

The link between Corporate Environmental and Financial Performance

- A study on Scandinavian firms

Abstract

Corporate Social Responsibility (CSR) has won terrain among managers during the previous decades; however, there are managers who still oppose it. These managers believe that a firm is better off by focusing on what it is good on, which does not incorporate CSR. However, empirically, the link between CSR and a firm's financial performance is unclear. In empirical research, CSR is defined as corporate social performance (CSP). In this thesis I test, through multiple linear regressions, if there is a link between the environmental dimension of CSP (corporate environmental performance) and corporate financial performance (CFP). The results imply that there is a neutral link between corporate environmental performance (CEP) and CFP, which means that a firm's engagement in environmental issues do not enhance or harm its financial performance.

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DISCUSSANTS

PRESENTATION

Table of contents

<i>1</i>	<i>Introduction.....</i>	<i>3</i>
<i>2</i>	<i>Theoretical framework and hypothesis development.....</i>	<i>4</i>
2.1	Theory supporting a negative relationship.....	4
2.2	Theory supporting a neutral relationship	5
2.3	Theory supporting a positive relationship.....	6
2.4	Hypotheses.....	8
<i>3</i>	<i>Previous Empirical Research.....</i>	<i>8</i>
3.1	Three groups in terms of method	8
3.2	Reasons for inconclusiveness in regression-based studies.....	11
<i>4</i>	<i>Methodology.....</i>	<i>12</i>
4.1	Sample and data	12
4.2	Financial performance measures.....	13
4.3	Control measures	14
4.4	Statistical procedures and shortcomings.....	15
<i>5</i>	<i>Empirical results and discussion.....</i>	<i>16</i>
<i>6</i>	<i>Conclusion.....</i>	<i>21</i>
<i>7</i>	<i>Suggestions for further research.....</i>	<i>21</i>
<i>8</i>	<i>References</i>	<i>22</i>

1 Introduction

Over thirty years ago the Nobel laureate in Economics Milton Friedman (1970) wrote in the *New York Times* that a firm has no social responsibility to the general public, rather, the only social responsibility of a firm is its obligations to the stockholders. These responsibilities require the manager of a firm to maximize its profits within a legal framework. Even though Corporate Social Responsibility (CSR)¹ has won terrain among managers during the previous decades, Friedman still sustains his theory. A recent example is the statement made by the CEO of Investment AB Öresund, Mats Qviberg (2006, March, 9). Qviberg argues, which is in line with Friedman (1970), that a firm is better off by focusing on its core business, which does not incorporate CSR.

The idea of this paper is to question the argument stating that a firm is better off without incorporating CSR. Friedman and Qviberg assume that CSR is negative for the firm, although empirical research concludes that the link between Corporate Social Responsibility and a firm's financial performance is still unclear. Important to mention is that Corporate Social Responsibility is defined as corporate social performance (CSP) in empirical research (Egels, 2005). If the link between CSP and corporate financial performance (CFP) is neutral, then Friedman and Qviberg lose the point of criticizing CSR, since including CSR in a firm's management, in that case, does not harm a firm's financial performance.

In this thesis, I analyze if indeed there is a link between the environmental dimension of CSP (corporate environmental performance) and CFP. There is no definite and undisputed definition of corporate environmental performance (CEP), which shows in the fact that previous empirical research has employed different measures of CEP (Wagner, 2001). These are emission data, pollution control, direct environmental compliance expenditure, reputation index and environmental rankings (Salama, 2005; Wagner, 2001). However, overall, CEP can be defined as the result of a firm's environmental commitment, e.g. pollution prevention, reduction of water and energy consumption and recycling (Habler & Reinhard, 2000).² Further on, a firm has a high CEP when its environmental activities are especially progressive

¹There are several definitions of the notion Corporate Social Responsibility (CSR), basically it means that the firm considers social and environmental issues in its operation and when dealing with stakeholders that go beyond what is described by law, see e.g. Ronald R Sims, *Ethics and corporate social responsibility: Why giants fall* (Westport: Praeger, 2003).

²For a detailed description of firms' environmental commitments, see annual reports.

within its industry while it is low for a firm which focuses on complying with environmental regulation but shows little or no further environmental commitment (Habler & Reinhard, 2000). In this thesis, a comprehensive measure of CEP is employed. This measure is environmental rankings, which were provided by the investment research firm, Innovest Strategic Value Advisors. I test the relationship between CEP and CFP through multiple linear regressions, using a sample of 83 Scandinavian firms. The purpose of the thesis is to add evidence to previous inconclusive empirical results on the link between corporate environmental performance and corporate financial performance. The value of this thesis resides upon the use of Scandinavian firms while most previous research has used a sample of US firms. Additionally I found only one research that has used a sample of Swedish firms (Hassel, Nilsson & Nyquist, 2005).

It would be valuable to stakeholders if a reliable empirical conclusion on the link would be achieved. For instance, a positive link would motivate managers to engage proactively in environmental issues and motivate investors to strategically invest in firms that are known to be environmentally friendly. This in turn would probably make the global environmental problems less severe since businesses have played a major role in contributing to environment pollution and depletion.

2 Theoretical framework and hypothesis development

The link between corporate environmental performance and corporate financial performance has been hypothesized to be positive, negative and neutral. The rational theoretical justifications for each of the possible positions show that there is a need for both a more unified theory and reliable empirical research.

2.1 Theory supporting a negative relationship

The neoclassical economic theory has dominated business research and practice during the last decades (Egels, 2005). It originates from Adam Smith who suggested that businesses should behave in a self-interested manner since the “invisible hand” (market place) will regulate it and ensure that businesses’ actions will benefit society (Cooper, 2004). The neoclassical economists suppose that the link between corporate social/environmental performance and financial performance is negative due to the belief that firms that perform responsibly incur a competitive disadvantage. The reason would be that they are incurring costs that might otherwise be avoided or that should be borne by others e.g. individuals or

government (Waddock & Graves, 1997). The stockholder theory is based on the neoclassical view. Milton Friedman, a Nobel laureate in Economics, is a known advocate of the stockholder theory. Friedman (1970) argued that the manager is the agent of the individuals who own the corporation, and his primary responsibility is to them, the stockholders. Thus, according to the stockholder theory, the firm has no moral obligations to non-shareholding stakeholders because of the special relationship between managers and owners (Rodin, 2005). Friedman stated that *“There is one and only one social responsibility of business - to use its resources and engage in activities designed to increase its profits so long as it stays within the rules of the game, which is to say, engages in open and free competition, without deception or fraud.”* (Friedman, 1970, p. 126) Friedman (1970) described what it would signify if a manager, in his capacity as a businessman, acted as if he had a responsibility towards other stakeholders than solely the stockholders. An example of such an act would be for a manager to spend money on pollution reduction beyond the amount that is in the best interests of the firm or required by law. Friedman concluded that the manager would be spending someone else’s money for a general social interest. This means that the manager would be imposing taxes and deciding how the tax proceeds should be spent, which should be governmental functions. Further on, a manager is presumably an expert in running his company, not an expert in handling social issues.

2.2 Theory supporting a neutral relationship

McWilliams and Siegel (2001) sustain the theory of a neutral relationship between corporate social/environmental performance and financial performance within a framework based on a supply and demand theory of the firm, which assumes shareholder wealth maximization. They argue that firms produce at a profit-maximizing level, including the production of social/environmental performance, which can be viewed as an investment. To maximize profits, the firm must offer a level of CSP/CEP for which the increased revenue equals the higher cost. This leads each firm to supply different amounts of social/environmental performance based on the unique demand for CSP/CEP the firm experiences. McWilliams and Siegel (2001) simplified their reasoning through an example of two firms that produce identical goods except that one of them has added a social/environmental characteristic to its product. They stated that in equilibrium, it could be shown that both firms would be equally profitable since the firm that produces CSP/CEP will have higher costs but also higher revenues, whereas the firm that do not produce CSP/CEP will have lower costs but also lower revenues.

2.3 Theory supporting a positive relationship

There are several theories and arguments which support a positive link between CSP/CEP – CFP; one of them is the stakeholder theory. The stakeholder concept is considered to have been founded in the 1960s but became first popular with the publication of Ed Freeman's *Strategic Management: A Stakeholder Approach* in 1984 (Carroll & Näsi, 1997). The stakeholder theory argues that managers have obligations to a broader group of stakeholders than simply shareholders and it's usually juxtaposed against the stockholder theory (Andriof, Waddock, Husted & Sutherland Rahman, 2002). There is a vast number of definitions of the term *stakeholder*.³ A recent definition is provided by Carroll and Buchholtz (2003), who define the term stakeholder as “Any individual or group who can affect or is affected by the actions, decisions, policies, practices, or goals of the organization.” (p. 70) Actually, there are several different types of stakeholder theories. Donaldson and Preston (1995) found a descriptive, normative and an instrumental type of stakeholder theory in the literature. The instrumental aspect of stakeholder theory establishes a framework for examining connections between the practice of stakeholder management and the achievement of various corporate performance goals. Practicing stakeholder management is considered to result in enhanced financial performance (Donaldson & Preston, 1995). Thus, according to the instrumental stakeholder theory, favorable corporate social performance, i.e. meeting the needs of various corporate stakeholders, will ultimately lead to favorable financial performance (Preston & O'Bannon, 1997). This holds true for corporate environmental performance, since a firm that is attentive to environmental issues improves its relationships with key stakeholders. This can lead to a better performance for the firm since it can avoid the costs of negative reactions from key stakeholders, while improving its image and enhancing the loyalty of key stakeholders such as customers, employees and government. For example, a firm may find it easier to recruit top quality employees, possibly resulting in increases in productivity at a relatively low cost (Waddock & Graves, 1997).

The resource-based theory is employed as a framework for analyzing the sources of competitive advantage within the field of strategic management. The theory originates from Wernerfelt's publication in the *Strategic Management Journal*, *A resource-based view of the firm*, in 1984 (Mills, Platts & Bourne, 2003). However, it took around five years for

³For an overview of the numerous definitions of stakeholders, see Ronald K. Mitchell, Bradley R. Agle and Donna J. Wood, “Toward a theory of stakeholder identification and salience: Defining the principles of who and what really counts.” *Academy of Management Review* 22, (1997).

academics and managers to be influenced by the paper (Wernerfelt, 1995). According to the resource-based theory, competitive advantage derives from valuable, costly-to-copy firm resources and capabilities (Hart, 1995). Moreover, the theory assumes that resources and capabilities are heterogeneous across firms and imperfectly mobile⁴ (Peteraf, 1993). Russo and Fouts (1997) argue, based on the resource-based theory, that the link between CEP-CFP is positive. To theoretically clarify why there should be a positive link, Russo and Fouts (1997) divided firms into two groups based on their environmental engagement or lack of it. The first group consisted of firms that reduce pollution through a short term approach and which resist the enforcement of environmental legislation. The second group consisted of firms that go beyond compliance of environmental regulations, focusing also on prevention. The first group, which focuses on compliance, adds, in general, pollution-removing or filtering devices to the existing assets of a firm. This policy does not require the firm to develop expertise or skills in managing new environmental technologies or processes. Thus, it leaves a firm essentially in the same resource and capability situation as it was before the taken measure. The second group, however, installs new technologies. According to the resource-based theory, physical resources cannot produce premium profits if they are purchased from a third party since the technology should be available to competitors. The advantages of the installation of new technology will, however, be less transparent if it is used in a way that allows a firm to enhance its internal methods, which is most likely to happen in the second group. Further on, a strong environmental spirit can be expected to become part of the company's image and to guide the actions of its members. This environmental spirit can be expected to influence human resource policies and in general, when a firm adopts a sophisticated human resource management strategy, productivity improvements are captured.

Porter and van der Linde (1995) argue that pollution reduction provides cost savings by increasing efficiency. Dechant, Altman, Dowining and Keeney (1994) argue that it is preferable for a company to be proactive concerning environmental issue because it implies that the firm can stay ahead of environmental regulation and reinforcement of it. This both reduces costs of complying with environmental regulations and gives the firm first mover-advantages. Shrivastava (1995) state that lower environmental liabilities provide companies with a lower credit risk and less vulnerability to litigation. Further on, he states that firms that

⁴Imperfectly mobile resources are resources which can be traded but are more valuable within the firm that currently employs them than in any other use.

are engaged in environmental issues can create distinctive eco-friendly products that appeal to green consumer segments of the industry.

2.4 Hypotheses

No single accepted theoretical foundation with clear empirical prediction exists. Thus, the first hypothesis tested in this paper is:

H₀: The link between corporate environmental performance and corporate financial performance is neutral

H₁: The link between corporate environmental performance and corporate financial performance is positive or negative.

Further on, to clarify that corporate environmental performance affects the corporate financial performance, and because the theories and arguments imply that there may be a time lag, the second hypothesis tested is:

H₀: The link between corporate environmental performance and its subsequent corporate financial performance is neutral.

H₂: The link between corporate environmental performance and its subsequent corporate financial performance is positive or negative.

3 Previous Empirical Research

3.1 Three groups in terms of method

Griffin and Mahon (1997) provide a review of the empirical research performed between CSP/CEP and CFP for the time period, 1972 to 1994. Griffin and Mahon (1997) use solely the definition of corporate social performance, however, early empirical studies of the CSP-CFP link, analyzed mainly a single dimension of CSP, i.e. environmental pollution (Simpson & Kohers, 2002). Griffin and Mahon (1997) concluded that no definitive consensus exists on the empirical CSP/CEP-CFP link. However, they added that the largest number of researchers had found a positive relationship. This is in accordance with the findings of Ullmann (1985) and Pava and Krausz (1996). Roman, Hayibor and Agle (1999) reviewed the work of Griffin

and Mahon (1997) and found that it had overstated the number of past studies that indicated a negative CSP-CFP link. This, because Griffin and Mahon (1997) had erroneously classified some results as negative results and because flawed investigations, which had found a negative CSP-CFP link, were included in the review. Wagner (2001) provides a review of the research performed concerning the link between CEP-CFP from year 1972 to 2000. He concluded that previous empirical research is inconclusive.

According to Wagner (2001), the previous empirical studies can, in terms of methodology, be classified into three groups. These are *event studies*, *(model) portfolio research* and *multiple regression-based studies*. *Environmental event studies* examine a change in stock return following an environmental event. Wagner (2001) found that the environmental event studies clearly show that markets react to environmental events. Moreover, in general, positive events lead to a positive market reaction and negative events lead to a negative market reaction. Derwall, Guenster, Bauer and Koedijk (2005) stated in their paper that event studies so far provide the most pronounced evidence of a link between environmental and stock market performance.

The studies that use the *(model) portfolio research methodology* form portfolios into groups with different levels of environmental performance and compare their respective returns. The portfolios created in this way can be industry-matched (e.g. each portfolio have the same industry structure), and can be matched for additional criteria such as firm size or export orientation (Wagner, 2001). Wagner (2001) concludes in his review that portfolio research in general shows that a portfolio of environmentally high performing firms does not penalize an investment fund and might well lead to significant, though modest, above-average returns. Derwall et al. (2005) composed two equity portfolios that differed in their environmental performances during the time period, 1995-2003. At the beginning of the period the sample consisted of about 180 U.S. companies, which in time increased to approximately 450. To measure environmental performance, Derwall et al. (2005) obtained rating data from the company, Innovest Strategic Value Advisors. They found that the high-ranked portfolio provided substantially higher average stock market returns compared to the low-ranked portfolio which could not be explained by differences in market risk, firm size, book-to-market ratio, momentum effects nor industry effects.

Multiple Regression-based Studies assess the relative influence of different factors such as environmental performance on firm profitability. King and Lenox (2001) analyzed 652 U.S. firms over the time period 1987 to 1996. To measure environmental performance, King and Lenox (2001) used a measure defined as *total emissions*, by calculating the logarithm of total facility emissions of toxic chemicals. Further on, they used two different measures to separate the effect of environmental management from the effect of industry positioning. These are the following: *relative emissions*, which compare the degree to which a firm's facilities are more or less polluting than other facilities in the same industry and *industry emissions*, which measure the degree to which a firm tends to operate in industries where production involves pollution. Tobin's q was used to measure financial performance. King and Lenox (2001) controlled for firm size, capital intensity, growth, leverage, R&D intensity and for the stringency of the regulatory environment in which the firm operates. The study provides evidence of an association between pollution reduction and financial gain. Further on, King and Lenox (2001) found that firms operating in cleaner industries have a higher financial performance, however, they were not able to rule out possible confounding effects from fixed firm attributes and strategic positions⁵. Elsayed and Paton (2005) conducted a static and dynamic panel data analysis of the impact of environmental performance on financial performance. They argued that a dynamic approach may be a valid method to use, since investing in new environmental technology is likely to lead to considerable costs in the short run, whereas gain in terms of possible productivity improvements and consumer satisfaction may only be realized much later on. The sample was based on 227 UK firms during the time period 1994 to 2000. To measure environmental performance, Elsayed and Paton (2005) used the corporate reputation index of "Britain's most admired companies" in terms of "community and environmental responsibility" which had been published in Management Today. The study used three alternative measures of financial performance, Tobin's q , Return on Assets and Return on Sales. Further on, they controlled for firm size, firm risk, R&D intensity, advertising intensity, capital intensity and industry effects. Elsayed and Paton (2005) found that environmental performance has a neutral impact on firms' performance. Salama (2005) used both median regression analysis and the conventional OLS regression to test if CEP and its subsequent financial performance are positively related. He used both regression methods in order to test if the results would differ, since median regression analysis

⁵Examples of a fixed firm attribute and a strategic position could be that an innovative firm may have both lower emissions levels and greater profits or that managers may choose to improve their firm's environmental performance when they have an especially profitable year.

is considered to be more robust to the presence of outliers and unobserved firm heterogeneity. The sample consisted of 201 British companies with CEP data from year 2000 and CFP data from year 2001. To measure environmental performance, Salama (2005) also used the corporate reputation index of “Britain’s most admired companies” in terms of “community and environmental responsibility” which had been published in Management Today. He controlled for firm size, systematic risk, R&D intensity and industry effects. The OLS regression results revealed that CEP has a neutral impact on subsequent CFP while the median regression results indicated that CEP has a positive impact on subsequent CFP. Hassel et al. (2005) investigated the link between market value of equity and environmental performance on 71 firms listed on Stockholm stock exchange, during nine quarters, from June 1998 to September 2000. The study used an accounting-based valuation model, in which the market value of equity is considered as a function of book value, accounting earnings and environmental performance. To measure environmental performance, the study used environmental ratings of companies that were provided by the Swedish firm, CaringCompany (CC) Research, AB⁶. Hassel et al. (2005) found a significant negative relationship between the market value of listed Swedish companies and their environmental performance ratings which indicates that firms rated highly in terms of environmental performance are not, ceteris paribus, highly valued by investors.

3.2 Reasons for inconclusiveness in regression-based studies

Griffin and Mahon (1997) argued that one of the reasons for the inconclusive results arose from differences in the definitions of financial performance. The previous studies used stock market-based data and/or accounting-based data to measure financial performance. McGuire, Sundgren and Schneeweis (1988) stated that market returns had several advantages over accounting-based measures since they are less susceptible to differential accounting procedures and managerial manipulation. Griffin and Mahon (1997) noted that in many previous studies only one measure of financial performance was used, and suggested instead the use of multiple measures of financial performance. Concerning the environmental performance, previous empirical research has employed different measures of it. These are emission data, pollution control, direct environmental compliance expenditure, reputation index and environmental rankings (Salama, 2005; Wagner, 2001). The reputation indices, Fortune corporate index and the corporate reputation index of “Britain’s most admired companies”, which have been used in some of the previous empirical studies, can be criticized

⁶CaringCompany (CC) Research, AB has changed name to GES Investment Services.

on the ground that the overall perception of the firm and its image, rather than the actual actions taken by the firm, may be the dominating factor in determining the firm's relative ranking of its environmental performance (Griffin & Mahon, 1997). Griffin and Mahon (1997) and Elsayed and Paton (2005) pointed out that the majority of previous studies have relied on cross-sectional data sets and that conclusions drawn from such studies are likely to be invalid in the presence of significant firm heterogeneity. Elsayed and Paton (2005) argued that the use of panel data allows researchers to control for unobservable firm-specific effects and could therefore provide more reliable results. Wagner (2001) argued that previous empirical studies often did not account for important moderating factors in the relationship between environmental and economic performance such as firm size and market structure of the industry. McWilliams and Siegel (2000) argued that one such omitted variable was the intensity of R&D investment by the firm.

4 Methodology

4.1 *Sample and data*

The sample consists of 83 Scandinavian firms, whereas 33 Swedish firms, 18 Danish firms, 18 Finnish firms and 14 Norwegian firms. It is based on an environmental ranking list provided by Innovest Strategic Value Advisors which is an investment research firm specialized in analyzing companies' performance on environmental and social issues. Innovest uses more than twenty information sources which are both quantitative and qualitative in nature and evaluates a company relative to its competitors via an analytical matrix. The ranked firms are evaluated on sixty different factors that all together constitute the final rating. For each of these factors, each firm receives a score between one and ten. Moreover, the different factors are not considered to be equally important, instead they are weighted differently in the overall assessment of a firm's environmental performance (Internal source, personal communication, January, 2006). These factors can be grouped into five broad categories which are the following (Internal source, personal communication, January, 2006; Derwall et al., 2005):

- *Operating risk exposure* – risk from recent events e.g. toxic emissions and hazardous waste
- *Historical liabilities* - risk arising from previous actions
- *Sustainability risk* – future risks due to the company's use of material sources e.g. energy efficiency, resource use efficiency and recycling

- *Strategic Management capacity* – ability to handle environmental risk successfully
e.g. environmental training & development, environmental reporting and certification
- *Sustainable profit opportunities* – business opportunities available to the company
relative to its competitors

The sampled firms are included in an established world index which, due to confidentiality issues can not be disclosed. The financial data was extracted from ORBIS database. The first hypothesis was tested by running three multiple linear regressions, using variables for the year 2004. The second hypothesis was tested by running three multiple linear regressions, using the corporate environmental performance variable for year 2003, while using all other variables for year 2004. The variables used in the regressions are described in Table 1.

4.2 Financial performance measures

Consistent with prior research (Elsayed & Paton, 2005) both accounting and market based measures are used in this thesis to evaluate a firm's financial performance. The accounting measures used are Return on Assets (ROA) and Return on Equity (ROE). These were selected because Griffin and Mahon (1997) concluded in their review that ROA and ROE were among the most widely used accounting measures. ROE can be calculated either before or after tax deductions. It's a distortion to calculate ROE after tax deductions when there is a comparison of ROE with rates of return on other sources of finance and/or when analyzing the efficiency of the management in organizing the economic operation (Alexander & Nobes, 2004). Hence, in this thesis, ROE is measured before tax deductions. Consistent with prior research (King & Lenox, 2000; Elsayed & Paton, 2005), the market based measure of financial performance employed was Tobin's q . Tobin's q measures the market valuation of a firm relative to the replacement costs of tangible assets (Lindenberg & Ross, 1981). Essentially it reflects the cash flows that the market thinks a firm will provide per dollar invested in assets. Tobin's q should be higher when future cash flows are expected to be higher or if they are expected to be less risky (King & Lenox, 2001). In accordance with studies in the same domain, a simplified measure of Tobin's q is used (King & Lenox, 2001; Dowell, Hart & Yeung, 2000). The more complicated measure of Tobin's q as proposed by Lindenberg and Ross (1981) was not employed since previous research in this domain has found only a small difference between this measure and the simplified version used in this thesis (Dowell et al. 2000).

4.3 Control measures

The control measures employed were firm size, firm risk, book-to-market ratio and industry and country effects. The multifactor model that occupies the center stage in financial theory is the three-factor model introduced by Fama and French (Bodie, Kane & Marcus, 2005). The systematic factors in the Fama-French model include firm size and book-to-market ratio. Hence, these are included as control variables. Consistent with prior studies (e.g. Salama, 2005) the firm risk is included as a control variable. The industry and country effects are included as control variables since for some firms, country and industry effects might have a greater influence on profits than the firm's relative performance within its industry or country. The preceding, because there are considerable variations in the economic performance across countries and industries at any time. It is difficult for an industry to perform well when the macroeconomy is bad or for a firm to perform well in a troubled industry (Bodie et al., 2005). The country effects consist of three dummy variables: Danish firms, Norwegian firms and Finnish firms. Swedish firms is the group which was excluded as a dummy variable. Further on, the industry effects consist of nineteen dummy variables, meaning that twenty different industries were sampled. The rating agency that provided the rankings had allocated each firm into one industry category; these categories are in accordance with OMX industry classifications. To minimize the number of industries, some firms that had been classified according to an industry sub-group were defined within a broader group. The industry classifications were the following:

- | | |
|------------------------------------|---------------------------|
| ▪ Airlines | ▪ Food and drug retailing |
| ▪ Auto components | ▪ Food products |
| ▪ Beverages and tobacco | ▪ Health care |
| ▪ Capital goods | ▪ IT services |
| ▪ Chemicals | ▪ Materials |
| ▪ Commercial services and supplies | ▪ Media |
| ▪ Communications equipment | ▪ Oil and gas |
| ▪ Consumer durables | ▪ Specialty retail |
| ▪ Energy equipment and services | ▪ Surface transport |
| ▪ Finance | ▪ Telecommunications |

Telecommunications was the missing industry among the dummy variables.

TABLE 1
Variable definitions

Variable name	Variable description
<i>Financial performance</i>	
Tobin's q	Market capitalization plus the firm's long-term debt plus the firm's short-term liabilities minus its short-term assets, all divided over the firm's total assets
Return on Assets	EBIT (Earnings Before Interest and Taxes) / Total Assets
Return on Equity	Net profit before tax deductions / Total Equity
<i>Environmental performance</i>	
Corporate environmental performance	Environmental rankings provided by the investment research firm, Innovest Strategic Value Advisors
<i>Control</i>	
Firm size	Market capitalization (number of shares outstanding times the current market price of the common stock)
Firm risk	Beta
Book-to-market ratio	Book value of total equity / Market value of total equity
Industry effects	Dummy variables of nineteen industries
Country effects	Dummy variables of three countries

4.4 Statistical procedures and shortcomings

The provided environmental rankings extend over a longer time period than the one chosen for the empirical test. Moreover, the empirical results would turn to be more accurate if tested over an extended time period. However, the rankings for previous years were only available for a small fraction of the sample. For the selected time period, the environmental rankings were available for all firms. Previous research states that R&D intensity is an essential control variable; nevertheless, the financial data source lacked R&D expenditures for most of the firms. Further on, the sample includes quite a few banks and financial institution which do not even include R&D expenditure as an item in their annual reports. Hence, R&D intensity was set aside since no good proxy for R&D expenditure could be established.

5 Empirical results and discussion

Descriptive statistics and partial correlations of key variables are presented in Tables 2 and 3. Innovest has requested that the provided environmental rankings should be handled under a non-disclosure agreement; hence they will be treated as confidential information not to be revealed within this paper. Therefore no table with CEP-rankings will be presented. However, the mean and standard deviation of the CEP-variables for year 2004 and 2003 are shown in Table 2.

TABLE 2
Descriptive statistics of key variables

Variable	Mean	Standard deviation
Corporate environmental performance (year 2004)	1129.253	265.932
Corporate environmental performance (year 2003)	1113.892	261.617
Tobin's q	1.177	1.027
Return on Equity (%)	27.533	23.484
Return on Assets (%)	10.275	9.357
Firm size (mil euros)	5472.707	8301.690
Firm risk	0.788	0.306
Book-to-market ratio	0.554	0.334

Note: $n = 83$.

The figures in Table 3 show that there is only one case where there is an indication of a negative partial correlation between CEP and CFP, which is the the partial correlation between CEP (year 2004) and ROE turning out to be significant at a 10% level. Thus, the significance level is rather weak. Noteworthy is that all partial correlation coefficients have a negative sign; however, they are all close to zero.

TABLE 3
Partial correlations of key variables

Variable	Tobin's q	Return on Assets	Return on Equity
Corporate environmental performance (year 2004)	-0.076	-0.185	-0.230 ⁺
Corporate environmental performance (year 2003)	-0.067	-0.151	-0.190

Note: All variables except CEP (year 2003) are for year 2004. All control variables were included and hold constant.

⁺ $p < 0.10$ (two-tailed test).

The classical linear regression model which is the cornerstone of most econometric theory and applied in this thesis is grounded on several assumptions.⁷ Before I tested the hypotheses, I tested if the regression models fulfilled the assumptions of no heteroscedasticity or multicollinearity. The results imply that these assumptions are fulfilled. Moreover, the residuals follow a normal distribution which is required in F-tests (Gujarati, 2003).

The results from the multiple linear regressions are presented in Tables 4 and 5. Table 4 presents the regression coefficients and statistics for three multiple regressions that were run to test the first hypothesis: *the link between corporate environmental performance and corporate financial performance is positive or negative*. Table 5 presents the regression coefficients and statistics for three multiple regressions that were run to test the second hypothesis: *the link between corporate environmental performance and its subsequent corporate financial performance is positive or negative*. The variables used in the multiple linear regressions are the same for Tables 4 and 5 with one exception. In Table 5, The CEP-variable used is for year 2003 instead of 2004.

As can be seen in Tables 4 and 5, the R Squares differ between the multiple regression models, with the lowest R Square for the model with ROE as dependent variable and highest for the model with ROA as the dependent variable. The R Squares are not close to one, so there should be no perfect fits, however, they are not very low either. Though, the adjusted R Square may be a better measure of the accuracy of fit than the R Square. This, because when the number of dependent variables increases, R Square almost invariably increases with the number and never decreases, while the adjusted R Square takes into account the number of dependent variables included (Gujarati, 2003). The Tables show that the adjusted R Square varies slightly more than the R Square between the three multiple linear regressions, with the highest adjusted R Square for the regression with ROA as the dependent variable. Moreover, Table 5 presents a slightly weaker adjusted R Square than Table 4, which implies that the model without a time lag has a slightly stronger fit. However, it is argued that the accuracy of the fit can not be judged only by the level of R Square or adjusted R Square since a low R Square or low adjusted R Square does not mean the model is necessarily inaccurate (Gujarati, 2003). The F-values in Tables 4 and 5 are presented since the F-value is a measure of the

⁷For a detailed description of these assumptions see e.g. Damodar N. Gujarati, Basic econometrics 4th ed. (New York: MacGraw-Hill, 1996).

overall significance of the estimated regression (Gujarati, 2003). The F-values are all significant at a 1 % level, which imply that the multiple regressions may be reliable models.

As can be seen in Tables 4 and 5, firm risk and firm size are not statistically significant. The book-to-market ratio is significant at least at the 1% level for all regressions. The sign of the coefficients is negative, which is in accordance with the findings of Fama and French (1995). The dummy variables that are significant are presented in Tables 4 and 5. No industry is significant for all regressions, although, three industries are significant at a 5% level for two of three regressions. The statistically significant industries for two of three regressions are finance, oil and gas and speciality retail. However, it does not mean that these industries have outstanding environmental rankings. For example, the oil and gas industry has a CEP-rating for year 2004 which is above the mean value for the sample; however, it is not one of the highest. When it comes to the CEP-ranking for year 2003 it is slightly above the mean value of the sample. Concludingly, the CEP ranking for oil and gas is around average. The weak significance level for the different industries in overall shows that there is not a significant difference within the different industries' CFP, which implies that if CEP affects a firm's CFP, its impact does not differ significantly among the industries. Further on, no country dummy variable is significant in any of the regressions, which means that if CEP affects a firm's CFP, its impact does not differ significantly among the countries.

As can be seen in Table 4, the CEP-variable (year 2004) from the regression with ROE as the dependent variable is only significant at a 10% level, while the CEP-variable is not significant for the regressions with ROA and Tobin's q as dependent variables. Even though the CEP-variable from the regression with ROE as the dependent variable is significant, it is rather weak, and therefore the null hypothesis is not rejected. Thus, the results imply that there is a neutral link between CEP and CFP. Noteworthy is that the coefficients of the CEP-variable are negative, although, close to zero, including the variable that is significant at a 10% level. This implies that the link can be interpreted to be neutral with an inclination to be negative.

TABLE 4
Coefficients and statistics from multiple regression analyses with all variables from year 2004

Independent and control variables	Dependent variable Tobin's <i>q</i>	Dependent variable Return on Assets	Dependent variable Return on Equity
Corporate environmental performance (year 2004)	-0.062	-0.149	-0.220 ⁺
Firm size	-0.043	-0.002	-0.031
Firm risk	-0.053	0.081	0.110
Book-to-market ratio	-0.439***	-0.383***	-0.380**
<i>Significant industries</i>			
Finance	-0.385*	-0.350*	0.055
Oil and gas	-0.074	0.230*	0.490***
Speciality retail	0.312**	0.276**	0.095
Surface transport	-0.119	0.241*	0.144
F	3.786***	4.123***	2.343**
R Square	0.637	0.657	0.521
Adjusted R Square	0.469	0.498	0.299

Note: All industry and country dummy variables were included in the regressions, however, only the significant ones are included in the Table.

⁺ $p < 0.10$, * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$ (two-tailed test).

As can be seen in Table 5, the CEP-variable (year 2003) is not statistically significant in any of the three regressions. This implies that taking into account for a time lag weakens the model since there was at least one weakly significant CEP-variable for year 2004. Since there is no significant CEP-variable, the null hypothesis is not rejected. Therefore, the link between CEP and its subsequent CFP implies to be neutral. Noteworthy to add, is that once again, the coefficients of the CEP-variable are negative, although close to zero.

TABLE 5
Coefficients and statistics from multiple regression analyses with all variables from year 2004, except CEP, which is from year 2003

Independent and control variables	Dependent variable Tobin's q	Dependent variable Return on Assets	Dependent variable Return on Equity
Corporate environmental performance (year 2003)	-0.052	-0.116	-0.174
Firm size	-0.053	-0.026	-0.067
Firm risk	-0.055	0.074	0.101
Book-to-market ratio	-0.438***	-0.382***	-0.377**
<i>Significant industries</i>			
Finance	-0.393*	-0.370*	0.026
Oil and gas	-0.080	0.215*	0.468***
Speciality retail	0.305**	0.259**	0.070
Surface transport	-0.119	0.244*	0.148
F	3.778***	4.049***	2.266**
R Square	0.637	0.653	0.513
Adjusted R Square	0.468	0.492	0.286

Note: All industry and country dummy variables were included in the regressions, however, only the significant ones are included in the Table.

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$ (two-tailed test).

The results are in line with the theory which sustains a neutral relationship between CEP and CFP. A neutral link between CEP and CFP signifies that a firm's engagement in environmental issues do not enhance or harm its financial performance. These results are in line with the findings of Elsayed and Paton (2005) who as well used Tobin's q and ROA as measures for a firm's financial performance. Further on, the results are consistent with Salama's (2005) OLS regression results. Both of these recent studies have used a sample of British firms. Further on, the results in this paper imply that there may be an inclination towards a negative link between CEP and CFP, since the CEP-variable which is weakly significant, has a negative sign, although, close to zero. I found only one study which has tested the link between CEP and CFP using a sample of Swedish firms (Hassel et al., 2005). However, this study uses different control variables than the ones I used in this study and other previous research mentioned in this thesis. Hassel et al. (2005) found a significant negative relationship between CEP and CFP. This is an interesting finding since this thesis shows an inclination towards a negative link. Moreover, most of the research in this area has used a sample of US firms, where the largest number of researchers has found a positive relationship. Thus, perhaps the nature of the link is region specific.

6 Conclusion

In this thesis, I test, through multiple linear regressions, if there is indeed a link between corporate environmental performance (CEP) and corporate financial performance (CFP) using a sample of Scandinavian firms. Different theories support a neutral, negative or a positive link between CEP and CFP. Hence, the hypotheses were formulated to test if there is a positive or negative link between CEP and CFP. Apart from testing if there is a positive or negative link between CEP and CFP, I test if the link between CEP and its subsequent CFP is positive or negative. The results imply a neutral link between CEP and CFP and CEP with its subsequent CFP, which is in accordance with the theory that supports a neutral relationship between CEP and CFP. The results mean that a firm's engagement in environmental issues does not enhance or harm its financial performance. However, the results imply an inclination towards a negative link. Most of the research in this area has been performed on U.S. firms, where the largest number of researchers has found a positive relationship. Only one study was found which investigated Swedish firms (Hassel et al., 2005). That study concluded a negative relationship between CEP and CFP. Thus, perhaps the nature of the link is region specific. Concerning this paper, an important limitation is the time period covered, which, in exchange for accuracy in the analyses, had to be given up due to missing information from the financial and environmental sources. Concludingly, even though the results imply a neutral relationship between CEP and CFP it can not be stated that it is necessarily the case. Instead, exhaustive and deeper theoretical and empirical research is recommended.

7 Suggestions for further research

It would be valuable to perform multiple regressions with an extended time period and a larger sample. Concerning the sample it could be interesting to expand it and include all countries in the European Union. Moreover, it would be interesting to conduct a deeper study on one single industry. Further on, it would be interesting to test the relationship between CSP-CFP and not only CEP. A disadvantage with performing studies on Swedish firms is that it can be a problem to attain data over CEP, especially, environmental rankings. A lot of studies have been done in this area, however, mostly on U.S. firms. However, based on discussions with people dealing with investments or environmental rankings, my belief is that this topic will become a more popular research field in Sweden, which will affect the availability of data in a positive way.

8 References

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