha_7 Cap\_Int + e$$

Table 36						
Panel A						
	Model summary		ANOVA			
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance	
TES	.088	.085	21.180	219.093	.000	
TEC	.089	.086	21.318	219.093	.000	
OER	.089	.086	21.384	219.027	.000	
Panel B						
	Regression coefficient					
	Total Environmental strength rating variable		Total Environmental Concern rating variable		Overall Environmental rating	
	B	Sig.	B	Sig.	B	Sig.
(Constant)	-.313	.000	-.319	.000	-.323	.000
lnAs	-.007	.120	-.006	.192	-.005	.263
SIC_01	-.021	.247	-.014	.472	-.014	.448
Fin_Lev	.000	.539	.000	.528	.000	.539
Prf_Mrgn	.001	.076	.001	.087	.000	.093
Cap_Int	.001	.067	.001	.077	.001	.082
ROA	.566	.000	.566	.000	.566	.000
Environmental ratings	-.018	.148	-.019	.061	-.014	.041

Where:

ER (environmental rating variable) = Total Environmental strength rating variable, or Total Environmental Concern rating variable, or Overall Environmental rating.

Cum_Ret = cumulative annual stock market returns;

LnAs (Size) = natural logarithm of Total Assets;

Table 36 (continued)

SIC (Industry classification) = “1” In case the firm operates in industries classified as environmentally unsafe, “0” otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder’s equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues);

and e is an error term.

Table 37

Model Summary, ANOVA, and Regression Results of the association between Environmental Strengths Variables and the Earning Levels

$$NI = \alpha_0 + \alpha_1 ESi + \alpha_2 lnAs + \alpha_3 SIC + \alpha_4 Fin\_Lev + \alpha_5 Prf\_Mrgn + \alpha_6 Cap\_Int + e$$

Table 37

Panel A

	Model summary		ANOVA		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Beneficial Product and Services	.054	.053	1494228796.98	26068775874.35	.000
Pollution Prevention	.058	.057	1606052484.32	25956952187.01	.000
Recycling	.054	.052	1476087861.84	26086916809.50	.000
Clean Energy	.063	.062	1742647733.79	25820356937.54	.000
Management Systems	.058	.057	1605337399.54	25957667271.79	.000
Other Strengths	.052	.051	1440298673.34	26122705998.00	.000

Panel B

Regression Coefficients

	Beneficial Product and Services		Pollution Prevention		Recycling		Clean Energy		Management Systems Strength		Other Strengths	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
(Constant)	-2166.56	.000	-2072.74	.000	-2144.77	.000	-1910.43	.000	-2019.17	.000	-2182.07	.000
lnAs	303.53	.000	291.00	.000	301.20	.000	265.70	.000	281.26	.000	307.02	.000
SIC	558.06	.000	526.39	.000	558.64	.000	517.80	.000	518.49	.000	571.60	.000

Table 37 (continued)

	Beneficial Product and Services		Pollution Prevention		Recycling		Clean Energy		Management Systems Strength		Other Strengths	
Fin_Lev	-.12	.890	-.10	.907	-.11	.903	-.09	.921	-.03	.970	-.12	.895
Prf_Mrgn	-.11	.707	-.10	.717	-.11	.709	-.10	.734	-.1	.730	-.11	.703
Cap_Int	-.08	.638	-.07	.650	-.08	.640	-.07	.666	-.075	.665	-.08	.633
ES_i	793.93	.001	1619.45	.000	744.56	.009	1264.67	.000	854.74	.000	82.23	.836

Where:

ES "i" range from 1 to 6 indicating different environmental strength measures. i = 1 refers to clean energy, i = 2 refers to beneficial products and services, i = 3 pollution prevention, i = 4 refers to recycling, and i = 5 management systems, i = 6 is other strengths;

NI = net income used as a proxy for earning levels;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder's equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues);

and e is an error term.

Table 38

Model Summary, ANOVA, and Regression Results of the Association between Environmental Concern variables and the Earning Levels

$$NI = \alpha_0 + \alpha_1 ECi + \alpha_2 lnAs + \alpha_3 SIC + \alpha_4 Fin\_Lev + \alpha_5 Prf\_Mrgn + \alpha_6 Cap\_Int + e$$

Table 38

Panel A

	Model summary		ANOVA		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Hazardous Waste	.063	.062	1744965928.174	25818038743.168	.000
Regulatory Problems	.059	.058	1617550762.430	25945453908.912	.000
Ozone Depleting Chemicals	.052	.051	1440236802.758	26122767868.584	.000
Substantial Emissions	.067	.065	1833910066.492	25729094604.850	.000
Agriculture Chemicals	.052	.051	1440093849.975	26122910821.367	.000
Climate Change C	.054	.053	1479175865.576	26083828805.766	.000
Other Concerns	.071	.070	1958181453.978	25604823217.363	.000

Panel B

Regression Coefficients

	Hazardous Waste		Regulatory Problems		Ozone Depleting Chemicals		Substantial Emissions		Agriculture Chemicals		Climate Change		Other Concerns	
	B	Sig	B	Sig	B	Sig	B	Sig	B	Sig	B	Sig	B	Sig
(Constant)	-1856.82	.00	-1967.42	.00	-2185.14	.00	-1854.71	.00	-2184.99	.00	-2136.59	.00	-1989.08	.00
lnAs	259.400	.00	274.11	.00	307.48	.00	258.18	.00	307.46	.00	298.90	.00	278.07	.00
SIC	453.38	.00	461.39	.00	573.46	.00	408.42	.00	573.50	.00	528.57	.00	437.29	.00
Fin_Lev	-.09	.92	-.20	.82	-.12	.89	-.34	.70	-.12	.89	-.11	.90	-.01	.98

Table 38 (continued)

	Hazardous Waste		Regulatory Problems		Ozone Depleting Chemicals		Substantial Emissions		Agriculture Chemicals		Climate Change		Other Concerns	
Prf_Mrgn	-.09	.74	-.10	.73	-.11	.70	-.09	.74	-.11	.70	-.11	.70	-.10	.72
Cap_Int	-.07	.68	-.07	.67	-.08	.63	-.06	.68	-.08	.63	-.08	.64	-.07	.66
ECi	1214.64	.00	767.06	.00	-202.60	.86	1262.17	.00	-28.58	.95	364.93	.00	2166.47	.00

Where:

EC "i" range from 1 to 7, indicating different environmental concerns. i = 1 refers to climate changes concern, i = 2 refers to regulatory problems, i = 3 refers to substantial emissions, i = 4 refers to ozone depletion chemicals concern, i = 5 refers to hazardous waste, i = 6 refers to agricultural chemicals, and i = 7 refers to other concerns;

NI = net income used as a proxy for earning levels;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder's equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues);

and e is an error term.

Table 39

Model Summary, ANOVA, and Regression Results of the Association between the Environmental Rating Variables and the Earning Levels

$$NI = \alpha_0 + \alpha_1 ER_i + \alpha_2 lnAs + \alpha_3 SIC + \alpha_4 Fin\_Lev + \alpha_5 Prf\_Mrgn + \alpha_6 Cap\_Int + e$$

Table 39

Panel A

	Model summary		ANOVA		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
TES	.065	.064	1801801830.962	25761202840.380	.000
TEC	.074	.073	2037116479.727	25525888191.614	.000
OER	.078	.077	2160646487.828	25402358183.514	.000

Panel B

	Regression coefficients					
	Total Environmental strength rating variable		Total Environmental Concern rating variable		Overall Environmental rating	
	B	Sig.	B	Sig.	B	Sig.
(Constant)	-1859.592	.000	-1634.861	.000	-1526.926	.000
lnAs	256.715	.000	223.258	.000	206.053	.000
SIC	469.407	.000	265.029	.004	261.754	.004
Fin_Lev	-.043	.962	-.223	.805	-.142	.875
Prf_Mrgn	-.095	.749	-.086	.769	-.079	.788
Cap_Int	-.070	.687	-.059	.729	-.055	.748
Environmental ratings	552.751	.000	524.099	.000	401.748	.000

Table 39 (continued)

Where:

ER_i (environmental rating variable) = Total Environmental strength rating variable, or Total Environmental Concern rating variable, or Overall Environmental rating;

NI = net income used as a proxy for earning levels;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = “1” In case the firm operates in industries classified as environmentally unsafe, “0” otherwise;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder’s equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues);

and e is an error term.

Table 40

Model Summary, ANOVA, and Regression Results of the Association between Environmental Strength Variables and the Yearend Prices

$$P = \alpha_0 + \alpha_1 \text{ ESi} + \alpha_2 \text{ lnAs} + \alpha_3 \text{ SIC} + \alpha_4 \text{ ROA} + \alpha_5 \text{ Fin\_Lev} + \alpha_6 \text{ Prf\_Mrgn} + \alpha_7 \text{ Cap\_Int} + e$$

Table 40

Panel A

	Model Summary		**ANOVA**		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Beneficial Product and Services	.051	.049	668543.700	12551904.455	.000
Pollution Prevention	.051	.049	668578.255	12551869.899	.000
Recycling	.051	.049	668475.604	12551972.551	.000
Clean Energy	.051	.049	668522.056	12551926.099	.000
Management Systems Strength	.051	.049	670245.625	12550202.530	.000
Other Strengths	.051	.049	670656.046	12549792.109	.000

Panel B

Regression Coefficients

	Beneficial Product and Services		Pollution Prevention		Recycling		Clean Energy		Management Systems Strength		Other Strengths	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
(Constant)	-5.253	.132	-5.360	.127	-5.291	.130	-5.155	.149	-5.800	.101	-5.529	.114
lnAs	4.658	.000	4.676	.000	4.666	.000	4.645	.000	4.746	.000	4.701	.000

Table 40 (continued)

	Beneficial Product and Services		Pollution Prevention		Recycling		Clean Energy		Management Systems Strength		Other Strengths	
SIC	.151	.938	.207	.915	.176	.928	.145	.940	.349	.858	.282	.884
Fin_Lev	-.004	.836	-.004	.836	-.004	.836	-.004	.837	-.004	.826	-.004	.836
Prf_Mrgn	-.002	.730	-.002	.729	-.002	.729	-.002	.730	-.002	.724	-.002	.728
Cap_Int	-.001	.836	-.001	.835	-.001	.836	-.001	.837	-.001	.830	-.001	.834
ROA	44.765	.000	44.807	.000	44.784	.000	44.780	.000	44.888	.000	44.799	.000
ESi	.945	.862	-1.327	.834	-.365	.954	.540	.883	-2.805	.403	-8.102	.353

Where:

ES "i" range from 1 to 6 indicating different environmental strength measures. i = 1 refers to clean energy, i = 2 refers to beneficial products and services, i = 3 pollution prevention, i = 4 refers to recycling, and i = 5 management systems, i = 6 is other strengths;

P = Calendar year end prices;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder's equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues);

and e is an error term.

Table 41

Model Summary, ANOVA, and Regression Results of the Association between Environmental Concern Variables and the Yearend Prices

$$P = \alpha_0 + \alpha_1 \text{ ECi} + \alpha_2 \text{ lnAs} + \alpha_3 \text{ SIC} + \alpha_4 \text{ ROA} + \alpha_5 \text{ Fin\_Lev} + \alpha_6 \text{ Prf\_Mrgn} + \alpha_7 \text{ Cap\_Int} + e$$

Table 41

Panel A

	Model Summary		**ANOVA**		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Hazardous Waste	.051	.049	668492.202	12551955.952	.000
Regulatory Problems	.054	.053	715243.855	12505204.300	.000
Ozone Depleting Chemicals	.051	.049	668621.194	12551826.961	.000
Substantial Emissions	.051	.049	669409.147	12551039.008	.000
Agriculture Chemicals	.051	.049	669194.911	12551253.244	.000
Climate Change	.051	.049	670732.846	12549715.309	.000
Other Concerns	.064	.063	848365.070	12372083.085	.000

Panel B

Regression Coefficients

	Hazardous Waste		Regulatory Problems		Ozone Depleting Chemicals		Substantial Emissions		Agriculture Chemicals		Climate Change		Other Concerns	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
(Constant)	-5.180	.151	-1.846	.605	-5.262	.131	-5.759	.107	-5.232	.133	-5.640	.108	-1.877	.590
lnAs	4.649	.000	4.137	.000	4.661	.000	4.735	.000	4.657	.000	4.728	.000	4.153	.000
SIC	.134	.946	-1.654	.403	.147	.940	.427	.829	.026	.990	.505	.797	-2.392	.219

Table 41 (continued)

	Hazardous Waste		Regulatory Problems		Ozone Depleting Chemicals		Substantial Emissions		Agriculture Chemicals		Climate Change		Other Concerns	
Fin_Lev	-.004	.837	-.006	.782	-.004	.836	-.004	.851	-.004	.836	-.004	.834	-.002	.905
Prf_Mrgn	-.002	.730	-.002	.755	-.002	.730	-.002	.725	-.002	.730	-.002	.727	-.002	.759
Cap_Int	-.001	.837	-.001	.869	-.001	.836	-.001	.831	-.001	.837	-.001	.832	-.001	.873
ROA	44.767	.000	44.044	.000	44.761	.000	44.958	.000	44.679	.000	44.767	.000	42.973	.000
ECi	.349	.921	12.461	.000	6.220	.805	-1.956	.542	5.360	.592	-2.778	.345	40.412	.000

Where:

EC "i" range from 1 to 7, indicating different environmental concerns. i = 1 refers to climate changes concern, i = 2 refers to regulatory problems, i = 3 refers to substantial emissions, i = 4 refers to ozone depletion chemicals concern, i = 5 refers to hazardous waste, i = 6 refers to agricultural chemicals, and i = 7 refers to other concerns;

P = Calendar year end prices;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder's equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues);

and e is an error term.

Table 42

Model Summary, ANOVA, and Regression Results of the Association between the Environmental Rating Variables and the Yearend Prices

$$P = \alpha_0 + \alpha_1 \text{ ER} + \alpha_2 \text{ lnAs} + \alpha_3 \text{ SIC} + \alpha_4 \text{ ROA} + \alpha_5 \text{ Fin\_Lev} + \alpha_6 \text{ Prf\_Mrgn} + \alpha_7 \text{ Cap\_Int} + e$$

Table 42

Panel A

	Model summary		ANOVA		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
TES	.051	.049	669047.290	12551400.865	.000
TEC	.052	.051	691999.111	12528449.044	.000
OER	.051	.050	677417.790	12543030.365	.000

Panel B

	Regression coefficient					
	Total Environmental strength rating variable		Total Environmental Concern rating variable		Overall Environmental rating	
	B	Sig.	B	Sig.	B	Sig.
(Constant)	-5.676	.113	-1.927	.597	-3.017	.413
lnAs	4.726	.000	4.150	.000	4.315	.000
SIC	.301	.878	-1.781	.382	-.938	.643
Fin_Lev	-.004	.833	-.005	.808	-.004	.831
Prf_Mrgn	-.002	.726	-.002	.754	-.002	.747
Cap_Int	-.001	.832	-.001	.869	-.001	.857

Table 42 (continued)

	Total Environmental strength rating variable		Total Environmental Concern rating variable		Overall Environmental rating	
ROA	44.842	.000	43.986	.000	44.305	.000
Environmental ratings	-.700	.633	3.295	.002	1.418	.060

Where:

ER (environmental rating variable) = Total Environmental strength rating variable, or Total Environmental Concern rating variable, or Overall Environmental rating;

P = Calendar year end prices;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = “1” In case the firm operates in industries classified as environmentally unsafe, “0” otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder’s equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues);

and e is an error term.

Table 43

Model Summary, ANOVA, and Regression Results of the Association between Environmental Strength Variables and the Following Year Annual Returns

$$\text{Cum\_Ret}_{t+1} = \alpha_0 + \alpha_1 \text{ ESi} + \alpha_2 \text{ lnAs} + \alpha_3 \text{ SIC} + \alpha_4 \text{ ROA} + \alpha_5 \text{ Fin\_Lev} + \alpha_6 \text{ Pef\_Mrgn} + \alpha_7 \text{ Cap\_Int} + e$$

Table 43

Panel A

	Model Summary		**ANOVA**		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Beneficial Product and Services	.020	.019	79.703	3915.590	.000
Pollution Prevention	.020	.018	78.223	3917.070	.000
Recycling	.020	.019	79.636	3915.657	.000
Clean Energy	.020	.019	80.102	3915.191	.000
Management Systems Strength	.021	.020	84.000	3911.293	.000
Other Strengths	.020	.019	79.636	3915.657	.000

Panel B

Regression Coefficients

	Beneficial Product and Services		Pollution Prevention		Recycling		Clean Energy		Management Systems Strength		Other Strengths	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
(Constant)	.149	.015	.146	.018	.156	.011	.168	.008	.177	.005	.153	.013
lnAs	-.014	.069	-.014	.086	-.015	.054	-.017	.037	-.018	.022	-.015	.063
SIC	.106	.002	.109	.002	.105	.002	.104	.002	.098	.004	.105	.002
Fin_Lev	.000	.665	.000	.663	.000	.659	.000	.658	.000	.631	.000	.662

Table 43 (continued)

	Beneficial Product and Services		Pollution Prevention		Recycling		Clean Energy		Management Systems Strength		Other Strengths	
Prf_Mrgn	.000	.063	.000	.063	.000	.064	.000	.064	.000	.066	.000	.063
Cap_Int	.000	.033	.000	.032	.000	.033	.000	.033	.000	.034	.000	.033
ROA	-.668	.000	-.666	.000	-.670	.000	-.665	.000	-.672	.000	-.667	.000
ESi	.131	.171	-.008	.945	.191	.084	.100	.123	.160	.007	.206	.181

Where:

ES "i" range from 1 to 6 indicating different environmental strength measures. i = 1 refers to clean energy, i = 2 refers to beneficial products and services, i = 3 pollution prevention, i = 4 refers to recycling, and i = 5 management systems, i = 6 is other strengths;

Cum_Ret_{t+1} = cumulative annual stock market returns for the following year;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder's equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues);

and e is an error term.

Table 44

Model Summary, ANOVA, and Regression Results of the Association between the Environmental Concern Variables and the Following Year Annual Returns

$$Cum\_Ret_{t+1} = \alpha_0 + \alpha_1 \text{ ECi} + \alpha_2 \text{ lnAs} + \alpha_3 \text{ SIC} + \alpha_4 \text{ ROA} + \alpha_5 \text{ Fin\_Lev} + \alpha_6 \text{ Pef\_Mrgn} + \alpha_7 \text{ Cap\_Int} + e$$

Table 44

Panel A

	Model Summary		**ANOVA**		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Hazardous Waste Concern	.020	.019	80.680	3914.612	.000
Regulatory Problems Concern	.020	.019	81.228	3914.065	.000
Ozone Depleting Chemicals Concern	.020	.018	78.300	3916.993	.000
Substantial Emissions Concern	.021	.020	84.165	3911.127	.000
Agriculture Chemicals Concern	.020	.018	79.372	3915.920	.000
Climate Change Concern	.020	.019	79.481	3915.812	.000
Other Concerns	.020	.018	78.633	3916.659	.000

Panel B

	Regression Coefficients													
	Hazardous Waste		Regulatory Problems		Ozone Depleting Chemicals		Substantial Emissions		Agriculture Chemicals		Climate Change		Other Concerns	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
(Constant)	.176	.006	.174	.006	.147	.017	.185	.003	.148	.016	.155	.012	.152	.014
lnAs	-.018	.029	-.018	.028	-.014	.081	-.019	.017	-.014	.077	-.015	.056	-.014	.068
SIC	.098	.005	.094	.007	.108	.002	.088	.012	.103	.003	.100	.004	.104	.003
Fin_Lev	.000	.658	.000	.686	.000	.663	.000	.724	.000	.664	.000	.660	.000	.658
Prf_Mrgn	.000	.065	.000	.065	.000	.063	.000	.066	.000	.063	.000	.064	.000	.064

Table 44 (continued)

	Hazardous Waste		Regulatory Problems		Ozone Depleting Chemicals		Substantial Emissions		Agriculture Chemicals		Climate Change		Other Concerns	
Cap_Int	.000	.034	.000	.034	.000	.033	.000	.035	.000	.033	.000	.033	.000	.033
ROA	-.669	.000	-.672	.000	-.666	.000	-.680	.000	-.670	.000	-.666	.000	-.669	.000
ECi	.109	.078	.100	.051	.142	.749	.155	.006	.213	.228	.066	.207	.061	.470

Where:

EC "i" range from 1 to 7, indicating different environmental concerns. i = 1 refers to climate changes concern, i = 2 refers to regulatory problems, i = 3 refers to substantial emissions, i = 4 refers to ozone depletion chemicals concern, i = 5 refers to hazardous waste, i = 6 refers to agricultural chemicals, and i = 7 refers to other concerns;

Cum_Ret_{t+1} = cumulative annual stock market returns for the following year;

LnAs (Size) = natural logarithm of Total Assets;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder's equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues);

and e is an error term.

Table 45

Model Summary, ANOVA, and Regression Results of the Association between the Environmental Rating Variables and the Following Year Annual Returns

$$\text{Cum\_Ret}_{t+1} = \alpha_0 + \alpha_1 \text{ ER} + \alpha_2 \text{ lnAs} + \alpha_3 \text{ SIC} + \alpha_4 \text{ ROA} + \alpha_5 \text{ Fin\_Lev} + \alpha_6 \text{ Pef\_Mrgn} + \alpha_7 \text{ Cap\_Int} + e$$

Table 45						
Panel A						
	Model summary		ANOVA			
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance	
TES	.021	.020	84.337	3910.956	.000	
TEC	.021	.020	85.189	3910.104	.000	
OER	.022	.021	87.935	3907.358	.000	
Panel B						
Regression coefficient						
	Total Environmental strength rating variable		Total Environmental Concern rating variable		Overall Environmental rating	
	B	Sig.	B	Sig.	B	Sig.
(Constant)	.188	.003	.204	.002	.221	.001
lnAs	-.020	.014	-.022	.007	-.025	.003
SIC	.095	.006	.075	.038	.072	.044
Fin_Lev	.000	.644	.000	.689	.000	.671
Prf_Mrgn	.000	.066	.000	.068	.000	.069
Cap_Int	.000	.035	.000	.036	.000	.037
ROA	-.673	.000	-.680	.000	-.682	.000
Environmental ratings	.072	.005	.057	.003	.047	.000

Where:

ER (environmental rating variable) = Total Environmental strength rating variable, or Total Environmental Concern rating variable, or Overall Environmental rating;

Cum_Ret_{t+1} = cumulative annual stock market returns for the following year;

LnAs (Size) = natural logarithm of Total Assets;

Table 45 (continued)

SIC (Industry classification) = “1” In case the firm operates in industries classified as environmentally unsafe, “0” otherwise;

ROA (Return on Assets) = net income/ average total assets;

Fin_Lev (Financial leverage) = (debt in current liabilities + debt in long term debt) / total shareholder’s equity;

Prf_Mrgn (Profit margin) = (net income / total sales);

Cap_Int (Capital Intensity) = (total assets / total revenues);

and e is an error term.

Table 46

Results of the Ohlson Clean Surplus Model Investigating the Association between Environmental Strength Variables and the Yearend Stock Prices

$$P = \alpha_0 + \alpha_1 \text{ BVPS} + \alpha_2 \text{ EPS} + \alpha_3 \text{ ESi} + e$$

Table 46

Panel A

	Model Summary		ANOVA		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Beneficial Product and Services	.810	.810	10712394.066	2507188.377	.000
Pollution Prevention	.811	.810	10715812.546	2503769.896	.000
Recycling	.811	.810	10715410.387	2504172.056	.000
Clean Energy	.811	.811	10718470.823	2501111.620	.000
Management Systems Strength	.811	.810	10715729.322	2503853.120	.000
Other Strengths	.810	.810	10709970.494	2509611.949	.000

Panel B

Regression Coefficients

	Beneficial Product and Services		Pollution Prevention		Recycling		Clean Energy		Management Systems Strength		Other Strengths	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
(Constant)	11.952	.000	11.918	.000	11.923	.000	11.779	.000	11.790	.000	12.035	.000
BVPS	1.067	.000	1.068	.000	1.067	.000	1.066	.000	1.068	.000	1.066	.000
EPS	2.356	.000	2.349	.000	2.351	.000	2.351	.000	2.347	.000	2.360	.000
ESi	5.649	.020	9.747	.000	9.422	.001	6.573	.000	5.035	.001	3.144	.418

Table 46 (continued)

Where:

ES "i" range from 1 to 6 indicating different environmental strength measures. i = 1 refers to clean energy, i = 2 refers to beneficial products and services, i = 3 pollution prevention, i = 4 refers to recycling, and i = 5 management systems, i = 6 is other strengths;

P = yearend stock price;

BVPS = book value per share;

EPS = earnings per share;

and e is an error term.

Table 47

Results of the Ohlson Clean Surplus Model Investigating the Association between Environmental Concern Variables and the Yearend Stock Prices

$$P = \alpha_0 + \alpha_1 \text{ BVPS} + \alpha_2 \text{ EPS} + \alpha_3 \text{ EC}_i + e$$

Table 47

Panel A

	Model Summary		ANOVA		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Hazardous Waste	.900	.810	10714159.662	2505422.781	.000
Regulatory Problems	.900	.810	10710553.399	2509029.044	.000
Ozone Depleting Chemicals	.900	.810	10710157.142	2509425.300	.000
Substantial Emissions	.900	.811	10715013.443	2504569.000	.000
Agriculture Chemicals	.900	.810	10710317.918	2509264.525	.000
Climate Change	.900	.810	10711117.222	2508465.221	.000
Other Concerns	.900	.811	10715046.565	2504535.878	.000

Panel B

Regression Coefficients

	Hazardous Waste		Regulatory Problems		Ozone Depleting Chemicals		Substantial Emissions		Agriculture Chemicals		Climate Change		Other Concerns	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
(Constant)	11.846	.000	11.948	.000	12.047	.000	11.790	.000	12.029	.000	12.199	.000	11.950	.000
BVPS	1.066	.000	1.066	.000	1.066	.000	1.068	.000	1.066	.000	1.066	.000	1.063	.000
EPS	2.350	.000	2.352	.000	2.359	.000	2.343	.000	2.357	.000	2.361	.000	2.350	.000
ECi	4.414	.003	1.657	.179	11.411	.311	4.420	.001	5.135	.247	-2.187	.088	6.948	.001

Table 47 (continued)

Where:

EC "i" range from 1 to 7, indicating different environmental concerns. i = 1 refers to climate changes concern, i = 2 refers to regulatory problems, i = 3 refers to substantial emissions, i = 4 refers to ozone depletion chemicals concern, i = 5 refers to hazardous waste, i = 6 refers to agricultural chemicals, and i = 7 refers to other concerns;

P = yearend stock price;

BVPS = book value per share;

EPS = earnings per share;

and e is an error term.

Table 48

Results of the Ohlson Clean Surplus Model Investigating the Association between Environmental Rating Variables and the Yearend Stock Prices

$$P = \alpha_0 + \alpha_1 \text{ BVPS} + \alpha_2 \text{ EPS} + \alpha_3 \text{ ER} + e$$

Table 48

Panel A

	Model summary		ANOVA		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
TES	.811	.811	10724375.532	2495206.911	.000
TEC	.810	.810	10713162.699	2506419.744	.000
OER	.811	.811	10719614.583	2499967.859	.000

Panel B

Regression coefficient						
	Total Environmental strength rating variable		Total Environmental Concern rating variable		Overall Environmental rating	
	B	Sig.	B	Sig.	B	Sig.
(Constant)	11.556	.000	11.758	.000	11.509	.000
BVPS	1.069	.000	1.066	.000	1.067	.000
EPS	2.337	.000	2.345	.000	2.333	.000
Environmental ratings	3.354	.000	1.147	.008	1.336	.000

Table 48 (continued)

Where:

ER (environmental rating variable) = Total Environmental strength rating variable, or Total Environmental Concern rating variable, or Overall Environmental rating;

P = yearend stock price;

BVPS = book value per share;

EPS = earnings per share;

and e is an error term.

Table 49

Results of the Ohlson Clean Surplus Model Standardized by Book Value per Share Investigating the Association between Standardized Yearend Stock Prices and Environmental Strength Variables

$$P/BVPS = \alpha_0 + \alpha_1 \, BVPS/BVPS + \alpha_2 \, EPS/BVPS + \alpha_3 \, ES_i + e$$

Table 49

Panel A

	Model Summary		ANOVA		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Beneficial Product and Services	.092	.092	892287.837	8811801.312	.000
Pollution Prevention	.092	.092	892288.916	8811800.233	.000
Recycling	.092	.092	892267.182	8811821.967	.000
Clean Energy	.092	.092	892323.777	8811765.372	.000
Management Systems Strength	.092	.092	894385.006	8809704.143	.000
Other Strengths	.092	.092	892269.345	8811819.803	.000

Panel B

Regression Coefficients

	Beneficial Product and Services		Pollution Prevention		Recycling		Clean Energy		Management Systems Strength		Other Strengths	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
(Constant)	2.674	.000	2.691	.000	2.683	.000	2.706	.000	2.835	.000	2.685	.000

Table 49 (continued)

	Beneficial Product and Services		Pollution Prevention		Recycling		Clean Energy		Management Systems Strength		Other Strengths	
EPS/BVPS	1.767	.000	1.767	.000	1.767	.000	1.767	.000	1.769	.000	1.767	.000
ESi	.489	.914	-.578	.912	-.026	.996	-.526	.859	-2.966	.276	-.256	.972

Where:

ES "i" range from 1 to 6 indicating different environmental strength measures. i = 1 refers to clean energy, i = 2 refers to beneficial products and services, i = 3 pollution prevention, i = 4 refers to recycling, and i = 5 management systems, i = 6 is other strengths;

P/BVPS = yearend stock price divided by the book value per share;

BVPS/BVPS = 1;

EPS/BVPS = earnings per share divided by the book value per share;

and e is an error term.

Table 50

Results of the Ohlson Clean Surplus Model Standardized by Book Value per Share Investigating the Association between Standardized Yearend Stock Prices and Environmental Concern Variables

$$P/BVPS = \alpha_0 + \alpha_1 BVPS/BVPS + \alpha_2 EPS/BVPS + \alpha_3 EC_i + e$$

Table 50

Panel A

	Model Summary		**ANOVA**		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Hazardous Waste	.092	.092	892454.167	8811634.982	.000
Regulatory Problems	.092	.092	892334.435	8811754.713	.000
Ozone Depleting Chemicals	.092	.092	892267.138	8811822.011	.000
Substantial Emissions	.092	.092	893612.367	8810476.781	.000
Agriculture Chemicals	.092	.092	892267.525	8811821.624	.000
Climate Change	.092	.092	892485.356	8811603.793	.000
Other Concerns	.092	.092	893874.821	8810214.328	.000

Panel B

Regression Coefficients

	Hazardous Waste		Regulatory Problems		Ozone Depleting Chemicals		Substantial Emissions		Agriculture Chemicals		Climate Change		Other Concerns	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
(Constant)	2.727	.000	2.716	.000	2.683	.000	2.552	.000	2.684	.000	2.739	.000	2.772	.000

Table 50 (continued)

	Hazardous Waste		Regulatory Problems		Ozone Depleting Chemicals		Substantial Emissions		Agriculture Chemicals		Climate Change		Other Concerns	
EPS/BV	1.767	.000	1.767	.000	1.767	.000	1.765	.000	1.767	.000	1.767	.000	1.768	.000
ECi	-.896	.746	-.446	.846	.004	1.000	2.206	.385	-.122	.988	-.839	.726	-3.753	.342

Where:

EC "i" range from 1 to 7, indicating different environmental concerns. i = 1 refers to climate changes concern, i = 2 refers to regulatory problems, i = 3 refers to substantial emissions, i = 4 refers to ozone depletion chemicals concern, i = 5 refers to hazardous waste, i = 6 refers to agricultural chemicals, and i = 7 refers to other concerns;

P/BVPS = yearend stock price divided by the book value per share;

BVPS/BVPS = 1;

EPS/BVPS = earnings per share divided by the book value per share;

and e is an error term.

Table 51

Results of the Ohlson Clean Surplus Model Standardized by Book Value per Share Investigating the Association between Standardized Yearend Stock Prices and Environmental Rating Variables

$$P/BVPS = \alpha_0 + \alpha_1 BVPS/BVPS + \alpha_2 EPS/BVPS + \alpha_3 ER_i + e$$

Table 51						
Panel A						
	Model Summary		**ANOVA**			
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance	
TES	.092	.092	892788.163	8811300.985	.000	
TEC	.092	.092	892338.936	8811750.212	.000	
OER	.092	.092	892552.393	8811536.756	.000	
Panel B						
Regression Coefficients						
	Total Environmental strength rating variable		Total Environmental Concern rating variable		Overall Environmental rating	
	B	Sig.	B	Sig.	B	Sig.
(Constant)	2.775	.000	2.728	.000	2.779	.000
EPS/BV	1.767	.000	1.767	.000	1.767	.000
Environmental ratings	-.630	.589	-.163	.841	-.225	.689

Table 51 (continued)

Where:

ER (environmental rating variable) = Total Environmental strength rating variable, or Total Environmental Concern rating variable, or Overall Environmental rating;

P/BVPS = yearend stock price divided by the book value per share;

BVPS/BVPS = 1;

EPS/BVPS = earnings per share divided by the book value per share;

and e is an error term.

Table 52

Model Summary, ANOVA, and Regression Results of the Association between the Changes in the Firms' Earning Levels and Changes in the Firms' Overall Environmental Rating

$$\Delta \text{NI} = \alpha_0 + \alpha_1 \Delta\text{OER} + \alpha_2 \Delta \ln\text{As} + \alpha_3 \text{SIC} + \alpha_4 \Delta \text{ROA} + \alpha_5 \Delta \text{Fin\_Lev} + \alpha_6 \Delta \text{Prf\_Mrgn} + \alpha_7 \Delta \text{Cap\_Int} + \text{e}$$

Table 52					
Panel A					
	Model summary		ANOVA		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Δ OER	.008	.003	145379587.453	18271586233.500	.112

Panel B

	Regression coefficient	
	Overall environmental rating change	
	B	Sig.
(Constant)	-464.160	.000
Δ LnAs	723.314	.017
SIC	.192	.999
Δ Fin_Lev	.264	.930
Δ Prf_Mrgn	-6.342	.026
Δ Cap_Int	-9.232	.027
Δ OER	53.462	.825

Where:

ΔOER (change in overall environmental rating) = $OER_{2008} - OER_{2006}$;

Δ NI = $NI_{2008} - NI_{2006}$;

Δ lnTA = $LnTA_{2008} - LnTA_{2006}$;

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

ΔROA = $ROA_{2008} - ROA_{2006}$;

Δ Fin_Lev = $Fin\_Lev_{2008} - Fin\_Lev_{2006}$;

Table 52 (continued)

Δ Prf_Mrgn = $Prf\_Mrgn_{2008} - Prf\_Mrgn_{2006}$;

Δ Cap_Int = $Cap\_Int_{2008} - Cap\_Int_{2006}$;

and e is an error term.

Table 53

Model Summary, ANOVA, and Regression Results of the Association between the Changes in the Firms' Earning Levels and Changes in the Firms' Overall Environmental Rating Groups (Deterioration and Improvement groups)

$$\Delta\,\mathrm{NI} = \alpha_0 + \alpha_1\,\Delta\mathrm{OER_i} + \alpha_2\,\Delta\,\mathrm{lnAs} + \alpha_3\,\mathrm{SIC} + \alpha_4\,\Delta\,\mathrm{ROA} + \alpha_5\,\Delta\,\mathrm{Fin\_Lev} + \alpha_6\,\Delta\,\mathrm{Prf\_Mrgn} + \alpha_7\,\Delta\,\mathrm{Cap\_Int} + e$$

Table 53

Panel A

	Model summary		ANOVA		
	R Square	Adjusted R Square	Regression sum of squares	Residual sum of squares	Model significance
Δ IMP	.128	.078	208398432.512	1414666262.417	.025
Δ DET	.346	.286	81235282.189	153484142.674	.000

Panel B

	Regression coefficient			
	Environmental rating Improvement		Environmental rating deterioration	
	B	Sig.	B	Sig.
(Constant)	-195.069	.878	2739.557	.000
Δ lnAs	1534.932	.220	-17.980	.968
SIC	-519.843	.507	110.978	.780
Δ Fin_Lev	-15.423	.711	.483	.741
Δ Prf_Mrgn	11555.930	.001	743.202	.072
Δ Cap_Int	-72.103	.701	97.927	.508
Δ OER_i	64.307	.951	2892.105	.000

Where:

ΔOER_i = change in the overall environmental rating variable for the improvement group and the deterioration group;

$\Delta\ NI = NI_{2008} - NI_{2006}$;

$\Delta\ lnTA = LnTA_{2008} - LnTA_{2006}$;

Table 53 (continued)

SIC (Industry classification) = "1" In case the firm operates in industries classified as environmentally unsafe, "0" otherwise;

$\Delta ROA = ROA_{2008} - ROA_{2006}$;

Δ Fin_Lev = $Fin\_Lev_{2008} - Fin\_Lev_{2006}$;

Δ Prf_Mrgn = $Prf\_Mrgn_{2008} - Prf\_Mrgn_{2006}$;

Δ Cap_Int = $Cap\_Int_{2008} - Cap\_Int_{2006}$;

and e is an error term.

VITA

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