Corporate social & environmental accounting, Physical performance, and reputation: How are they related and which matters to financial decision-makers? Three empirical studies of CSR and its relation to investment decisions

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Corporate Social & Environmental Accounting, Physical Performance, and Reputation: How are they related and which matters to financial decision-makers?

Three empirical studies of CSR and its relation to investment decisions

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ABSTRACT

Cases involving sudden environmental events, such as British Petroleum's (BP's) accidental oil spill in the Gulf of Mexico in 2010, clearly demonstrate the causal relation between poor corporate environmental performance and abrupt loss of shareholder value. Under such circumstances, a firm's results can be readily priced using a conventional valuation model and hence, there is a clear nexus between environmental performance and business outcomes, as represented by the firm's financial results as well as the event impact on shareholder value through equity prices. However, in less extreme cases there is no clear evidence of there being a relationship between these elements. Further, in relation to the literature on the nature of and motivations for corporate social and environmental reporting, scant attention has been directed towards research on the usefulness of environmental performance information to financial decision makers. Moreover, such studies as there have been have delivered mixed results in the absence of a conceptual framework that is able to distinguish the quality of such reporting from underlying performance and other representations of performance, such as reputation and SRI index membership.

In order to address these previous shortcomings in this field, the proposed research focuses on environmental issues to investigate whether corporate environmental performance information can be considered as an aspect of a firm's value, in terms of equity performance and to this end three empirical studies are carried out probing the relationships, respectively, between:

- corporate social responsibility (CSR) reputation and equity performance,
- socially responsible investment (SRI) index membership and equity performance, and
- CSR ratings and share selection in SRI versus general investment funds,

whilst in each case controlling for other environmentally related factors, as well as financial performance.

The findings of the first empirical study suggest that environmental reputation and physical performance measured as proxies of the corporate environmental performance have value relevance, being negatively significantly related to the stock valuation, whereas environmental disclosure (DJSI) is not value relevant to financial decision-makers, and hence, not incorporated

into share prices. However, the outcomes suggest that the GRI, an alternative measure of environmental disclosure, is value relevant even though it is not incorporated into share prices. The outcomes of the second empirical study indicate that companies being added to the DJSI or the FTSE4Good index in the March announcement results in a temporary decrease in a their share price, whilst companies added in (deleted from) the September announcement of the FTSE4Good index experience a significant but temporary increase (decrease) in stock return. However, membership of SRI indices does not have value relevance. Finally, the findings from the third empirical study suggest that CSR ratings have a weak influence on the ownership holdings decisions taken by SRI fund managers and further, they show that they, on aggregate, prefer to take into account multidimensional CSR measurements when making investment choices.

CHAPTER 1

Chapter 1. Introduction

1.1 Context

A series of cases have demonstrated the causal relation between poor corporate environmental performance and abrupt loss of shareholder value. Memorable examples include the General Public Utilities' nuclear accident at Three Mile Island in 1978, Union Carbide's toxic release in Bhopal in 1984 and Exxon's oil spill in Alaska in 1989, but British Petroleum's (BP's) accidental oil spill in the Gulf of Mexico in 2010 provides a near-contemporary example. Its share price fell from $57.16 on 19th April, 2010, the day before the accident, to a low of $27.62 on 24th June, 2010, although with some subsequent recovery[1]. In addition, the loss of the company's reputation in this area was marked by its removal from socially responsible investment (SRI) indices, such as the DJSI and FTSE4Good index, and shareholders faced future losses as a result of calls for tighter regulation by the US on deepwater oil drilling.

While these cases involved sudden events with dramatic and easily understood consequences or risks, the common characteristic more important for the present purpose is that there were financial consequences in terms of regulatory breaches, clean-up and compensation costs etc. which thus economically internalised at least some element of the environmental harm (see, for example, Blacconiere and Patten, 1994). Such financial representation of this harm in the firms' results could also be readily priced using conventional valuation models. Thus, in cases such as these, there is a clear nexus between environmental performance, business outcomes, as represented by the firm's financial results and the impact on shareholder value through equity prices.

The research challenge lies in less extreme cases, where the firm's environmental impact is more subtle and/or manifested over a longer period. In such cases, the question then is whether securities markets incorporate these factors when considering risk and return, i.e. as internal factors ultimately represented in the firm's financial results, whether they incorporate them in

[1] Source being the Wall Street Journal, http://quotes.wsj.com/BP/historical-prices?mod=WSJ_qtoverview_relatedinfo

some other way in their decision-making, perhaps as part of more general environmental, social and governance (ESG) concerns, or whether they are insensitive to them?

Regarding this, environmental issues have been reflected in large body of academic literature examining the relationship between environmental performance and firm performance (see Appendix I for examples), but the empirical evidence is mixed and further, there is the confusion over the utilizing of the term "*performance*". Accordingly, the term '*firm performance*' in this context is categorised as a firm's equity performance, as indicated by its share price movements, and its financial/economic performance, which is measured by the managers' performance on business activities as presented in their financial results. For example, a number of the aforementioned studies (e.g. Hammond and Slocum, 1996; Herremans et al., 1993) have conflated these two aspects of a company's performance to represent a firm's overall financial performance. The fundamental debate in this context is whether corporate environmental performance can be considered as an aspect of firm value in terms of its financial and/or equity performance. Accordingly, in this study equity performance and financial performance are defined separately as the constituent parts of overall firm performance, unless stated otherwise.

The other aspect environmental performance is what form of accounting the market uses as the source of environmental performance information for its decision-making. Regarding this, from the perspective of conventional finance and accounting theory, financial statements and reports are primarily directed towards enabling investors to make decisions appropriate to their preferences, but here the questions are: if investors only care about risk/return, does such information convey enough about the impact of ESG factors? Further, if they care about ESG concerns for their own sake, is adequate non-financial information available to help them form a view on this? With respect to this, little is known about how such information impacts on investors' decision making and further, previous empirical studies have elicited mixed findings regarding the value relevance of ESG information (Black et al., 2000; Clarkson et al., 2004; Hassel et al., 2005; Hughs II, 2000). From the perspective of financial accounting theory, it is accepted that financial information provides valuable information to investors, but because the adaptation of ESG issues and related activities, which are mostly presented in non-financial

reporting, are related to business cases and are usually on a voluntary basis, it is hard to identify whether the non-financial information has value relevance.

Coupled with these matters, is the issue of how to measure the existence or absence of such a relationship. However, this previous research has not explicitly identified the impact of the various aspects of environmental performance on financial outcomes. One key reason for this is the lack of standardised measurements for environmental performance owing to their non-financial nature. Regarding this, corporate environmental performance does not just involve physical performance (e.g. pollution levels) and hence, several alternative measurements have been considered, such as: corporate environmental reputation (e.g. Belkaoui, 2004; McGuire et al., 1988 and 1990; Toms, 2002); company environmental disclosures (e.g. Belkaoui, 1976; Freedman and Patten, 2004; Murray et al., 2006); and the badge of SRI indices memberships (e.g. Cheung, 2011; Curran and Morran, 2007; Robinson et al., 2011). This variation gives rise to what exactly do these measures represent. That is, what, if anything, do markets react to, i.e. what form of environmental accounting, if any, do they use as their source of information? That is, if it is actual environmental performance, then it can be said that this is a rational link either based on the conventional perspective or ethical/moral motives, but if it is reputation then it needs to be interpreted with care whether it is consistent with performance or not. If not, there is an argument that the market is being irrational and it needs to look at what reputation is for. Similarly, with the badge of SRI indices, if linked with performance, then this may be a quick way of conveying a great deal of information and further, giving a good signal of corporate sustainability leadership and thus enhancing a firm's reputation (Cho et al., 2012; Robinson et al., 2011). Conversely, if performance and badge are not related then it might be also argued that the market is being irrational. Regarding these matters, much less attention has been directed in the form of comprehensive research, with one exception being Cho et al. (2012), who argued that perceived corporate reputation is not always followed by actual corporate performance. Hence, one of the main aims in this thesis is to identify which measure(s) of environmental performance, if any, is/are relevant in contributing to a firm's value and to elicit which measure(s), if any, investors rely upon in their investment decision-making.

1.2. Aims and Objectives

The proposed research focuses on environmental issues and aims to investigate the fundamental point of whether corporate environmental performance information can be considered as an aspect of a firm's value, in terms of equity performance. Further, there is the aim of discovering the extent to which, if at all, various measures of a company's environmental performance individually and collectively impact upon firm value. From the perspective of traditional accounting, there is still ongoing debate as whether it can enhance firm value or not, because it is still carried out on a voluntary basis and as a result, there is neither universal recognition nor a universal definition (e.g. Gary et al, 1995). For example, it cannot be concluded that strong environmental performance leads to strong firm value, because it has not been clearly elicited whether environmental performance is associated with other universal financial measures, such as earnings and dividends and hence, feed through to firms' stock prices. In this respect, the information from various sources essential for making investment decisions and hence, another goal is to elicit whether investors take into account information regarding a firm's environmental performance in their investment decision-making. By fulfilling these aims, this thesis contributes to the field by providing new insights into the perceptions regarding environmental performance information by outside investors as well as delivering useful guidelines for managers and policy makers in relation to how to manage their environmental reporting.

More specifically, this thesis is driven by the need to address the following research questions:

Question 1: What effect do various measures of environmental performance have on investor decisions?

Question 2: Which measure is of greatest relevance in this process?

Question 3: Are there differences between SRI-styled and other funds in terms of the environmental performance of companies represented in their portfolios?

In order to address these questions, the following objectives are pursued.

1) To identify emerging themes and gaps in the extant theoretical and empirical studies;
2) To develop a conceptual framework which takes into account an investor's preference in relation to environmental performance when making investment decisions;
3) To conduct empirical research to test the conceptual framework and propositions using an appropriate research design. More specifically, the empirical research comprises three studies investigating the relationships respectively between:

   i. corporate social responsibility (CSR) reputation and equity performance,
   ii. socially responsible investment (SRI) index membership and equity performance,
   iii. CSR ratings and share selection in SRI versus non-SRI funds,
   whilst in each case controlling for other environmentally related factors;
4) To assess whether the findings provide support for the conceptual framework.

1.3. An overview of the thesis

The study consists eight chapters, including the introduction. Having presented the aim of the study with main research questions here, chapter 2 provides discussion on the definitions of CSR and a review of the extant studies on the relationship between corporate environmental performance and equity performance. In addition, the theories underpinning the empirical approaches in prior relevant studies are reviewed and the results of these are highlighted so as to indicate what relation between environmental performance and firm performance might be expected in this research. Drawing on the findings of the CSR literature, focusing on the corporate environmental performance, in chapter 3 a conceptual framework is devised regarding investors' decisions in relation to environmental performance. Finally, in this chapter the propositions for the subsequent development of hypotheses to be tested in the empirical studies are put forward and the proxies used for environmental performance in each of the subsequent empirical studies are described in detail.

For the three empirical studies (chapters 4, 5, and 6) a variety of datasets and econometric techniques are used to assess the relation between equity performance and corporate environmental performance:

- Chapter 4 explores corporate environmental reputation, environmental disclosure and pollution performance impacts on firms' equity performance through the development of a model for testing the relationship between share returns and environmental performance, which is an extension of the earnings-returns model used by Belkaoui (2004). In addition, the valuation model developed in Ohlson (1995) who showed how firm value is related accounting data and other information is employed to investigate whether or not environmental performance, as other information, is value relevant.

- In chapter 5 there is an event-study for testing the value relevance of non-financial information. The aim here is to determine whether or not DJSI World and FTSE4Good Global Index membership conveys information that is relevant to the investment community. More specifically, the event investigated is the announcement of addition to or deletion from the DJSI World from 2000 to 2007 or the FTSE4Good Global Index from 2002 to 2007. Further, whether membership of such indices can enhance firm value is probed by using Ohlson's (1995) model.

- Chapter 6 explores whether the level of CSR ratings positively influences the equity holdings decision by SRI funds more than for non-SRI ones, using Lipper's data on portfolio holdings for the years 2006 and 2007.

Chapter 7 provides discussion on the main findings from the hypotheses tested in the empirical studies. The final chapter, chapter 8, contains a synthesis of the findings, which involves drawing on the review of the literature, the key elements of the conceptual framework as well as important empirical outcomes. Further, future research avenues in this area are proposed and the major implications for academics, policy makers and managers outlined.

Overall, in this chapter, the importance of the case for improved accuracy in the measurement of environmental performance has been put forward. That is, it is posited that if a range of measures

is tested to assess their impact on equity performance, this could provide useful insights for managers and policy makers, because they would have greater knowledge on how investment decisions are influenced by CSR/environmental reporting. The next chapter provides a comprehensive literature review of extant scholarly research into the relationship between corporate environmental performance and equity performance.

Chapter 2

Chapter 2. Literature Review

2.1 Introduction

Research interest in social responsibility matters in business started to grow in the 1970s, when a number of empirical studies were carried out to investigate whether these have an impact on firm profitability (Carroll, 1999). It could be that it was Milton Friedman (1970) who galvanised this debate by claiming there was a link between CSR and firm performance and which led to a proliferation of papers in a variety of management and business journals supporting or refuting this position. However, despite all this scholarship no hard and fast conclusions have been arrived at. In general, what is evident is that there are no comprehensively agreed uniform measurements of CSR (Ilinitch et al., 1998; Margolis and Walsh, 2003) and further, no robustness of consistent positive findings between the two, although they seemed to indicate that CSR has a positive influence on firm performance (Orlitzky et al., 2003). In fact, it cannot be emphasized enough that the results of any analysis setting out to evaluate the impact on firm profitability of compliance with CSR depend crucially on how well chosen are the CSR measures used to capture its various facets.

In this chapter, there is an overview of all of the extant research that is relevant for informing three empirical studies: the first uses various proxies as measures of CSR to examine the association between it and equity performance; the second is an a event study on the announcement of SRI index membership status; and the third uses a portfolio ownership holdings dataset to investigate whether the decisions made by SRI and non-SRI fund managers differ, because of former's dependence on CSR.

The aims of this chapter are:

- To chart a comprehensive landscape of the relevant literature;
- To present a cohesive overview of the extant studies and their results;
- To discuss the reasons why any relationship should be expected based on the theoretical approach in extant previous studies;

- To develop a research agenda for this thesis by identifying existing gaps in this field.

This chapter is structured as follows. After considering the definition of corporate social responsibility (section 2.2), the following section (section 2.3) contains analysis of the existing literature regarding the relationship between CSR and firm value. Subsequently, the literature concerning how CSR might influence the investment decision making in relation to empirical research and the possible theoretical approaches are discussed in section 2.4 and 2.5, respectively. Section 2.6 identifies the remaining issues in literature, which are pursued in the theoretical development and research design discussed in the subsequent chapter.

2.2. Definitions of Corporate Social Responsibility (CSR)

Shareholder values (returns), in terms of profits and dividends, used to be considered as the key drivers of all corporate activities. In this respect, perhaps best known is Milton Friedman's (1970) CSR definition, published in a 1970 *New York Time Magazine* article, stating that the responsibility of firms is "to conduct the business in accordance with their desires, which generally will be to make as much as money as possible while conforming to the basic rules of the society, both those embodied in law and those embodied in ethical custom." In other words, under this perspective the only legitimate function of business is to maximise profits, which implicitly maximises shareholder value in financial terms, whilst complying with legal and ethical norms. It has caused researchers in the area of the CSR to respond by seeking to prove that this view is too narrow regarding the relationship between business and society.

Owing to CSR being multifaceted (Cochran, 2007), it has evolved in a number of different ways, depending on the researchers' orientation towards the business environment and their attitudes towards environmental factors, such as: economic, legal, and ethical considerations. For example, Shocker and Sethi (1973) considered that a "social contract" is a core element of CSR in order for a company to survive and grow. That is, a firm has to operate according to guidelines that are set by society and these authors defined CSR as "consideration by the corporation of the interests of groups other than those with direct economic ties to the firm" (1973, p98), thereby specifically referring to groups that are able to press companies to change their behaviour. Later, Sethi (1975)

redefined it as "bringing corporate behavior up to a level where it is congruent with the prevailing norms, values and expectations of performance" (1975, p62). Moreover, he contended that it is "prescriptive in nature", in that companies usually conform to prevailing social norms even before the new social expectations are legally required and as such, can be linked to organizational legitimacy (Dowling and Pfeffer, 1975). Further, McWilliams and Siegel (2001) characterized CSR as "actions that appear to further some social good, beyond the interests of the firm and that which is required by law" (p.117), where this refers to going beyond legal requirements by adopting activities, such as: progressive human resource management programmes, developing non-animal testing procedures, recycling, abating pollution and supporting local business. From this perspective, obeying the law is not a sufficient condition to be considered a socially responsible company.

In order to address comprehensively the obligations of business to society, Carroll (1979) identified four hierarchical categories ranging upwards through: economic, legal, ethical and discretionary responsibility. Economic responsibility refers to companies producing goods and services that society wants and selling them at a profit and these activities should be congruent with the prevailing legal requirements, i.e. these are the legal responsibilities. Ethical responsibilities are societal expectations that go beyond the legal requirements companies have to comply with. Regarding the last, discretionary responsibility is probably the most difficult to conceptualize amongst them and may be analogous with the concept of voluntary participation, coined by McWilliams and Siegel (2001) when considering CSR. In general, based on a study on the development of CSR definitions during the 1950s to 1990s period, Carroll (1999) found that its definitions expanded during 1960s and proliferated as well as becoming more specific in the 1970s. However, in the 1980s and 1990s, more refined conceptualisations emerged that were focused on the measurements of CSR and empirical research regarding whether it has a relationship with firm performance.

Overall, the scope of CSR remains conceptually quite unbounded, with there being no single commonly accepted definition and no general agreement on its main components. Further in relation to this, some contemporary authors on CSR have noticeably broadened this out to include the fields of: business, economics, law, the environment, different stakeholders,

voluntary participation, and society as a whole (e.g. Dahlsrud, 2008; Raynard and Forstater, 2002). In fact, with regards to their definition of CSR, the Commission of the European Communities has included all of the above dimensions, that is, CSR is defined as "a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis" (2001, p.6) and this perspective has been widely adopted and implemented by other interested researchers (Dahlsrud, 2008). Given its popularity in prior scholarship, this is the definition of CSR adopted in this thesis and within this broader definition it is accepted that CSR is a tool beyond the creating of economic value, which includes social and environmental aspects of the interaction between companies and their stakeholders. Moreover, it is voluntary, going beyond legal requirements as well as being multi-dimensional. That is, under this lens companies should take the interests of multiple stakeholders (e.g. NGO, government, investors), the environment and society at large into account as well as being economic sustainable when choosing to go beyond what is legally expected.

2.3 CSR and firm value

In this section, so as to provide more insight and understanding of the influence CSR on the investment decision, the previous studies on this issue are reviewed, including those in other literature reviews. Although there is a significant body of empirical analysis on the influence of CSR on financial performance (Griffin and Mahon, 1997; Orlitzky et al., 2003), most studies have not set out to identify this performance in terms of a financial measure as well as equity performance. Regarding this, recall that *firm performance* has been defined as financial performance using financial results of business outcomes and equity performance determined by share price movements (i.e. stock returns). The concern of this research lies in the impact of CSR on equity performance, which unlike the financial results that can be easily internalised, is subject to a number of subjective considerations on the part of the investors. Having said this, an outline analysis of previous studies regarding the association between CSR that have focused on the corporate environmental performance and firm performance in terms of financial performance and equity performance is presented in Appendix I. This section contains discussion on the definition of value relevance and studies regarding CSR that have focussed on

corporate environmental performance information and its relation with the market values of firms.

The concept of CSR has been, as shown above, complicated and further, has been broadened to include not only the environment (which is focused upon in this thesis), but also: the protection of human rights, the provision of community support, the maintenance of product safety standards, the improvement of employee welfare and the protection of minority interests, amongst other matters. From the European Community's point of view, it is essentially about companies presenting their CSR practices to their stakeholders voluntarily within their business operations. However, how to measure CSR has not been standardised and further, whether or not it is value relevant to investors has yet to be conclusively ascertained. Moreover, because how companies interpret CSR varies substantially across businesses, it is hard to elicit whether the non-financial CSR information has value relevance. If such information is able to predict or drive at least some portion of financial information, then this will indicate that it is value relevant to investors. In other words, if it is internalized in terms of financial information, such as a firm's: assets, liabilities, or earnings, investors can be seen to assess the value of CSR information. Most of the existing studies have investigated whether CSR impacts on stakeholder values by concentrating on the CSR influence on an improvement in the firm's operating (financial) performance and whether, in turn, this can have an impact on share price, with little attention being paid to whether non-financial CSR information is value relevant, i.e. influences share price.

In the context of value relevance, Francis and Schipper (1999) proposed four possible interpretations of the construction of value relevance as follows (p. 325-326):

- Interpretation 1: financial statement information leads stock prices by capturing intrinsic share values towards which stock prices drift. Then value relevance would be measured as the profits generated from implementing accounting-based trading rules.
- Interpretation 2: financial information is value relevant if it contains the variables used in a valuation model or assists in predicting those variables. Thus, the value relevance of earnings for a discounted dividend valuation model, or a discounted cash flow valuation model, or a discounted residual income model, might be measured by the ability of

earnings to predict: future dividends, future cash flows, future earnings, or future book values.

Interpretations 3 and 4 are based on value relevance as indicated by the statistical association between financial information and prices and returns.

- Interpretation 3: the statistical association measures whether investors actually use the information about changing prices and in this case value relevance would be measured by the ability of financial statements information to change the total mix of information in the market place. This interpretation implies that value relevance is measured in terms of "news", whereby value relevant information changes stock prices because it causes investors to revise their expectations.
- Interpretation 4: value relevance is measured by the ability of financial statement information to capture or summarize information, regardless of source, that affects share values. This interpretation does not require that financial statements are the earliest source of information. It is consistent with the value relevance of financial reports stemming from either the content of the financial statements themselves or a settling-up role, in which the audited financial statements discipline other, more timely information disclosures, such as management earning forecasts.

Further, as pointed out by Barth et al. (2001), such information might be considered as value relevant information, if investors can summarize or aggregate information available from other sources when valuing a firm, even though it may not be "new" to the market. A number of studies have probed into identifying the value relevance of CSR information (Black, et al., 2000; Clarkson et al., 2004; Hassel, et al., 2005; Hughes II, 2000). For example, Hughes II (2000) found that non-financial pollution measures, such as superfund sites and the emissions rate are negatively related to firm value for high polluting utility industries, but not for their counterparts. It also emerged that this non-financial information is negatively and significantly related to a high polluting firm's share prices, but not for the rest. Their findings were the same as those from research by Jaggi and Freedman (1992), which was based on market-based valuation. Clarkson et al. (2004) examined the pulp and paper industry using environmental capital expenditures as the other information variable and they elicited that low polluting firms that have

low environmental impact and low levels of prosecution enjoy incremental benefits associated with environmental investments.

More recently, Hassel et al. (2005) have claimed that the environmental performance ratings are informative for listed Swedish companies, being negatively related to the market value of firms. Even though three of these previous studies (Clarkson et al., 2004; Hassel et al., 2005; Hughs II, 2000) found that environmental performance is value relevant and negatively associated with a firm's market value, their investigations were only conducted on polluting industries in one domestic market. Another relevance variable, firm reputation, was employed in a work by Black et al. (2000), in which they stated that non-financial information, as measured by the Fortune reputation score, is incrementally value relevant to the firm even after controlling for the financial halo effect (i.e. the reputation is highly positively correlated to a firms' financial performance).

2.4 CSR and investment decision - empirical analysis

This section considers CSR, focusing on environmental performance, and stock market performance in terms of: the evidence at the firm-level regarding the relationship between CSR and equity performance; the evidence at the firm-level relating to the assessment of market reaction to the membership of SRI indices; and the evidence at the fund-level concerning the different performance between SRI funds and non-SRI ones.

CSR and its relationship to equity performance

Several scholars have elicited that there is a positive market reaction to disclosures of high environmental performance by corporations. For instance, Belkaoui (1976), Ingram (1978), and Jaggi and Freedman (1982) examined market reaction to CSR disclosure by comparing pollution disclosures with non-pollution disclosures and found both that the information is useful to investors and that the market reacts positively to such disclosures. Although Jaggi and Freedman (1982) did not use annual report announcement month as an event day, which was employed in Belkaoui's (1976) study, their findings were consistent with the latter's results, thus indicating that investors react positively to the disclosure of pollution abatement information from polluting

firms. However, in another study by Freedman and Jaggi's (1986) their results indicated that the investors' reaction was not affected by the depth of company disclosures and this could be interpreted to mean that they just want to know whether a firm has disclosed information on pollution or not, rather than in how much detail. Another point is that Freedman and Jaggi's (1986) disclosure score was weighted by pollution information and this may be an insufficient indicator of environmental performance.

Similarly, Murray et al. (2006) found that annual company returns and social and environmental disclosure, measured by the number of pages, did not have any direct relationship with each other after testing such disclosures for the UK's top 100 companies over nine years. One possible limitation from using this measure is that a firm may provide many pages, regardless of its written content and quality in their reporting, so as to look good in the eyes of the investor. In relation to this, Unerman (2000) suggested that measuring the number of sentences might be more accurate than measuring the number of pages, because the former may be more reliable owing to there being less risk of measurement error than for the latter as page content is not always in text form. However, when adopting such a numerical approach there is always a trade off between the quantity and quality of the disclosed data.

Moreover, a number of studies using independent environmental information, such as CEP, the first public information available on environmental performance, founded in 1969, have been carried out (Shane and Spicer, 1983; Spicer, 1978a and 1978b; Stevens, 1984), but an overview shows that they having been very much focused on highly polluting industries (the paper, power, steel, and oil industries). For example, Spicer (1978a), with a sample of pulp and paper firms, found the pollution control information from 1968 to 1973 was not associated with market risk. However, when controlling for accounting measures, he showed that the market risks are significantly associated with pollution control records. Further, in another study (1978b), the same author found that companies with better pollution control records tend to have higher profitability, larger asset size, lower total risk, lower system risk, and a higher P/E ratio, than ones with poor records. However, Chen and Metcalf (1980) rebutted Spicer's (1978b) results, claiming that the relationship between pollution control records and financial performance exists only when firm size is controlled. Furthermore, Shane and Spicer (1983) set out to investigate

the information content of social disclosures by conducting an event study using the date of release of pollution expenditure information by CEP as the event to be investigated and found that negative abnormal returns were evident on the two days prior to the information release. Further, they elicited that companies with low pollution control performance rankings experienced significantly more negative returns than those with high rankings. Steve (1984) supported this position that the information released by CEP is useful to investors.

Unlike CEP, the TRI, the first regulatory requirement instigated by the Environmental Protection Agency (EPA), regarding the disclosure of a firm's pollution data, is evidence of the growing social interest in companies' environmental performance. In this context, Hamilton (1995) and Konar and Cohen (1997) looked at the market reaction to the release of TRI reports and found it to be negative. However, other studies that have employed CEP or TRI as a proxy for environmental performance showed evidence that a better pollution control record tends to result in higher financial performance.

Using different measures, Mahapatra (1984) investigated the association of pollution control expenditures as a CSR activity with systematic risk and profitability, over the period 1967 to 1978, for six polluting industries targeted by the Environmental Policy Act (1979) and found that companies' pollution control expenditures did not lead to higher market returns, i.e. they did not reward the companies with greater profitability. Jaggi and Freedman (1992) employed control of water pollutants as an example of pollution performance and elicited that between 1975 and 1980 market performance was negatively associated with the former. This result is different to Spicer's (1978b) empirical findings for the same industry, to obtain which he examined a different time period (1968-1973) and used different measurements (the CEP pollution index). The reason for this variation may be that investors are only interested in a company's general environmental performance, rather than the details. However, both these studies can be criticized for their small sample sizes: 18 companies in the Spicer study and 13 in that of Jaggi and Freedman.

Corporations with a good reputation can increase their market value and have advantages over their competitors, if the market values respond positively to reputation. However, this is not easy

to measure because it relies on the evaluators' perceptions. In addition, it can be greatly influenced by the company's: size, age, access to mass media, and name changing caused by mergers, amongst other reasons (Abbott and Monsen, 1979). Since Moskowitz (1972) developed the first reputation index, some researchers have employed it for testing for the relationship between CSR reputation and equity performance (Abbott and Monsen, 1979; Alexander and Buchholz, 1978; Cochran and Wood, 1984; Vance, 1975). However, the studies that did so elicited inconsistent results between a firm's equity performance and the level of reputation. For example, after Moskowitz (1972) found the positive results, Vance (1975) refuted these, arguing that companies with a higher rank of reputation experience lower stock market performance. However, when Alexander and Buchholz (1978) re-examined Vance (1975) and Moskowitz's (1972) work and corrected their deficiencies (e.g. short period times and no use of adjusted risk), for 1970 to 1974 and 1971 to 1973, their results indicated there was no relationship between them. Additionally, Abbott and Monsen (1979) questioned Vance's testing period and outcome, because of the stock market collapse in 1974 and the fact that he reported regression coefficients rather than correlation coefficients. Consequently, scholars called for new more reliable measures of CSR that substantially reduced the levels of subjectivity involved (Cochran and Wood, 1984).

As corporate reputation has been surveyed by Fortune magazine annually since 1982, researchers have easily been able to obtain consistent and comparable data over an extended period (McGuire et al., 1988). Regarding this, Szwajkowski and Figlewicz (1999) pointed out that it is hardly surprising that researchers quickly adapted to the Fortune reputation rankings as measures of CSR, when one considers the previous measures available and in fact, they have triggered substantial research into the impact of CSR reputation on a company's equity performance (Belkaoui, 2004; Herremans et al., 1993). Herremans et al. (1993) showed that abnormal returns with better and poor companies' CSR reputation in higher polluted industries do significantly differ from one another, whereas these results do not hold for lower polluted industries. From a different angle, using the same measure of CSR, Belkaoui (2004) reported that the information of earnings in determining stock returns is monotonically and significantly related to CSR reputation, as provided by Fortune. Such a finding is consistent with the evidence reported by Hussainey and Salama (2010), who found that firms with higher levels of reputation scores

provided by Management Today, exhibit higher levels of share price anticipation of earnings than those with lower ones.

SRI index Membership

SRI indices have been receiving increasing attention within investment communities. Regarding these, following the Domini 400 social index, launched in 1990 by KLD and the first SRI index (Fowler and Hope, 2007), several indices have emerged for listing companies according to environmentally and socially responsible investing criteria, such as the DJSI in 1999, FTSE4Good index in 2001, and the Calvert social index in 2000. However, the history of such indices as proxy measures for CSR is relatively shorter than that for the others described above.

The performance of SRI indices has been studied by some researchers, such as: the Domini 400 social index by Statman (2000) and Sauer (1997), the DJSI by Lopez et al. (2007), and the FTSE4Good by Collison et al. (2008). Further, Schroder (2007) analyzed comprehensively the performance of 29 SRI indices with conventional benchmark indices. The research into the Domini 400 index revealed that there was no difference in performance with a benchmark index (e.g. S&P 500). Lopez et al. (2007) compared a sample of DJSI verses non-DJSI European firms for the period from 1998 to 2004, inclusive and found that there were significant differences in performance between firms belonging to the DJSI and those not. Moreover, it emerged that the firms on the DJSI are negatively associated with accounting-based performance and the authors suggested from these results that being included in an SRI index may involve costs or reallocation of resources that affects a firm's performance. Collison et al. (2008) compared financial performance between the FTSE4Good index series and their benchmarks (e.g. FTSE All Share index) over a nine-year period from 1996 to 2005 and found that the FTSE4Good indices outperformed the benchmarks, concluding that most of the superior performance for the indices was because of risk reduction. Finally, Schroder (2007) reported that most SRI indices did not exhibit risk-adjusted returns significantly different from the benchmarks, but many of them have a higher β-coefficient.

Furthermore, market reaction to SRI index announcement of inclusions and exclusions has been investigated by several scholars, such as: the DJSI by Cheung (2011) and Robinson et al. (2011),

the DJSSI (Dow Jones Sustainability Stoxx Index) by Consolandi et al. (2009), the FTSE4Good by Curran and Moran (2007), and the Calvert social index by Doh et al. (2010). Cheung (2011) and Robinson et al. (2011) studied the impact on US or North America firms of being included in or excluded from the DJSI World index over the period from 2002 to 2008 and from 2003 to 2007, respectively. They elicited similar results that there is no significant impact on stock return on the announcement day. However, on the day of exchange, i.e. the day that the index came into effect, Cheung found evidence that firms being included to (excluded from) the DJSI experienced a temporary, but significant, increase (decrease) in stock return. In contrast, Robinson et al. (2011) showed that inclusion stocks experienced a sustained increase in stock return following the index change. Further, both studies provided evidence that there is a temporary decrease in stock return when firms are removed from the DJSI. Consolandi et al. (2008) studied whether inclusion in, or deletion from, the DJSSI, an index for European corporations, results in a market reaction and found that there is no significant impact on the day of announcement or the date of index revision. However, the results did show that companies experience a significant and positive excess return of 0.03% after it is announced that they have been added to the DJSSI.

Curran and Moran (2007) examined whether being added to or deleted from the FTSE4Good UK50 index resulted in a significant impact on share price changes from 2001 to 2002. They found that inclusions on this index lead to positive share price change and exclusions lead to the converse, but the results were not statistically significant. Finally, Doh et al. (2010) examined market reaction to the inclusion in or deletion from the Calvert social index and found that the abnormal returns for additions are not statistically different from zero, but the abnormal returns on a day after announcement for deletions are negative and significant at the 5% level. They considered this difference to be an imbalance in information availability between companies that were about to be added and those that were about to be deleted. That is, firms being added to the index would be likely to publish this news for stakeholders, whereas firms being deleted from index would tend to suppress or not publicize this news. In general, these studies have provided inconclusive evidence after testing a restricted market or for a short time period. In this context, Fowler and Hope (2007) have pointed to the limited research into the impact of SRI indices, even though there has been an increase in interest in such indices from companies and investors.

In sum, the existing studies that have examined the association between the proxies of CSR and equity performance have been dominated by the question of whether the CSR can be integrated into the objective function of the profit maximizing firm. However, the answer to this has yet to be inconclusively established, in particular, because it would appear that the existence of preferences beyond those of the classical perspectives may be involved and as yet, no clear evidence on what these are has been determined. The following subsections address these matters in detail.

The performance of socially responsible investing

Since more and more investors are integrating social and environmental criteria into their investment decisions, much literature has been generated to document the performance of Socially Responsible Investment (SRI) funds (Kreander et al., 2005). Regarding this, by comparing historical returns of SRI funds and non-SRI funds, the empirical link between socially responsible practices and financial performance has been investigated. Previous research has shown that SRI funds, on average, perform similarly to non-SRI ones (for more details see Appendix II). For instance, by testing the excess returns, calculated by using Jensen's alpha, Hamilton et al. (1993) investigated the performance of 32 SRI funds and 320 randomly selected non-SRI funds from 1981 to 1990. They found that the mean monthly excess return for 17 SRI funds established before 1985 was higher (-0.063%) than those of the corresponding 170 non-SRI funds (-0.140%). Further, they showed that the mean monthly excess return for the 15 SRI funds established after 1985 was lower (-0.277%) than those of the corresponding 150 non-SRI funds (0.480%). However, the differences in the performance of SRI funds and non-SRI ones were not statistically significant.

Statman (2000) investigated the performance of 31 SRI and 62 non-SRI funds, matched by similar fund size, in the US, for the period from 1990 to 1998. He showed that the mean annual excess return, calculated by Jensen's alpha, of SRI funds was higher (-5.02%) than those of the non-SRI type (-7.45%), but the difference in performance between the two was not statistically significant. Consistent with previous studies, Bauer et al. (2007) reported that the difference in mean excess return was not significant between 8 Canadian SRI funds and 267 of their

conventional peers, for the period from 1994 to 2002. This evidence probably needs to be interpreted cautiously, because the treatment did not involve matching SRI funds and the non-SRI in pairs so as to control for the effect of specific characteristics, which may be endemic in SRI fund portfolios (Mallin et al., 1995) such as: fund size, start date, or geographical investment area. That is, the findings of this study are possibly misleading because the authors failed to ensure that similar entities were being compared.

Similarly, Mallin et al. (1995) compared the performance of 29 UK SRI funds to those of 29 non-SRI funds, for the period from 1986 to 1993. The performance of funds was measured by the risk-adjusted Sharpe, Treynor, and Jensen's alpha. It was found that the Jensen's alphas of SRI funds, which ranged from -0.28% to 1.21%, were not significantly different from those of non-SRI funds, which were spread between -0.41% and 1.56%, whilst the performance of the SRI funds slightly outperformed those of non-SRI ones. Further, they reported that the performances of SRI funds and non-SRI ones seem to underperform the market benchmark: the Financial Times All Share Actuaries Index. Using a similar matched pair approach on the basis of fund age, size, and investment universe, with the same performance measures, Kreander et al. (2005) carried out an extensive study of the European fund market over the period 1995 to 2001and found similar results to those of Mallin et al. (1995).

Further, the results of these authors (Kreander et al., 2005; Mallin et al., 1995) affirmed that both funds underperformed the benchmarks, i.e. the Financial Times All share index and the Financial Times World index. Gregory et al. (1997) also found that the SRI funds, on average, did not perform significantly differently to the non-SRI ones, when they controlled for: the type of funds, ages, the area of investment, and size. A recent paper by Benson et al. (2006) comprehensively analysed the portfolio allocation across industries and the results confirmed the findings of previous studies, in which the performance of SRI funds was found to be not significantly different from the performance of non-SRI ones. Further, the portfolio analysis showed that those of SRI were different to those of their conventional counterparts. However, Brammer et al. (2006) criticized these previous studies for confusing fund manager performance with firm performance regarding CSR, further pointing out that it is probably that SRI fund managers are

poor stock pickers or that the transaction cost of SRI funds may be higher than conventional funds, rather than socially responsible companies yielding lower stock performance.

In general, it emerges that the performance of SRI funds is weakly better than non-SRI ones, but the difference is not significantly different from zero. Next, the question arises as to whether the portfolio holdings for SRI funds are different from those for non-SRI funds. However, few empirical studies have attempted to find the difference between the two funds' portfolios at a given level of CSR performance. The evidence regarding this has not been clearly elicited, yet and it only shows that institutional investors, on aggregate, prefer to invest in companies with higher levels of CSR. Further, their investment decision regarding CSR information has been found to be more reliant on the quantitative rather than the narrative information. Regarding this, Teoh and Shiu (1990) surveyed Australian institutions about their attitudes towards SRI and found that institutions used CSR information for investment decisions, if it was presented in relation to quantified, specific issues, rather than as SRI information disclosed in a company's annual report. Similarly, Coffey and Fryxell (1991) examined the relationship between institutional ownership and the aspects of CSR, using Fortune 500 firms over a single period and found an inconsistent relationship: a positive relationship with the number of women on the board of directors; a negative relationship with the Sullivan principle; and no relationship with charitable contributions. Nevertheless, it remains unclear from the results of these two earlier studies as to whether there is a definite relationship between ownership holdings and the level of CSR.

2.5 CSR and Investment decisions – Theoretical approaches

Scholars have adopted various theoretical stances when investigating whether CSR has an influence on firm performance and in this section, these, as aforementioned in the previous section and others shown Appendix I and II, are discussed. The most popular of these theories are the stakeholder theory and/or legitimacy theory as they indicate that CSR is expected to increase firm performance. Moreover, these theories overlap, because a company needs to be considered as part of a broad social system, upon which it has an impact (Deegan, 2002). As

such, most studies would appear to indicate that there is a positive relationship, albeit somewhat weak, between CSR and firm performance. Regarding this, Pava and Krausz (1996) observed that among 21 empirical papers they reviewed that were published between 1972 and 1992, 12 verified that a positive relationship exists. A more extensive study conducted by Orlitzkey et al. (2003) also reported the existence of a positive association between CSR and firm performance, which involved a meta-analysis of the 52 studies from 1976 to 1997.

Stakeholder theory, originally known as stockholder theory, has focused on the fiduciary responsibility of managers to shareholders (Hasnas, 1998). Friedman's (1970) comment regarding the social responsibility of business is probably the best phrase from this perspective and further, Jensen (2002) developed this point by arguing that managerial fiduciary responsibility enhanced by the fact that maximisation of the interest of different stakeholders is much more complex than the simple profit maximizing behaviour. Hence, to overcome this conflict, he postulated a new concept *enlightened value maximization* that "utilizes of the long-run value of the firm as the criterion for making the requisite tradeoffs among its stakeholders" (p.235). Further, from the modern stakeholder theory perspective, a number of studies have asserted that companies should meet the demands of a broader range of stakeholders, not just shareholders (e.g. Cornell and Shapiro, 1987; Wood and Jones, 1995), which includes groups and/or individuals who can have an impact on the achievement of an organization's objectives, or who are affected by it (Freeman and Reed, 1983). Broadly speaking, the stakeholder can cover many people or organizations (e.g. consumers, investors, and employees, and community) and even society as a whole. According to one of aspect of this lens, proponents of normative (or ethical) stakeholder theory assert that organizations have a social responsibility to uphold the interest of all stakeholders (Hasnas, 1998). From this perspective, their expectations in relation to CSR may be different depending on which group they belong to and further, the often conflicting demands from these groups, regarding CSR, are prime levers of influence on corporate behaviour (Wood and Jones, 1995). For example, the consumer is a key stakeholder for any company and attraction and their loyalty is fundamental to any business. With growing awareness of environmental concerns, they may expect a company to produce green products and risk free products as well as having good environmental performance in its operations. In particular, this trend towards purchasing green products has been growing with increasing

climate change concerns. However, the question is whether they really care or are willing to pay a premium for the CSR products. Regarding this, one survey conducted by the Boston Consulting Group (BCG) found that more consumers purchased green products in 2008 than in 2007 and they also found that people were willing to pay a premium.

Further, Pivato et al. (2008) found that socially responsible companies are associated with a higher level of trust in them and their products, which leads to increased sales and customer loyalty. With regard to employee demands, these are often related to human resource management, such as: workplace safety, amenities, and financial security, and a catalyst for their enforcement is the unionization of the workforce as this can encourage firms to adopt CSR policies (McWilliams and Siegel, 2001). These authors pointed out the positive relationship between management and workers and further, as an outcome of employing CSR, this would result in firms being rewarded with increased employee loyalty and attractiveness to potential employees (Truban and Greening, 1997) as well as greater productivity (Mittal et al., 2008). In addition, a community group may want a company to have more proactive environmental practices and to support local services. Fair trade, building an education centre in South Africa or supporting HIV/AIDS education programmes, are good examples of such community-based activities. Consequently, it is expected that socially responsible companies will be rewarded through the increase in their market values and socially reprehensive companies will not.

Finally, from the perspective of society as a whole, the relationship between an organization and society, which often relies on the notion that societal expectations lead to the forming of a social contract between the two, has been discussed within legitimacy theory by several scholars (e.g. Deegan, 2002; Dowling and Pfeffer, 1975; Gay et al., 1995). Under this discourse, it is argued that organizations need to ensure that their operating activities are within the bounds and norms of the society in which they operate. If they breach this contract, their business will be threatened by society's enforcement it, by such means as: reduction in the demand for products by consumers, fines or by the imposition of new regulations. So as to mitigate such risks, companies have to demonstrate their understanding of society's views by providing information that is commensurate with this goal (Deegan, 2002), referred to as *organizational legitimacy*

(Dowling and Pfeffer, 1975). Dowling and Pfeffer suggested that an organization may legitimate its activities for treating legitimacy as follows (1975, p.127):

- the organization can adapt its output, goals, and method of operation to conform to prevailing definitions of legitimacy;
- The organization can attempt, through communication, to alter the definition of social legitimacy so that it conforms to the organization's present practices, output, and values;
- The organization can attempt, again through communication, to become identified with the: symbols, values, or institutions that have a strong base of social legitimacy.

Disclosures and annual reports can be used as a means of communication by companies. From a legitimacy theory perspective, a number of studies have probed companies' social and environmental disclosures practices (Deegan and Rankin, 1996; Patten, 1992) and found positive results in support of this theory. As a result, proponents of these theories have tended to believe that companies could increase equity performance with higher CSR, because under this perspective investors who have their demands satisfied, in terms of their receiving sufficient information, are considered likely to reciprocate by giving credit to companies through greater involvement with them.

Those arguing that there is a negative relationship between CSR and firm performance, whereby a higher level of CSR will lower the firm's financial performance (Aupperle et al., 1985), are thus of the opinion that these two components have a trade-off relationship. This line of thinking may be analogous with Friedman's (1970) statement and the traditional stakeholder theory (i.e. profit maximization). Further, Preston and O'Bannon (1997) proposed the possibility of this negative effect, because of a private managerial goal, referred to as the managerial opportunism hypothesis, the reasoning behind which being: "when financial performance is strong, managers may attempt to "cash in" by reducing social expenditures in order to take advantage of the opportunity to increase their short-term proven gains" (1997, p423-424).

A third perspective is that the relationship between CSR and firm performance is neutral. Adopting this stance, Waddock and Graves (1997) and Ullmann (1985) explained that because there are so many variables in the relation between the two these could be coincidental, i.e. trade

off against one another. Further, McWilliams and Siegel (2001) argued that firms that supply the demanded for CSR will not get any benefit, because of the cost of providing the CSR in the first place. Moreover, from the efficient capital market perspective, one should not be able to get profit, because the share price fully incorporates publicly available CSR information. That is, following this logic there will be no difference in performance between socially responsible and irresponsible companies. The next section provides a succinct research agenda that seeks to address these gaps in the literature.

2.6. Developing the research agenda

This section builds a research agenda from the themes that are absent from the literature on CSR, focusing on corporate environmental performance. The literatures reviewed in this chapter have done much to cast light on the role, importance, and impacts of corporate environmental performance on investment decisions. The research agenda in this thesis is aimed at addressing those issues that will lead to significant enhancement of the extant appreciation of the role and importance of CSR in investors' decision making.

The lack of consistent results is probably because of the existence of no standardized measure of CSR. As pointed out by Ilinitch et al. (1998), with growing attention being paid to corporate environmental performance, the measure used is becoming increasingly important. Furthermore, environmental/CSR reporting is produced on a voluntary basis and the disclosures have commonly depended on companies' business practice, which has led to the reliability of environmental performance measures being strongly criticised by some scholars (e.g. Clarkson et al., 2011; Ingram and Frazier, 1980; Patten, 2002; Rockness, 1985). In this context, investors and other stakeholders may have difficulty gathering accurate information when making decisions. Further, regarding inconsistent outcomes, Wood and Jones (1995) pointed to the possibility of benefiter(s) from CSR being misidentified when conducting empirical studies, as well as the need to broaden the definition of stakeholders. As a consequence, it remains unclear whether the indicators that have been utilized in the earlier studies are an appropriate way to measure CSR, because there is no consensus on what it actually is.

It can be also argued that a single CSR proxy measure presents some obvious limitations with regard to the interpretation and reliability in the previous empirical research. For example, single CSR proxy measures are frequently used in CSR literature to assess either a social, environmental or economic characteristic of a company and subsequently endeavour to link this with a firm's equity and financial performance. A major concern with this body of research is that it assumes that a single proxy, such as environmental disclosure, can assess a company's broader commitment to socially responsible activities and further, provide sufficient information for investors' decision making. This approach clearly fails to recognise the multi-faceted social, environmental or economic aspects of CSR on investors' decision- making behaviour.

In addition, the limitation associated with prior SRI studies is that the majority have sought to analyze SRI portfolio performance by employing mutual fund data, finding that there is no significantly different performance between SRI and non-SRI funds on stock returns (e.g. Bauer et al., 2007; Statman, 2000). However, this focus on these funds has been criticized by Brammer et al. (2006), who pointed out that these outcomes are reliant on the fund managers' performance rather that of the company itself. In addition, these studies have rarely differentiated the influence of CSR on decision making between SRI and non-SRI fund managers. That is, they have simply investigated whether fund managers prefer to invest in companies with high CSR performance (e.g. Coffey and Fryxell, 1991; Waddock and Graves, 1997), rather than whether there is a distinct difference in the decision making behaviour between the two different types of fund manager. Consequently, it is debatable whether this earlier research has accurately assessed the true impact of CSR on institutional investors' decision-making.

Finally, the lack of conceptualization/theory is another hindrance to objective and comprehensive CSR research. Regarding these, few have referenced those available to explain the inconsistent outcomes and further, they have often been conducted with implicit assumptions lacking clear justification. In relation to this, Ullman's (1985) comment "empirical data in search of an adequate theory" probably captures well the difficulty that scholars have faced once they have produced any results, irrespective of the relationship identified. Further on this score, as pointed out by Ullman (1985) and Aupperla et al. (1985), previous studies on CSR have been hindered by: little reference to underlying theory, inappropriate definition of key terms, short time periods

and small samples. The same holds in relation to CSR and stock market performance twenty five years later. It may be that the apparent lack of acceptance surrounding prior CSR research based on the underlying assumption grounded in theory appears to be due to the difficulty of combining financial and non-financial factors into an investment strategy. Even though a recent study conducted by Brammer et al. (2006) explicitly and comprehensively probed the relationship between CSR and the stock market through the demand side, they failed to provide clearly a conceptual link describing the relationship. Taken together, the general conclusion to be drawn from the existing studies is that investors in the equity market seem to be aware of a firm's environmental performance. However, it cannot be concluded that strong environmental performance leads to strong equity performance, because they have not clearly elicited whether the environmental performance information is associated with other financial indicators, such as earnings and dividends and hence, feed through to stock prices. In other words, it remains unclear whether investors consider corporate environmental performance as a key factor when making their investment decisions and in order to examine whether there is a strong systematic relationship between the two, what empirical data is sufficiently robust to be able come to a definitive conclusion on the matter needs to be elicited.

2.7. Chapter summary

This literature reviewed in this chapter has shed light on the debate relating to the influence of CSR by focusing on the effect of corporate environmental performance on investors' decisions, both empirically and theoretically. The evidence from the existing studies has shown that this needs further comprehensive enquiry as the results have been inconsistent. To this end, drawing on the research issues identified in this chapter, in chapter 3, the conceptual framework and research design to reinforce the foundations for this thesis are presented and justified.

CHAPTER 3

Chapter 3. Conceptual framework and research design

3.1. Introduction

Based on the research issues identified in the previous chapter, this chapter has the following aims:

- To outline and develop a conceptual framework of investor preference based on conventional economic theory;
- To formulate research questions and related propositions for empirical testing;
- To develop the analytical framework for the empirical research.

This chapter is structured as follows. First, following the introduction section 3.2 considers the motivations for investors in the decision making process, given the existence of non-financial concerns, especially regarding corporate environmental performance. Regarding this, nowadays utility measures in relation to ethical and social dimensions have been incorporated into the more traditional wealth maximisation utility-based models. In general, CSR, as discussed in chapter 2, is accepted here as relating to complex issues, such as: environmental protection, human resource management, healthy and safety at work and relations with the local community. Further among these aspects, growing public concern over issues, such as, natural resource depletion and global warming, amongst others, has led to a substantial increase in multiple stakeholder (e.g. government, shareholders, investors, NGO) awareness of corporate environmental performance, which is reflected in international agreements/regulations (e.g. the Kyoto Protocol, emissions trading schemes) (Ilinitch et al., 1998). However, despite enhanced interest in companies' environmental activities, the earlier studies, as also shown in chapter 2, have failed to provide robust evidence regarding the influence of environmental performance on stock market performance and further, which corporate environmental information should be relied on when making investment decisions, in particular, because there is no standardized measure of such performance. Regarding this, there is an overview of the various measures of environmental performance used in previous studies, with the aim of deciding which information should be tested for value relevance in this research. Following this, in section 3.3 the selected

measures of environmental performance for the conceptual model are presented and justified. Section 3.4 presents the research design and the overall methodology employed in the thesis and section 3.5 is the chapter summary.

3.2 Development of the conceptual framework

3.2.1 Conventional economic theory

In conventional economic theory, two dimensional assessments (i.e. expected return and risk) have been forged on the back of the theoretical utility models of investor behaviour within a Markowitz (1952) portfolio optimisation framework and the assumptions underpinning the capital assets pricing model (CAPM). This framework simply assumes that investors are only concerned with the dollar return and a firm's risk profile and hence, all investments are assessed with regard to risk and expected return in an attempt to maximise their utility. Within this perspective, the investor's utility function can be expressed as follows:

$$U_i = f(E_R, \sigma_R)$$

where U_i is the total utility of an investor i and E_R and σ_R are the expected return and risk (i.e. the standard deviation of the possible divergence of actual investment outcomes from expected outcomes) in terms of R which is rate of return on an investor's investment (Sharp, 1964, p.428). In sum, the metric of risk and return that is typically measured with regard to monetary measures of risk and return, whilst other non-financial forms of risk (e.g. environmental risk) and social return are ignored.

Uncertainty in economic activities makes it impossible for investors to know the value of a firm's stock in future, but they do need to have some expectation of its terminal value, which they can obtain from the current price of a firm's shares. Regarding this, the valuation requires an estimate of the present value of all expected future cash flows from owning the security, which includes the dividends and/or earnings (Gordon, 1959; Miller and Modigliant, 1961). In other words, it involves looking into an uncertain future and making an educated guess about the many factors determining future cash flows. Accordingly, because of the uncertainty in future earnings and the fact that the discount rates have to reflect the riskiness of the cash flows in the

valuation, investors who want to maximise the return at a given level of risk will diversify their investment.

Regarding the aspects of CSR operating through the conventional risk and return parameters of investment decision-making, they may spread their investments over a number of assets in order to reduce the risk. That is, the company's socially undesirable activities, which may be liable to legislative action, will increase firm risk (i.e. market risk and accounting risk) and have a negative impact on the firm's valuation. On the other hand, Richardson et al. (1999) have claimed that higher CSR companies can reduce risk and resolve uncertainty about cash flow. They posited three aspects of CSR that may be indentified in capital markets: market process effects (i.e. reducing uncertainties about a firm's profitability) by the provision of extensive information, including CSR; expected cash flow effects due to CSR projects (i.e. pollution abatement investment), due to the impact of CSR on product markets (i.e. green products), or due to anticipated regulatory costs; and discount rate effects due to the interaction between CSR and investor preference (i.e. investors are willing to trade-off return and risk) (Richardson et al., 1999, p.20-21). Further, Bowman (1973, p.33-34) stated that a corporation being associated with CSR may affect the price of its stock and thus investors return. As such, if the corporate environmental performance has been internalized by regulation or capital market, it is then expected to affect a firm's earnings prospects and stock market value (e.g. Amir and Lev, 1995; Anderson and Frankle, 1980; Belkaoui, 2004; Cormier and Magnan, 1997; Hussainey et al., 2010; Ingram, 1978; Klassen and McLaughlin, 1996). These results, in turn, make it more attractive to outside investors. That is, higher levels of CSR are subject to lower uncertainty regarding future cash flows, more predictable earnings, and lower risk for investors.

In fact, the recent few empirical studies that have focused on the impact of CSR on risk have shown that the higher a firm's CSR the lower its systematic risk (Salama et al., 2011) or firm risk (Orlitzky and Benjamin, 2001). In particular, Orlitzky and Benjamin, (2001) claimed that this was the case after conducting a meta-analysis and further, showed that high CSR appears to be most highly negatively correlated with total market risk rather than accounting risk (e.g. standard deviation of long-term ROA). Even if findings were to show that CSR is negatively related a firm's market risk, its correlation with financial return may not show, as claimed with

asset pricing models. Indeed, the evidence in the previous studies reported a different story, which is that there is an inconsistent relationship between the two (e.g. Brammer et al., 2006). Regarding this, some scholars have claimed that the conventional perspective on investor behaviour is too narrow to provide a full explanation of market behaviour, in particular, because investors do not always behave in a homogeneous way (e.g. DeBondt and Thaler, 1994; Thaler, 1999; Statman, 2005).

3.2.2 Additional preferences: ethical preference

Regarding the conventional perspective, investors are assumed to be rational in the sense that their investment decisions are driven by seeking to maximise return for any given level of risk. In other words, this perspective does not admit that other motivations can have an effect on investment decision making (Statman, 2005). However, this cannot provide a complete explanation for certain financial market phenomena and, one major area of enquiry that has challenged these classical norms is that of behavioural finance (e.g. De Bondt and Thaler, 1994; Thaler, 1999; Shiller, 2003). This area of study is founded on the assumption that real investors are not completely rational in the above sense in their market behaviour at all times, and the degree to which they behave irrationally can change over time. Moreover, they can be influenced by general market sentiment and wider prevailing economic factors. Under this lens, some scholars (e.g. De Bondt and Thaler, 1994; Thaler, 1999) have claimed that investor decision making behaviour is not homogeneous and evidence has shown that different investor segments have different preferences (Clark-Murphy and Soutar, 2005) as well as that investors use a variety of criteria when making investment decisions, rather than just a single one (Nagy and Obenberger, 1994). For example, Nagy and Obenberger (1994) found that other variables, such as the feelings for a firm's products and services, are important factors affecting investment decision-making as well as the classical wealth maximisation criteria.

Regarding this perspective, individual investors who want to invest in a socially responsible way can generally make investment in two ways: directly, by purchasing securities issued by a company known to be socially responsible or by investing in corporations for the purpose of shareholder engagement activities; and indirectly, by purchasing units in socially responsible

mutual funds, which are commonly managed by institutional (or professional) investors (Haigh and Hazelton, 2004). However, it may be difficult to distinguish the preferences and motivations for making ethical investment decisions (e.g. human rights, the environment, Fair Trade, or self-interest in material well-being) and therefore, it is hard to ascertain whether and how far they trade off their financial benefits against their ethical criteria. Notwithstanding the fact that some studies (e.g. Lewis, 2001; Lewis and Webley, 1994; Mackenzie and Lewis, 1999) have attempted to elicit what motivates individual investors to trade-off their financial returns for ethical considerations, their results have been inconclusive. Even with changing social norms, which has led to growing acknowledgement of CSR issues among investors, the bottom line is that naturally they expect remuneration from their investments, whether they are ethical or not and as a consequence many have mixed portfolios of ethical and non-ethical holdings (Lewis, 2001).

In another study it was found that investors are often willing to trade off their returns, if they have surplus funds to invest, but if they do not, they expect a reasonable return from their investments (Mackenzie and Lewis, 1999). Nevertheless, the results of all of these studies have indicated that investors' motivations are mixed and complicated and include, such as matters as: wanting to be good; self-interest; religion and contributing to society. Other researchers have elicited that investors who have moral or ethical preferences focus on non-financial information when making their investment decisions (Hudson, 2005), such as how companies have carried out their business to achieve their profits, rather than how much they have earned (Cowton, 1999).

Even though most individual investors may prefer to invest in special investment vehicles (Cowton, 2004), as witnessed by the rapid growth of SRI mutual funds/unit trusts since the 1980s (Gray et al., 1988), relatively few studies have been focused on the motivations/preference of institutional investors managed SRI funds when making investment decisions. For instance, it may be the case that most managers, as advisors of SRI funds have to consider both the clients' personal preference as well as meeting fiduciary obligations (e.g. Cowton, 1999b and 2004; Jansson and Biel, 2011; Harte et al., 1991; Rockness and Williams, 1988). Regarding this, Cowton (1999b and 2004) showed how a UK-based SRI fund found that tension between these two was hard to resolve. With respect to investment decisions and CSR, Derwall et al. (2011)

have contended that socially responsible investors may apply both value-driven and profit-seeking orientations in their investment decisions. In general, while this approach has been able to explain certain financial phenomena not explicable by such social norms alone, it still remains difficult to assess the degree of investor behaviour taking place at any one time and further, whether CSR information is value relevant or not to the decision-making process.

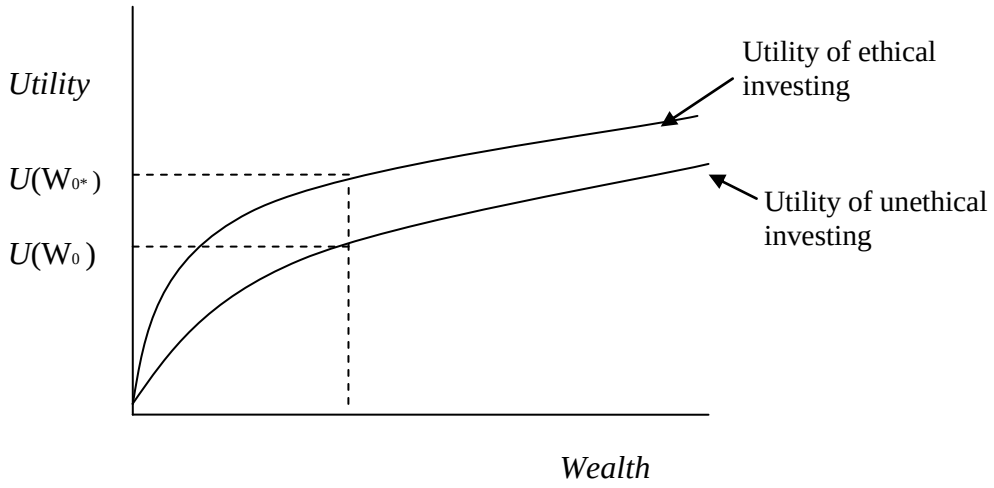
To incorporate ethical investment into the theoretical economic utility function, Beal et al. (2005) suggested three potential motivations drawn from the financial theory and ethical investment literature: for superior financial returns, for non-wealth returns from the investment, and for the contribution to social change. The last two may be depended on the degree of ethicalness of investors' investments. Further, by adopting the measure of people's well-being (e.g. happy, frustrated/annoyed, etc.) devised by Kahneman et al. (2004), these authors constructed a model of ethical investor behaviour, defining the utility of an investor's "pleasure" over the course of an investment as "the sum of the product of the investment period and the net affective experience associated with the ownership of the ethical investment" (Beal et al, 2005., p.75). Therefore, from this perspective the total utility of an investor over the investment period can be represented by summing the flow of pleasure and the conventional utility model, thus including an ethical investment element in the model, as follows:

$$U_i = f(E_R, \sigma_R) + \sum_j h_{ij}\mu_{ij}$$

where U_i is the total utility of an investor i. E_R and σ_R are the expected return and the risk of return (Sharpe, 1964, p. 428). h_{ij} is the amount of time an individual investor i invests in a particular investment j and μ_{ij} is the net affective experience of investment j in relation to the ownership of the ethical investment. The feature of an investor's pleasure in the expanded model will vary depending on their intensity of preference for ethical investment. For instance, if an investor does not take account ethical criteria (i.e. μ_{ij}=0) in the investment decision making, their total utility can be obtained in the same manner as for the function of return and risk derived from the conventional valuation model (e.g. CAPM). In other words, in this case the investor's utility will be driven by the set of his/her efficient portfolios associated with risky and risk free assets (see Sharpe, 1964). At the other extreme, if an investor is not at all concerned about their

economic wealth and only places importance on ethical criteria, then their investment decisions will be unaffected by expected return and risk (e.g. NGO activists). Beal et al. (2005, p.74) also mentioned this scenario and pointed out that the person in question would have complete control over income and budgetary constraints. However, in reality an investor is likely to be motivated by a mix of ethical and financial considerations. If an investor includes ethical preference in their investment decision, then his/her utility will be increased from undertaking ethical investment, as shown in figure 1 (Beal et al. 2005, p 73). That is, when an investor includes their ethical preference in the investment decision process, his/her utility curve shifts upwards from U (W_0) to U (W_{0*}).

Figure 1. Investor's utility function



Source: Beal et al., (2005, p73)

Regarding this perspective, Derwall et al. (2011) treated investors as profit-seekers who believe that companies with higher levels of CSR produce higher return and proposed the error-in-expectation hypothesis, which contends that high CSR companies can be expected to receive higher stock returns, because the market is slow to recognize the positive impact of such activities on companies' expected future cash flows. This idea could be justified by identified issues in chapter 2, with a number of studies investigating the relation between CSR and firm performance having reported that there is a positive, albeit often weak, association between them (see Appendix I for more details). Little work has been carried out under this particular

hypothesis, but Derwall et al., (2005) and Kempf and Osthoff (2007) implicitly applied this idea by utilizing the *best-in-class* screening approach and found that investors can enjoy a higher firm performance by incorporating this into their investment decision.

Once investors want to take into account environmental considerations as an aspect of SRI, they have to make decisions based on "information" from various sources (Cowton, 2004; Harte et al., 1991). In relation to this, CSR information can be obtained from companies' reporting (e.g. Deegan and Rankin, 1997) and/or from other sources (e.g. the media) (e.g. Chatterji and Levine, 2006). The next subsection discusses the role of information in investment decision-making and considers the alternative sources and types of information.

3.2.3 Role of environmental performance information

In conventional finance and accounting theory, financial statements and reports are primarily directed towards enabling investors to make decisions appropriate to their preferences. For example, the International Accounting Standards Board (IASB) framework (2007) stated that the objective of financial statements is "to provide information about the financial position, financial performance and cash flows of an entity that is useful to a wide range of users in making economic decisions" (paragraph 9, 2007). That is, the information generated by providers should help investors in rational decision making and it should be of a high standard so as to give effective support to their choice process (Deegan and Unerman, 2006, p.376-380). In other words, investors should be able to understand the information that is communicated by firms and further, be able to predict the future financial performance through the information provided.

Regarding this perspective, Dowling and Pfeffer (1975) stated that "communication" is an important means to reduce potential risk as well as proving that the organization understands society's norms and expectations. Companies have increasingly made the effort to provide information as part of their communications strategies, so as to ensure that stakeholders' different norms are accommodated for as best as is possible (Epstein and Freedman, 1994; Deegan, 2002). Moreover, from this perspective Gray et al. (1996, p.46) stated that information "is a major element that can be employed by the organization to manage (or manipulate) the

stakeholder in order to gain their support and approval, or to distract their opposition and disapproval." In other words, information may be a crucial factor both for the provider (e.g. a firm's manager) and for the decision makers (e.g. investors). However, according to Deegan (2002), even though the organization attempts to communicate through providing extensive information, it is not easy to identify whether its information is valued by stakeholders, that is, is it useful to investors in their decision-making? In other words, if investors only care about risk/return, does such information convey enough about the impact of CSR factors? Further, if they care about CSR for its own sake, is adequate non-financial information available to help them form a view on this?

The environmental performance information provided by companies

CSR information can be presented as financial, social and environmental reporting by companies and supplemented by a range of additional data, in such a way as to be publicly accessible to both investors and other market players. Moreover, they should provide relevant information, especially that which is useful for making the investment decision (Sprouse, 1963) and further such information is, regarding the efficient capital market perspective, expected to be fully reflected immediately in the share price and not manipulated in any way (Fama, 1970). Regarding this, Deegan and Unerman (2006, p 379) pointed out that information efficiency is important for the capital market in accounting, because share prices are deemed to be based on expectations about future earnings. That is, if a share price changes when information is released then it may imply that the information was of use to investors and could lead them to develop new expectations about the future earnings of a company. In other words, a change of price reflecting new information to investors about an event is an important signal for reallocation of their level of ownership in the capital market, which has a subsequent effect on the profitability of a company.

In this respect, if the information is presented in quantitative (i.e. financial) terms, the link to financial performance can be easily estimated (Teoh and Shiu, 1990) and if not, it should be explained clearly whether it is able to be internalized into financial performance. In this context, it was found that narrative (or non-financial) information often fails to communicate sufficiently precisely about a firm's risk and return relationship (Milne and Chan, 1999). Nevertheless, as

mentioned earlier, with the growth of interest in corporate environmental performance, alongside pressure from the public and increased statutory regulations, corporations are increasingly trying to disclose as much information as possible, with regards to their environmental performance (Epstein and Freedman, 1994).

According to Epstein and Freedman (1994), the majority of investors think companies should disclose corporate environmental information in their reporting and hence, these authors inferred from their finding that such information is useful to investors. These results would appear to support the view that investors will give credit to companies who provide more extensive voluntary environmental disclosures than those who do not (e.g. Belkaoui, 1970; Hasseldine et al., 2005). Nevertheless, how to measure a firm's environmental performance and which aspects of such performance exert the greatest/least influence on financial decision makers, are still open to debate. The main difficulties in this measurement are: that it requires the assessment of non-financial performance, which is mostly un-unified and/or narrative in format, uncertainty as to what to measure and how and the methods to be used for the aggregation of multiple types of metrics (Illinitch et al., 1998). In addition, Abbott and Monsen (1979) stated that the basic difficulties in measuring CSR are: the unavailability of detailed information on corporate social activities in quantitative terms; and the difficulty of measuring the full impact of known corporate activities on society.

Further to this, Deegan and Unerman (2006, p352-356) also highlighted the problems faced when trying to include social and environmental performance in financial accounting information, owing to: lack of financial equivalence, the materiality decisions associated with social and environmental costs, and the absence of accurate tools for measuring intangibles. Regarding this point, one study by Teoh and Shiu (1990) showed that investors would be influenced by CSR information, if it was presented in clear quantified financial terms. Thus, because of the complexity and lack of financial equivalence for non-financial performance, investors may need to be able corroborate knowledge by seeking external information prior to making an investment decision.

Regarding this context of the difficulty of assessing the information, i.e. whether it is value relevant or not, Healy and Palepu (2001) suggested that the information provided by intermediaries can help investors in their investment decision making and further it can lessen information asymmetry between firms and outsider investors. More specifically, alternative measures of environmental performance generated by formal organizations that regularly collect and distribute information about companies (Deephouse and Heugens, 2009), can take the form of: quantity/quality of information (e.g. ratings); third party representational measures (e.g. badges of CSR performance) or summary estimation (e.g. reputation). Table 1 presents the possible measures of corporate environmental performance, which can be utilized by investors when making investment decisions.

Table 1. List of proxies of corporate environmental performance

	Reporting by	
Subject	Company	Intermediary
Environmental performance	GRI	Ratings, Indices, Reputation
Reporting quality (of company)	Assurance	Ratings

The environmental performance information provided by information intermediaries

Chatterji and Levine (2006) asserted that CSR measures, including the environmental performance by information intermediaries, may help investors by supporting reliability, validity, and comparability of firms' environmental/CSR performance. This is because they can rely on the firm's environmental performance being measured regularly in the same format and being easily comparable across firms or sectors and over time. In addition, because the information intermediaries may access private data that is not publicly available or have their own methodological tools for the measuring of the environmental performance, investors who wish to use such information in decision making can save the time and cost of collecting it from disparate sources (Illinitch et al., 1998). The alternative environmental performance measures:

- quality/quantity of information,
- third-party representational measures, and
- CSR/environment reputation

are discussed below and are covered in greater detail when they are utilized in the empirical study in chapters 4 to 6. Note that these measures by information intermediaries have not been discussed separately in the CSR literature as a measure of environmental performance, but rather have been broadly categorized as CSR/environmental ratings. Thus, in the relevant literature discussed below these three identified discrete areas often overlap.

Quality/quantity of information as a measure of environmental performance

With regards to the quality/quantity of environmental performance information, investors can look at the ratings of a company's CSR performance, such as the: Accountability Rating, the Corporate Responsibility (CR) Index, or Kinder, Lydenberg, Domini Research & Analytics (KLD) rating, which are regularly measured and evaluated by organizations (or rating agencies) in terms of how responsibly companies manage their impact on the: society, environments, and the economies in which they operate. The CSR/environmental ratings give simple ordered information to investors regarding the companies' past environmental/CSR performance and their future outlook (Chatterji et al., 2009), which facilitates the decision-making process (Ilinitch et al., 1998). Research has shown that the information from CSR ratings companies most likely does support investors in their decision making (Derwall et al., 2005; Kempf and Osthoff, 2007) and that they can minimize the information asymmetry by providing them with reliable information (Chatteri and Levine, 2006; Derwall et al., 2005; Scalet and Kelly, 2010). Looking at it from a different angle, effective CSR ratings may assist managers to make better strategic decisions regarding CSR and consequently, their efforts may be rewarded with higher firm performance (Chatteri and Levine, 2006; Scalet and Kelly, 2010).

Of the very few studies that have investigated how well the CSR ratings represent corporate environmental performance, it has been observed that some (e.g. KLD ratings) provide a fairly good summary of past environmental performance and current management decisions that may affect future outcomes (Chatteri et al., 2009). Further, it has been suggested that ratings (e.g. KLD ratings) provide a transparent, reliable, and valid measure of environmental performance (Rahman and Post, 2012). The few empirical studies that have investigated the influence of CSR ratings on stock market performance seem to support the assertion that higher CSR ratings are preferred by investors and the likelihood that these ratings are a reliable measure of corporate

environmental performance (Kempf and Osthoff, 2007; Mahoney and Robert, 2007; Waddock and Graves, 1994).

The third party representational measure as environmental performance

As another alternative measure, investors may rely on the membership of SRI indices as measured by a third representational party, such as the FTS4Good indices of the Financial Times and the London Stock Exchange, the DJSI of the Dow Jones indexes and the Sustainability Asset Management (SAM) Group, or the Domini Social Index (DSI) of the KLD. Regarding these, to be included companies have to meet certain criteria, including: environment, social and financial performance measures and hence their membership has been taken as demonstrating commitment towards sustainability leadership (Robinson et al., 2011). Thus, through these indices, providing standardized measures and creating benchmarks to track performance in public, socially responsible investors can conduct SRI easier than before (White, 2005). The empirical evidence would seem to suggest that companies included in the indices experience higher returns than those excluded (e.g. Consolandi et al., 2009; Curran and Moran, 2007; Doh et al., 2010). In short, this third representational measure of SRI indices provides valuable information that supports investment decisions.

CSR/environmental reputation as a measure of environmental performance

Scholars have found defining and measuring corporate reputation, deemed an intangible asset, problematic, largely because they have only considered it within their single subject area and the fact that the measurement scales chosen have been unidimensional, which has made it hard to compare one reputation with another (see Chun, 2005 for more details). Moreover, identifying a suitable measure of reputation has been made more complex because of the move away from a single stakeholder view (e.g. investors or employees) to multiple one where reputation can be defined as "a collective representation of a firm's past actions and results that describes the firm's ability to deliver valued outcomes to multiple stakeholders" (Gradberg and Fombrun, 2002, p304). Under these circumstances, investors can gauge a firm's CSR/environmental performance either by trusting information provided by firms or through more unbiased measures taken from outside agencies (Fombrun and Shanley, 1990; Karpik and Belkaoui, 1989). Empirically, two well-known reputation ratings have been employed in relevant studies, these

being: Fortune's America's (or World's) Most Admired Companies (AMAC or WMAC) and Britain's Most Admired Companies by Management Today, which assess companies according to multiple criteria, including: social and community responsibility, financial performance and innovation. They will be discussed in further detail in the next chapter. There is evidence that has linked reputation positively with corporate environmental performance (Brammer and Pavelin, 2004; Konar and Cohen, 2001; Stanwick and Stanwick, 1998b). In particular, Konar and Cohen (2001) showed that environmental reputation is positively related to a firm's intangible assets. Further, empirical evidence has suggested that investors strongly take account of environmental/CSR reputation when making decisions (e.g. Belkaoui, 2004; Herremans et al., 1993; Hussainey and Salama, 2010).

In sum, even though environmental performance information from intermediaries supports outside investors for investment making decisions, they still might want to know about actual performance and until recently there is no clear evidence which measures of this are more value generating. That is, it is still to be elicited whether investors pay more attention to actual physical performance than representative measures or whether they weight these equally during decision making.

Deviation from investors' expectations

The evidence from the above studies has provided strong confirmation that investors believe that information related to corporate environmental performance is value relevant and that they use such information in valuing firms. However, other researchers have come up with contrasting results which have shown that these representational information measures do not represent a firms' future cash flow, and thus should not be relied on to give an accurate current valuation. For instance, studies carried out by Inglis et al. (2006) and Rose and Thomsen (2004) showed that reputation does not influence a company's future performance. Moreover, Dierkes and Antal (1985) contended that even though representational measures can provide useful information regarding the current challenges that a business faces, the investor needs to have knowledge on how the company will perform in the future. Further, Ilinitch et al. (1998) and Chatteiji and Levine (2006) asserted that investors attempting to use the data provided by information intermediaries should fully understand and cautiously interpret them by examining whether they

are measured accurately and do in fact represent investors' concerns. In sum, these results imply that it is likely that these representative measures are not powerful enough to capture comprehensively corporate environmental performance information.

From a different perspective, other scholars have elicited that investors' non-financial motivation can lead to their decision-making being diverted away from the expectations of conventional theory, in that investors have other concerns than just simple maximisation of their economic utility (e.g. Belkaoui, 1976 and 2004; Bollen, 2007; Pasewark and Riley, 2010; Stevens, 1984). For instance, Bollen (2007) probed investors' behaviours focusing on the cash inflow and outflow from SRI and non-SRI mutual funds and reported that those investing in a socially responsible manner are less sensitive to the poor performance of SRI funds than those who do not. A more recent study conducted by Pasewark and Riley (2010) revealed that investment decision-making depends on an investor's personal values. That is, in their empirical investigation, they found that investors who were concerned about the societal implications of their investment chose non-tobacco companies to invest in even though the latter experienced a 1% higher rate of return. From this, it would appear that socially responsible investors are willing to trade-off their maximized wealth for their ethical preferences.

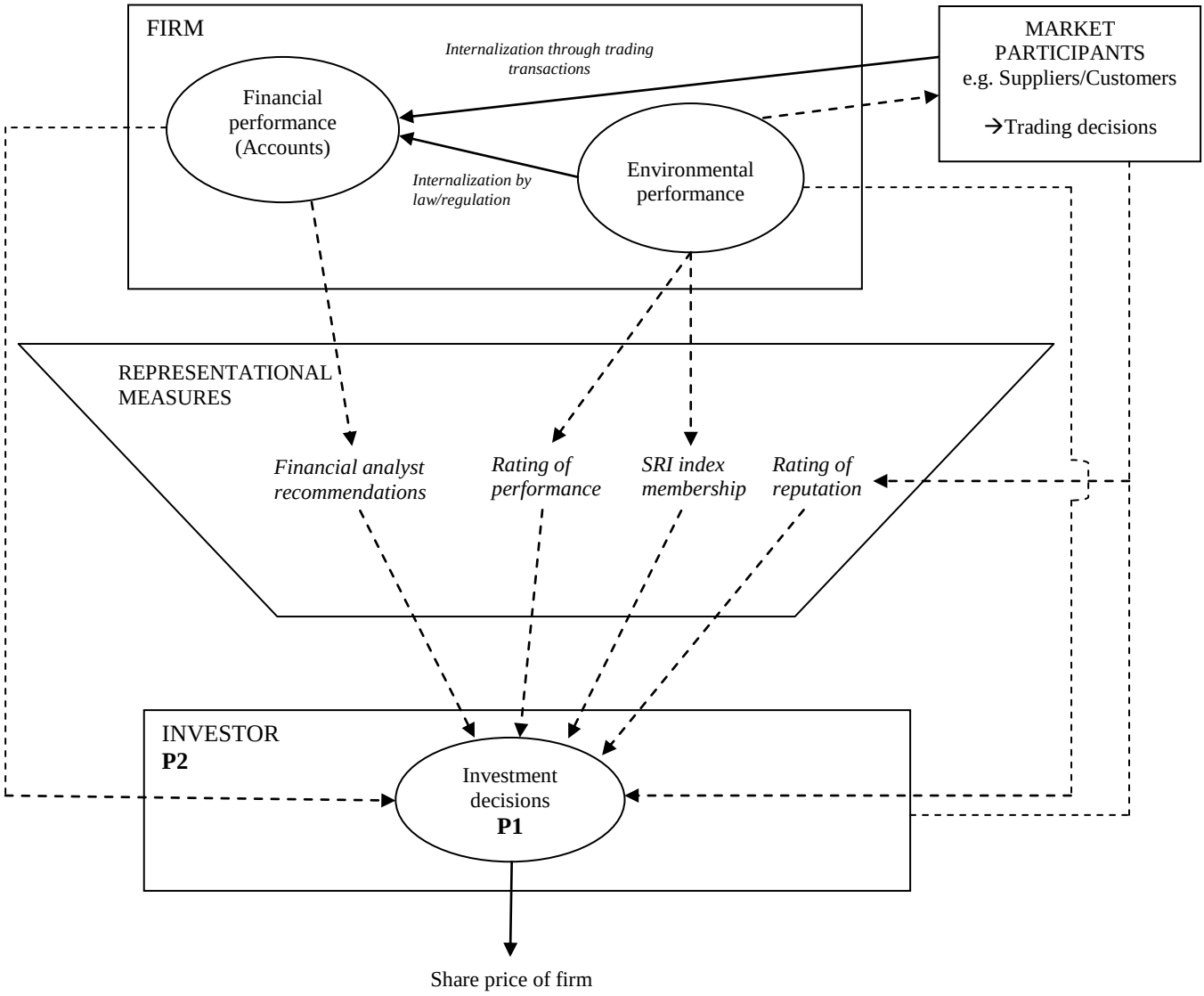
On balance, the above discussion would appear to indicate that corporate environmental performance is value relevant in investment decision-making, but one caveat to this is the limited number of studies that have investigated this relationship. Moreover, there is substantial evidence that investors will take this performance into account so as to maximize their utility, but the strength of the relation between these two aspects of performance is still contested. However, whereas measuring the financial aspects of environmental performance can be easily accomplished through the financial information contained in statements, non-financial performance, which this researcher believes constitutes an important part of this phenomenon, has yet to be measured robustly and hence there remains information asymmetry between the two parties of outsider investors and companies. Thus, investors often have to rely on the information provided from intermediaries so as to reduce the uncertainty in their decision making. In addition, the extant studies have not comprehensively investigated the relationship between corporate pollution levels, representative measures of environmental performance (e.g.

ratings or reputation), and/or quality of reporting as measures of corporate environmental performance. In particular, whether investors differentiate between these measures when they are making their investment decisions has yet to be specifically investigated. If it were found that these measures are taken into account during investment decision-making, this would demonstrate that there is a positive relationship between corporate environmental performance and equity performance, whereby a better reputation brought on by the former leads to higher returns on investment. Finally, the above cited previous empirical studies have not clearly elicited which of these measurements investors rely upon most when assessing environmental performance.

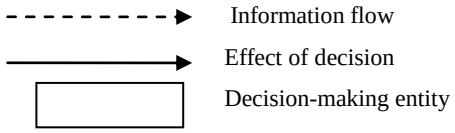
On the other hand, investors may convey on these measurements equal weight when making investment decisions. In respect of this, the earlier studies have not thoroughly determined whether these measurements are highly positively correlated or not with each other and if they are, this would indicate that they have no particular preference with regards to each of them. If not, then the power of each measurement needs to be carefully interpreted in relation to investment decision making, because focusing on the measure/s that impact most positively on a company's performance would prove beneficial. A third possibility is that it may be found that investors do not trust the reliability of firms reporting on their environmental performance and prefer a more objective external assessment. Regarding this, a number of previous studies have revealed that there is no association between actual corporate environmental performance and the content of a company's report disclosures (Ingram and Frazier, 1980; Rockness, 1985; Wiseman, 1982), which lends support to the questionable reliability of these disclosures. However, rather than these results indicating a lack of quality and trustworthiness in relation to the information disclosed, they could just point to a lack of interest in environmental information to the external investor. Furthermore, a firm's environmental performance could be misrepresented in other contexts, such as in the media. For example, if corporate managers realise that higher corporate environmental reputation is related to higher profit, then they may pay more attention to building a good corporate reputation in the press, at the cost of other aspects of environmental performance, such as the control of levels of pollution. In such circumstances, a manager's behaviour could be reflecting his/her wish to improve economic performance by any means, rather than indicating any environmental concerns.

In reality, it is hard to disguise actual underlying performance regarding environmental issues, because of the increasing number of international agreements on pollution abatement, such as the mechanisms (i.e. emissions trading, joint implementation, and clean development) under the Kyoto Protocol. However, it has not been clearly established whether environmental performance is relevant, in terms of value to a corporation, or whether it has a positive or negative impact on corporate equity performance. Moreover, regarding the measurements included for this thesis (i.e. corporate physical performance, environmental reputation and environmental disclosures) it has not been previously established whether or not they affect corporate environmental performance in equal measure. If this were elicited, company managers could then use the results to orient their business strategy in accordance with the most fruitful performance measure/s, thereby attracting increased investment. Drawing the above discussion together, figure 2 provides a diagram of the conceptual framework to be applied in this research endeavour. This framework includes recognition that aspects of environmental performance may be internalized in financial performance through law/regulation (e.g. environmental taxes) or through trading transactions (e.g. where customers' buying decisions are sensitive to environmental performance) and that other aspects of environmental performance may be relevant to investors even though they do not have such a direct financial impact. The primary research aim here is to determine which forms of information on environmental performance are used by investors for whom such performance is relevant to their decisions.

Figure 2. Conceptual framework



Proposition1 (**P1**): The investor's decisions are influenced by information on environmental performance.
Proposition 2 (**P2**): An institutional investor's investment style affects to what extent environmental performance is taken into account.



3.3 Implications

Investors may have different reasons for taking into account corporate environmental performance when making investment decisions. For instance, this may be driven by a financial motivation (i.e. profit maximisation), where it is perceived that the higher the level of corporate environmental performance, the higher are the expected returns and the lower the potential risk in the future, which will result in higher cash flows, consistent with conventional theory. However, under this perspective it is assumed that investors are homogeneous and thus, the presence of non-financial motivations in relation to corporate environmental performance are overlooked when the intention is to understand financial market phenomena, as a number of scholars have pointed out (e.g. DeBondt and Thaler, 1994; Nagy and Obenberger, 1994; Thaler, 1999). Consequently, because certain financial phenomena are not explicable by norms alone, an alternative theory that can capture heterogeneous investor behaviours taking place at any one time is needed. Therefore, to this end, behavioural theory, which challenges the classical norms, is adopted for this thesis as it can take into account the role of potentially sub-optimal information sources and non-financial information.

In addition, in the conceptual framework it is posited that investors can maximize their utility function by taking account of corporate environmental performance when making investment decisions. That is, it is assumed that the environmental performance information is directly related to a firm's share price. However, in order to understand the environmental performance in terms of non-financial information it is absolutely crucial to elicit which information can help investors to assess environmental performance related to financial risk and returns, which has yet to be established. Regarding this, investors may need to draw information on environmental performance not only from intermediaries, such as reputation, rating or badges of CSR performance, but also from information provided by the companies themselves, such as CSR/annual reporting or physical performance. The empirical evidence on this has shown that investors seek other information, including environmental information, from sources other than CSR/annual reporting (Deegan and Rankin, 1997; Harte et al., 1991).

In the context of the usefulness of information, including environmental information, this is a key element of the investment decision-making process, as its effective dissemination lessens the uncertainty between companies and investors, thereby resulting in increased efficiency in the allocation of resources for the latter, than were it otherwise (Williams, 1987). However, different investors adopt different approaches to processing such information so as to generate value. In particular, it is suggested here that the investment decision is dependent on an investor's perception regarding CSR/environmental performance. Nevertheless, to date, it is unclear which aspects of the latter investors rely upon most, if any, when making the decision whether to invest or not in a particular company.

In this thesis, investors are considered as information users who require environmental information from a variety of sources, including representational forms, physical performance and/or the quality of a firm's reporting, when making their investment decisions. Moreover, the level of usefulness of this information is positively dependent on the degree to which it is employed in the decision making process, which varies across investors. This gives rise to the first proposition.

Proposition 1*:* Investor's decisions are influenced by information on environmental performance.

Institutional investors generally can be categorised into two investment styles these days: non-SRI and SRI. The former type is the mainstream investment industry, which has been hesitant to be concerned with corporate environmental performance and only aims at maximizing investment return in their investment decisions. By contrast, institutional investors in the latter integrate social, environmental, and ethical considerations into investment decisions and have become the leaders in the SRI investment market (Louche, 2009; Sparkers and Cowton, 2004). That is, these investors engage in socially responsible investment, which the Social Investment Forum (SIF) has explained "involves evaluating companies on CSR issues, analyzing corporate social and environmental risks, and engaging corporations to improve their CSR policies and practice" (Social Investment Forum, 2006, p.2). In other words, this form of investing reflects CSR activities that matter to those investors who have an interest besides simply maximizing their wealth. In this respect, a number of studies have posited that, increasingly, SRI has become

interrelated with firms' CSR practices (Cowton, 1999a; Sparkes and Cowton, 2004), whereby SRI investors can play a major role in encouraging companies to engage in CSR. Further, SRI investors often work cooperatively to steer management teams onto a course that is believed to improve financial performance over time as well as enhancing the well-being of all the company's stakeholders (i.e. customers, employees, investors) and protecting the natural environment (Schueth, 2003). Regarding the evidence of firms' efforts, many have adopted various CSR initiatives to improve the relationship between them and their stakeholders (Bhattacharya et al., 2009). This is supported by empirical evidence that the SRI investors prefer to invest in companies with a higher level of CSR (e.g. Neubaum and Zahra, 2006; Mahoney and Roberts, 2007). The above discussion leads to the second proposition.

***Proposition 2*:** An institutional investor's investment style affects to what extent environmental performance is taken into account.

3. 4 Research design

In this section the methodologies used for the research in this thesis based on the outcomes of the literature review, chapter 2, and the conceptual framework presented in chapter 3 are explained. Note that this section does not cover the details of the methods employed, samples used in the individual empirical studies, mode of data collection and why each data type/source has been used, as these will be provided as appropriate in each empirical chapter. Here, the intention is to provide a broad overview of the identified environmental performance measures, as utilized in each empirical chapter, and what the aims of the research are.

A large body of literature has investigated the relationship between environmental and equity performance, but the empirical evidence to date is inconsistent. As pointed out by a number of scholars (e.g. Griffin and Mahon, 1997; Ullman, 1985), the conflicting results in the prior research are probably mainly attributable to differences in methodology and in the choice of environmental performance indicators. For this thesis, where stock returns are used as the equity performance measure, three analytical procedures are employed to test the propositions in three

empirical studies: value relevance, drawing on the Ohlson model, a multiple regression and an event study, all being undertaken using secondary data.

Regarding the first two analytical methods, these assess at the general level how well a company's performance information is reflected in investors' investment decisions. Linked with this, a further goal is to elicit the extent to which the valuation of a firm depends on the information that is available and whether any change in it affects current and/or future prices. As a test of information content, event studies are carried out over a long time to see how quickly and correctly the market reacts to a particular piece of news. Previous studies on CSR have employed this methodology to investigate market reaction to the issuing of new information. That is, it is considered an effective way for determining whether the market genuinely cares about information on a company's CSR. More specifically, through this using this approach in this research it is possible to establish whether certain corporate environmental performance measures are taken into account when equity investment decisions are made as well as whether there is a significant difference between SRI and non-SRI investment decision making.

3.4.1 Assessing environmental performance

It has been discussed earlier in this chapter that with the modified utility model investors can optimise their utility by incorporating other objectives than just earnings and risk choices. That is, if they take into account corporate environmental performance as an additional consideration in their investment decision-making, their total utility can simply be expressed as:

$$U_i = f(E_R, \sigma_R) + \sum_j h_{ij} EP_{ij}$$

where U_i is the total utility of an investor i and E_R and σ_R are the expected return and the risk of return. h_{ij} is the amount time an individual i invests in a particular investment j. EP_{ij} is the corporate environmental performance of investment j. In other words, an investor's investment decision-making can be derived from a firm's performance, measured by expected return and risk, and its environmental performance. If the corporate environmental performance has been internalised by regulations or the capital market, investors can take this into account when

making their investment choices, because they can be exhibited in a tangible form, such as: financial, rank, risk or written report. That is, they may believe that higher environmental performance can lead to better expected earnings and/or lower risk, resulting in higher present value of a firm (Narver, 1971). However, because the definition and measurements for environmental performance have not been clearly identified, as yet (Ilinitch et al., 1998), it is difficult to assess the impact of corporate environmental performance on investment decision-making.

As has already been discussed, when a corporation releases its environmental performance information the physical performance information can be internalised by the capital market and indicated in its performance. However, because of the characteristics of non-financial performance, all of its environmental performance information may not be internalised and recognised and thus, investors may need to consider the company's overall environmental representative measurements as a proxy for environmental performance. Next, which proxy is used for corporate environmental performance is explained and justified for each study as well as there being an overview of the analytical approaches employed in each case.

***Study* 1**

The first study tests the first proposition that environmental performance information is of relevance to investors' decision making. To do this, two methodological approaches are employed, multivariable regression and the Ohlson valuation model, using secondary data taken from Fortune's WMAC. More specifically, initially, OLS regressions for panel data between 1999 and 2007 are applied by extending Belkaoui's (2004) study to elicit whether the corporate environmental performance measure has explanatory power for stock return and hence, is systematically related to the earnings. Next, following Hassel et al. (2005), using the same data set an analogue of the Ohlson model is enlisted to explore whether environmental performance has value relevance. In this study, three proxies are utilized as measures of environmental performance:

- Environmental disclosure: measured by membership of the DJSI and assigned 1 if companies are listed and 0 otherwise, over the sample period. Further, to improve the

level of robustness, GRI Guidelines usage is used as another variable relating to disclosure from 2000 to 2007.

- Pollution (i.e. physical) performance: measured by Green House Gases (GHG) intensity, defined as a firm's total sales/revenues divided by GHG emissions.

- Environmental reputation: measured using Fortune's WMAC scores on this aspect.

The two aims of this study are:

- To elicit which type of information regarding environmental performance is more trustworthy to investors when making decisions and further, whether this is positively or negatively related to stock market performance;

- To explore which type of information has value relevance.

Study 2

As discussed in chapter 1, the badge of belonging to an SRI index may be a quick way of conveying positive information regarding corporate sustainability leadership, thus enhancing a firm's reputation as well its value (Cho et al., 2012; Robinson et al., 2011). Hence, to test the second proposition, SRI indices: the DJSI and the FTSE4Good index are used. It also involves two analytical approaches, event study and value relevance, based on secondary data taken from the two indices. More specifically, the constituents of SRI indices were extracted from the DJSI World website from 2000 to 2007 and FTSE4Good Global index website from 2002 to 2007. The event study is conducted by following Brown and Warner's (1980) statistical significance testing method and further, for the value relevance study the model used in Hassel et al. (2005) is employed. Understandably, the measure for environmental performance in this study is membership of one of these SRI indices.

The three main aims of this part of the empirical research are as follows:

- Using an event study to examine whether the announcement of membership of SRI indices has an impact on the market;

- To test how the announcement of inclusion in or exclusion from indices affects companies' abnormal returns;

- To test whether the badge of such indices has value relevance.

Study 3

This relates to the last proposition, for which four CSR ratings with different characteristics (i.e. global or regional, multi-dimensional or single dimensional CSR measure), are utilised: Fortune's WMAC reputation score, the Environmental Index, the Corporate Responsibility Index and the Accountability Rating. The analysis involves cross-sectional regression of the equity holdings on the CSR ratings. The companies' ownership holdings are provided by the Lipper Analytic Services, a Reuters Company, for the sample period 2006 and 2007.

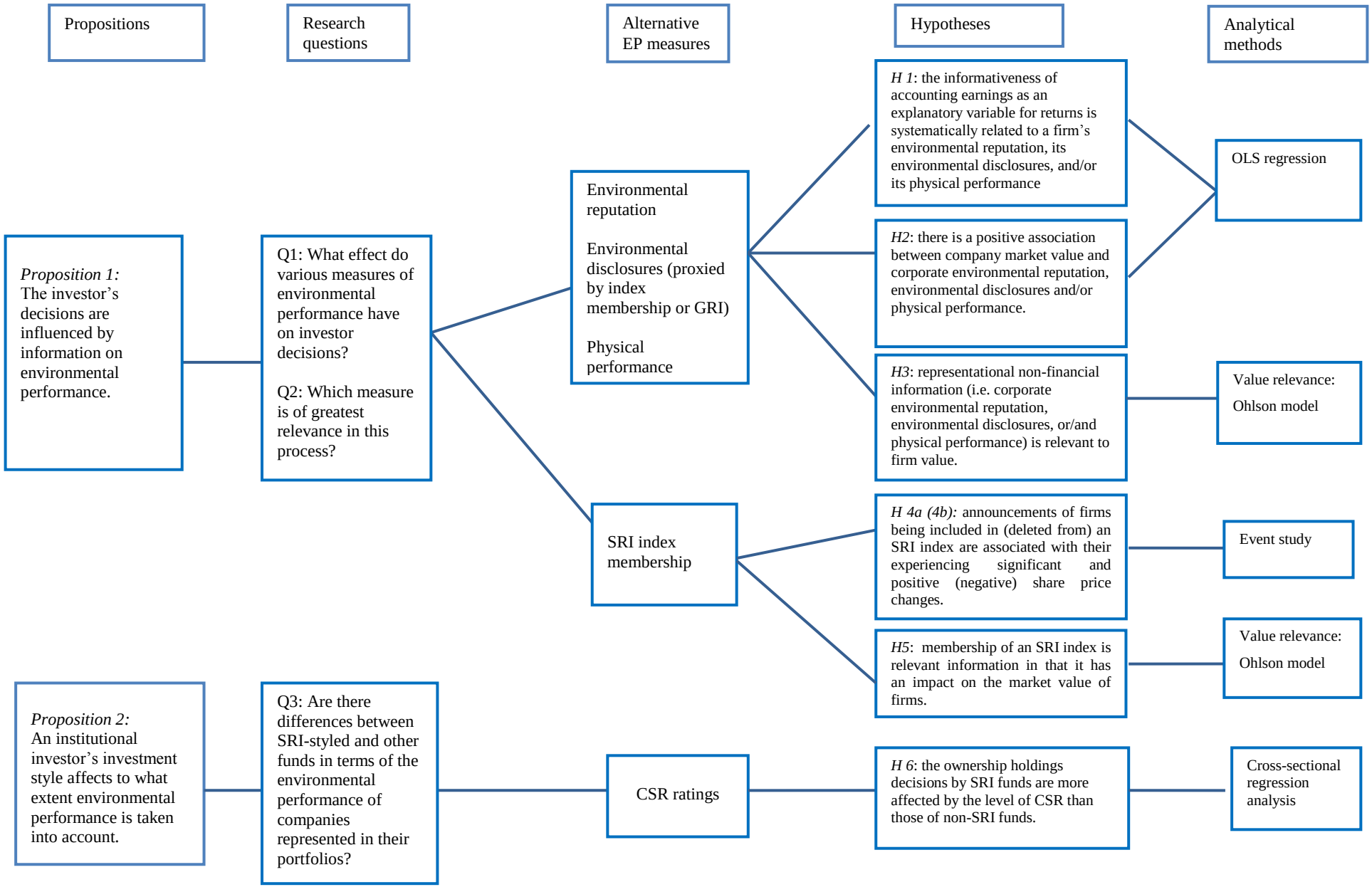
This study has two aims as follows:

- To test whether the level of CSR positively influences the equity holdings decision by SRI funds more than in the case of non-SRI ones;

- To probe whether the characteristics of the CSR ratings measures, namely, environment reputation or multi-attributed reputation have a different impact on investment decision making for SRI fund managers and non-SRI fund managers.

Figure 3 shows the overview of conceptual framework including analytical framework, which have been discussed above and then other key issues and hypotheses that are discussed in detail in the relevant empirical chapters.

Figure 3. Overview of conceptual framework including analytical frameworks



3.5 Chapter summary

In this chapter it has been posited that investors do not have homogenous preference when making decisions and hence, it is necessary to draw on behaviour theory in order to understand this process. That is, non-financial motivations impact variously on investors in that some have an ethical aspect in their utility maximization strategy. However, because of the lack of a standardized measure of environmental performance, which is usually seen to represent non-financial performance, investors often have to rely on the third party representational measures. Regarding this, it has been put forward that investors' perceived importance regarding the measuring of the environmental performance will determine the value of the information provided (i.e. usefulness information). The propositions outlined in this chapter are developed into hypotheses for testing in the empirical chapters and the specific methodologies applied in each case are introduced and explained as appropriate.

CHAPTER 4

Chapter4. CSR Reputation and Equity performance

4.1 Introduction

In this chapter the aim is to acquire a comprehensive understanding of the impacts of corporate environmental reputation on equity performance, by developing a research model to test the relationship between share returns and environmental reputation as well as establishing whether or not the latter can be relevant to firm value. Although there are some studies that have investigated the relationship between environmental disclosures or environmental performance and equity performance, to date, the link between environmental reputation and equity performance has not been comprehensively investigated. Most environmental reputation studies have concentrated on its association with financial performance and have also been heavily focused on a specific market. Therefore, in this study Fortune's WMAC reputation scores over a nine-year period from 1999 to 2007 are used to elicit whether they are value relevant and have an impact on equity performance at the global level.

In addition, the environmental disclosures and pollution (or physical) performance are employed, in turn, as CSR performance measures also to test whether they are positively associated with equity performance and thus, relevant to firm value. A further aim in this chapter is evaluate whether all three CSR performance measures (i.e. environmental reputation, environmental disclosure, and physical performance) taken together have value relevance. However, the critical decision of choosing the measurements for environmental performance is problematic, because there is no widely agreed method for doing so. As explained in detail below, the approach adopted in this research is to draw upon a set of measures that have been used in previous empirical studies to measure corporate environmental performance, which include: membership of the DJSI for environmental disclosures and eco-efficiency, in the form greenhouse gas emissions, for physical performance.

Section 4.2, contains explanation of and justification for the research design as well as hypothesis development. Moreover, the method of data collection and the empirical models are also presented in this section. In section 4.3 the results from the empirical

analysis are reported for both market and accounting based measures of performance. Section 4.4 contains discussion on the findings and section 4.5 is the chapter summary.

4.2 Research Design

4.2.1 Environmental reputation as a CSR measure

Even though it has been criticized for long time owing to the high degree of subjectivity in the assessment criteria, corporate reputation is, undoubtedly, a significant and relevant corporate asset (Belkaoui, 2004). Unerman claimed that the building of good corporate reputation can be a worthiness asset to corporation noting that;

"*A corporation's reputation among its economically powerful stakeholders is a valuable asset which needs to be protected and developed, and a key aspect of this reputation is stakeholders' perceptions of the corporation's CSR – or, more precisely, perceptions of how well the corporation's CSR policies, practices and outcomes meet stakeholders' social and environmental values and expectations*." (2008, p.362)

Nevertheless, environmental reputation in CSR has yet to be comprehensively investigated, partially because there is no general agreement on how this can be measured and also because until fairly recently there has been limited public data available. In this regard, the few early studies carried out used simple techniques that lacked robustness to examine the market reaction to CSR reputation and in any case produced inconsistent results (Moskowitz, 1972; Vance, 1975; Cochran and Wood, 1984). Since Fortune started publishing the first annual surveys of "America's Most Admired Corporation (AMAC)" and the "World's Most Admired Companies (WMAC)" in 1983 and 1997, respectively, a standard measure of reputation has been available to public. Subsequently, a similar reputation measure, Britain's Most Admired Companies (MAC) by Management Today, became available for use in empirical research. In this research, it is drawn upon along with that of Fortune's WMAC for the empirical analysis, being more extensive than AMAC and each is discussed next.

Britain's Most Admired Companies, which was first published in 1994 by Management Today, is commonly used in empirical analysis of UK firms. The method that they use is very similar to than employed by Fortune's reputation index, being rated on a scale of 0 (poor) to 10 (excellent) for nine performance criteria: quality of management, financial soundness, ability to attract, develop and retain top talent, quality of product/services, value as a long term investment, capacity to innovate, quality of marking, community and environmental responsibility and use of corporate assets. A few studies have involved taking its "community and environmental responsibility" score to investigate: the relationship between environmental reputation and its disclosure (Hasseldine et al., 2005; Toms, 2002), the usefulness of reputation information to investors (Hussainey and Salama, 2010), and the impact of reputation on firm performance (Elsayed and Paton, 2005). The findings from the first two supported the existence of there being a positive relationship between environmental reputation and its disclosure. Moreover, the most recent study, Hussainey and Salama (2010), showed that the environmental reputation contains value-relevant information and increases the stock market's ability to anticipate future earnings change.

Fortune's reputation ratings are the most popularly used in CSR empirical research and since its AMAC ratings index became available to the public, a number of academics have taken the attribute "responsibility to the community and environment" as a CSR reputation measure, finding a positive relationship between environmental reputation and corporate financial performance (e.g. Belkaoui, 2004; Herremans et al., 1993; McGuire et al., 1988). However, the Fortune scores have been questioned because a significant body of research has found that these ratings are strongly correlated with financial performance and thus it has been argued that these financial effects should be removed before using the data (Brown and Perry, 1994 and 1995; Fryxell and Wang, 1994; Sodeman, 1995). Nevertheless, in spite of there being this downside, Brown and Perry (1995) and Wood (1995) also accepted that its "responsibility to the community and environment" is a useful measure of CSR performance. Moreover and perhaps more importantly, Fryxell and Wang (1994) elicited that the environmental reputation score is the only component in the ratings that does not seem to be affected by the financial effects.

In sum, the results of the studies above have shown that there is a positive relationship between environmental reputation and corporate financial performance. However, these research endeavours were mainly focused on restricted markets at a national or regional level (i.e. US or UK) and as such they were too narrow to elucidate the general level influence of environmental reputation. In order to fill this knowledge gap, for this research, Fortune's WMAC "responsibility to the community and environment" is used as a measure of CSR reputation, thereby examining the matter in the whole world context.

Fortune the World's Most Admired Companies Scores (WMAC)

Since 1997, the Hay Group, as a partner of Fortune, has conducted surveys of top executives, directors, and industry analysts, in the form of questionnaires being sent to the participants in October each year, with the deadline for responses being mid-December at the latest. The respondents are only asked to rate companies from within their own industry, thus implying that they have direct access to industry specific disclosures. They are asked to rank each of the selected companies within 57 different industry groups, 26 international industries and 31 US oriented industries, on nine factors: ability to attract and retain talented people; quality of management; social responsibility to the community and the environment; innovativeness; quality of products or services; wise use of corporate assets; financial soundness; long-term investment value; and effectiveness in doing business globally.[2] Each of these criteria has to be rated on a scale of 0 (poor) to 10 (excellent) and subsequently, the company's overall ranking is determined by a simple averaging of the attribute scores. Fortune releases the results annually on its website at the end of February and in the March edition of its magazine. Consistent with previous studies (e.g. McGuire et al., 1988; Belkaoui, 2004), social responsibility to the community and the environment is used as a measure of a firm's environmental reputation and table 2 presents a summary of the scores from 1999 to 2007, before any adjusting for such matters as: mergers, take-overs or bankruptcy.

[2] Because of similar methodologies, America's Most Admired Companies (AMAC) is not discussed in detail. Moreover, the attributes of AMAC are same as those of WMAC, except for the addition of an extra one for the latter: the effectiveness of doing business globally.

Table 2. Summary of environmental reputation scores from 1999 to 2007

Year	N	Mean	Min	Max	Standard deviation
1999	271	5.7931	3.09	8.43	1.0891
2000	331	5.8388	2.82	8.59	1.0015
2001	380	5.9050	2.16	8.25	0.8878
2002	318	5.6474	3.21	7.9	0.8774
2003	345	5.4754	1.64	8.63	1.0693
2004	346	5.7929	2.42	8.4	1.0040
2005	357	5.8632	2.6	8.5	0.9936
2006	351	5.8935	3.52	8.25	0.9757
2007	347	5.7150	3.16	8.63	1.0417
Average	338	5.7694	2.74	8.40	0.9933

Although the number of firms that have been listed in the environmental reputation index has varied during the focal period of between 1999 and 2007, the mean score is around 5.7 with a standard deviation 1.0; that is, the spread of scores is very narrow and most rated companies have come within the range of 4.7-6.7.

4.2.2 Development hypothesis

In what follows, explanations are made for the impact of corporate environmental performance on investment decision-making, based on the conceptual framework presented in the previous chapter, under the market-based (i.e. stock return) and accounting-based (i.e. firm value) perspectives. Moreover, the sample of companies used are identified and justified as well as the proxies for environmental performance, including: environmental disclosure, environmental reputation, and physical performance.

Market-based measurement

Most of the existing work that elicited results positively relating environmental reputation to a firm's performance has focused on its financial rather than equity performance (i.e. change in share price), with only a small number determining its link with the latter (Belkaoui, 2004; Hussainey and Salama, 2010) Those studies that have considered equity performance have established the link between this and CSR

disclosures (e.g. Ingram, 1978; Murray et al., 2006) or CSR performance (e.g. Mahapatra, 1984) , rather than reputation.

A number of researchers have carried out empirical investigations to test the assumption that information regarding environmental performance is reflected in share price changes, because the relevant stakeholders use this information when making investment decisions (e.g. Ingram, 1978; Murray et al., 2006). In this regard, to examine the movement in share prices, the return to investors is commonly used, because it can be simply calculated as a percentage of share price change. Using this approach, a few studies have been conducted to establish whether it is a firm's corporate environmental disclosures or environmental performance that contains information that has an influence on investment decision-making, but they showed inconsistent results (see, for example, Belkaoui, 1972; Ingram, 1978; Mahapatra, 1984; Murray et al., 2006).

Further, research related to corporate environmental reputation was conducted by Belkaoui (2004) and Hussainey and Salama (2010), but even though they used a similar methodology their findings showed slightly different results. More specifically, Belkaoui (2004) examined whether the level of knowledge of earnings in the determination of stock returns is dependent on the quality of environmental reputation by employing Fortune's AMAC data based on the US market and concluded that environmental reputation is significantly and positively related to returns. Hussainey and Salama (2010), using Management Today ratings information for UK companies, investigated whether environmental reputation could act as a predictor of future annual earnings and they found that such information is useful, whereas regarding its impact on current earnings this emerged as being insignificant, but notably negative in relation to returns. It is too early to confirm whether corporate environmental reputation is value relevant information or not to stakeholders for investment decision-making, because their studies (i.e. Belkaoui, 2004; Hussainey and Salama, 2010) only focused on a specific market, such as US and UK. However, despite this limitation the methods they used are valid for testing the association between the corporate environmental performance and equity performance to assess whether environmental information to stakeholders affects the level of accounting earnings and hence, that of returns.

Earning's explanatory power for returns

Since Ball and Brown (1968) published their findings that the accounting earnings are useful information for stakeholders' investment decision-making, investigation into the association between them and returns has been undertaken (Easton and Harris, 1991). In a study by Easton and Harris, how accounting earnings are an appropriate variable for explaining returns has been comprehensively discussed by using the book valuation and earnings valuation model.[3] Under the premise that if market price and book value are considered as a "stock" of wealth then changes to these measures of wealth can be considered as "flow", which these authors expressed as follows:

$$\Delta P_{it} = \Delta BV_{it} + \mu_{it}$$

Where a change in price *(ΔP_{it})* is the difference in price per share of firm *i* between two points in time (*t-1* to *t*), change in book value (ΔBV_{it}) is the difference in the book value per share of firm *i* between the same two points in time, and u_{it} is the difference between ΔP_{it} and ΔBV_{it}. Moreover, under the clean surplus relation that was put forward by Ohlson (1995), the change in book value per share equals earnings per share minus the dividend per share over the time period in question, i.e. $\Delta BV_{it} = E_{it} - d_{it}$ and when rearranged these two formats and divided through by beginning of period price can be expressed as follows:

$$\frac{\Delta P_{it} + d_{it}}{P_{it-1}} = \frac{E_{it}}{P_{it-1}} + \mu_{it}$$

That is, this equation shows that the earnings per share divided by the starting price related to expected returns.

[3] The book valuation model is only discussed in this study because the earning valuation model involves using a similar approach to reach the same return-earnings relation. Further, the concern in this research is with the level of accounting earnings rather than changes in earnings (for more details see Easton and Harris, 1991, p.22-23).

Driven by the above discussion, two hypotheses that arise for testing in this research are:

H1: The informativeness of accounting earnings as an explanatory variable for returns is systematically related to a firm's environmental reputation, its environmental disclosures, and/or its physical performance.

H2: there is a positive association between company market value and corporate environmental reputation, environmental disclosures and/or physical performance.

Accounting-based measurements

Even though financial information, such as earnings and cash flow, has been shown to be value relevant to the market, non-financial information was not a central concern in this respect until Ohlson (1995) presented a valuation model, using: book value, earnings, and other information. The model can be expressed as follows based on standard assumptions that underlie the dividend discount model, the clean surplus relation, and an assumed stochastic process for abnormal earnings:

$$P_t = BV_t + \alpha_1 E_t + \alpha_2 v_t$$

where P_t is stock price at time *t*, BV_t is end of book value of equity, E_t is abnormal earnings for period *t*, and v_t is other non-accounting value relevant information.

The visible difference between the market-based and accounting-based models is that the latter incorporates "other information", which is information about future abnormal earnings that is not contained in current earnings. The author stated that v_t summarizes value relevant events that have yet to have an impact on the financial statements and a factor which is related future earnings independently of current and past earnings. However, researchers have faced difficulty in defining "other information". Thus, some have employed the valuation model, having set the other information variables aside (Bernard, 1995; Clubb, 1996), whereas others defined them by using various non-financial information events, such as: air pollution, reputation, or analysts' forecasts of next year's earnings (Amir and Lev, 1996; Black

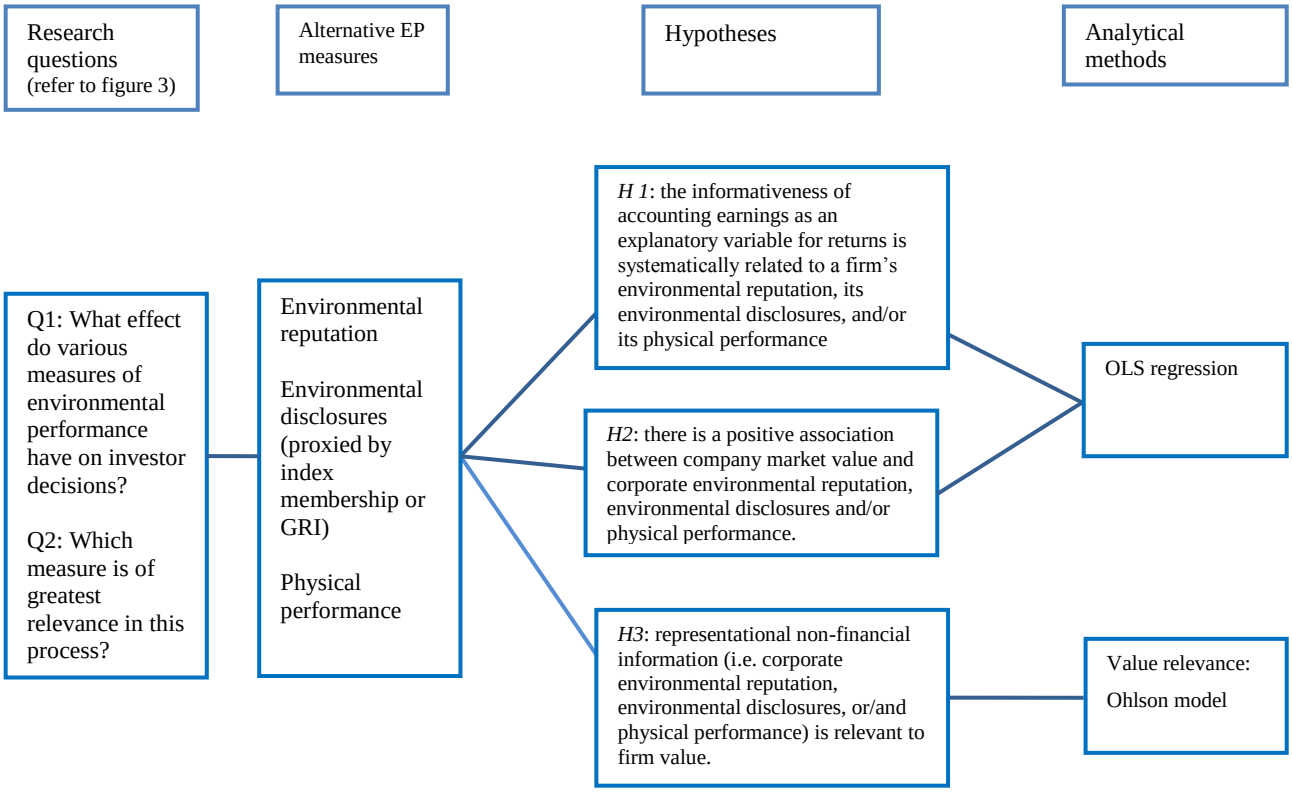
et al., 2000; Clarkson et al., 2004; Dechow et al., 1999; Hassel et al., 2005; Hughes II, 2000).

From the previous empirical investigations (for more detail see Appendix I), it can be inferred that environmental performance is value relevant to financial information, but it is not necessarily the case that it is positively associated with a firm's market valuation, because the market based valuation studies have shown an inconsistent relationship between environmental performance and market returns. Furthermore, as yet, there are not even clear widely accepted measurements of environmental performance. Compared to market-based valuation, little research has investigated the value relevance of non-financial information variables, because, as pointed out above, there is no clear definition of what they entail. Dechow et al. (1999) comprehensively conceptually summarized the valuation model with and without the other information variable, which they defined as the analysts' forecasts of the next period's abnormal earnings, and their findings weakly supported the Ohlson model. However, they pointed out that the model is still useful for empirical research, because it provides a unifying framework of a large number of previous valuation models by using three variables (i.e. book value, earnings, and short-term forecasts of earnings). Moreover, as such it is a robust basic framework on which subsequent research can build, and the studying of the relationship between future abnormal earnings and current information variables is heuristically appealing. Hence, in this study the model is adapted by using environmental performance, corporate environmental reputation and disclosure, which have not been fully investigated previously, as the non-financial information variables. The issue of interest here is to assess whether corporations can increase their value with this non-financial information, which gives rise to the following hypothesis:

*H*3: representational non-financial information (i.e. corporate environmental reputation, environmental disclosures, or/and physical performance) is relevant to firm value.

The hypotheses development discussed above is summarized diagrammatically in Figure 4.

Figure 4. Summary of hypotheses developments



4.2.3 Sample and Data Collection

The three variables that were used in this research to measure corporate environmental performance are: reputation, disclosure, and physical performance. Regarding the longitudinal data collection on reputation, because the firms in the WMAC index change from year to year, only those that were listed for the entire time period of 1999 to 2007 were included, which resulted in a total of 1,197 firm-year observations.

As a measure of corporate environmental disclosures, membership of DJSI World was used rather than content analysis, which has mostly been employed in previous studies (e.g. Freedman and Jaggi, 1982 and 1986; Murray et al., 2006) and the reason for doing so was because disclosing environmental performance is still voluntarily reported by companies and is not normally verified by an independent third party. Shane and Spicer (1983) argued that a major problem in previous studies was the voluntary CSR disclosures. They suggested that without mandated disclosures and

reporting standards for firms, difficulties relating to inconsistency and non-comparability of information disclosed made empirical analysis problematic. Moreover, content analysis has other drawbacks, such as it being extremely time consuming and consequently most of the research using this method is only short term as well as being highly subjective, because of the self-constructed recording by the researcher themselves, rather than by any objective procedure, such as a ranking or rating method (for more detail see Appendix I). Ever since DJSI World was launched in 1999, its committee has reviewed three criteria annually, i.e. economic, environment, and the social dimensions, to decide whether a firm can qualify to join. More specifically in relation to this research, the index committee reviews the firm's environmental reporting according to industry specific criteria, such as: the climate change strategy or biodiversity.[4] Although the assessment is subjective, it can be considered consistent and comparable across firms because the committee is applying the same criteria to each firm. In fact, to be a member of an index firms need to maintain and disclose information that reflects the prescribed criteria in their sustainable practices. Regarding the scoring for this aspect, a dummy variable was created and it was defined 1 if a company belonged to DJSI World and 0 otherwise.

As the alternative measurement of the disclosure variable, the Global Reporting Initiative (GRI) data from 2000 to 2007 was employed. GRI was established in 1997 by the CERES (Coalition for Environmentally Responsible Economics) in partnership with the UNEP (United Nations Environmental Programme), with the aim of developing a globally acceptable standardized format for reporting on the: economic, environmental, and the social performance of organizations. Since the first sustainability reporting guidelines were released in 2000 (known as the G1), the frameworks have been comprehensively revised and the second (G2 guidelines) and the third versions of the guidelines (G3 guidelines) were issued in 2002 and 2006, respectively. Many organizations have accepted the guidelines in their sustainability reporting. This variable is defined as a dummy variable, which was given a value of 1 if a company applied any of the guidelines in its CSR/environmental reporting and 0 otherwise, with the data being obtained from the GRI website and Corporateregister.com, a global directory of CSR resources.

[4] For more detailed information see http://www.sustainability-index.com/07_htmle/assessment/csa.html

The third explanatory variable, *ghg-intensity*, was used as a measure of corporate environmental performance, being defined as a firm's total sales and revenues divided by its greenhouse gases emissions. Corporate total sales and revenues, which are accounting items in the corporate income statements representing a firm's business activities over a period of time, were collected from DataStream for local currency and then the averaged monthly exchange rate over period *t*, collected from DataStream, was applied converted into the US dollar. Based on a review of websites of CorporateRegister.com and the corporate websites for firms included in the reputation index from 1999 to 2007, each company's greenhouse gases emission levels were collected from its environmental reporting, but because of the difficulty of separating the geographic segment sales, only corporate total greenhouse gases emission figures were used. The term "environmental performance" is probably the most ambiguously defined CSR performance measure being identified by a range of different indicators in the previous studies, including: the CEP index (e.g. Ingram and Frazier, 1980; Shane and Spicer, 1983; Spicer 1978a and 1978b; Stevens, 1984), emissions data taken from the TRI (e.g. Al-Tuwaijri et al., 2004; Hamilton, 1995; Patten, 2002) and various alternative performance ratings (e.g. Belkaoui and Karpik, 1989; Rosso and Fouts, 1997; Ruf et al., 2001). It is this lack of consensus on which measure(s) to use that explains the inconclusive results on environmental performance and corporate business performance. Further, a few studies have involved employing corporate underlying performance without controlling for variation in the size of organizations and hence, by using the ratio of total firm revenue to greenhouse gas emissions as the environmental performance variable a distinction between firm size can be incorporated into the analysis.

Accounting and stock return data were also taken from DataStream, with earnings per share being employed (Worldscope item 05202). In sum, the most significant constraints on sample size were the availability of the corporate environmental performance data from 1999 to 2007 and also that on a firm's financial performance, which resulted in 338 firm-year observations that satisfied all conditions; however, the sample size varied for each model.

Measurements employed for the other variables

In addition to the corporate environmental performance above, four selected financial performance variables, as used by Belkaoui (2004), were also examined in the models: leverage, growth opportunity, systematic risk, earnings variability, and in each case, an expectation regarding its relationship to stock return is stated based on Belkaoui's study.

Leverage was measured as the ratio of total debt divided by total assets, which has been used in previous research to determine how much of the company's assets have been financed by debt, thereby representing the level of riskiness of a firm (Waddock and Graves, 1997). That is, the lower the company's ratio of debt to assets, then the more it is financed through equity rather than debt.

Growth opportunity was measured as the ratio of market value of equity to book value of equity, which was used because it can assess the future profitability of a firm, and a high ratio can indicate high expectations by investors of a firm's future profitability.

Risk was measured by market model beta, which is known as the systematic or unavoidable risk of the security, because it is that portion of the variance of the security's return that cannot be diversified away by increasing the number of securities in the portfolio. The estimations of a security's systematic risk $\beta_{i,t}$ for each year were obtained by running a time series regression over the sixty months prior to the test period, using the market model, which is commonly used in this context. Standard and Poor's Global 1200 index was utilized to measure the monthly market factor. In general, the higher the observed variation, the higher the risk involved in holding the equity.

Accounting risk measures are considered as a firm's earning variability and these were measured by finding the standard deviation of earnings for the thirty-six quarters of the years 1999 through to 2007, inclusive. Beaver et al. (1970) claimed that accounting-based measures of risk should be considered as an assessment of the risk parameters for a future decision in the same manner as market-based measures of risk.

4.2.4 Empirical models

The empirical analysis was conducted by two different performance measure approaches: market-based and accounting-based measurements. Regarding the former, this was aimed at assessing the degree to which earnings are informed by the chosen environmental performance variables and hence, how much the latter determines the level of returns. Belkaoui (2004) took US companies to investigate whether earnings are significantly and positively related to the level of environmental reputation and it is his procedure that was adopted for this work. However, in order to examine whether these relationships are stable enough to apply globally, the AMAC environmental reputation scores were replaced with the WMAC environmental reputation scores. As a preliminary step, correlation analysis was conducted between earnings and returns and the earnings coefficients from the regression of stock returns on earnings for three identified ranges of company environmental reputation across the sample were computed, these being: 3.95 to 5.63, 5.64 to 6.49, and 6.50 to 8.44 for the DJSI. In addition, to conduct procedure above for the other environmental performance variables, the environmental disclosures were divided by two groups: companies listed in the DISJ and those not listed. Further, the physical environmental performance was categorized into three groups: 0.0002 to 0.0050, 0.0051 to 0.0184, and 0.0185-0.2717. The same procedures were repeated to make groups for the case of the GRI and a similar range of groups was obtained.

For the regression based approach, the corporate environmental performance variables were examined separately and together. Furthermore, also in accordance with Belkaoui (2004), additional variables considered as the determinants of earnings were included and are discussed in detail later in this subsection. The process of testing involved longitudinal data analysis of the earnings coefficient conditional on the level of environmental performance, as defined above. Each explanatory variable was deflated by the closing share price at the end of fiscal year *t-1*, except for Fortune's environmental reputation, because the collinearity test (i.e. variance inflation factor (VIF)) showed that it was highly correlated with $E_{i,t}/P_{i,t-1}$. The cross-sectional time series models, with an environmental performance interaction term, were formulated as follows:

$$R_{i,t} = \beta_0 + \beta_1 \frac{E_{i,t}}{P_{i,t-1}} \quad (model1.1)$$

$$R_{i,t} = \beta_0 + \beta_1 \frac{E_{i,t}}{P_{i,t-1}} + \beta_2 fscore_{i,t} + \varepsilon_{i,t} \quad (model1.2)$$

$$R_{i,t} = \beta_0 + \beta_1 \frac{E_{i,t}}{P_{i,t-1}} + \beta_2 \frac{E_{i,t} * DJSI_{i,t}}{P_{i,t-1}} + \varepsilon_{i,t} \quad (model1.3)$$

$$R_{i,t} = \beta_0 + \beta_1 \frac{E_{i,t}}{P_{i,t-1}} + \beta_3 \frac{E_{i,t} * ghg - intnesity_{i,t}}{P_{i,t-1}} + \varepsilon_{i,t} \quad (model1.4)$$

$$R_{i,t} = \beta_0 + \beta_1 \frac{E_{i,t}}{P_{i,t-1}} + \beta_2 fscore_{i,t} + \beta_2 \frac{E_{i,t} * DJSI_{i,t}}{P_{i,t-1}} + \varepsilon_{i,t} \quad (model1.5)$$

$$R_{i,t} = \beta_0 + \beta_1 \frac{E_{i,t}}{P_{i,t-1}} + \beta_2 fscore_{i,t} + \beta_3 \frac{E_{i,t} * ghg - intnesity_{i,t}}{P_{i,t-1}} + \varepsilon_{i,t} \quad (model1.6)$$

$$R_{i,t} = \beta_0 + \beta_1 \frac{E_{i,t}}{P_{i,t-1}} + \beta_2 \frac{E_{i,t} * DJSI_{i,t}}{P_{i,t-1}} + \beta_3 \frac{E_{i,t} * ghg - intnesity_{i,t}}{P_{i,t-1}} + \varepsilon_{i,t} \quad (model1.7)$$

$$R_{i,t} = \beta_0 + \beta_1 \frac{E_{i,t}}{P_{i,t-1}} + \beta_2 fscore_{i,t} + \beta_3 \frac{E_{i,t} * DJSI_{i,t}}{P_{i,t-1}} + \beta_4 \frac{E_{i,t} * ghg - intnesity_{i,t}}{P_{i,t-1}} + \varepsilon_{i,t} \quad (model1.8)$$

$$R_{i,t} = \beta_0 + \beta_1 \frac{E_{i,t}}{P_{i,t-1}} + \beta_2 fscore_{i,t} + \beta_3 \frac{E_{i,t} * DJSI_{i,t}}{P_{i,t-1}} + \beta_4 \frac{E_{i,t} * ghg - intensity_{i,t}}{P_{i,t-1}} + \beta_5 \frac{E_{i,t} * debt_{i,t}}{P_{i,t-1}} + \beta_6 \frac{E_{i,t} * growth_{i,t}}{P_{i,t-1}} + \beta_7 \frac{E_{i,t} * risk_{i,t}}{P_{i,t-1}} + \beta_8 \frac{E_{i,t} * VAR_i}{P_{i,t-1}} + \varepsilon_{i,t} \quad (model1.9)$$

where $R_{i,t}$ is the stock returns of firm *i* for the annual period from nine months prior to the fiscal year-end through to three months after the fiscal year-end, as suggested by Ingram (1978), where $E_{i,t}$ is earnings-per-share of firm *i* at the end of fiscal period *t*, $P_{i,t-1}$ is the price-per-share at the end of fiscal period *t-1*, $fscore_{it}$ is Fortune's WMAC environmental reputation score for firm *i* for the year *t*, $DJSI_{i.t}$ is membership of the Dow Jones Sustainability Index (DJSI) for the period *t*, $ghg\text{-}intensity_{i,t}$ is the ratio of total sales revenues($M) dividend by greenhouse gases emission (tone) for firm *i* for the period *t*, $debt_{i,t}$ is the firm's ratio of total debt to total assets, $growth_{i,t}$ is measured as market value of equity divided by book value, $risk_{i,t}$ is a firm's systematic risk, measured by the market model and $VAR_{i,}$ is the standard deviation of earnings for the thirty-six quarters from 1999 to 2007.

The first two hypotheses were tested using market-based performance valuations, whilst the last one involved accounting-based performance valuation. Under the assumption that the corporate environmental performance measures provide investors with value relevant information, the empirical model followed Hassel et al. (2005) which is the empirical analogue of Ohlson's (1995) valuation model, which asserted that the firm value is related to accounting data and other information. The foundation model is as follows[5]:

$$MV_{it} + d_{it} = \beta_0 + \beta_1 BV_{it-1} + \beta_2 E_{it} + \beta_3 v_{it} + \varepsilon_{it}$$

Where MV_{it} is the market value of firm *i* for the period *t*, d_{it} is the dividend of firm *i* for the period *t*, $MV_{it} + d_{it}$ is the cum-dividend adjusted market value, BV_{it-1} is the closing book value of firm *i* at *t-1*, E_{it} is the current period's earning of firm *i* for the period *t*, and v_t indicates the other non-accounting information.

Then, the equation is divided by the beginning book value of each firm for regression of the cum-dividend market value on net income without the other information variables.

$$\frac{MV_{it} + d_{it}}{BV_{it-1}} = \beta_0 \frac{1}{BV_{it-1}} + \beta_1 + \beta_2 \frac{E_{it}}{BV_{it-1}} + \beta_3 v_{it} + \varepsilon_{it}$$

where all the other variables are as before. To control for size difference, the model is deflated by the beginning of book value of a firm. The constant term, β_1, which corresponds to the coefficient to book value, is expected to be positive and β_2, which is coefficient of earnings, is also expected to be positive. The non-financial

[5] This model can be expressed by substituting the definition of abnormal earnings (i.e. $AE_t = E_t - (R_f - 1)BV_{t-1}$,where AE_{it} is abnormal earnings of firm i for period t, E_{it} is earnings of firm *i* for period *t*, R_f is one plus the risk-free rate, and BV_{it} is the book value of firm *i* for the beginning of period *t*) from Ohlson's model (i.e. $MV_{it} = BV_{it} + \alpha_1 AE_{itt} + \alpha_2 v_{it}$), where all variables are defined as before. v_{it} is non-financial information. The model can be expressed as follows:

$$MV_{it} = BV_{it} + \alpha_1 E_{it} - \alpha_1 (R_f - 1) BV_{it-1} + \alpha_2 v_{it}$$

Then, after substituting the right-hand side of the clean surplus relation (i.e. $BV_{it}=BV_{it-1}+E_{it}-d_{it}$) into the above expression, it can be arranged as follows:

$$MV_{it} + d_{it} = (1 + \alpha_1) E_{it} + [1 - \alpha_1 (R_f - 1) BV_{it} + \alpha_2 v_{it}$$

This expression can be transformed into a regression equation, containing an intercept term and an error term for calculation as follows:

$$MV_{it} + d_{it} = \beta_0 + \beta_1 BV_{it-1} + \beta_2 E_{it} + \beta_3 v_{it} + \varepsilon_{it}$$

information variable is not deflated, because it is assumed to be independent of BV_{it-1} and E_{it}, following Hassel et al. (2005)

The other value relevance information, the regression models, which are presented as "per share" of variable are as follows:

$$\frac{P_{it} + DPS_{it}}{BVPS_{it-1}} = \beta_0 + \beta_1 \frac{1}{BVPS_{it-1}} + \beta_2 \frac{eps_{it}}{BVPS_{it-1}} + \varepsilon_{it} \qquad (model2.1)$$

$$\frac{P_{it} + DPS_{it}}{BVPS_{it-1}} = \beta_0 + \beta_1 \frac{1}{BVPS_{it-1}} + \beta_2 \frac{eps_{it}}{BVPS_{it-1}} + \beta_3 fscore_{it} + \varepsilon_{it} \qquad (model2.2)$$

$$\frac{P_{it} + DPS_{it}}{BPSV_{it-1}} = \beta_0 + \beta_1 \frac{1}{BVPS_{it-1}} + \beta_2 \frac{eps_{it}}{BVPS_{it-1}} + \beta_3 DJSI_{it} + \varepsilon_{it} \qquad (model2.3)$$

$$\frac{P_{it} + DPS_{it}}{BVPS_{it-1}} = \beta_0 + \beta_1 \frac{1}{BVPS_{it-1}} + \beta_2 \frac{eps_{it}}{BVPS_{it-1}} + \beta_3 ghg - intensity_{it} + \varepsilon_{it} \qquad (model2.4)$$

$$\frac{P_{it} + DPS_{it}}{BVPS_{it-1}} = \beta_0 + \beta_1 \frac{1}{BVPS_{it-1}} + \beta_2 \frac{eps_{it}}{BVPS_{it-1}} + \beta_3 fscore_{it} + \beta_4 DJSI_{it} + \varepsilon_{it} \ (model2.5)$$

$$\frac{P_{it} + DPS_{it}}{BVPS_{it-1}} = \beta_0 + \beta_1 \frac{1}{BVPS_{it-1}} + \beta_2 \frac{eps_{it}}{BVPS_{it-1}} + \beta_3 fscore_{it} + \beta_4 ghg - intensity_{it} + \varepsilon_{it} \qquad (model2.6)$$

$$\frac{P_{it} + DPS_{it}}{BVPS_{it-1}} = \beta_0 + \beta_1 \frac{1}{BVPS_{it-1}} + \beta_2 \frac{eps_{it}}{BVPS_{it-1}} + \beta_3 DJSI_{it} + \beta_4 ghg - intensity_{it} + \varepsilon_{it} \qquad (model2.7)$$

$$\frac{P_{it} + DPS_{it}}{BVPS_{it-1}} = \beta_0 + \beta_1 \frac{1}{BVPS_{it-1}} + \beta_2 \frac{eps_{it}}{BVPS_{it-1}} + \beta_3 fscore_{it} + \beta_4 DJSI_{it} + \beta_5 ghg - intensity_{it} + \varepsilon_{it} \qquad (model2.8)$$

$$\frac{P_{it} + DPS_{it}}{BVPS_{it-1}} = \beta_0 + \beta_1 \frac{1}{BVPS_{it-1}} + \beta_2 \frac{eps_{it}}{BVPS_{it-1}} + \beta_3 fscore_{it} + \beta_4 DJSI_{it} + \beta_5 ghg - intensity_{it} + \beta_6 ENV_i + \beta_7 fscore_{it} * ENV_i + \beta_8 DJSI_{it} * ENV_i + \beta_9 ghg - intensity_{it} * ENV_i + \varepsilon_{it} \qquad (model2.9)$$

where all the variables are as before. The variable, $BVPS_{it-1}$ is the book value per share for firm *i* at the beginning of fiscal period *t-1*. P_{it} is the price per share of firm *i* at the end of fiscal year *t* after three months, eps_{it} is earning per share of firm *i* at the end of fiscal year *t*, ENV_i, is a dummy variable that takes a value of one if the firm *i* was operating in an industry with significant environmental impact and zero otherwise. Note that the proxies for the corporate environmental performance measure are not deflated, because they are assumed to be independent of company size, following Hassel et al. (2005).

4.3. Empirical analysis and results

4.3.1 Market based measurement

Descriptive statistics and correlation analysis

Panel A of table 3 presents the two groups of descriptive statistics for the measures of environmental disclosure (i.e. DJSI or GRI) for the variables used in the empirical tests, which are provided both before and after each was subjected to earnings being deflated by using the beginning of share price. When checked to see whether there were any outlying observations which could have influenced the results of the analysis, the residuals of each regression model were often large and graphs (i.e. added-variable plot and leverage verse residual squared plot) also support their existence. Hence, it was decided to drop the outliers so as to apply the same analytical methodology in each model as used in Belkaoui's (2004) study. To see which observations are outliers and have large residuals in the regression analysis, some regression diagnostics were employed, including: added-variable plot (Stata commend: avplot), leverage verse residual squared plot (lvr2plot), normal probability plot (pnorm), normal quintile plot (qnorm). Visual inspection of the scatter plots was employed to identify outliers, with any that appeared being dropped, which sometimes involved omitting just one observation and at other times more than one. Subsequently, the regression and plots were rerun to look at how the outcome changed. This was continued until the results of graphical inspection showed that the observations were relatively spread and the line was smoother.

After this treatment was completed, in the case of the membership of the DJSI, the sample 310 firm-year observations for which all variables were available was reduced to 269 observations. The effect of post deflation earnings is most apparent in relation to growth opportunity and earnings variability, with the mean of the former changing from 4.3646 to 0.2284 and that for the latter from 2.0402 to 0.1362, whilst the medians changed from 3.1 to 0.1916 and from 1.4208 to 0.0764, respectively. Moreover, the standard deviations for these variables are all narrower under this condition. It should be noted that after this deflation treatment, when the correlations between the variables and the outcomes were calculated, that for corporate environmental reputation emerged as being too highly correlated to be a valid result.[6]

Panel B of table 3 shows a Pearson (Spearman) correlation matrix after all the explanatory variables are interacted with eps_{it}/P_{it-1}, except for corporate environmental reputation. The earnings are strongly correlated with other explanatory variables at the 1% level, with the exception being environmental reputation. Moreover, correlation between earnings and environmental disclosures, defined as membership of the DJSI, is significant (0.518) at the 1% level, suggesting that there is strong association between earnings and environmental disclosures. Further, a company with higher eco-efficiency ratio has higher earnings than a company with a lower one, as determined by the correlation between eps_{it}/P_{it-1} and physical performance (0.267).[7] The relationship between corporate environmental reputation and disclosure is negative and insignificant, which is inconsistent with findings by Hasseldine et al. (2005) and Cho et al. (2012). Interestingly, the ratio of the eco-efficient is negatively and significantly correlated (-0.199) with environmental reputation[8] at the 1% level, suggesting that companies with a higher reputation have a poorer eco-efficient ratio. However, this should be treated with caution as there is no clear explanation why this

[6] When the test for multicollinearity was carried out, the variance inflation factor (VIF) test showed that the earnings deflated by share price (eps_{it}/p_{it-1}) and its reputation scores ($fscore*eps_{it}/p_{it-1}$) were 22.73 and 19.57, respectively. Although the condition index, which is a measure of the degree of collinearity among the regression variables displays a maximum number 27.64 which is less than 30, this is considered as indicative of moderate to strong multicollinearity. That is, the figure for VIF was considered to be too high, when compared with those for the other variables. Thus, reputation was used without deflating earnings.

[7] The terms 'corporate physical performance' and 'eco-efficiency' are interchangeably used in this study and refer to the ratio of a company's total sales divided by its greenhouse gases emissions.

[8] To check the possible influence of deflating earnings, correlation analysis tests, both with and without this were carried out and compared. However, the same result of their being a negative and significant relationship between eco-efficient and environmental reputation (-0.1803) occurred in both cases.

is negative and the likelihood is that other unidentified factors are involved, rather than this being a valid result. Both leverage and the standard deviation of earnings per share show negative correlations (-0.119 and -0.129, respectively) with reputation at the 10 % level or better.

Panel C of table 3 presents the descriptive statistics when the sample companies have membership of the DJSI and the industry impacts (ENV_i). The latter category, the sample companies' industry was extracted from DataStream and then each firm was allocated into one of twelve sectors, following Brammer and Millington (2005), these being: business services, chemicals, construction, consumer products, engineering, finance, high technology, publishing, resources, retail, transportation, utilities. Among these sectors, the chemicals, resource extraction, and utilities sectors were defined as having high environmental impact, because they all involve intensive interaction with nature, whilst the others were categorised conversely. To test whether two group's means were significantly different, the parametric (ANOVA) and non-parametric (Mann Whitney's rank sum) tests were used.

Panel C of table 3 shows that there is no significant difference in the means between those listed on the DJSI and those who are not, although those for nearly all the variables are higher for the former than the latter. This could well be because, although the criteria for membership are quite stringent, unlike those for the FTSE4Good in the UK, the DJSI committee do not exclude firms on ethical grounds. Regarding environmental impact, the figures suggest that low level firms are more profitable and have higher growth opportunities than their counterparts. In addition, the former have higher earnings variability and higher systems risk and leverage, which is consistent with the study of Beaver et al. (1970). Moreover, whilst low environmental impact firms have lower environmental reputation, they have a higher eco-efficiency ratio and more are listed in the DJSI than high impact ones. Whereas Panel B of table 3 shows a negative correlation between reputation and environmental (i.e. physical) performance, Panel C also presents their relationship as acting in an opposite direction. That is, companies operating with high environmental impacts have higher reputation and lower environmental performance than their counterparts. One possible reason why the low environmental firms have lower levels of reputation,

but their environmental and financial performance is better, is because the higher impact firms are already at a stable stage regarding these aspects.

Although membership of the DJSI as a measure of the corporate environmental disclosures provides a subjective assessment and availability of environmental disclosures data for long time periods, it could still be the case that it has some limitations, such as unbalanced weighting of the three dimensions (i.e. economic 18%, environment 3%, and social 22% and the different weighting percentage of industry specific criteria in each dimension depending on the industry). Therefore, the Global Reporting Initiative (GRI) for 2000 was used as an alternative measure for disclosure, when the first sustainability reporting guidelines were released, up until 2007 and the variable was denoted a 1 when companies had adopted this guideline and 0 otherwise. The final firm-year observations dropped from 291 to 255 after the elimination of outliers.

The descriptive and correlation analysis show similar results in panel A and B, in table 3, except that GRI which is replaced as the measure of disclosures is positively significantly related to environmental reputation (0.154) at the 5% level, which is consistent with Toms (2002). Further, Panel C of table 3 shows that there is a significant difference in the means of environmental reputation between those adopting the GRI guidelines and those who do not, thus supporting the few extant studies in which it is claimed that companies providing extensive disclosure have higher CSR/environmental reputation (e.g. Hasseladine et al., 2005; Toms, 2002). However, those for market risk are not significantly different between two, contrasting with those of results when using membership of the DJSI as an environmental disclosure measure. Further, the results in panel C in table 3 reveal that there is significant difference in the means of environmental disclosure between companies operating with high environmental impacts and those who are not. That is, high polluting companies tend to adopt GRI guidelines when preparing environmental disclosures more than their counterparts.

Table 3. Descriptive statistics and correlation analysis

Panel A: Descriptive analysis: DJSI or GRI

	DJSI					GRI				
Variable	Mean	Standard Deviation	Median	Min	Max	Mean	Standard Deviation	Median	Min	Max
Return (R_{it})	0.1183	0.2691	0.1047	-0.7446	1.5806	0.1252	0.2641	0.1084	-0.7446	1.5806
Earnings (eps_{it})	2.8069	6.3128	1.5900	-4.2420	64.8820	2.78	6.4555	1.545	-4.242	64.882
Environ. Reputation ($fscore_{it}$)	6.4168	0.9395	6.4300	3.95	8.44	6.3901	0.9522	6.43	3.95	8.44
Environ. Disclosure ($djsi_{it}$ or gri_{it})	0.6431	0.4800	1	0	1	0.4824	0.5007	0	0	1
Physical Performance ($ghg\text{-}intensity_{it}$)	0.0210	0.0339	0.0133	0.0002	0.2717	0.0209	0.0348	0.0128	0.0002	0.2717
Leverage (lev_{it})	0.2569	0.1467	0.2432	0.0061	0.6826	0.2638	0.1516	0.2495	0.0061	0.6826
Risk ($risk_{it}$)	0.8944	0.5124	0.8281	-0.1037	2.2726	0.9185	0.5469	0.8366	-0.1037	2.7169
Growth opportunities ($growth_{it}$)	4.3646	5.9770	3.1000	0.8300	80.6600	4.2557	6.0932	2.99	0.72	80.66
Earnings variability (VAR_i)	2.0402	2.5239	1.4208	0.2528	23.3852	2.0451	2.5876	1.3807	0.2528	23.3852
Earnings interacted with:										
Earnings (eps_{it}/P_{it-1})	0.0583	0.0411	0.0550	-0.1400	0.2257	0.0582	0.0381	0.0558	-0.1404	0.192
Environ. Reputation ($fscore_{it}$)	6.4168	0.9395	6.4300	3.95	8.44	6.3901	0.9522	6.43	3.95	8.44
Environ. Disclosure $(djsi_{it}*eps_{it}/P_{it-1})$ or $(gri_{it}*eps_{it}/P_{it-1})$	0.0384	0.0404	0.0381	-0.1400	0.1920	0.0336	0.0406	0	0	0.1667
Physical Performance $(ghg\text{-}intensity_{it}*eps_{it}/P_{it-1})$	0.0013	0.0031	0.0005	-0.002	0.0252	0.0013	0.0031	0.0004	-0.0024	0.0252
Leverage $(lev_{it}*eps_{it}/P_{it-1})$	0.0135	0.0134	0.0113	-0.045	0.0761	0.0139	0.0141	0.0115	-0.0455	0.076
Risk $(risk_{it}*eps_{it}/P_{it-1})$	0.0524	0.0529	0.0397	-0.1702	0.2274	0.0556	0.0593	0.0401	-0.1702	0.3868
Growth opportunities $(growth_{it}*eps_{it}/P_{it-1})$	0.2284	0.2525	0.1916	-0.1796	3.0588	0.2254	0.2563	0.1855	-0.1796	3.0588
Earnings variability $(VAR_i*eps_{it}/P_{it-1})$	0.1362	0.2662	0.0764	-0.1962	2.6442	0.1347	0.2672	0.077	-0.1423	2.6442

Table 3 (continued)

Panel B: Correlation analysis: variables scaled by the beginning of the price other than environmental reputation

Variables	1	2	3	4	5	6	7	8	9
DJSI									
1. Return (R_{it})	1	0.4055***	-0.1490**	0.2819***	0.1214**	0.3208***	0.2653***	0.2822***	0.2728***
2. Earnings (eps_{it}/P_{it-1})	0.355***	1	-0.0729	0.4941***	0.3527***	0.5806***	0.7256***	0.5165***	0.7415***
3. Environ. Reputation ($fscore_{it}$)	-0.149**	-0.0136	1	-0.0145	-0.1684***	-0.1463**	-0.0281	0.1649***	-0.0624
4. Environ. Disclosures ($djsi_{it}*eps_{it}/P_{it-1}$)	0.280***	0.518***	-0.0116	1	0.2288***	0.2759***	0.4125***	0.2311***	0.3624***
5. Physical performance ($ghg\text{-}intensity_{it}*eps_{it}/P_{it-1}$)	0.0547	0.267***	-0.199***	0.282***	1	0.4572***	0.2723***	0.3458***	0.2492***
6. Leverage ($lev_{it}*eps_{it}/P_{it-1}$)	0.311***	0.632***	-0.119*	0.377***	0.376***	1	0.4065***	0.4239***	0.3238***
7. Risk ($risk_{it*}eps_{it}/P_{it-1}$)	0.280***	0.771***	-0.017	0.520***	0.431***	0.544***	1	0.1816***	0.6129***
8. Growth ($growth_{it}*eps_{it}/P_{it-1}$)	0.113*	0.288***	0.0896	0.0923	0.0314	0.317***	0.117*	1	0.4151***
9. VAR (VAR_i*eps_{it}/P_{it-1})	0.108*	0.438***	-0.129**	0.293***	0.0637	0.218***	0.444***	0.0809	1
GRI									
1. Return (R_{it})	1	0.4287***	-0.1283**	0.1963***	0.1464**	0.3396***	0.3023***	0.2761***	0.2720***
2. Earnings (eps_{it}/P_{it-1})	0.402***	1	-0.0545	0.5166***	0.3263***	0.5690***	0.5165***	0.7216***	0.7147***
3. Environ. Reputation ($fscore_{it}$)	-0.135**	0.0103	1	0.1415**	-0.1125*	-0.1432**	0.2124***	-0.0215	-0.0294
4. Environ. Disclosure ($gri_{it}*eps_{it}/P_{it-1}$)	0.149**	0.531***	0.154**	1	0.1941***	0.1678***	0.3162***	0.3389***	0.3603***
5. Physical Performance ($ghg\text{-}intensity_{it}*eps_{it}/P_{it-1}$)	0.0515	0.269***	-0.187***	0.165***	1	0.4002***	0.3640***	0.2243***	0.2565***
6. Leverage ($lev_{it}*eps_{i}t/P_{it-1}$)	0.374***	0.662***	-0.129**	0.203***	0.333***	1	0.4121***	0.4069***	0.2805***
7. Risk ($risk_{it} * eps_{it}/P_{it-1}$)	0.308***	0.740***	-0.0616	0.281***	0.352***	0.581***	1	0.1615***	0.4257***
8. Growth ($growth_{it}*epsit/P_{it-1}$)	0.109*	0.262***	0.109*	0.118*	0.0306	0.299***	0.0748	1	0.5741***
9. VAR (VAR_i*eps_{it}/P_{it-1})	0.0869	0.379***	-0.110*	0.161**	0.0604	0.174***	0.342***	0.0613	1

Table 3 (continued)

Panel C: Mean difference tests for independent samples by the membership of DJSI or GRI and industry impacts

	DJSI								GRI							
Variables	DJSI=0 N=96	DJSI=1 N=173	One-way ANOVA p-value	Mann Whitney p-value	ENV=0 N=161	ENV=1 N=108	One-way ANOVA p-value	Mann Whitney p-value	GRI=0 N=132	GRI=1 N=123	One-way ANOVA p-value	Mann Whitney p-value	ENV=0 N=161	ENV=1 N=94	One-way ANOVA p-value	Mann Whitney p-value
Annual-return (R_{it})	0.081	0.139	0.086	0.075	0.132	0.097	0.295	0.295	0.096	0.156	0.071	0.017	0.138	0.103	0.302	0.324
Earnings (eps_{it})	2.355	3.044	0.390	0.279	2.830	2.773	0.948	0.000	2.313	3.266	0.238	0.000	2.728	2.850	0.884	0.092
Environ. Reputation ($fscore_{it}$)	6.395	6.429	0.782	0.605	6.125	6.852	0.000	0.000	6.259	6.531	0.022	0.023	6.092	6.9	0.000	0.000
Environ. Disclosure ($djsi_{it}$) or (gri_{it})					0.677	0.593	0.158	0.157					0.404	0.617	0.001	0.001
Physical Performance ($ghg\text{-}intensity_{it}$)	0.018	0.023	0.326	0.736	0.030	0.008	0.000	0.000	0.175	0.246	0.105	0.194	0.028	0.008	0.000	0.000
Leverage (lev_{it})	0.283	0.242	0.029	0.068	0.306	0.184	0.000	0.000	0.296	0.230	0.001	0.001	0.315	0.176	0.000	0.000
Risk ($risk_{it}$)	0.816	0.938	0.061	0.049	0.960	0.797	0.010	0.008	0.939	0.897	0.537	0.413	0.980	0.814	0.019	0.019
Growth opportunities ($growth_{it}$)	5.253	3.872	0.069	0.694	4.456	4.229	0.761	0.008	4.886	3.579	0.087	0.151	4.363	4.072	0.714	0.011
Earnings variability (VAR_i)	1.711	2.223	0.111	0.971	2.207	1.792	0.188	0.027	2.154	1.928	0.487	0.596	2.145	1.875	0.423	0.000

Note: Annual returns are measured for the 12 month period from nine months prior to the fiscal year-end through to three months after the fiscal year-end. Earnings are the accounting earnings per share. Environmental reputation ($fscore_{it}$) is measured by the Fortune Magazine score. Environmental disclosures (DJSI or GRI) are measured by membership of the Dow Jones Sustainability Index ($djsi_{it}$) and as the statute of the Global Reporting Initiative (gri_{it}) guidelines, respectively. Environmental performance (ghg-intensityi$_t$) is measured by the ratio of total sales to total greenhouse gases emissions. Leverage (Lev_{it}) is measured by the ratio of total debt to total assets. Risk ($risk_{it}$) is measured by the market model beta. Growth opportunity ($growth_{it}$) is measured as the ratio of a firm's market value to book value. Earnings variability (VAR_{it}) is measured as the standard deviation of earnings per share for the 36 quarters from1999 to 2007. Price (P) is the stock price at the beginning of the fiscal period. Environmental impact (ENV) equals 1 if the firm operated in an industry with high significant environmental impact and 0 otherwise. Superscripts *, **, *** denote statistical significance at the 10%, 5% and 1% levels, respectively. The top of right half of the correlation matrix above the main diagonal provides the non-parametric spearman correlation estimations. A total of 269 (DJSI) and 255 (GRI) observations were used after dropping outliers from 1999-2007 and 2000-2007 fiscal years, respectively.

4.3.2 Regression analysis

Preliminary analysis of environmental performances and earnings

Preliminary analysis has the function of determining whether earnings can be treated as an explanatory variable for returns in this study and table 4 presents this evidence. The variables, corporate environmental reputation and physical performance are divided into three groups, whereas membership of the DJSI or GRI, obviously, is binary in form. As the first part of the analysis, correlations between earnings and returns were examined for the entire sample size of 269 for the case of the DJSI and 255 for the GRI, the number of observations being based on model 1.9.[9] The last row of table 4, column 3, presents the results, where in can be seen that similar to a study by Belkaoui (2004), the correlation between earnings and returns is positive and significant related at the 5% level or better for all the variables in both cases. However, the relationship between earnings and returns is inconsistent, except for that regarding membership of the DJSI and also, this is significant at the 5% level or better.

Turning to the different levels of the environmental reputation, the results in panel A show that earnings are more highly and significantly (0.6080) related to returns for the lowest category than for the other two levels. This is not consistent with the findings of Belkaoui (2004), which showed that the correlation between earnings and returns is strongly positively linked with the level of the corporate social responsibility reputation. Similarly, the findings in panel B illustrate that the link between the two is highly associated at the lowest level of environmental reputation. One possible reason for these different outcomes could be because the AMAC has been compiled for substantially more time than the WMAC and therefore, investors and the public are more aware of the impact of reputation on financial performance. By contrast, because the WMAC covers a whole range of industrial cultures across the world and the data has only been collected since 1997, reputation has not been established as such an important economic matter as in the US.

[9] So as to compare each variable identified as a measure of the environmental performance under same circumstances, the common sample size imposed was that for model1.9. When the same procedure was conducted for each variable for the different models, the results showed the same patterns as above and all correlations between earnings and returns as well as earnings coefficients being significant at the 5% level or better.

In addition, whilst the results in panel A of table 4 show that the strength of relations between earnings and returns increases with membership of the DJSI, those in panel B report the link between the two decreases from maximum (0.4795) to minimum (0.1870) as using the GRI guidelines. The results are inconsistent with the findings from some studies, which claimed that expanded environmental disclosures are likely to be used by investors to better assess a firm's earnings perspectives and reduce implied uncertainty (e.g. Cormier and Magnan, 2007; Healy et al., 1999). In other words, the findings in panel B seem to indicate that a firm with expanded disclosures tends to have lower earnings than those who have not. The possible explanation for the difference in the outcomes regarding the link between earnings and returns in panel A and B can be drawn from the level of media exposure (Aerts et al., 2008; Cormier et al., 2011; Cormier and Magnan, 2003). In particular, Cormier et al. (2011) noted the importance of how companies efficiently convey the CSR information. In this regard, membership of the DJSI, which is announced annually, may be a quick way of conveying a company's expanded environmental disclosure to investors rather than the GRI guidelines. However, more environmental disclosure is not necessarily a reflection of better environmental performance (Delmas and Bless, 2010) and hence, the reasons for this clearly needs fleshing out further.

With respect physical performance, the results from the panel A and B report same pattern of relationship between returns and earnings on the level of eco-efficiency ratios, that is, the earnings are highly related with the returns at a low level more than a high one, which is counterintuitive to what was expected. That is, the link between the two in the middle group is significantly higher (0.3690 in panel A and 0.4483 in B) than that of the other groups, and that of the lower group is significantly lower than that of middle group (0.3454 in panel A and 0.4370 in panel B). These outcomes lend support, Brammer and Millington's recent study (2008) that there is likely to be a non-liner relationship between CSR and financial performance. In relation to the management strategy perspective, they stated that the improvement in CSR performance, which is associated with effective management of the stakeholder relationship, will enhance financial performance, but if the scope CSR is outstrips stakeholder demand, then improvement in CSR will be associated with diminished financial performance. Therefore, the evidence provided by panel A and B could the

existence of a possible non-linear relationship between CSR and financial performance.

Adopting Belkaoui's assumption that there is possible non-linearity within the data, in particular because of the results for the earnings and returns correlation analysis, the same groups were regressed on returns on earnings, individually being run for each of the three or two measures of environmental performances. These regressions do not impose a constant residual variance assumption across each measure of environmental performance (see Belkaoui (2004) p.128 for details). The earnings coefficient from these regressions is presented in column 4 of table 4 and except for environmental disclosure and physical performance in panel A there is a non-monotonic increase in these coefficients as each measure of environmental performance increases. However, the results pattern for reputation is similar to that of the correlation relationship between earnings and returns. That is, the earnings coefficient from 3.95-5.63 to 6.50-8.44 decreases 4.2598 to 2.0527, which is more than 50 percent, but as for the correlation analysis, the middle category between 5.64 and 6.49 is even lower at 1.1995. Moreover, in general the evidence shows that the level of knowledge of earnings regarding the level of environmental performance is significantly related at least at the 5% level or better for all categories, but this requires further investigation.

Table 4. Relation between earnings and returns according to the level of environmental performance

Panel A. DJSI from 1999-2007

Level of environmental performance	Number of firm period observations	Correlation between earnings and returns	Earnings coefficient
Environmental reputation			
3.95-5.63	56	0.6080***	4.2598***
5.64-6.49	89	0.2106**	1.1995**
6.50-8.44	124	0.2963***	2.0527***
3.95-8.44	269	0.3550***	2.3224***
Environmental disclosures			
0	96	0.3316***	1.8648***
1	173	0.3759***	2.7672***
overall	269	0.3550***	2.3224***
Physical performance			
0.0002-0.0050	88	0.3454***	1.7757***
0.0051-0.0184	96	0.3690***	2.5909***
0.0185-0.2717	85	0.3579**	3.1916***
0.0002-0.2717	269	0.3550***	2.3224***

Panel B. GRI from 2000-2007

Level of environmental performance	Number of firm period observations	Correlation between earnings and returns	Earnings coefficient
Environmental reputation			
3.95-5.57	57	0.5726***	4.3657***
5.58-6.47	78	0.4181***	2.7205***
6.48-8.44	120	0.2534***	1.6883***
3.95-8.44	255	0.4020***	2.7848***
Environmental disclosures			
0	132	0.4795***	3.5289***
1	123	0.1870**	1.2803**
overall	255	0.4020***	2.7848***
Physical performance			
0.0002-0.0046	86	0.4370***	2.5001***
0.0047 -0.0183	87	0.4483***	3.4497***
0.0184-0.2717	82	0.3710***	3.2603***
0.0002-0.2717	255	0.4020***	2.7848***

Note: All correlations (Pearson) are between annual earnings per share and annual returns, and the earnings coefficients from the regression of annual return on earnings per share are significant at the 0.05 level or better (i.e. * p<0.1, ** p<0.05, *** p<0.01). Annual returns are measured for the twelve-month period extending from nine months prior to the fiscal year-end through to three months after the fiscal year-end, earnings per share is scaled by using the beginning of period stock price, and the corporate environmental reputation figures are Fortune Magazine's WMAC scores. Membership of the DJSI and GRI is defined as 1 if companies are members of the index or have adopted the GRI guidelines and otherwise 0, and the GHG-intensity is measured by the ratio of a firm's sales divided by its greenhouse gases emissions. The sample of annual earnings reports are drawn from the nine-year period corresponding to the 1999-2007 fiscal years in panel A and the eight-year period, from the 2000-2007 fiscal years in panel B.

The corporate environmental performance measures and other determinants of earnings' explanatory power

Depicted in table 4, the corporate environmental performance measures are one set of determinants of the information on earnings. Next, for a more comprehensive examination of these outcomes, tests of earnings conditional on the corporate environmental performance measures and accounting performance variables were conducted, the results of which are presented in table 5. For each of the models 1.1 to 1.9, after regressing the variables any outliers were removed, which in some cases led to large drops in sample size when the model included the corporate physical performance measured as total sales divided by the emission of greenhouse gases, because of there being so much missing data. So as to be able to compare the results derived from the Belkaoui (2004) study, the dependent variable is the annual returns, which is measured for the twelve-month period extending from nine months prior to the fiscal year-end through to three months after the fiscal year-end, adjusted for dividends. This measure for the returns (i.e. annual or abnormal return) is often used in empirical tests, because its period (i.e. from 9 months prior to 3 months after the fiscal year-end) approximately corresponds to the period between earnings announcements (e.g. for example Belkaoui, 2004; Easton and Harris, 1991; Ingram, 1978). Subsequent to the above analysis, and in the light of any possible unobserved relationship between the returns and the corporate environmental performance, it was decided that a further set of tests should be undertaken using monthly share price data spanning the period from nine months before the company's financial year end to three months following it.[10] The abnormal returns as a dependent variable are conducted by using model1.9 and subsequently reporting this as model1.9B in table 5. Moreover, after adding the environmental impact variable to the latter model this becomes model1.9C.

[10] As a further another test, panel data analysis was proceeded with. Regarding this, Baltagi (2005) pointed out the advantages of using panel data rather than OLS, include: obtaining more informative data, more variability, less collinearity among the variables and being able to control for individual heterogeneity. Therefore, to decide which of the two models (fixed or random effects) is more appropriate for panel regression, the Hausman test (i.e. Stata command: hausman fe re) and then the Breusch-Pagan Lagrange Multiplier test for random effects (xttest0) statistics was conducted to see whether the random effects estimator is consistent. The result suggests that the OLS regression is appropriate in this study and thus, the table presents this. That is, even though the Hausman test clearly selects the random effects, the Breusch-Pagan test (xttest0) shows that $\sigma^2_u = 0$ is not rejected.

Table 5 presents the results of the regressions, comprising: parameter estimates, t-statistics estimated using White's (1980) standard error from the pooled ordinary least squares (OLS) regression, adjusted R^2s, F-values, and sample size. Panel A of table 5 reports the results of the regression of earnings on returns using members of the DJSI for the period 1999 to 2007 and panel B does the same using the GRI guidelines as the corporate environmental disclosures for 2000 to 2007. Consistent with a prior accounting research returns on earnings (e.g. Easton and Harris, 1991), the results in model1.1 indicate that contemporaneous earnings explain a relatively small fraction of returns. For example, even though the earnings coefficient is strongly and significantly related to returns, the adjusted R^2 is relatively low at 7.9%, when compared with the other models, the exception to this being model 1.3. Next, three models, 1.2, 1.3 and 1.4, provide evidence on the existence or not of a link between return on earnings and corporate environmental performance variables, by including three identified variables: corporate environmental reputation, environmental disclosures, and physical performance. The next four models, 1.5 through to 1.8, present the results of regression by including two environmental performance variables in each model and the latter using them all together. Finally, model1.9 shows the results of regression with the inclusion of other accounting variables (i.e. leverage, market-to-book value, risk, and earnings variability). As shown in table 5, there is an improvement in the adjusted R^2 by including corporate environmental performance, for which the highest explanatory power of 21.2% is obtained for model1.8. As expected, the coefficient (β_1) for earnings is positive and significant at the 10% level or better, in all cases, except for model 1.9C.

Table 5. Regression of returns on earning-environmental performance measures, and earnings interaction with other determinant variables

Panel A. regression of returns on earnings: DJSI, 1999-2007[11]

Model	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.9A	1.9B	1.9C
Variables	Dependent variable: Annual Returns										Abnormal Returns	
EPS_{it}/P_{it-1} (β_1)	1.521***	2.233***	1.173***	2.856***	1.666***	2.588***	2.561***	2.489***	1.459**	1.746**	0.091**	0.076
	(6.56)	(7.26)	(4.74)	(5.99)	(7.86)	(4.87)	(4.62)	(4.53)	(2.25)	(2.31)	(1.99)	(1.46)
$fscore_{it}$ (β_2)		-0.039***			-0.040***	-0.052***		-0.050***	-0.050***	-0.043**	-0.01***	-0.01***
		(-3.13)			(-3.39)	(-3.13)		(-3.20)	(-2.88)	(-2.41)	(-4.08)	(-4.28)
$DJSI_{it}$ * EPS_{it}/P_{it-1} (β_3)			0.661**		0.473		0.833	0.936*	1.008*	0.976*	0.029	0.032
			(2.24)		(1.62)		(1.58)	(1.83)	(1.88)	(1.79)	(0.76)	(0.85)
ghg-intensity * EPS_{it}/P_{it-1} (β_4)				3.84		0.871	2.571	-0.894	-13.528***	-14.489***	-0.848*	-0.799*
				(0.58)		(0.13)	(0.37)	(-0.13)	(-2.65)	(-2.77)	(-1.94)	(-1.78)
$Leverage_{it}$ * EPS_{it}/P_{it-1} (β_5)									2.687	2.117	0.245**	0.278**
									(1.57)	(1.05)	(2.11)	(2.16)
$MTBV_{it}$ * EPS_{it}/P_{it-1} (β_6)									0.015	0.011	0.002	0.002
									(0.34)	(0.26)	(0.58)	(0.68)
$Risk_{it}$ * EPS_{it}/P_{it-1} (β_7)									0.333	0.315		
									(0.61)	(0.58)		
Earnings variability * EPS_{it}/P_{it-1} (β_8)									-0.107**	-0.115**	-0.018***	-0.017***
									(-2.04)	(-2.09)	(-3.04)	(-2.93)
ENV_i (β_9)										-0.042		0.003
										(-1.00)		(0.84)
_cons (β_0)	0.053***	0.249***	0.041**	-0.051*	0.270***	0.305***	-0.065*	0.259***	0.288***	0.258**	0.028***	0.030***
	(3.37)	(3.15)	(2.43)	(-1.69)	(3.51)	(2.94)	(-1.96)	(2.66)	(2.78)	(2.51)	(3.39)	(3.62)
N	1029	957	948	299	948	279	292	292	269	269	255	255
Adj. R^2	0.079	0.111	0.067	0.184	0.101	0.175	0.189	0.212	0.164	0.165	0.119	0.118
F-value	43.064***	28.939***	21.945***	19.939***	32.148***	9.848***	12.788***	10.141***	3.975***	3.846***	4.915***	4.521***

Table 5 (continued)

Panel A-1: regression of returns on earnings, including regional and/or industry effects: DJSI, 1999-2007[11]

	Model 1.9			Model 1.9B		
Variables/dependent variables	Annual Returns			Abnormal Returns		
EPS_{it} /P_{it-1} (β_1)	1.543**	1.575	1.527	0.091*	0.041	0.029
	(2.29)	(1.47)	(1.1)	(1.95)	(0.62)	(0.43)
$fscore_{it}$ (β_2)	-0.034*	-0.052*	-0.043*	-0.005***	-0.007***	-0.007***
	(-1.85)	(-1.97)	(-1.74)	(-3.46)	(-4.42)	(-3.96)
$DJSI_{it}$*EPS_{it} /P_{it-1} (β_3)	0.856	0.719	0.329	0.013	0.046	0.029
	(1.21)	(1.23)	(0.42)	(0.29)	(1.12)	(0.52)
ghg-intensity*EPS_{it} /P_{it-1} (β_4)	-13.412***	-10.221	-8.926	-0.868**	0.218	0.563
	(-2.62)	(-0.99)	(-0.81)	(-2.05)	(0.23)	(0.55)
$Leverage_{it}$ * EPS_{it} /P_{it-1} (β_5)	2.85	2.157	2.735	0.241**	0.26	0.314
	(1.64)	(0.79)	(0.89)	(2.02)	(1.43)	(1.65)
$MTBV_{it}$ * EPS_{it} /P_{it-1} (β_6)	0.04	-0.008	0.017	0.002	-0.000	0.002
	(0.73)	(-0.14)	(0.26)	(0.67)	(-0.01)	(0.46)
Risk * EPS_{it} /P_{it-1} (β_7)	0.33	0.368	0.349			
	(0.58)	(0.46)	(0.4)			
Earnings variability * EPS_{it} /P_{it-1} (β_8)	-0.119**	-0.07	-0.076	-0.017***	-0.015**	-0.016**
	(-2.04)	(-1.36)	(-1.39)	(-2.86)	(-2.35)	(-2.46)
_cons (β_0)	0.228**	0.291	0.283	0.026***	0.050***	0.053***
	(2.12)	(1.4)	(1.08)	(3.09)	(3.7)	(3.45)
Industry effects	No	Yes	Yes	No	Yes	Yes
Region effects	Yes	No	Yes	Yes	No	Yes
N	269	269	269	255	255	255
Adj. R^2	0.165	0.171	0.169	0.115	0.098	0.1
F-value	3.441***	2.325***	2.300***	4.157***	2.147***	2.031***

[11] Although the data have been thoroughly examined to see whether any observations could have influenced the outcome of regression by using regression diagnostics, the normality test indicated that the residuals are not normally distributed. Hence, the full observations were rechecked using inter-quartile range (iqr), which reported outliers with reference to the residuals which are either 3 inter-quartile-ranges below the first quartile or 3 inter-quartile ranges above the third quartile (see more details at www.ata.ucla.edu/stat/stata/webbooks/reg/chapter2/ststsreg2.htm) until the statistical test (i.e. sktest) reported that the residuals of regression are normal. When comparing the outcomes of regression when the residuals are normal with those in panel A and A-1 of table 5, the regression results are consistent with those in table 5, except for the $DJSI_{it}$*EPS_{it}/P_{it-1} variable in panel A, which become insignificant.

Table 5 (continued)

Panel B. Regression of returns on earnings: GRI, 2000-2007[12]

Model	1.1A	1.2A	1.3A	1.4A	1.5A	1.6A	1.7A	1.8A	1.9A	1.9AB	1.9AC	1.9AD
Variables	Dependent variable: Annual Returns										Abnormal Returns	
EPS_{it}/P_{it-1} (β_1)	1.508***	2.301***	2.263***	2.771***	2.233***	2.518***	3.620***	3.518***	2.502**	2.767**	0.069	0.065
	(6.78)	(8.01)	(5.2)	(5.82)	(4.91)	(4.73)	(4.7)	(4.72)	(2.31)	(2.43)	(1.23)	(1.12)
$fscore_{it}$ (β_2)		-0.033**			-0.035**	-0.051***		-0.049***	-0.040**	-0.033*	-0.004***	-0.004**
		(-2.64)			(-2.18)	(-2.99)		(-3.12)	(-2.43)	(-1.90)	(-2.68)	(-2.46)
$GRI_{it}*EPS_{it}/P_{it-1}$ (β_3)			0.235		-0.028		-0.507	-0.328	-0.151	-0.100	0.025	0.024
			(0.58)		(-0.06)		(-0.97)	(-0.65)	(-0.28)	(-0.19)	(0.71)	(0.69)
ghg-intensity*EPS_{it}/P_{it-1} (β_4)				4.102		1.402	2.484	-0.906	-10.572**	-11.586**	-1.013***	-0.995***
				(0.62)		(0.21)	(0.39)	(-0.14)	(-2.26)	(-2.46)	(-3.87)	(-3.81)
$Leverage_{it} * EPS_{it}/P_{it-1}$ (β_5)									3.269**	2.656	0.118	0.128
									(1.99)	(1.38)	(0.96)	(0.89)
$MTBV_{it} * EPS_{it}/P_{it-1}$ (β_6)									-0.011	-0.014	0.001	0.001
									(-0.28)	(-0.34)	(0.37)	(0.38)
Risk * EPS_{it}/P_{it-1} (β_7)									0.058	0.046		
									(0.14)	(0.11)		
Earnings variability * EPS_{it}/P_{it-} (β_8)									-0.088*	-0.095*	-0.015***	-0.015**
									(-1.78)	(-1.86)	(-2.60)	(-2.56)
ENV_i (β_9)										-0.042		0.001
										(-1.05)		(0.21)
_cons (β_0)	0.037**	0.192**	-0.022	-0.046	0.207**	0.298***	-0.071*	0.249***	0.219**	0.189*	0.023***	0.024***
	(2.29)	(2.33)	(-0.91)	(-1.53)	(2.07)	(2.84)	(-1.84)	(2.59)	(2.30)	(1.93)	(2.7)	(2.61)
N	920	856	472	291	464	272	269	269	255	255	255	255
Adj. R^2	0.090	0.125	0.103	0.185	0.119	0.176	0.198	0.222	0.189	0.19	0.056	0.052
F-value	46.029***	36.924***	26.453***	18.889***	11.091***	9.217***	11.771***	9.255***	4.844***	5.023***	3.498***	3.130***

Table 5 (continued)

Panel B-1. Regression of returns on earnings, including regional and/or industry effects: GRI, 2000-2007[12]

	Model1.9A			Modle1.9AC		
Variables/Dependent variable	Annual Returns			Abnormal Returns		
EPS_{it} / P_{it-1} (β_1)	2.407**	2.118	1.801	0.062	0.031	0.01
	(2.25)	(1.61)	(1.23)	(1.08)	(0.43)	(0.14)
$fscore_{it}$ (β_2)	-0.022	-0.054*	-0.043	-0.003**	-0.005**	-0.005*
	(-1.24)	(-1.86)	(-1.62)	(-2.07)	(-2.06)	(-1.96)
GRI_{it}*EPS_{it} / P_{it-1} (β_3)	-0.12	0.236	0.2	0.017	0.022	0.021
	(-0.23)	(0.48)	(0.4)	(0.48)	(0.63)	(0.58)
ghg-intensity*EPS_{it} / P_{it-1} (β_4)	-10.824**	-12.696	-12.088	-1.035***	-0.814	-0.741
	(-2.30)	(-1.34)	(-1.18)	(-3.97)	(-1.34)	(-1.07)
$Leverage_{it}$ * EPS_{it} / P_{it-1} (β_5)	3.454**	3.145	3.807	0.107	0.191	0.234
	(2.06)	(1.16)	(1.29)	(0.85)	(1.01)	(1.09)
$MTBV_{it}$ * EPS_{it} / P_{it-1} (β_6)	0.018	-0.035	-0.013	0.002	-0.004	-0.003
	(0.37)	(-0.67)	(-0.23)	(0.52)	(-0.73)	(-0.53)
Risk * EPS_{it} / P_{it-1} (β_7)	0.085	0.306	0.3			
	(0.21)	(0.55)	(0.47)			
Earnings variability * EPS_{it} / P_{it-1} (β_8)	-0.100*	-0.077	-0.087*	-0.015**	-0.013**	-0.014**
	(-1.84)	(-1.58)	(-1.71)	(-2.44)	(-2.09)	(-2.19)
_cons (β_0)	0.149	0.274	0.261	0.019**	0.039**	0.039**
	(1.45)	(1.31)	(1.08)	(2.15)	(2.22)	(2.06)
Industry effects	No	Yes	Yes	No	Yes	Yes
Region effects	Yes	No	Yes	Yes	No	Yes
N	255	255	255	255	255	255
Adj. R^2	0.192	0.21	0.21	0.055	0.02	0.016
F-value	3.835***	2.833***	2.746***	3.100***	1.635**	1.586**

[12] Although the data have been thoroughly examined to see whether any observations could have influenced the outcome of regression by using regression diagnostics, the normality test indicated that the residuals are not normally distributed. Hence, the full observations were rechecked using inter-quartile range (iqr), which reported outliers with reference to the residuals which are either 3 inter-quartile-ranges below the first quartile or 3 inter-quartile ranges above the third quartile (see more details at www.ata.ucla.edu/stat/stata/webbooks/reg/chapter2/ststsreg2.htm) until the statistical test (i.e. sktest) reported that the residuals of regression are normal. When comparing the outcomes of regression when the residuals are normal with those in panel B and B-1 of table 5, the outcomes are also consistent with those in table 5, except for the leverage variable ($Leverage_{it}$ * EPS_{it} / P_{it-1}), which becomes significant at the 10% level.

Note: Annual returns are measured for the 12 months period from nine months prior to the fiscal year-end through to three months after the fiscal year-end. Earnings are the accounting earnings per share. Abnormal returns are the average of monthly abnormal returns. The data in Model1.9A did not interact with earnings deflated by the beginning of share price. Environmental reputation (fscore) is measured using the Fortune Magazine score. Environmental disclosures (DJSI or GRI) are measured by membership of the Dow Jones Sustainability Index (DJSI) and use of the GRI guidelines. Environmental performance (ghg-intensity) is measured by the ratio of total sales to total greenhouse gases emission. Leverage (Lev) is measured by the ratio of total debt to total assets. Risk (risk) is measured by the market model beta. Growth opportunity (growth) is measured as the ratio of a firm's market value to book value. Earnings variability (VAR) is measured as the standard deviation of earnings per share for the 36 quarters of 1999 to 2007. Price (P) is the stock price at the beginning of the fiscal period. Environmental impacts (ENV_i) equal 1 if the firm operated in an industry with high significant environmental impacts and 0 otherwise. Superscripts *, **, *** denote statistical significance at the 0.1, 0.05, and 0.01 levels, respectively. T-statistics (in Parentheses) are estimated using White's (1980) standard error as measured during the regression. Sample size varies depending on the model and each model has been checked for outliers. The sample comprises firm-year observations drawn from the 1999 to 2007 fiscal years for the DJSI and from 2000 to 2007 for the GRI.

The coefficient (β_2) of environmental reputation in panel A of table 5, taken from Fortune Magazine data, is negative and significant for all models, which is inconsistent with prior research. More specifically, in contrast to Belkaoui's (2004) findings, it can be seen that the estimates for this coefficient range from -0.039 to -0.050 in model 1.2 - model 1.9A, which is reliably significant at the 5% level or better for all the models. Compared to the other environmental performance measures, the coefficient of reputation is stably significant even though its disclosures become diminished by a significant level when other explanatory variables are included. As in previous studies, it has rarely been attempted to find the relationship, if any, between the corporate environmental performance measures and earnings as an explanatory variable for returns, it is hard to give clear reasons why the evidence here indicates that environmental reputation is negatively related to returns (Hussainey and Salama, 2010). One possible reason for these different outcomes could be that companies with higher reputation are already in stable profitability so that investors' expectations may not be incrementally increased compared to those with a lower reputation. Roberts and Dowling (2002) empirically showed that better performing companies have more chance of sustaining high performance levels when they have a relatively good reputation and that below average performing companies heavily influenced their reputation. Moreover, companies with higher reputation may have small volatility on share price than those with low reputation.

The disclosure coefficient (β_3) in model 1.3 of panel A shows that the effect of earnings on returns is positively related to membership of the DJSI and from this it can be inferred that in turn, the level of disclosures is also linked to returns, because of the threshold required when qualifying to join the index. The β_3 parameter measures the relation between the corporate environmental disclosures and earnings and reflects the extent to which the information on earnings is affected by the quality of disclosures. Hence, the equation of model1.3 can be expressed with $\beta_1 + \beta_3 DJSI_{it}$ in terms of earnings (i.e. differentiate model1.3 with respect to eps_{it}/P_{it-1}). The regressed result reveals that, the effect of earnings on returns is $1.173+0.661DJSI_{it}$, for members, which is significantly greater than zero at the 5% level. Further, models 1.8 to 1.9A of panel A in table 5 show that the effect of earnings on returns appears (i.e. is significant at the 10% level) to depend on the level of disclosures. These outcomes are similar to those found in previous studies related to market reaction to disclosing environmental information (e.g. Belkaoui, 1976; Healy et al, 1999; Jaggi and Freedman, 1982).[13]

Unlike for disclosure, the environmental performance coefficient (β_4) in Panel A of table 5 is insignificant until model1.8, whereas in model 1.9 it is significantly negative at the 1% level, which is at variance with extant literatures on the effects of pollution control on company performance (e.g. Spicer, 1978a and 1978b; Stanwick and Stanwick, 1998b). That is, in contrast to these authors the result suggests that the earnings on returns are negatively affected by the level of the corporate physical performance, but this may not be a linear relationship. Even though other determinant variables report the same signs as predicted, there is no evidence regarding the relationship between other accounting variables and returns (i.e. insignificant) other than earnings variability, which is significantly negative at the 5% level. Model 1.9A extends Model1.9 by including the control variable, environmental impacts (ENV_i), defined as being 1 if a firm was operating in an industry with significant environmental impact and 0 otherwise and its purpose is to test whether any industry type effects exist. The results suggest that operating in an environmentally sensitive industry is not associated with a lower corporate return.

[13] The outcomes of regression when the residuals are normally distributed show that the effect of earnings on returns does not appear to depend on the level of disclosures.

Some researchers have emphasized that the risk of equity should be considered when the security's return is measured (e.g. Alexander and Buchholz, 1978; Cochran and Wood, 1984). Thus, the security's risk measured by using the market model was undertaken in the measure of its abnormal return and the results are presented in model 1.9B and model 1.9C, which is an extension of model 1.9B by including the control variable (i.e. ENV_i). The estimations of an individual security's systematic risk β_i were removed from the explanatory variables and then used to calculate the abnormal returns. In this regard, an individual security's abnormal returns, which are excess returns to the market portfolio returns, are the sum of the abnormal returns over twelve months beginning with nine months prior to the fiscal year-end through to three months after. The explanatory power of earnings-returns (adjusted R^2) has slightly dropped to 0.119 and the sample size has also fallen, to 255. The negative relationship between the returns and the corporate environmental reputation is robust when systematic risk is removed in both cases, whereas physical performance ($ghg\text{-}intensity_{it}$) changes acts to lessen the negative significant level. In fact, the coefficient of performance in model 1.9C is not much different to that in model 1.8, although the coefficient of leverage (total debt/total assets), which is usually termed accounting risk, turns out to be significantly greater than zero at 5% level. Like model 1.9A, model 1.9C extends the analysis further by including the industry type effect and the results show that there is not much significantly different to model 1.9B, except for the explanatory power of earnings in relation to returns diminishing, whereas when compared with model 1.9A the sign of the control variable (ENV_i) changes to positive. This evidence indicates that companies operating in an environmentally sensitive industry are more likely to experience systematic risk than their counterparts.

Regarding this, Spicer (1978a) argued that companies' environmental performance conveys some relevant information to investors for judging the riskiness of their equity, in the case of polluting industries. To examine whether the effect of systematic risk on these two aspects of environmental performance (i.e. reputation ($fscore_{it}$) and eco-efficiency ($ghg\text{-}intensity_{it}$)) existed during the sample period, a simple statistical analysis, t-test, was conducted to determine whether the mean performance in low risk firms (i.e. $\beta<=1$) is significantly greater than that in high risk ones (i.e. $\beta>1$). The results show that there is no significant difference in the means for reputation, as these are: 6.4653 for low risk firms and 6.3375 for high risk ones. However, there is a significant difference in the environmental performance "eco-efficiency"

means, these being: 0.0009 for low risk firms and 0.0021 high risk ones. This evidence suggests that high risk companies have better environmental performance (i.e. higher ratio of eco-efficiency) than their counterparts. These results can be explained by drawing on Orlitzky and Benjamin's (2001) contention that companies with higher risk have a greater incentive to increase their investment in environmental performance than those with low risk, without causing negative financial effects by market reaction, because the market will not punish them in ways that would make their risk exposure greater. By contrast, as a matter of fact, the better environmental performance will reduce business risk and further, low-risk companies will be motivated to increase their investment in environmental performance.

In addition, to explore the issue of whether the impact of the environmental performance measures on equity performance varies across different industry sectors and/or regions, model 1.9 is extended by including the dummy variables for each primary four-digit Industrial Classification Benchmark (ICB) and/or for each region, which is categorized into 3 groups: the Americas, Europe, and Asia and others, allocation depending on where a company is domiciled and Asia and others is the omitted category in the regression. The results are presented in panel A-1 in table 5. Model 1.9 with region effects shows that environmental reputation and physical performance are negatively significantly different from the zero, which is similar to model 1.9 without region effects. However, when including industry effects, most of the results, notably, turn to being insignificant, except for environmental reputation, reporting that it is negatively significant at the 10% level. Repeating the analysis, including an indicators variable to control for region and industry effects, yields the same results. Further, when using abnormal returns as a dependent variable, the outcomes from model 1.9B in panel A-1 show a similar pattern, except for earnings variability, which is negatively significant at the 5% level or better across industries and regions. Regarding the industry effects, the findings (i.e. no significant effects) are similar to those reported by Al-Tuwaijri et al. (2004) and Brammer et al. (2006). That is, the results here point to the existence of industry specific unobserved heterogeneous variables having different impacts on environmental performance. Therefore, the outcomes for the Breusch-Pagan Lagrange Multiplier test for random effects are questionable and this indicates that pooled OLS regression is the more effective form of analysis of these two.

Panel B of table 5 presents the OLS regression results for the change to using the GRI guidelines to represent corporate environmental disclosures and because of the dropping of the year 1999 and outliers, the sample size in each model is different from those in panel A of table 5. For example, the sample size in model 1.9A falls to 255, but the explanatory power moderately increases to 18.9%. The environmental performance measures have similar results to those in panel A of table 5, except for the change to insignificant and a negative sign for disclosures. One possible explanation for this is that companies' earnings will be justified if the extensive or higher environmental disclosures generate extra spending costs for companies even though it has been proven that the extensive or higher voluntary disclosures are related to the higher returns from the majority of the extant literature. In general, the evidence from table 5 suggests that there is no relationship between disclosures (i.e. $DJSI_{it}$ or GRI_{it}) and returns, which is consistent with Murray et al. (2006) and Moneva and Ortas (2008). Further, panel B-1 of table 5 provides similar evidence to that reported in panel A-1 except, notably, environmental reputation becomes insignificant when including region effects as in model 1.9A.

The residuals of the regression were not normal so model 1.9 for DJSI and model 1.9A for GRI were re-tested using non-parametric quantile regression, specifying the 25th, 50th, and 75th percentiles. Table 5-1 presents the two groups (i.e. DJSI and GRI) of results of the regression, comprising t-statistics estimated using White's (1980) standard error from quantile regression[14], sample size, and R^2. The results of regression provide weak evidence on the existence of a link between return on earnings and corporate environmental variables, which are not consistent with the reported regression results in table 5 as well as the results from the regression when the residuals are normal. For example, in the case of the DJSI, the environmental reputation is negatively significant at the 5% level or better for the 25th and 75th percentiles, whereas the environmental disclosures (DJSI) is only significant at the 5% level for the 50th percentile. Further, in the case of GRI, environmental reputation is negatively significant at the 5% level for the 75th percentile. Unlike the results from the DJSI, those from GRI report that there is no significant association with returns at any percentile

[14] In STATA, "qreg2" is a wrapper for "qreg" (see STATA 11 manual reference p.1446-1465 for more detail) which estimates quantile regression and reports standard errors and t-statistics that are asymptotically valid under heteroscedasticity and misspecification. (STATA 11 help qreg2)

level. Interestingly, the results from the cases of the DJSI and GRI show that physical performance is insignificant at any percentile level.

Table 5-1. Non-parametric quantile regression analysis

	DJSI			***GRI***		
Variables	Q 25	Q 50	Q 75	Q 25	Q50	Q 75
EPS_{it} /P_{it-1} (β_1)	3.008**	2.741**	3.106*	2.953***	3.142***	2.451*
	(2.58)	(2.10)	(1.76)	(2.68)	(2.96)	(1.80)
$fscore_{it}$ (β_2)	-0.048***	-0.024	-0.065**	-0.034	-0.018	-0.070**
	(-2.60)	(-1.48)	(-2.36)	(-1.56)	(-1.10)	(-2.07)
$DJSI_{it}$ or GRI_{it}*EPS_{it} /P_{it-1} (β_3)	1	0.911**	1.449	-0.079	-0.612	0.018
	(1.59)	(2.01)	(1.61)	(-0.15)	(-1.24)	(0.02)
ghg-intensity*EPS_{it} /P_{it-1} (β_4)	0.109	-0.106	-0.06	0.035	-0.147	-0.283
	(0.36)	(-0.48)	(-0.17)	-0.26	(-0.62)	(-0.45)
$Leverage_{it}$ * EPS_{it} /P_{it-1} (β_5)	-0.867	-0.559	-1.665	-0.454	-0.432	-0.329
	(-0.71)	(-0.47)	(-0.60)	(-0.42)	(-0.40)	(-0.18)
$MTBV_{it}$ * EPS_{it} /P_{it-1} (β_6)	0.133*	0.166**	0.004	0.155**	0.185**	0.14
	(1.95)	(2.19)	(0.02)	(2.20)	(2.58)	(0.85)
Risk * EPS_{it} /P_{it-1} (β_7)	-1.280*	-0.933	-0.95	-1.311*	-0.819	-0.761
	(-1.66)	(-1.21)	(-0.39)	(-1.83)	(-1.04)	(-0.81)
Earnings variability* EPSit /P_{it-1} (β8)	-0.041	-0.11	-0.164**	-0.016	-0.109	-0.119
	(-0.47)	(-1.26)	(-2.15)	(-0.28)	(-1.12)	(-0.77)
_cons (β_0)	0.095	0.082	0.536***	0.045	0.074	0.594**
	(0.81)	(.78)	(2.73)	(0.34)	(0.66)	(2.51)
N	310	310	310	291	291	291
R^2	0.155	0.148	0.172	0.119	0.100	0.136

Note: The t-statistics (in parentheses) were estimated using White's heteroscedasticity-corrected standard error in the regression. Superscripts *, **, *** denote statistical significance at the 0.1, 0.05, and 0.01 levels, respectively.

4.3.3 Further analysis on environmental reputation

The results from the analysis above suggest that the environmental reputation contained within a firm's earnings information is negatively significantly related with its stock return, which is inconsistent with the findings of Belkaoui (2004). Hence, to test the multivariate relationship between the environmental performance and firm performance, further regression analysis without deflated by earnings has been conducted. The statistical test for normality of residuals (i.e. sktest) indicated that the residuals of the regression before dropping some observations in the case of DJSI and GRI are normally distributed. Table 6A presents the results from regressions for the DJSI in panel A and the GRI in panel B. However, the evidence from results show that the models do not fitted to the data when including industry and/or regional effects dummy variables (i.e. models 5, 6, 9 and 10 in both cases). Thus, outliers indicated by reference to residuals have been removed from the data so that the sample size for which all variables were available was reduced to 275 for the DJSI (i.e. panel A of table 6) and 258 for the GRI (i.e. panel B of table 6) for measuring environmental disclosure. The normality test also reports that the residuals of regression are normal (i.e. sktest) and the results are presented in table 6. Further, the additional variable which was dropped in the analysis above owing to multicollinearity, namely, company size (i.e. logarithm of total assets) is introduced in this statistical test because the variance of inflation (VIF) test revealed no such problem. Moreover, larger companies, probably because of visibility issues, are subject to greater public scrutiny than smaller companies. Thus, they are under greater pressure to behave in a more socially responsible manner and are more likely to disclose social responsibility information (e.g. Neu et al., 1998; Patten, 1991). It is also more likely that larger, more visible companies will consider social responsibility activities as a way of enhancing corporate reputation. For example, Fombrun and Shanley (1990) showed that these firms have a higher level of corporate reputation, as measured by Fortune's reputation rankings. In addition, the control variables, industry and/or the region ones, are added to test whether there exist any differences across industries and/or region.

Table 6 sets out the results from tests examining the impact of environmental disclosures and physical performance variables with/without control variables, industry and/or region effects. Models 1 and 2 show separate effects adding, respectively, environmental disclosures and

physical performance without control variables and further, models 3 to 6 show the results for the full model, in this case including environmental disclosure and physical performance with/without control variables. The last models from 7 to 10 show the results when including other financial and control variables.

The evidence presented in table 6 for the DJSI in panel A and the GRI in panel B shows that environmental reputation is negatively significantly related with annual returns in all cases at the 10% level or better, suggesting that companies with higher reputations generate lower stock return than their counterparts. The findings are consistent with those in table 5, but inconsistent with evidence reported by previous studies (Herremans et al., 1996; McGuier et al., 1988 and 1990). On explanation for the negative outcome, could be that high ESG performance information may be overpriced by the market, as put forward by several scholars (Derwall et al., 2005; Manescu, 2011). In particular, Manescu (2011) empirically provided some evidence, albeit weak, that it is not incorporated into share prices, when using KLD data. However, there is, so far, no robust evidence and hence, future research is required into the precise nature of this relationship.

Table 6A. Regression analysis before drop outliers

Panel A. DJSI for environmental disclosures from 1999 to 2007

	Dependent variable: environmental reputation									
Variables/Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Annual return	-0.212***	-0.436***	-0.464***	-0.266**	-0.370***	-0.293***	-0.350**	-0.193*	-0.260**	-0.209**
	(-3.54)	(-3.40)	(-3.64)	(-2.20)	(-3.17)	(-2.64)	(-2.48)	(-1.68)	(-2.34)	(-1.98)
Earnings	0.000***	0.003	0.001	0.005	-0.004	0	0.054***	0.036***	0.017	0.021*
	(5.86)	(0.53)	(0.20)	(1.22)	(-0.97)	(-0.01)	(4.69)	(3.96)	(1.41)	(1.93)
Environ. Disclosure *(DJSI)*	0.309***		0.210**	0.449***	0.074	0.249**	0.052	0.275***	-0.118	0.017
	(5.37)		(2.06)	(5.44)	(0.70)	(2.55)	(0.53)	(3.37)	(-1.15)	(0.19)
Physical performance		-0.071**	-0.059*	-0.098***	-0.060*	-0.097***	-0.038	-0.070**	-0.031	-0.059
		(-2.28)	(-1.85)	(-3.15)	(-1.74)	(-2.65)	(-1.08)	(-2.16)	(-0.87)	(-1.61)
Leverage							-1.176***	-1.270***	0.309	-0.357
							(-3.59)	(-4.32)	(0.73)	(-0.86)
Growth							0.029**	0.011***	0.025**	0.019***
							(2.58)	(2.74)	(2.47)	(2.94)
Risk							-0.075	-0.125*	-0.05	-0.227***
							(-0.83)	(-1.69)	(-0.63)	(-3.11)
Earning variability							-0.178***	-0.112***	-0.090***	-0.082***
							(-5.85)	(-4.59)	(-2.85)	(-2.95)
Size							0.128**	0.125***	0.460***	0.365***
							(2.34)	(2.82)	(6.54)	(4.97)
_cons	5.987***	6.343***	6.226***	5.532***	6.738***	6.314***	4.586***	3.909***	-1.498	-0.32
	(163.69)	(116.08)	(81.01)	(60.83)	(42.08)	(31.04)	(4.63)	(4.96)	(-1.17)	(-0.24)
Industry effects	No	No	No	No	Yes	Yes	No	No	Yes	Yes
Region effects	No	No	No	Yes	No	Yes	No	Yes	No	Yes
N	1063	338	338	338	338	338	310	310	310	310
Adjusted R^2	0.039	0.022	0.031	0.276	0.395	0.446	0.183	0.4	0.516	0.558
F-value	30.688***	5.51***	5.234***	34.219***	.	.	11.963***	36.035***	.	.

Table 6A. (Continued)

Panel B. GRI for disclosures from 2000 to 2007

	Dependent variable: environmental reputation									
Variables/Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Annual return	-0.233***	-0.450***	-0.444***	-0.260**	-0.356***	-0.282**	-0.341**	-0.183	-0.261**	-0.202*
	(-3.02)	(-3.45)	(-3.35)	(-2.01)	(-3.00)	(-2.45)	(-2.35)	(-1.57)	(-2.30)	(-1.88)
Earnings	0	0.002	0.002	0.008*	-0.004	0	0.056***	0.046***	0.021*	0.024**
	(-0.05)	(0.51)	(0.49)	(1.83)	(-1.03)	(-0.09)	(4.62)	(4.70)	(1.67)	(2.08)
Environ. Disclosures *(GRI)*	0.246***		0.220**	0.094	0.007	-0.003	0.06	-0.069	-0.038	-0.036
	(2.85)		(2.11)	(1.00)	(0.07)	(-0.04)	(0.55)	(-0.70)	(-0.43)	(-0.43)
Physical performance		-0.070**	-0.083**	-0.123***	-0.069**	-0.111***	-0.045	-0.077**	-0.022	-0.056
		(-2.24)	(-2.58)	(-3.93)	(-2.04)	(-3.04)	(-1.24)	(-2.26)	(-0.60)	(-1.50)
Leverage							-1.129***	-1.320***	0.451	-0.208
							(-3.31)	(-4.34)	(0.98)	(-0.47)
Growth							0.027**	0.009**	0.019**	0.016***
							(2.53)	(2.18)	(2.44)	(2.84)
Risk							-0.073	-0.136*	-0.004	-0.185**
							(-0.79)	(-1.77)	(-0.05)	(-2.48)
Earning variability							-0.181***	-0.137***	-0.103***	-0.092***
							(-5.64)	(-5.24)	(-2.99)	(-3.09)
Size							0.120**	0.136***	0.432***	0.366***
							(2.09)	(2.84)	(6.36)	(4.95)
_cons	6.131***	6.336***	6.232***	5.795***	6.760***	6.487***	4.716***	3.979***	-1.027	-0.29
	(121.75)	(114.88)	(89.16)	(69.26)	(39.65)	(28.31)	(4.60)	(4.72)	(-0.83)	(-0.22)
Industry effects	No	No	No	No	Yes	Yes	No	No	Yes	Yes
Region effects	No	No	No	Yes	No	Yes	No	Yes	No	Yes
N	536	327	318	318	318	318	291	291	291	291
Adjusted R^2	0.019	0.023	0.032	0.226	0.407	0.443	0.184	0.388	0.532	0.569
F-value	5.82***	5.569***	5.034***	19.358***	.	.	11.259***	30.085***	.	.

Note: Superscripts *, **, *** denote statistical significance at the 0.1, 0.05, and 0.01 levels, respectively. T-statistics (in Parentheses) are estimated using White's (1980) standard error during the regression. Sample size varies depending on the model. The sample comprises firm-year observations drawn from the 1999 to 2007 fiscal years for the DJSI and from 2000 to 2007 for the GRI.

Table 6. Regression analysis after drop outliers

Panel A. DJSI for environmental disclosures from 1999 to 2007

	Dependent variable: Environmental Reputation									
Variables/ Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Annual return	-0.205***	-0.435***	-0.471***	-0.258**	-0.328***	-0.250**	-0.293**	-0.159*	-0.214**	-0.166*
	(-2.81)	(-3.56)	(-3.91)	(-2.41)	(-3.34)	(-2.56)	(-2.55)	(-1.76)	(-2.42)	(-1.90)
Earnings	0.002	0.017**	0.016*	0.013***	-0.002	0.002	0.078***	0.021	0.001	-0.002
	(0.47)	(1.99)	(1.73)	(3.03)	(-0.24)	(0.32)	(3.45)	(0.99)	(0.05)	(-0.08)
Environ. Disclosure (*DJSI*)	0.305***		0.270**	0.447***	0.214**	0.384***	0.14	0.261***	0.009	0.096
	(5.08)		(2.57)	(5.32)	(2.01)	(3.88)	(1.44)	(3.06)	(0.09)	(0.98)
Physical performance		-4.394***	-4.831***	-3.022**	-2.06	-2.325	-10.651***	-8.037***	0.812	-3.175
		(-4.09)	(-4.42)	(-2.57)	(-0.72)	(-0.92)	(-7.11)	(-5.59)	(0.36)	(-1.46)
Leverage							-1.371***	-1.187***	-0.938**	-1.331***
							(-4.54)	(-4.29)	(-2.41)	(-3.91)
Growth							0.109***	0.045***	0.086***	0.065***
							(6.46)	(2.96)	(4.61)	(3.68)
Risk							-0.024	-0.064	-0.197*	-0.368***
							(-0.22)	(-0.67)	(-1.85)	(-3.41)
Earning variability							-0.169***	-0.108***	-0.098***	-0.109***
							(-5.11)	(-3.54)	(-2.93)	(-3.44)
Size							0.329***	0.304***	0.429***	0.353***
							(6.25)	(5.95)	(6.35)	(5.17)
_cons	5.998***	6.415***	6.261***	5.616***	6.654***	6.294***	0.766	0.73	-0.847	0.086
	(156.03)	(97.42)	(73.61)	(60.49)	(42.11)	(31.26)	(0.82)	(0.82)	(-0.68)	(0.07)
Industry effects	No	No	No	No	Yes	Yes	No	No	Yes	Yes
Region effects	No	No	No	Yes	No	Yes	No	Yes	No	Yes
N	982	303	303	303	303	303	275	275	275	275
Adjusted R^2	0.032	0.045	0.062	0.321	0.444	0.492	0.349	0.474	0.584	0.613
F-value	12.057***	10.637***	9.653***	41.183***	27.776***	30.667***	23.394***	33.86***	26.673***	27.943***

Table 6 (continued)

Panel B. GRI for disclosures from 2000 to 2007

	Dependent variable: Environmental Reputation									
Variables/ Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Annual return	-0.291***	-0.473***	-0.485***	-0.273**	-0.335***	-0.263**	-0.312**	-0.176*	-0.240***	-0.186**
	(-2.81)	(-3.84)	(-3.95)	(-2.55)	(-3.30)	(-2.54)	(-2.47)	(-1.90)	(-2.67)	(-2.06)
Earnings	0.019**	0.017**	0.016**	0.015***	-0.002	0.001	0.071***	0.013	-0.002	-0.007
	(2.07)	(2.02)	(2.58)	(3.89)	(-0.26)	(0.20)	(2.92)	(0.57)	(-0.08)	(-0.24)
Environ. Disclosure (*GRI*)	0.292***		0.332***	0.159*	0.079	0.061	0.106	0.054	0.034	0.038
	(3.28)		(3.12)	(1.67)	(0.88)	(0.67)	(0.97)	(0.54)	(0.39)	(0.43)
Physical performance		-4.308***	-4.714***	-2.656**	-2.009	-2.255	-10.445***	-7.795***	0.198	-3.486
		(-4.02)	(-4.65)	(-2.31)	(-0.69)	(-0.79)	(-7.11)	(-5.46)	(0.09)	(-1.58)
Leverage							-1.280***	-1.156***	-0.790*	-1.121***
							(-4.08)	(-3.93)	(-1.90)	(-3.10)
Growth							0.115***	0.052***	0.076***	0.057***
							(6.39)	(3.04)	(3.79)	(3.04)
Risk							0.022	-0.03	-0.125	-0.299**
							(0.19)	(-0.29)	(-1.11)	(-2.55)
Earning variability							-0.173***	-0.130***	-0.108***	-0.120***
							(-5.13)	(-4.08)	(-3.10)	(-3.57)
Size							0.322***	0.300***	0.412***	0.350***
							(5.98)	(5.60)	(6.14)	(5.08)
_cons	6.141***	6.415***	6.271***	5.854***	6.704***	6.469***	0.87	0.954	-0.545	0.199
	(113.02)	(97.61)	(83.44)	(66.81)	(38.85)	(27.93)	(0.92)	(1.04)	(-0.44)	(0.16)
Industry effects	No	No	No	No	Yes	Yes	No	No	Yes	Yes
Region effects	No	No	No	Yes	No	Yes	No	Yes	No	Yes
N	472	294	285	285	285	285	258	258	258	258
Adjusted R^2	0.031	0.048	0.076	0.283	0.448	0.475	0.348	0.463	0.594	0.619
F-value	7.459***	11.31***	12.253***	24.532***	27.552***	28.33***	20.664***	27.687***	52.149***	53.551***

Note: Superscripts *, **, *** denote statistical significance at the 0.1, 0.05, and 0.01 levels, respectively. T-statistics (in Parentheses) are estimated using White's (1980) standard error during the regression. Sample size varies depending on the model and each model has been checked for outliers. The sample comprises firm-year observations drawn from the 1999 to 2007 fiscal years for the DJSI and from 2000 to 2007 for the GRI.

Turning to the other environmental performance variables, the results from the environmental disclosures in panel A and B suggest that an improvement in environmental reputation might not be generated from expanded environmental disclosures, which is inconsistent with evidence reported by some studies (e.g. Hasseldine et al., 2005: Toms, 2002). For example, membership of the DJSI as a proxy for disclosures shows that there is significant relationship between the two at the 5% level or better until the other financial variables are introduced. Further, the environmental disclosures turn out to be significant at the 1% level if the region effects variable is included (i.e. model 8 in panel A), whilst the industry effects variable appears not to have any significant impact on disclosures when the other financial variables are included. Moreover, the evidence from Panel B shows that the status of using the GRI guidelines for disclosures is significantly related to environmental reputation at the 10% level or better in only model 1 to 4 and otherwise there is no relationship between the two, inconsistent with the assertion that reporting using the guidelines can lead to an enhancement of reputation (GRI, 2002). Regarding the impact of industry effects, previous studies have revealed that the higher polluting or larger companies are more likely to provide extensive environmental disclosure that their counterparts (e.g. Cho and Patten, 2007; Hasseldine et al., 2005; Patten, 1992 and 2002; Toms, 2002). However, there is a relative lack of direct evidence regarding the relationship between environmental reputation and environmental disclosures, as noted by Hasseldine et al. (2005) and further, even though they found that there are significant industry impacts on both reputation and disclosures, their study was focused on the UK rather than being international. Moreover, regarding the region effects, unlike the results in panel A, those in panel B show that the level of significance of disclosure falls the region effects are included (i.e. model 4) does not register at all in the other models. Hence, the evidence from the results in panel A and B of table 6 suggests that there is likely to be unobserved heterogeneous differences in environmental disclosure related to industry-specific firm characteristics and across regions.

In addition, the identical evidence reported in panel A and B shows, notably, that environmental reputation is negatively significantly related to environmental performance (e.g. $ghg\text{-}intnesity_{it}$) at the 5 % level or better. In other words, this indicates that higher eco-efficiency ratio has no incremental effect on a company's environmental performance, consistent with the finding by Cho et al. (2012). These authors contended that the negative

relationship between the two is due to the voluntary nature of environmental disclosure practices and further, found that the level of disclosure is negatively significantly related to environmental performance, that is, the worse performing companies provide the most extensive disclosure information to mitigate the influence of poorer environmental performance on environmental reputation. Further, the findings show that the significant link between environmental performance (i.e. $ghg\text{-}intensity_{it}$) and environmental reputation fades away if industry effects are added (i.e. model 5 and 6 in both cases), whereas such a relationship is moderated when including region effects (i.e. model 6 in both cases). However, in models 7 and 8 in panels A and B the environmental variable becomes more significant if other financial performance variables are added, with/without region effects. Regarding the region effects, the evidence from this analysis suggests that there is no systematic difference across regions in this sample data, whereas there is difference across industry sectors. In relation to the latter point, Brammer and Pavelin (2006) noted that since industry environments are correlated with significant pressure from multiple stakeholders (e.g. investors or institutions), it could be that industry type plays a mediating role in the relationship between environmental performance and corporate reputation. Thus, in the light of heightened stakeholder expectations regarding environmental performance across industries, environmental reputation may be differentially related to environmental performance across industry sectors. Considering the impacts of the financial performance variables, the results of table 6 are consistent with the earlier findings that reputation is significantly related to: market risk, growth, leverage and size (e.g. Brammer and Pavelin, 2006; McGuire et al., 1988; Toms, 2002).

Taken together, these findings indicate that environmental reputation is negatively significantly related with stock returns and physical performance, whereas it seems to be weakly related to environmental disclosures. There is a lack of comparable international evidence, for most studies have been confined to a single domestic region (e.g. Cho et al., 2012; Hasseldine et al., 2005), but, nevertheless, the findings from this analysis seem to support those in the most recent study, Cho et al.'s (2012). However, even though they elicited comprehensively the relationship among environmental performance, its disclosure and its reputation, using the most recent environmental reputation scores (i.e. reported by Newsweek launched in 2009), the outcomes need to be treated with caution owing to the

relative newness of the measuring of environmental ratings and the short-time test period (i.e. one year). In sum, it could well be that because reputation is a subjective concept, the correct way of measuring it has yet to be uncovered and hence, the inconsistency in the reporting on the links between environmental performance and environmental disclosures (e.g. Al-Tuwaijri et al., 2004; Hughes et al., 2001; Patten, 2002).

4.3.4 Accounting-based measurements

Descriptive statistics and correlation analysis

Panel A of table 7 contains a summary of the descriptive statistics for the 310 observations based on model 2.8, after excluding outliers, for the period 1999 to 2007. Note that the number of observations reported in the regression analysis in this section may not equal 310, because the lack of availability of corporate environmental performance data (i.e. the ratio of firm's sales to greenhouse gases emissions) results in reduced sample size. All variables were scaled by the closing of book value per share for the period *t-1*, except for the corporate environmental performance measures, which were assumed to be independent of company size, following Hassel et al. (2005). The high standard deviation of $MV_{i,t}/BVPS_{i,t-1}$, giving a range of 0.5838 to 18.5081, shows that this is spread out over wide range and the distribution of this variable is positively skewed (i.e. 2.19). Moreover, the deflated earnings variable, $EPS_{it}/BVPS_{i,t-1}$, result indicates that the mean profitability in the sample is 19.84% on a yearly basis, but there is a wide range from very negative to very high scores. Regarding extreme negative profitability, this is found among a few consumer services firms, especially airline companies for the period 2000 to 2003 (e.g. Dutsche Lufthansa), which could reflect the financial recession between those times. The corporate environmental performance measures, except for the ratio of company sales to greenhouse gas emissions, show similar results to those in Panel A of table 3, but there distribution is wider, with it having a minimum of 0.0002 and a maximum of 10.0018, which is roughly 10 times bigger. Further, the environmental performance variable, $ghg\text{-}intensity_{it}$, has a mean of 0.0843 and a lower median of 0.0127 (0.0125), in the case of the DJSI (GRI). However, using the sales to greenhouse gases emissions ratio as a proxy for environmental performance has only been adopted in a few studies and hence it is difficult to identify the boundary between high and low performers. Hassel et al. (2005) also encountered a wide range of environmental

performance when investigating Swedish industry and chose to differentiate between high and low environmental performers in their discussion.

Panel B in table 7 provides the parametric (Pearson) and nonparametric (spearman) pairwise correlation analysis, with each yielding similar results. As expected, the deflated market value is statistically significantly correlated with earnings and the inversed book value at the 1% level. However, whilst the results show that there is significant positive (0.1012) relationship between the inversed book value and deflated earnings at the 10% level, such a finding is inconsistent with evidence reported by Hassel et al. (2005), who found that the link between the two was significantly negatively (-0.49) different from zero at the 1% level. In contrast to the results in panel B in table 3, the corporate environmental reputation measure ($fscore_{i,t}$) is positively and significantly related to: deflated market values, book values, and earnings, thus suggesting: the higher the reputation score, the better the firm value. Finally, the corporate environmental performance measure ($ghg\text{-}intensity_{it}$) is significantly negatively related with environmental disclosure at the 10% level, while environmental disclosure ($DJSI_{it}$) is not significantly related to any variables.

To test whether following the GRI guidelines for disclosures is favourable to firm value, descriptive and correlation analysis were conducted again using 292 observations for the period 2000 to 2007. Panel A of table 7 reports the corresponding results to those presented for the DJSI. In contrast to finding of correlation between $DJSI_{it}$ and other variables, the Pearson correlation matrix findings show that its disclosure (GRI_{it}) is statistically significantly related to inversed book values (-0.1619) and deflated earnings (0.1870) at the 1% level, which is consistent with Schadewitz and Niskala (2010), whereas the other variables show similar outcomes to those for the DJSI in table 7. Further, use of the guidelines is positively significantly associated with reputation (0.1395) at the 5% level, suggesting that companies with effective environmental disclosures have higher reputations than those that do not (Toms, 2002). The correlation matrix does not suggest the presence of any serious multicollinearity problems, supported by the outcome that the variance inflation factor (VIF) statistics testing are less than 10. Next, to provide a more comprehensive analysis of the value relevance of the corporate environmental performance measures, multivariate analysis was conducted for each measured variable.

Table 7. Descriptive statistics and correlation

Panel A. Descriptive analysis

	DJSI (N=310)					GRI (N=292)				
Variables	Mean	Standard deviation	Median	Min	Max	Mean	Standard deviation	Median	Min	Max
$MV_{i,t}/BVPS_{i,t-1}$	3.8926	2.7805	3.2135	0.5838	18.5081	3.8323	2.7659	3.0787	0.5838	18.5081
$1/BVPS_{i,t-1}$	0.1619	0.175	0.1042	0.0027	1.3477	0.1616	0.1781	0.103	0.0027	1.3477
$EPS_{i,t}/BVPS_{i,t-1}$	0.1984	0.1496	0.1843	-0.2809	0.7901	0.1969	0.1504	0.1843	-0.2809	0.7901
Environ. Reputation ($fscore_{it}$)	6.3053	0.9474	6.225	3.78	8.44	6.2972	0.9494	6.225	3.78	8.44
Environ. Disclosures ($DJSI_{it}$) or (GRI_{it})	0.6226	0.4855	1	0	1	0.4623	0.4994	0	0	1
Environ. Performance ($ghg\text{-}intensity_{it}$)	0.0843	0.7927	0.0127	0.0002	10.0018	0.0886	0.8166	0.0125	0.0002	10.0018

Panel B. Correlation analysis

	DJSI						GRI					
Variables	1	2	3	4	5	6	1	2	3	4	5	6
1. $MV_{i,t}/BVPS_{i,t-1}$	1	0.2787***	0.7281***	0.2528***	0.0449	0.1860***	1	0.2579***	0.7373***	0.2422***	0.2029***	0.1822***
2.1/$BVPS_{i,t-1}$	0.2795***	1	0.1124**	-0.0975*	0.0235	-0.0459	0.2710***	1	0.0890	-0.0998*	-0.1519***	-0.0432
3. $EPS_{i,t}/BVPS_{i,t-1}$	0.6680***	0.1012*	1	0.2268***	0.0199	0.0648	0.6612***	0.0798	1	0.2294***	0.2302***	0.0438
4. Environ. Reputation ($fscore_{it}$)	0.2486***	-0.1923***	0.1976***	1	0.1016*	-0.0699	0.2380***	-0.1979***	0.2005***	1	0.1460**	-0.0704
5. Environ. Disclosures ($DJSI_{it}$) or (GRI_{it})	0.0591	-0.0143	0.0680	0.0868	1	0.0320	0.0219	-0.1619***	0.1870***	0.1395**	1	0.1059*
6. Physical Performance ($ghg\text{-}intensity_{it}$)	0.0814	-0.009	0.0437	-0.0618	-0.1008*	1	0.0862	-0.0088	0.0454	-0.0628	0.0942	1

Note: market value (MV_{it}) is cum-dividend market value, which is the three months after fiscal year-end share price plus dividend per share for the period *t*. Book value per share ($BVPS_{i,t-1}$) is firm *i*'s book value per share for the period *t-1*, and earnings per share ($EPS_{i,t}$) is firm *i*'s earnings per share for fiscal period-end *t*. Corporate environmental reputation ($fscore_{i,t}$) is represented by the Fortune Magazine's WMAC scores. Members of the DJSI ($DJSI_{i,t}$) and statute of the GRI guidelines (GRI_{it}) are assigned a 1, otherwise 0, and the ghg-intensity ($ghg\text{-}intensity_{i,t}$) is measured by the ratio of a firm's sales divided by the greenhouse gas emissions. Superscripts *, ** and *** denote statistical significance at the 0.1, 0.05, an1d 0.01 levels, respectively. The top of right half of the correlation matrix above the main diagonal provides the non-parametric spearman correlation estimations. A total of 310 observations for the DJSI and 292 for the GRI after drop outliers are included in table 7and the sample firm-year observations were drawn from the 1999 to 2007 fiscal years.

Regression analysis

The objective of the multivariate analysis was to test whether corporate environmental performance measures and financial performance implicit in model 2.1 to model 2.8A, which is an extension of model 2.8, are relevant to company market value. The financial performance information, book value and earnings presented per share, were expected to be positively related to the market values (i.e. P_{it} + DPS_{it}). Even though it is still unresolved whether environmental performance has a positive or negative effect on market values, it cannot be ignored that it is a fact that corporate environmental performances has emerged as one of the investment decision making criteria. Furthermore, the stock market today participates in sustainable investment as evidenced by launching SRI indices. Thus, the empirical question is whether they are positively or negatively related to the market values. Table 8 provides the regression results for model 2.1 to model 2.8A in panel A, using the DJSI as a measure of corporate environmental disclosure, for the period 1999 to 2007 and model 2.1A to model 2.8AA in panel B, using the GRI guidelines to represent disclosure for the period 2000 to 2007. In panel A in table 8, model 2.1 shows the results for the earnings regression, whilst model 2.2 to model 2.4 show the outcomes including each environmental performance measured variable. Model 2.5 to model 2.7 reports the findings of regression for two environmental performance variables in each model and model 2.8 shows the results including all the environmental performance variables. Finally, model 2.8A provides the results of interaction with environmental impacts (ENV_i), which is 1 if companies are operating in an industry with environmentally significant impacts and 0 otherwise. Panel B in table 8 reports the results using the GRI as an alternative environmental disclosure measure and the regression for each model involves the same approach as for those in panel A.

The evidence presented in table 8 for model 2.1 shows that the coefficients for earnings and book values are substantially greater than zero (11.876 and 1.817, respectively) at the 1% significance level, consistent with prior value relevance studies (e.g. Hassel et al., 2005; Kallapur and Kwan, 2004; Schadewitz and Niskala, 2010). Adding the corporate environmental performance variables (model 2.2 to model 2.4) slightly increases the adjusted R^2 and their F-statistics are significant, which indicates that the corporate environmental performance measures (i.e. reputation ($fscore_{it}$), disclosures ($DJSI_{it}$) and physical

Table 8. Valuation model regressions results

Panel A. Regression for the DJSI, 1999 to 2007[15]

Variables/Model	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.8A
$1/BVPS_{it-1}$ (β_1)	1.817***	2.429***	1.853***	5.546***	2.436***	6.224***	3.423***	4.041***	4.396***
	(5.36)	(6.7)	(5.51)	(3.8)	(6.72)	(4.24)	(3.73)	(4.19)	(4.53)
EPS_{it} /$BVPS_{it-1}$ (β_2)	11.876***	10.793***	11.817***	11.425***	10.919***	10.646***	11.933***	11.197***	10.232***
	(20.97)	(20.18)	(20.84)	(9.18)	(20.58)	(8.86)	(9.64)	(9.47)	(8.30)
$fscore_{it}$ (β_3)		0.705***			0.696***	0.539***		0.533***	0.650***
		(8.90)			(8.64)	(4.18)		(4.13)	(4.94)
$DJSI_{it}$ (β_4)			0.232*		0.048		0.139	0.075	0.369
			(1.66)		(0.35)		(0.59)	(0.33)	(1.48)
ghg-$intensity_{it}$ (β_5)				0.193***		0.241***	0.202**	0.245***	0.288***
				(2.78)		(4.74)	(2.69)	(4.27)	(5.37)
ENV_i (β_6)									2.927*
									(1.84)
$fscore_{it}$*ENV_i (β_7)									-0.437*
									(-1.79)
$DJSI_{it}$*ENV_i (β_8)									-0.466
									(-0.94)
ghg-$intensity_{it}$*ENV_i (β_9)									73.710***
									(3.49)
_cons (β_0)	1.315***	-2.914***	1.226***	0.780***	-2.907***	-2.578***	0.867***	-2.411***	-3.307***
	(11.65)	(-5.87)	(9.87)	(2.9)	(-5.84)	(-2.96)	(2.96)	(-2.75)	(-3.77)
N	979	979	979	305	970	305	310	310	310
Adj. R^2	0.486	0.529	0.487	0.511	0.530	0.540	0.489	0.517	0.55
F-value	220***	164.21***	150.756***	42.827***	128.319***	43.765***	31.53***	33.322***	25.905***

[15] Although the data have been thoroughly examined to see whether any observations could have influenced the outcome of the regression by using regression diagnostics, the normality test indicates that the residuals are not normally distributed. Hence, regression diagnostics have been conducted with the full sample and its processes repeated until the normality test (i.e. sktest) is accepted and then the regression rerun to compare the results with those in panel A in table 8. The outcomes under the meeting of normally distributed condition are consistent with those in panel A (regression for the DJSI for 1999 to 2007).

Table 8. (Continued)

Panel B. Regression for the GRI, 2000 to 2007[16]

Variables/Model	2.1A	2.2A	2.3A	2.4A	2.5A	2.6A	2.7A	2.8A	2.8AA
$1/BVPS_{it-1}$ (β_1)	1.817***	2.173***	2.274***	5.740***	2.798***	6.386***	3.221***	3.786***	4.082***
	(5.36)	(6.15)	(3.87)	(3.8)	(4.7)	(4.2)	(3.59)	(4.03)	(4.35)
$EPS_{it}/BVPS_{it-1}$ (β_2)	11.876***	10.378***	10.219***	11.569***	9.644***	10.798***	12.050***	11.370***	10.556***
	(20.97)	(18.78)	(13.61)	(9.09)	(13.61)	(8.77)	(9.07)	(8.99)	(8.5)
$fscore_{it}$ (β_3)		0.606***			0.578***	0.528***		0.523***	0.659***
		(8.3)			(5.57)	(3.98)		(3.81)	(4.76)
GRI_{it} (β_4)			-0.342*		-0.493**		-0.406	-0.481	0.079
			(-2.04)		(-2.91)		(-1.66)	(-1.97)	(0.35)
ghg-$intensity_{it}$ (β_5)				0.193**		0.239***	0.221**	0.270***	0.253***
				(2.75)		(4.6)	(3.02)	(4.79)	(5.08)
ENV_i (β_6)									4.658**
									(2.88)
$fscore_{it}*ENV_i$ (β_7)									-0.603*
									(-2.41)
$GRI_{it}*ENV_i$ (β_8)									-1.903**
									(-3.24)
ghg-$intensity_{it}*ENV_i$ (β_9)									87.462***
									(4.16)
_cons (β_0)	1.288***	-2.343***	1.708***	0.715*	-1.808**	-2.565**	1.107***	-2.111*	-3.135***
	(11.19)	(-5.09)	(10.47)	(2.53)	(-2.74)	(-2.86)	(4.77)	(-2.42)	(-3.56)
N	875	875	504	296	496	296	292	292	292
Adj. R^2	0.529	0.567	0.457	0.514	0.494	0.541	0.487	0.514	0.575
F-value	193.97***	144.444***	68.055***	41.244***	55.659***	41.751***	34.028***	35.457***	26.774***

[16] Although the data have been thoroughly examined to see whether any observations could have influenced the outcome of the regression by using regression diagnostics, the normality test indicates that the residuals are not normally distributed. Hence, regression diagnostics have been conducted with the full sample and its processes repeated until the normality test (i.e. sktest) is accepted and then the regression rerun to compare the results with those in panel B in table 8. The outcomes under the meeting of normally distributed condition are inconsistent with those in panel B (i.e. regression for the GRI 2000 to 2007). Hence, the new results for GRI are reported in panel B-1and B-2, which are the outcomes from the descriptive and correlation analysis and B-3 which is the outcome of the regression in table 8-1.

Note: market value (MV_{it}) is cum-dividend market value which is three months after fiscal year-end share price plus dividend per share for the period *t*. Book value per share ($BVPS_{i,t-1}$) is firm *i*'s book value of per share for the period *t-1*, and earnings per share ($EPS_{i,t}$) is firm *i*'s earnings per share for the fiscal period end *t*. These variables are scaled by the beginning of book value per share ($BVPS_{it-1}$). Corporate environmental reputation ($fscore_{i,t}$) is represented by Fortune Magazine's WMAC scores. Members of the DJSI ($DJSI_{i,t}$) are assigned a 1, otherwise 0, and the ghg-intensity ($ghg\text{-}intensity_{i,t}$) is measured by the ratio of a firm's sales divided by its greenhouse gas emissions. The environmental impacts variable (ENV_i) is given a score of 1 if companies were operating in an industry with high environmental impact and 0 otherwise. GRI_{it} is assigned a 1 if a firm's reporting is based on the GRI guidelines and 0 if not. Superscripts *, **, *** denote statistical significance at the 0.1, 0.05, and 0.01 levels, respectively. The t-statistics (in parentheses) were estimated using White's heteroscedasticity-corrected standard error in the regression. Sample size varies depending on the model and each model is checked for outliers each time by graph. The sample comprises firm-year observation drawn from the 1999 to 2007 fiscal years for the DJSI and from 2000 to 2007 for the GRI.

performance ($ghg\text{-}intensity_{it}$)) have incremental value. This outcome gives partial support to the perspective that financial performance represents information of firm value. Moreover, the results indicate that companies are more valued by the market if they have a high environmental reputation than those with a lower one, which is consistent with the extant corporate reputation on value relevance literature (e.g. Black et al., 2000; Smith et al., 2010). Furthermore, the outcomes show that environmental performance ($ghg\text{-}intensity_{it}$) is positively related to market value, consistent with Cormier et al. (1993) and King and Lenox (2002).[17] When the corporate environmental performance measures are together included in models (model 2.4 to model 2.8), reputation and performance are still statistically significantly greater than zero at the 1% level, whereas disclosures are insignificant. The adjusted R^2 moderately increases and is in the range of 0.489-0.54 and the F-statistics are strongly all significant. These results suggest that companies with both high reputation and eco-efficiency can experience more of an increase in their market values than those that do not.

Model 2.8A reports the findings after including the control variable environmental impact and the adjusted R^2 increases marginally to 0.55. The environmental impact (ENV_i) is significant at the 10% level, inconsistent with Hassel et al.'s (2005) finding that there are no unknown systematic unexplained differences between the high polluting and low polluting industries. The interaction between environmental impact and environmental reputation ($ENV_i*fscore_{it}$) as well as that with disclosure (ENV_i*DJSI_{it}) are negative but only the latter is significant, at the 10% level, suggesting that low environmental impact companies have

[17] Cormier et al. (1993) measured the pollution index as actual levels recorded by the environment ministries for a given plant divided by the pollution standard set by the same body. King and Lenox (2002) used Tobin's q as a market valuation, rather than a price model and defined total emissions as the actual level of pollution, as published by the Toxic Release Inventory (TRI).

higher environmental reputation than those with a high impact. However, ENV_i*$ghg\text{-}intensity_{it}$ is positively significantly greater than zero at the 1% level. This result indicates that high environmental impact companies with good environmental performance have higher market values than those with low impact and performance levels. That is, high eco-efficiency is more sensitive to high polluting industries than their counterparts, which is consistent with Hughes II (2000) contention that a nonfinancial pollution proxy is value-relevant for high polluting industry. Regarding the evidence reported by table 7 and 8, it may be that the companies operating in low polluted industries tend to focus more on improving their environmental reputation than their counterparts.

Panel B in table 8 provides the results of regression by changing the environmental disclosures measure to that of the GRI guidelines for the period 2000 to 2007. Under this treatment, earnings and book values remain significantly greater than zero at the 1% level. Further, environmental reputation ($fscore_{it}$) and performance ($ghg\text{-}intensity_{it}$) remain positive and significant, at the 5% level or better. In panel A of table 8, the DJSI is positive but insignificant for most models, whereas in panel B the GRI is significantly negative in model 2.3A and model 2.5A, but remains insignificant for models 2.7A and 2.8A. These results are inconsistent with those in the extant disclosure literature (see Appendix I for more detail). Further, in a recent study Schadewitz and Niskala (2010) found that following the GRI guidelines for voluntary responsibility disclosures is an incremental explanatory factor in determining a firm's market value, but this finding may contain a potential sample selection bias for it focused on one specific market (i.e. Finland). One possible interpretation of the findings in table 8 is that voluntary environmental disclosures, which represent non-financial performance, may be less efficient and hence, more costly to firm than mandated financial disclosures, because some or all of what is reported may not be valued by potential investors (Hughes II, 2000).

Model2.8AA reports that environmental disclosures are insignificantly positive after adding environmental impact (ENV_i). Consistent with panel A in table 8, the variable ENV_i is statistically significant at the 5% level, indicating that companies operating in environmentally sensitive industries have higher firm values than their counterparts. Having interacted the corporate environmental performance variables with ENV_i, the coefficients of $fscore_{it}$* ENV_i and GRI_{it}*ENV_i, are negative and significantly greater than zero at the 10%

level or better, whilst environmental performance ($ghg\text{-}intensity_{it}*ENV_i$) remains significantly positive. These results suggest that the market value of companies operating in environmentally significant industries is significantly influenced by the level of corporate environmental performance. For example, the environmental performance variables-environmental impact interaction parameter for environmental performance variables show that the higher market value of companies in environmentally significant industries (i.e. ENV_i=1) might be increased more than 5% of market values depending on the level of reputation, whereas decreased by more than 180% of market values depending on following GRI guidelines under the assuming that other variables are same. [18] In sum, table 8 has shown that the market value of companies operating in an environmentally significant industry is positively and significantly influenced by the level of their corporate environmental reputation and performance except environmental disclosures (GRI_{it}).

[18] When the parameter estimates of model 2.8AA are rearranged by including the corporate environmental performance measures, the model can be expressed as follows:
MV_{it}= -3.135 +4.082*1/$BVPS_{it-1}$+10.556*EPS_{it}/$BVPS_{it-1}$+(0.659-0.603*ENV_i)*$fscore_{it}$ + (0.079-1.903*ENV_i) GRI_i + (0.253+87.462*ENV_i)*$ghg\text{-}intensity_{it}$ +4.658*ENV_i

Table 8-1. Descriptive statistics and regression results when the residuals of regression are normal

Panel B-1. Descriptive analysis, GRI from 2000 to 2007

	GRI (N=244)				
Variables	Mean	Standard deviation	Median	Min	Max
$MV_{i,t}/BVPS_{i,t-1}$	3.1606	1.5897	2.8119	0.6622	8.9907
$1/BVPS_{i,t-1}$	0.1227	0.1001	0.0901	0.0027	0.5015
$EPS_{i,t}/BVPS_{i,t-1}$	0.1817	0.135	0.1773	-0.2809	0.7901
Environ. Reputation ($fscore_{it}$)	6.2302	0.9407	6.14	3.78	8.44
Environ. Disclosures (GRI_{it})	0.4918	0.501	0	0	1
Environ. Performance ($ghg\text{-}intensity_{it}$)	0.1036	0.8929	0.0123	0.0002	10.0018

Panel B-2. Correlation analysis, GRI from 2000 to 2007

Variables	1	2	3	4	5	6
1. $MV_{i,t}/BVPS_{i,t-1}$	1	0.1537**	0.7166***	0.1219*	0.3229***	0.2053***
2. $1/BVPS_{i,t-1}$	0.1959***	1	0.0147	-0.1317**	-0.0591	-0.041
3. $EPS_{i,t}/BVPS_{i,t-1}$	0.6851***	0.0373	1	0.1534**	0.3208***	0.0297
4. Environ. Reputation ($fscore_{it}$)	0.0752	-0.2010***	0.1357**	1	0.1858***	-0.1428**
5. Environ. Disclosures(GRI_{it})	0.3142***	-0.0341	0.3202***	0.1731***	1	0.1093*
6. Environ. Performance ($ghg\text{-}intensity_{it}$)	0.2078***	0.0245	0.0668	-0.0626	0.0966	1

Table8-1. (Continued)

Panel B-3. Regression for the GRI, 2000 to 2007

Variables/Model	2.1A	2.2A	2.3A	2.4A	2.5A	2.6A	2.7A	2.8A	2.8AA
$1/BVPS_{it-1}$ (β_1)	0.807***	0.421***	1.561***	2.663***	1.730***	2.792***	2.697***	2.782***	3.385***
	(4.48)	(3.08)	(3.98)	(3.82)	(4.14)	(3.87)	(3.8)	(3.84)	(4.48)
EPS_{it} /$BVPS_{it-1}$ (β_2)	3.593***	3.757***	4.020***	7.909***	3.612***	7.840***	7.485***	7.468***	6.864***
	(10.97)	(10.09)	(10.82)	(10.79)	(10.2)	(10.73)	(9.67)	(9.76)	(9.00)
$fscore_{it}$ (β_3)		0.278***			0.116**	0.067		0.028	0.181*
		(8.11)			(2.32)	(0.83)		(0.35)	(1.68)
GRI_{it} (β_4)			0.082		0.056		0.362**	0.316**	0.419**
			(0.84)		(0.56)		(2.25)	(1.99)	(2.26)
ghg-$intensity_{it}$ (β_5)				0.279***		0.284***	0.263***	0.272***	0.277***
				(5.35)		(5.64)	(5.25)	(5.46)	(6.32)
ENV_i (β_6)									3.069***
									(3.09)
$fscore_{it}$*ENV_i (β_7)									-0.442***
									(-2.90)
GRI_{it}*ENV_i (β_8)									-0.721**
									(-2.45)
ghg-$intensity_{it}$*ENV_i (β_9)									66.186***
									(7.29)
_cons (β_0)	1.144***	-0.379*	1.546***	1.400***	0.841***	0.977*	1.301***	1.103**	0.136
	(21.39)	(-1.85)	(18.93)	(9.50)	(2.83)	(1.82)	(9.08)	(2.07)	(0.20)
N	216	228	232	249	224	249	248	244	244
Adj. R^2	0.446	0.532	0.415	0.499	0.417	0.498	0.509	0.523	0.601
F-value	61.384***	65.422***	58.049***	66.694***	41.141***	51.085***	59.077***	46.795***	45.532***

Note: The t-statistics (in parentheses) were estimated using White's heteroscedasticity-corrected standard error in the regression. Superscripts *, **, *** denote statistical significance at the 0.1, 0.05, and 0.01 levels, respectively.

The full observations have been thoroughly rechecked by removing outliers identified by reference to residuals until the statistical test for the normality of residuals could be accepted. The results from panel B-2 of table 8-1 are similar to those from panel B (GRI) of table 7, except for the relationship between the measured environmental performance variables and firm value. For example, the relationship between environmental reputation and firm value has faded away, whereas the other variables (i.e. GRI and physical performance) turn out to be significantly related to firm value at the 1% level in the Pearson correlation analysis. Further, the significant relationship between GRI and book value has diminished in the Pearson and Spearman correlation analysis. The regression analysis in panel B-3 of table 8-1 shows that the outcomes for the other variables are consistent with those in panel B of table 8, except for GRI, the measurement for environmental disclosures, which has become significant at the 5% level in models 2.7A, 2.8A and 2.8AA. Further, when comparing the outcomes of GRI in panel B of table 8 with those in panel B-3 of table 8-1, the latter provide a more consistent relationship between firm value and GRI (i.e. there is a positive relationship between the two in all models), than the former. Weak value relevance of environmental reputation on firm value can be deduced from the level of association between the two in panel B-2 (i.e. there is no association in the Pearson treatment and this is only significant at the 10% level in Spearman correlation analysis).

Because the residuals of the regression for the full sample are not normal, non-parametric quantile regression has been conducted using model 2.9 with full observations for the 25th, 50th, and 75th percentiles. The results from this quantile regression, presented in table 8-2, are relatively consistent with those in the case of the DJSI and GRI in table 8. For example, the environmental disclosures (DJSI or GRI) are insignificant in the quantile regression for all the percentile cases, except the DJSI, which is significant at the 10% level in the 25th percentile. Environmental reputation is significant at the 5% level or better in the cases of the DJSI and GRI for all percentiles. Further, the physical performance is significant at the 5% level or better, except for the 75th percentile for the DJSI and 50th percentile for the GRI. Whereas the book value ($1/BVPS_{it-1}$) is significant at the 10% or better for the DJSI and GRI, except for the 50th percentile for the GRI, the earnings ($EPS_{it}/BVPS_{it-1}$), interestingly, are only significant at the 10% level for the 75th percentile for the DJSI and GRI. Unlike the outcomes from quantile regression for the DJSI, those for the

GRI provide different evidence for environmental disclosure (GRI) compared to those of table 8-1, which suggests that GRI does have value relevance. In general, the results from the non-parametric analysis imply that they are closer to those in table 8 than those in table 8-1 where the residuals are normal.

Table 8-2. Non-parametric quantile regression analysis

	DJSI			***GRI***		
Variables	Q25	Q50	Q75	Q25	Q50	Q75
$1/BVPS_{it-1}$ (β_1)	3.123**	5.231*	11.140***	2.396***	5.314	11.002***
	(2.09)	(1.69)	(4.03)	(3.47)	(1.14)	(4.18)
EPS_{it} /$BVPS_{it-1}$ (β_2)	3.329	7.159	10.948*	3.42	7.748	10.115*
	(0.88)	(1.41)	(1.67)	(0.77)	(0.94)	(1.73)
$fscore_{it}$ (β_3)	0.638**	0.616***	0.576***	0.563**	0.693**	0.583**
	(2.57)	(3.75)	(2.78)	(2.12)	(2.32)	(2.41)
$DJSI_{it}$ or GRI_{it} (β_4)	0.546*	0.484	-0.855	0.233	0.316	0.4
	(1.96)	(1.56)	(-1.13)	(0.74)	(0.72)	(0.82)
ghg-$intensity_{it}$ (β_5)	0.484***	0.308**	0.14	0.445***	0.246	0.185***
	(4.84)	(2.08)	(1.36)	(3.86)	(1.40)	(3.09)
ENV_i (β_6)	6.573**	5.337**	3.153	5.319	6.765*	7.451***
	(2.54)	(2.49)	(0.67)	(1.57)	(1.86)	(3.26)
$fscore_{it}$*ENV_i (β_7)	-0.859***	-0.779***	-0.652	-0.722	-0.995*	-1.006***
	(-2.64)	(-2.83)	(-1.00)	(-1.47)	(-1.90)	(-2.97)
$DJSI_{it}$ or GRI_{it} *ENV_i (β_8)	-1.075**	-0.86	1.015	-0.243	-1.092	-1.899**
	(-2.06)	(-1.56)	(1.06)	(-0.31)	(-1.50)	(-2.05)
ghg-$intensity_{it}$*ENV_i (β_9)	60.536***	58.207***	53.613	52.121***	67.087***	63.458
	(3.76)	(3.32)	(1.13)	(3.74)	(3.21)	(1.58)
_cons (β_0)	-3.158**	-2.938***	-2.012*	-2.527*	-3.264**	-2.691**
	(-2.18)	(-2.67)	(-1.68)	(-1.82)	(-2.00)	(-2.39)
N	338	338	338	318	318	318
R^2	0.349	0.330	0.354	0.316	0.324	0.365

Note: The t-statistics (in parentheses) were estimated using White's heteroscedasticity-corrected standard error in the regression. Superscripts *, **, *** denote statistical significance at the 0.1, 0.05, and 0.01 levels, respectively.

4.4 Discussion

The negative results for this research, regarding environmental reputation and physical performance with equity performance, which are somewhat counterintuitive, have been found in other studies (e.g. Brammer et al., 2006). However, in the majority of the extant studies high levels of such performance measures have been associated with a strong stock market or firm financial performance (e.g. Belkaoui, 2004; Derwall et al., 2005; Margolis and Walsh, 2003; Orlitzky et al., 2003). Regarding the value relevance of environmental performance to investors' decision making, in this research this has emerged as being strongly significantly positive, which reflects positive expectation of future cash flows and this is in line with several previous works (e.g. Clarkson et al., 2004; Hughes II, 2000). Therefore, taking the results for this research together it would appear that they are contradictory.

The findings for the negative environmental and equity performance outcome could be down to the traditional economic notion that increased costs in environmental issues result in decreased earnings and market values for firms, or it could be that there is the presence of altruistic investors who are willing to forgo returns to salve their ethical conscience (Aupperle et al., 1985; Brammer et al., 2006; Hassel et al., 2005; Mahapatra, 1984; Vance, 1975). One further possible explanation for this anomaly is the aforementioned lack of a standardized metric of environmental performance to measure something that is non-financial and hence, the variation in the representative variables chosen could be the cause of the inconsistent outcomes (Ilinitch et al., 1998; Ullman, 1985). Further, even though it has been posited by this researcher in chapter 3 that the inclusion of third party measures would be expected to enhance environmental performance information for investors, the evidence for this thesis suggests that some such reporting, e.g. Fortune's environmental reputation ranking, is an insufficient proxy for non-financial environmental performance. Regarding such measures, some scholars have expressed concern about their validity, that is, whether the measures identify performance (e.g. environmental performance) is important to investors and society, because there is no information provided as to how these reputational measures are compiled at the internal level (Chatterji and Levine, 2006; Illiniotch et al. 1998). That is, it could well be that the reputational scores from year to year are perceived by investors as reflecting the immediate

concerns of the assessor organization, rather than what is of interest to them when making investment decisions. However, the problem still remains that in this work the relationship is negative and hence, further reasoning is required to explain this, as put forward next.

It is suggested, that one plausible explanation for the negative relationship between reputation and physical performance with returns relates to risk. That is, a higher level of CSR implies lower CSR risk (i.e. firm-specific risk) and therefore, the lower expected stock return. By way of explanation, risk, the premier element in investment decisions, can be distinguished as systematic risk, known as market risk or beta, and firm-specific or idiosyncratic risk. The former can be contrasted with the latter in that it is likely to affect most companies to some degree, in the form of: economic growth rate shocks, interest rate shocks, and inflation shocks. Further, systematic risk has been deemed as a risk factor that must be included in the return-risk link in the asset pricing model (e.g. CAPM), whilst firm specific risk can be theoretically eliminated through portfolio diversification. However, a few studies have contended that idiosyncratic risk does matter as it is priced by the market (Cornell and Shapiro, 1987; Malkiel and Xu, 1997). More specifically, Malkiel and Xu (1997) provided evidence of existence the positive relationship between idiosyncratic risk and stock returns. In sum, the negative relationship between CSR and stock market returns found in this research could be attributed to the low level of firm-specific risk experienced by high performers.

4.5 Chapter summary

In this chapter the results have been reported of an investigation into how information on corporate environmental performance, in the form of reputation, disclosures and eco-efficiency, affects the level of earnings and hence, that of stock returns, by using an earnings-returns model based on the work of Belkaoui (2004). Furthermore, results have been presented regarding whether the performance measures are value relevant to financial decision-makers as reflected by their investment decisions, thereby extending a study of Hassel et al. (2005).

The first and second tested hypotheses were aimed at establishing whether information on earnings in explaining stock returns is systematically related to corporate environmental performance measures and whether this relationship is positive. Regarding the first hypothesis, the results in table 4 show that all of the corporate environmental performance measures are determinants of information on earnings. More specifically, it has been elicited that the higher level of the corporate environmental disclosures ($DJSI_{it}$), the greater the weight investors will attach to the information on earnings and hence, on the determination of stock returns. However, this relationship was not established for other environmental performance measures (i.e. reputation ($fscore_{it}$), physical performance ($ghg\text{-}intensity_{it}$), and the use of GRI guidelines, as alternative measure of disclosure). Turning to the outcomes from testing the second hypothesis, the findings in table 5 illustrate that environmental reputation is significant and negatively associated with equity performance and the same result has emerged for environmental performance, assessed using eco-efficiency data ($ghg\text{-}intensity_{it}$), when other variables are included in the regression model. However, the results of the test in general for the direction of the link between environmental disclosures and equity performance, measured by membership of the DJSI and the use of the GRI guidelines, revealed that they are not associated with stock returns.

The third hypothesis involved testing whether useful corporate environmental performance information is value relevant for investment decision-making. The results in table 7, table 8 and table 8-1 indicate that this is the case and further, performance varies across industries. Moreover, the evidence from table 8 and table 8-1 suggests that companies operating in industries with significant levels of environmental impact are positively sensitive, in terms of their market values, to the level of the environmental reputation and environmental performance information, whereas this relationship is negative for such industries when it comes to voluntary environmental disclosures (i.e. GRI guidelines).

In sum, the evidence in this chapter has shown that investors confer high value relevance on information about corporate environmental reputation ($fscore_{it}$) and environmental performance ($ghg\text{-}intensity_{it}$), but these aspects are negatively associated with earnings and annual stock returns. One possible reason for this result could be due to the correlation values between earnings and returns shown in table 4,

where no monotonically increasing relationship between them is found. Whereas the outcomes regarding environmental disclosures ($DJSI_{it}$ and/or GRI_{it}) have demonstrated that they are not incorporated into company equity performance, the evidence from environmental disclosure as measured by the GRI Guidelines shows that it is considered by investors when making investment decisions. This difference may be attributable to the fact that financial-decision makers give more credit to GRI disclosures, which are more voluntary in nature when compared with the DJSI, i.e. the latter involves greater formality in the disclosures process.

CHAPTER 5

Chapter 5. SRI Index Membership and Equity performance

5.1 Introduction

As discussed in chapter 1, the badge of SRI index membership may be a quick way of conveying the information regarding on a company's social responsibility practices to financial market participants. In this respect, although some researchers have examined how the market reacts to a specific event (i.e. SRI index announcement), whether SRI index membership as non-financial information for CSR is relevant to financial information for firm value has not, as yet, been comprehensively empirically investigated. Thus, by means of market-based and accounting-based valuations, this chapter explores the different ways in which SRI index membership influences shareholder value through equity performance. Regarding the former, an event study is used to test the effect of membership of an SRI index, as a measure of CSR related information, on the share price of a set of companies. In relation to latter, the valuation methodology used in Hassel's (2005) work is used to examine whether or not this information has value relevance. These two approaches employing data from extended sample periods of the best known SRI indices (i.e. the DJSI and the FTSE4Good index) and thus, may fill the aforementioned gap the empirical literatures. However, the main empirical emphasis in this chapter is focused on the event study, because the value relevance investigation is fundamentally the same as that carried out in chapter 4.

Event studies are a useful method for assessing the effect of new stories or events on share price in that they reflect how the market, analysts, and investors react to good news or bad news about specific companies. In particular, they have been used in order to assess the financial impact of new information on the share prices of a corporation in terms of market efficiency. With regards to this, given the semi-strong form of market efficiency, investors react quickly and rationally to any newly available information by incorporating it into their investment decision. In general, understandably, a firm's share price declines when there is bad news, whereas it rises in the case of good news. Empirically, event studies have been used to determine the impact of CSR related events, such as: the disclosure of corporate environmental

performance (Freedman and Jaggi, 1986), releases of pollution data (Hamilton, 1995) and environmental news (Klassen and McLaughlin, 1996). In this chapter, the announcement of the constituents of SRI indices is used as the proxy for CSR related events. More specifically, the market reaction of stock prices to the inclusion (deletion) of a company in (from) an SRI index is employed to test the hypothesis that inclusion in (exclusion from) such indices affects significantly and positively (negatively) its share price changes. The data on these announcements is analyzed over the sample period using both the whole sample and subsamples for each year covered.

First, previous event studies on CSR are reviewed to aid hypothesis development and, the descriptive statistics are provided for the independent and dependent variables as well as there being an overview of the data (section 5.2). Subsequently, section 5.3 contains the results of the correlations between the independent variables and the overall findings from the empirical models used for the event study as well as discussion of the results for the accounting based valuation. Section 5.4 contains further consideration of the findings, whilst section 5.5 is the chapter summary.

5.2 Research Design

5.2.1 Hypothesis development

Market reaction to CSR event announcements

As noted in the previous chapter, because of the difficulties of measuring the construct of CSR, CSR related announcements (e.g. environmental performance) have been used as a proxy in the event studies that have the goal of estimating the market value impacts of specific happenings. Moreover, such studies have been used to determine the impact of both positive and negative CSR related events. For instance, in their research relating to the announcement of environmentally-related company news, Klassen and McLaughlin (1996) and Filbeck and Gorman (2004) found that the stock price reacted significantly and positively to environmental awards news and negatively when an environmental group makes a detrimental statement about a company. However, Lorraine et al. (2004) showed that no significant effects occurred on the day of the issuing of environmental news when testing UK companies' share price movements from 1993 to 2000 over a 21 day window surrounding the

announcement day (*Day t*), but notably on Day *t-7* the market reacted significantly positively and on Day *t+7* it reacted negatively. These authors suspected that the market may have been responding to something unrelated to environmental information or there may have been some leakage of this information (ibid). Studies relating to market reaction on the quality of disclosures have provided evidence that those that disclose environmental performance are less risky than those that do not (Anderson and Frankle, 1980; Belkaoui, 1976; Jaggi and Freedman, 1982 and 1986). However, Freedman and Stagliano (1991) reported that the market reacted negatively to mandated environmental disclosures ordered by the US Supreme Court for the cotton and textile industry, i.e. levels of cotton-dust emissions.

Other information sources employed to represent environmental events include: announcements by the Toxic Release Inventory (TRI) (Hamilton, 1995; Konar and Cohen, 1995) and those by the Council on Economic Priorities (CEP) (Shane and Spicer, 1983; Stevens, 1984). Regarding the latter, Shane and Spicer (1983) investigated whether investors' perception of company performance might be affected by such third party information and found that CEP firms experienced negative abnormal returns on the two days prior to an announcement as well discovering that companies with low pollution control performance rankings had significant and more negative returns than those with high rankings, on the announcement day. Using the same dataset, Stevens (1984) examined whether estimated future pollution control expenditure influences investment decisions and found that portfolios with low estimated expenditure had a higher return than those with high estimated expenditure. Hamilton (1995) examined whether the market takes into account TRI information for investment decision making and found that firms had statistically significant and negative abnormal returns on the TRI release date. As an extension to Hamilton's study, Konar and Cohen (1997) examined whether or not firms reduced toxic emissions after they had significantly negative returns and they elicited that companies who received the largest negative returns owing to high emissions significantly lowered their emission rates after the release of TRI information, which was not the case for those with low levels of emissions. Furthermore, Frooman (1997) conducted a meta-analysis of 27 event studies of socially irresponsible and illicit behaviour and discovered that this type of behaviour had a statistically significant and

negative effect on shareholder wealth. Therefore, they concluded that firms should act in a socially responsible manner aimed at promoting their shareholders' interests.

The results from these studies, in general, show a consistent trend of positive movements in share price when good news is released and the converse when there is bad news. However, even though they can provide information as to whether or not investors care about CSR performance in relation to a specific event, the evidence is still weak regarding its impact on equity performance. As discussed in the previous chapter, there is no single concept of CSR nor is there a commonly accepted way of measuring it and because it requires multidimensional measurement, if its effect is to be robustly estimated, these earlier research endeavours, focused on specific events rather than a variety of measures, have failed to provide clear evidence of the role of CSR in determining market value changes of companies. Therefore, in this chapter CSR related events are defined as inclusion in or exclusion from SRI indices, because membership requires companies to qualify on a range of environmental, social and financial performance measures.

Index inclusions and exclusions

Prior research has involved considering whether change in the composition of indices over a period of time provides information that affects the market. For example, scholars have examined the impact of listing and/or delisting from the S&P 500 index on returns and have consistently shown that companies that were delisted experienced negative market returns (Goetzmann and Garry, 1986; Jain, 1987). Further, Chen et al. (2004) discovered that companies added to the S&P 500 index could enjoy a permanent increase in share price, but those delisted only suffered temporary losses over the period from 1962 to 2000. It is notable that these authors elicited that investors' reaction is more sensitive to addition to an index than deletion from it. A recent paper by Elliott et al. (2006) has supported the perspective put forward by Chen et al. (2004) regarding investor awareness, but they also found that the benefits of inclusion in the index would involve only a temporary price increase rather than one that is permanent.

Compared to event studies relating to general stock indices, the list of extant studies on SRI indices is quite short (Cheung, 2011; Clacher and Hagendorff, 2011;

Consolandi et al., 2009; Curran and Moran, 2007; Doh et al., 2010; Lackmann et al., 2011; Robinson et al., 2011; Schroder, 2007). Regarding this particular research, three previous studies are closely related: Robinson et al. (2011), Cheung (2011), Clacher and Hagendorff (2011), and Curran and Moran (2007), all of which examined the impact of inclusion and exclusion from the DJSI World or the FTSE4Good index. Cheung (2011) used only US companies from 2002 to 2008, whilst Robinson et al. (2011) focused on North American companies over the period 2003 to 2007. The former found that DJSI inclusion (exclusion) stocks reported a significant, but temporary, increase (decrease) in returns on the day of exchange (i.e. the effective day of index exclusion and index inclusion), whereas the latter discovered that companies being added to this index experienced a sustained increase in share price and those being deleted from it had a decrease in share price for the first 10 days subsequent to the announcement. Curran and Moran (2007) tested whether being included in or excluded from the FTSE4Good UK 50, tradable index, resulted in a significant impact on share price over the period 2001 to 2002 and found that there was no significant difference in the returns between companies being added to the index when compared to those being deleted. More recently, Clacher and Hogendorff (2011) also did not find the strong evidence in favour of a positive market reaction to the announcement of FTSE4Good index from 2001 to 2008.

Value relevance of SRI indices

The results of the above event studies have provided some evidence of market reaction on the announcement-day of SRI indices composition change. In other words, the literature would appear to support the view that SRI indices announcements, as a proxy for CSR, convey new information to the market. However, there has been no prior research on whether and how inclusion in or exclusion from such indices affects a firm's value, which is the aim of this particular study. Moreover, the question arises as to whether the market is genuinely concerned about firms' efforts to be members of an SRI index and whether listed companies can boost their firm value. Another matter of interest is whether investors are genuinely concerned about SRI investments or whether they are just investing in brand imaging when they are making investment decisions. If there is a significant relationship between being listed on an SRI index and a company's value, then it can be concluded that environmental/CSR performance, as proxied by membership of SRI indices, conveys new information to

the market and further, that this knowledge can be considered as being relevant to a company's firm value.

There is some evidence that firms want to be members of SRI indices. For instance, when the FTSE4Good index was launched, Tesco, the Royal bank of Scotland and Marconi could not join at first, because they did not meet the criteria (Foley, 2001). In particular, unlike Sainsbury and BP, Tesco failed to gain membership as it did not meet the necessary environmental criteria and this was widely reported in the media, which may have had a negative impact on its firm value. However, since then it has made efforts to report more transparently on social and environmental policies and hence, has been allowed to join the index. In fact, the company now produces more public information than before, which may be due to its desire to remain on the index.

In the case of investors' assessments of a firm's CSR, if they consider membership of an SRI index as a factor that affects their investment decision, this will have an influence on share prices and thus it is to be considered as relevant to a firm's value. Under such circumstances, this will motivate corporations to improve continuously CSR related to social and environmental performance as well as human rights in order to remain on the indices. That is, companies will assume that they can increase their market value if investors are cognizant of the fact they are listed in SRI indices and thus, are doing their business ethically and in an environmentally friendly way.

Hence, two hypotheses are formulated as follows:

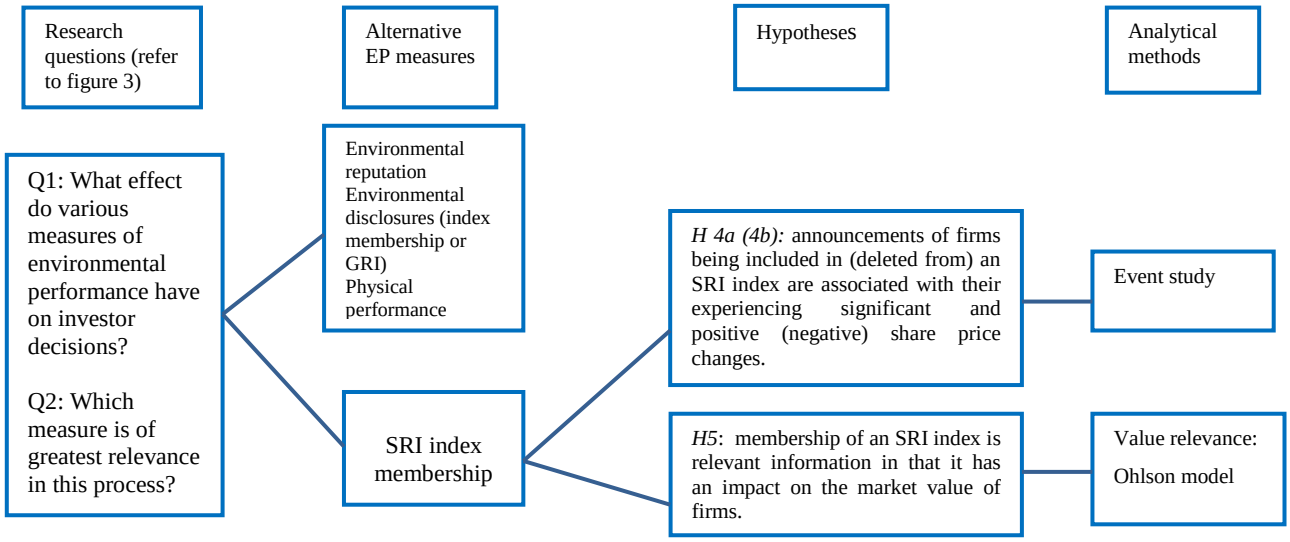
H4a: Announcements of firms being included in an SRI index are associated with their experiencing significant and positive share price changes.

H4b: Announcements of firms being deleted from an SRI index are associated with their experiencing significant and negative share price changes.

H5: Membership of an SRI index is relevant information in that it has an impact on the market value of firms.

The development of hypotheses in this chapter is shown in figure 5 below.

Figure 5. Summary of development of hypotheses for SRI indices



5.2.2 Sample and Data

The lists of firms included in or excluded from SRI indices were extracted or provided from these websites: DJSI World for 2000 to 2007 and FTSE4Good Global for 2002 to 2007.

Inclusions and exclusions from the DJSI

The Dow Jones Sustainability World Index (DJSI World) comprises the top 10% of the largest companies in the Dow Jones Global Index (DJGI), in terms of economic, environmental and social criteria and consists of a composite index and five indices: DJSI World excluding alcohol, DJSI World excluding gambling, DJSI World excluding tobacco, DJSI World excluding armaments & firearms, and DJSI World excluding alcohol, gambling, tobacco, armaments and firearms.

DJSI World, the first global index for tracking the performance of sustainably driven companies worldwide, was started with 227 members on 8 September 1999, which have since been annually monitored as to whether they meet the corporate sustainability assessment criteria, in terms of: economic, environmental and social performance. In cooperation with the Sustainable Asset Management group (SAM), the organisation announces the list of companies included in and excluded from the index during the first week in September of each year and the new composition comes

into effect on the third Friday following the declaration. The DJSI serves as a benchmark for investors who integrate sustainability considerations into their portfolios, and provides an effective engagement platform for companies who want to adopt sustainable best practices. According to the DJSI webpage, "Currently more than 70 DJSI licenses are held by asset managers in 19 countries to manage a variety of financial products including active and passive funds, certificates and segregated accounts. In total, these licensees presently manage over 8 billion USD based on the DJSI."[19] Panel A of table 9 provides the number of companies included in and excluded from the DJSI index from 2000 to 2007.

Table 9. The number of companies included in and excluded from the DJSI from 2000 to 2007 and the FTSE4Good index from 2002 to 2007[20]

Panel A. DJSI

DJSI world	Announcement date	Effective date	Additions	Deletions
2000	07/September	06/October	91 (42)	82 (37)
2001	04/ September	08/ October	131 (59)	45 (20)
2002	04/ September	23/ September	81 (45)	70 (39)
2003	04/ September	22/ September	51 (27)	42 (27)
2004	02/ September	20/ September	38 (27)	32 (15)
2005	07/ September	19/ September	57 (35)	54 (36)
2006	06/ September	18/ September	46 (30)	36 (20)
2007	06/ September	24/ September	42 (31)	33 (18)
Total			537 (296)	394 (212)

Panel B. FTSE4Good

Global Index	Announcement date	Effective date	Additions	Deletions
March/2002	13/March	18/March	62 (38)	4 (0)
September/2002	17/September	23/September	48 (23)	7 (4)
March/2003	19/March	24/March	33 (21)	4 (1)
September/2003	18/September	22/September	57 (34)	19 (11)
March/2004	12/March	22/March	62 (38)	29 (13)
September/2004	10/September	20/ September	63 (50)	8 (3)
March/2005	10/ March	21/ March	70 (45)	22 (8)
September/2005	07/ September	19/ September	30 (15)	20 (9)
March/2006	08/ March	20/ March	29 (17)	19 (9)
September/2006	07 / September	18/ September	20 (15)	8 (6)
March/2007	07/ March	19/ March	15 (7)	16 (6)
September/2007	12/ September	24/ September	20 (9)	24 (13)
Total			509 (312)	180 (83)

Note: The table provides the number of companies being included in and excluded from the DJSI World (panel A) and the FTSE4Good Global index (panel B) over the periods 2000 to 2007 and 2002 to 2007, respectively. The figures in parentheses are the total numbers of companies used for calculating abnormal returns, the share price information for which is taken from DataStream.

[19] Retrieved from http://www.sustainability-indexes.com on April 30, 2011

[20] For the FTSE4Good index biannual announcement in 2002, the announcement date for the inclusion in and exclusion from index is from the Regulatory News Services (RNS), but from the website otherwise.

Inclusions and exclusions from the FTSE4Good index

Similar to the aims of the DJSI, the FTSE4Good index series were designed in response to the increasing focus on CSR by investors seeking to measure the social, environmental and ethical performance of the companies that they invested in. To qualify for inclusion in these indices, companies must be listed on the FTSE All-Share (UK) or FTSE Developed Index (Global) and must meet criteria in five areas: working towards environmental sustainability; developing positive relationships and stakeholders; up-holding and supporting universal human rights; ensuring good supply chain labour standards and countering bribery. The index selection criteria have been designed to "reflect a broad consensus of what constitutes good corporate responsibility practice globally."[21] Companies involved with or investing in sectors where products or activities are deemed to be unethical, such as the weapons and tobacco industries, are excluded from the indices. The inclusion criteria have been regularly reviewed and tightened since the launch, with tougher environmental and human rights requirements being introduced as well as new supply chain labour standards and countering bribery rules. Those companies deemed to be no longer meeting the standards are deleted from the indices.

The FTSE4Good Global index was initiated with 525 companies in 2001 and the performance of companies is monitored every six months by the FTSE4Good Policy Committee. Company screening information for the indices is also provided by the Ethical Investment Research Service (EIRIS), who act as a third party scrutinizing: annual reports, research company websites and publicly available other material as well as regularly updating and reviewing the company's information. The FTSE4Good comprises eight indices, four benchmark indices (FTSE4Good UK; FTSE4Good Europe; FTSE4Good US; FTSE4Good Japan; and FTSE4Good Global), and four tradable ones (FTSE4Good UK 50; FTSE4Good Europe 50; FTSE4Good US 100; and FTSE4Good global 100).[22] A benchmark index includes all those companies from the given country/region whose performance meets the inclusion criteria, whereas the tradable indices are the largest 50 or 100 companies in the benchmark

[21] For further details see http://www.ftse.com/Indices/FTSE4Good index series/Downloads/FTSE4Good Inclusion Criteria.pdf.

[22] For more detail see http://www.ftse.com/Indices/FTSE4Good_index_Series/Downloads/indexrules.pdf. "Ground rules for the management of the FTSE4Good index series" Version 1.3 August 2005.

index. Of these indices, the FTSE4Good Global Index, which covers the same geographical region as DJSI World, was used for this research to examine the market reaction to the entrance to and exit from the index. The data has been taken from the Financial Times Stock Exchange (FTSE) and panel B of table 9 gives the number of companies included in and excluded from the FTSE4Good Global Index for each announcement (i.e. in March and September) year from 2002 to 2007.

The LexisNexis Group database[23] (a database of newspaper articles and newswire stories) was searched for news stories for each company in each sample and then confounding events are controlled for by eliminating from the sample those companies for which confounding events were found for a period of 5 days prior to and after the event-date. The objective was to see whether companies in each sample had been subject to any significant confounding events during the event window. A confounding event would have been a very big news story involving the company in question, for example, declarations of dividends, announcements of an impending merger and/or acquisitions, filings of damage suit or strike, announcements of earnings. Furthermore, companies whose addition to or deletion from theses indices was caused by significant contemporaneous events have been excluded. That is, if they had experienced happenings during a year, such as a: merger, takeover, spin-off or they were entered on the secondary line of a company that already existed, then they were not included in the analysis. For example, in the additions to the FTSE4Good in September, 2002, Henkel Kagg Ord and Telus Corporation A were dropped, because they were on the secondary line of the Henkel and Telus corporations, respectively. Moreover, if companies were added to or deleted from one of the FTSE4Good index review in the same year, they were also excluded from the sample. For instance, in the 2003 two companies, Alumina and ConocoPhillips, were included in the index in the March review, but they were excluded in the September, because they failed to meet the requirements of the newly approved human rights criteria. Consequently, of the total initial number of 1,620 observations, 903 were used for testing the hypotheses in this study, as indicated by the parentheses in table 9.

[23] LexisNexis Group: see www.lexis-nexis.com

5.2.3 Empirical models

Similar to the empirical approach in chapter 4, a market based valuation approach is adopted. However, in this case an event study is employed in addition to accounting based valuation as in the last chapter, but with different variables taken from a study by Hassel et al. (2005), which is an empirical analogue of Ohlson's (1995) model. That is, these techniques are employed to examine the market reaction to companies added to or deleted from the chosen SRI indices.

Event Study

Event studies have been used from the late 1960's (Fama, 1970) and are probably the most common way to examine how the market responds to new publicly available information, such as: regulation announcements, earning announcements, and merger or acquisition announcements. Even though this type of study is the best way to examine market behaviours and share prices, it can generate different outcomes for the same event, depending on how the event date and periods are defined or how the normal returns are estimated with the application of the different models. Some researchers have reviewed the various approaches employed in event studies, with the aim of establishing a rigorous approach that reduces the impact of sensitive issues, such as the length of the interval around an event, whilst controlling for market-wide influences on stock prices (Bowman, 1983; Brown and Warner, 1980 and 1985; Henderson Jr., 1990; MacKinlay, 1997).

In this research, regarding the structure of the event study, Bowman's (1983) approach is adopted, as follows: (i) identify the event of interest and event date; (ii) model the normal returns; (iii) estimate excess returns i.e. abnormal returns; (iv) aggregate excess returns; and (v) analyze the results. That is these steps are carried out in order to examine the market behaviour towards new information. The first task is to define the event of interest and to identify the event window, the period over which the security prices of the companies in this event will be examined. The events of interest in this study are the information content of the announcement of addition to or deletion from the FTSE4Good index and the DJSI from the year after the indices were launched, 2002 and 2000, respectively, up until to 2007. Thus, the event dates (Day $t = 0$) are the press release days in March and September for the FTSE4Good index and

in September for the DJSI. The event window is taken as five days before and after the event day (from Day *t -5* to Day *t+5*) and the estimation window, which is used for calculating a security's systematic risk (β), is estimated over the 250 days prior to Day *t-5* . The length of the estimation period used in previous research has varied and so the most commonly used of 250 days is adopted here (Binder, 1998; Brown and Warner, 1985; Mackinlay, 1997).

In the determination of which methods (e.g. mean adjusted returns, market adjusted returns, risk controlled portfolio returns, and market model) are the most suitable for calculating the normal returns and to estimate the abnormal returns for the best explanatory power in event studies, the market model, the most commonly employed model, has been found slightly to outperform the other models (Armitage, 1995; Cable and Holland, 1999). In this regard, Armitage (1995) elicited that the market model was relatively more powerful than the others available when estimating returns in an event study. Moreover, most researchers who have examined the effect of CSR on share prices have adapted the market model to measure normal returns in event studies (Curran and Moran, 2007; Freedman and Jaggi, 1982; Freedman and Stagliano, 1991; Hamilton, 1995; Konar and Cohen, 1997; Shane and Spicer, 1983). Hence, in this research the market model is used for measuring the abnormal returns.

The daily security prices are obtained from DataStream from 2000 to 2007 for the DJSI and from 2002 to 2007 for the FTSE4Good. From the raw daily share prices the logarithmic returns are used to calculate the security returns, because they are more likely to be normally distributed than the discrete returns (Strong, 1992). The share returns are calculated from the share price using the formula:

$$R_{it} = \ln\left[\frac{P_{it} + D_{it}}{P_{it-1}}\right] \qquad (1)$$

where P_{it} is the price of security *i* on day *t*, P_{it-1} is the price of security *i* on Day *t-1*, and D_{it} is the dividend paid on the share of security *i* on Day *t*. The security's share price is the DataStream price data type *P*, which the database delivers already adjusted for stock splits and other capital events. The model posits a linear

relationship between the return on a stock and the market return over a given time period as:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it} \qquad (2)$$

where R_{it} is the return of stock *i* on Day *t*, α_i is the intercept of the relationship for stock *i*, β_i is the slope of the relation for stock *i* with respect to the market return, R_{mt} is the return on a market index, the FTSE All-World Index or the Dow Jones Global Index for Day *t*, depending on the firm's membership of the index, and ε_{it} is the part of the return that cannot be explained by market movement and thus captures the effect of firm-specific information. The parameters α_i and βi are estimated by using ordinary least squares (OLS) regression over the estimation period of 250 daily observations before the start of the event window (i.e. Day *t-255* to Day *t-6*).

The abnormal returns (AR_{it}) for firm *i* on Day *t* are calculated as the difference between the actual security return of firm *i* and its expected return:

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt}) \qquad (3)$$

where the assumed E (ε_{it}) = 0, and δ (ε_{it}, ε_{jt}) = 0 i ≠ j

The average abnormal return ($\overline{AR_t}$) can provide information as to whether the event is associated with a change in security holder wealth and can also predict the sign of the average effect (Kothari and Warner, 2004). The mean abnormal return (MAR) for Day *t* is calculated as:

$$\overline{AR_t} = \sum_{i=1}^{N} \frac{AR_{it}}{N} \qquad (4)$$

where N is the number of securities in the event.

To test the statistical significance of the average abnormal return, each mean abnormal return AR_{it} is divided by its estimated standard deviation S ($\overline{AR_t}$), which is

estimated from the time series of mean excess returns, thereby addressing cross-sectional dependence. If the average AR_{it} is normal, independent and identically distributed, then this test statistic is distributed Student-t with 249 degrees of freedom (Brown and Warner, 1980). Brown and Warner (1980) called this method "*Crude Dependence Adjustment*", because according to this test the standard deviation of the Day *t* average excess return is estimated from the values of the mean excess returns over the estimation period. The portfolio t-test explicitly takes into account any potential cross-sectional dependence in the security specific excess returns and hence this helps to avoid the potential problem of cross-sectional correlation of security returns. To test the null hypothesis, which is that the mean abnormal return on the Day 0 (i.e. event day) is equal to zero, the test statistic TS_t for Day *t* can be expressed as (for more details see Brown and Warner, 1980, p.251-252 ; 1985, p7):

$$TS_t = \frac{\overline{AR_t}}{S(\overline{AR_t})} \qquad (5)$$

where

$$S(\overline{AR_t}) = \sqrt{\left(\sum_{t=-255}^{t=-6} (\overline{AR_t} - \overline{\overline{AR}})^2\right) \Big/ 249} \qquad (6)$$

$$\overline{\overline{AR}} = \frac{1}{250} \sum_{t=-255}^{t=-6} \overline{AR_t} \qquad (7)$$

The number of average abnormal returns can be aggregated over the event period (Day *t-5*, Day *t+5*) for each security *i* to investigate whether a security holder's wealth changes around event periods (Kothari and Warner, 2004). The average cumulative abnormal returns (CAR) can be measured for a given time period (t_1, t_2) as follows:

$$CAR(t_1, t_2) = \sum_{t=t_1}^{t_2} \overline{AR_t} \qquad (8)$$

The test statistic TS_{CAR} for a period spanning multiple days is derived in a manner similar to that for a single day. For the test interval (*t1*, *t2*) the test statistic is the ratio of the cumulative mean abnormal return to its estimated standard deviation and is given by:

$$TS_{CAR} = \left(\frac{1}{\sqrt{k}}\right) * \left(\sum_{t=t_1}^{t_2} \overline{AR_t} \Big/ S(\overline{AR_t}) \right) \qquad (9)$$

where the terms in the denominator are from equation (6) above and *k* is the number of days in the event window.

In addition, a non-parametric statistic is used to test the robustness of the conclusions based on parametric testing. This approach usually does not require such stringent assumptions concerning the distribution of returns as parametric tests and is regularly used in conjunction with its parametric counterparts (Cowan, 1992). Further, it is not as sensitive to outliers when compared with parametric testing. Regarding these, McWilliams and Siegel (1997) pointed out that deleting outlying observations is an extreme approach, because outliers may provide an important signal of the existence of confounding effects. Hence, for the non-parametric testing the generalized sign test proposed by Cowan (1992) is used in this study, which is the the proportion of positive to negative returns that exceeds the number expected from the market model.

The number expected is based on the fraction of positive abnormal returns in the 250 day estimation period for the sample of N security-events,

$$\hat{p} = \frac{1}{N} \sum_{i=1}^{N} \frac{1}{250} \sum_{t=255}^{t=-6} S_{it} \qquad (10)$$

where

$$S_{it} = \begin{cases} 1\,, if AR_{it} > 0 \\ 0, otherwise \end{cases} \qquad (11)$$

The test statistic (e.g. Z-statistic) uses the normal approximation of a binomial distribution with parameter $\hat{p}$. The generalized sign test is as follows:

$$Z_s = \frac{w - N\hat{p}}{(N\hat{p}(1-\hat{p}))^{1/2}} \qquad (12)$$

where *w* is the number of stocks in the event window for which the abnormal return (AR) or the cumulative abnormal return (CAR) is positive.

Accounting Based Valuation

As noted earlier, an event study is suitable for testing for immediate market reaction, that is, whether investors are aware of a specific event as measured over a short-time period. To test whether membership of these indices is relevant to a firm's value over a long-time period the model used in Hassel et al.'s (2005) study is also used here, and the variable non-financial information measures as a dummy variable, for which a value of 1 is taken, if a company is added to the SRI index and 0 otherwise. The regression model is as follows:

$$\frac{(P_{it} + DPS_{it})}{BVPS_{it-1}} = \beta_0 + \beta_1 \frac{1}{BVPS_{it-1}} + \beta_2 \frac{EPS_{it}}{BVPS_{it-1}} + \beta_3 index_{it} + \varepsilon_{it} \ (model\ 3)$$

where the other variables are those presented chapter 4, the variable, $BVPS_{it-1}$ is the book value per share for firm *i* at the ending of fiscal period *t-1*. P_{it} is the price per share of firm *i* at the end of fiscal year *t* after three months, EPS_{it} is earnings per share of firm *i* at the end of fiscal year, with the exception being the variable $index_{it}$, which is the SRI index membership status, assigned the value of 1 for the addition to and 0 for the deletion from the DJSI or the FTSE4Good index for year *t*.

5.3 Empirical analysis and results

5.3.1 Event study

Preliminary test of individual security stock for each index

Table 10 reports the properties of daily normal returns and abnormal returns for the 250 day estimation period and 11 day event period for the sample for the DJSI and the FTSE4Good, from 2000 to 2007 and 2002 to 2007, respectively. The standard deviations indicate the distribution of the returns is highly condensed and close to zero. Further, the bulk of the normal and abnormal returns lie to the left (i.e. positively skewed) of the mean for the DJSI and to the right (i.e. negatively skewed) of the mean for the FTSE4Good index. Moreover, the *p*-values of skewness and the kurtosis normality test are significantly different to zero at the 5% level and this indicates that the returns depart from normality. The fraction of positive returns for both the DJSI and the FTSE4Good index is over 45% during the estimation and event periods, indicating that the positive and negative returns are evenly spread.

Table 10. Descriptive statistics of daily returns and abnormal returns for the estimated and event periods

Type of return	Mean	Standard Deviation	Skewness	Kurtosis	Min	Max	% Days returns>0
DJSI: estimated period							
Raw return	0.0019	0.0859	41.3430 (0.0000)	1905.498 (0.0000)	-0.5765	4.6357	47.86%
Abnormal return	0.0000	0.0835	39.4135 (0.0000)	1803.558 (0.0000)	-0.5830	4.4373	48.27%
DJSI: event period							
Raw return	0.0000	0.0705	44.2814 (0.0000)	2209.612 (0.0000)	-0.2725	3.6565	45.15%
Abnormal return	-0.0009	0.0671	40.2670 (0.0000)	1955.010 (0.0000)	-0.3049	3.3752	47.21%
FTSE4Good: estimated period overall							
Raw return	0.0006	0.0217	0.0645 (0.0000)	11.0069 (0.0000)	-0.3176	0.3013	48.83%
Abnormal return	0.0000	0.0203	0.0959 (0.0000)	11.0658 (0.0000)	-0.3006	0.2707	48.46%
FTSE4Good: event period overall							
Raw return	0.0001	0.0200	-0.2741 (0.0000)	8.9507 (0.0000)	-0.2259	0.1162	47.39%
Abnormal return	-0.0002	0.0186	-0.1906 (0.0000)	11.1708 (0.0000)	-0.2365	0.1277	47.09%

Note: the table reports the mean of 508 stocks for the estimated and event periods of the DJSI from 2000 to 2007 and the mean of 395 stocks for these periods of the FTSE4Good from 2002 to 2007. The figures in parentheses exhibit the p-value of the skewness and kurtosis normality test conducted by the Stata program at the 5% level. The last columns contain the percentage of positive returns for the estimation and event periods over the sample test period.

Market reaction to SRI index announcements

Table 11 presents the results of the mean abnormal returns (MARs) for each day during the 11 day interval as well as those for total focal period, for inclusion in and deletion from the DJSI (panel A) and the FTSE4Good index (panel B), for the periods 2000 to 2007 and 2002 to 2007, respectively. There were 296 inclusions and 212 exclusions for the DJSI and 312 inclusions and 83 exclusions for the FTSE4Good index over the sample periods and further, as table 9 shows, the number of inclusions and exclusions for each index varies by year. The results of the parametric, t-test, and the non-parametric, generalized sign z test, following Brown and Warner (1980 and 1985) and Cowan (1992), respectively, are also reported in table 11. Figure 6 and 7 and 8 contain graphs of the MARs for inclusion in and deletion from the DJSI and the FTSE4Good index for the March and September announcements, respectively, for each day in the event window.

Regarding the full sample of the DJSI announcements, the results of the parametric test in panel A indicate that the MARs are not significant nor are those for the event period as a whole throughout the sample period. The one exception being the mean return for Day -4 and Day -3 is significantly different from zero at the 10% level. Further, in the case of exclusions the MARs during the event period are not statistically distinguishable from zero. However, the generalized sign z test provides some statistical evidence of market reaction to DJSI announcements. In particular, the MARs for Day 0 for the inclusions are negatively statistically significant at the 5%, with values of -0.0063 and generalized sign z-statistics of -2.0612. Further, regarding post-announcement Day 1 for inclusions and Day 2 for deletions are significantly different from zero at the 10% level or better.

Whilst the MAR for the whole 11 day window (Day (-5, 5)), is significant and negative for the additions, there is no significant difference from zero for the deletions. When considering the MARs results in general, no sustained trend in share prices for either good news or bad news, before or after the announcement, can be observed, but a temporary effect following the announcement is seen. That is, regarding inclusions, for Day 1 a marked rise in MAR occurs and there is slight fall on this day for exclusions, with, the former rising from -0.0063 to -0.0035. Moreover, figure 6 reveals that the pattern of the share price movements for inclusions and exclusions is similar before the announcement, indicating some anticipation of it happening. More specifically, the MAR for both inclusions and exclusions starts increasing from negative territory then fluctuating before the announcement. However, there is a loss of momentum after the announcement. Similar evidence was found by Cheung (2011), when investigating US companies being added to or deleted from the DJSI World over the period 2002-2008.

When considering the subsamples for the years 2000 to 2007, in panel A of table 11 the results show that market reaction to the announcement differs substantially over the years. In this regard, whilst the parametric test for the MAR is not significantly different from zero for inclusions on the announcement day, for the non-parametric generalized sign test it is reported that there is some evidence of market reaction on that day. For example, for the event day in the year 2000 the MAR is negatively and

significantly different from zero at the 1% level, whilst in the years 2001 and 2002 these are cases at the 10% level. However, there is no significant evidence for any of the other years in the case of deletions from the index on Day 0. With respect to the pre-announcement days for the event, in the case of both inclusions in and exclusions from the index the results show that there is some expectation of the announcement of index constituents changing as they register as significantly different from zero at the 10% level or better. In the case of the post-announcement period, the results show that the MARs for inclusion companies seems to be better than those for excluded ones after the announcement of index constituents changing, in: 2002, 2005 and 2007. Taken together, the results for the index inclusion stocks for the subsamples over the years from 2000 to 2007 provide weak evidence that the announcement has any significant impact on stock returns, but the index exclusion stocks are not significantly influenced by it.

Table 11. Mean abnormal returns (MARs) in the 11 days for companies included and excluded from the indices

Panel A. Inclusions and exclusions from the DJSI over the period 2000 - 2007

Year	**Overall**			**2000**			**2001**			**2002**		
Event days	MAR	t-statistic	sign z test	MAR	t-statistic	Sign z test	MAR	t-statistic	sign z test	MAR	t-statistic	sign z test
DJSI inclusion												
Day -5	-0.0036	-0.5211	-0.4327	-0.0049	-0.2494	-0.6425	-0.0037	-0.3942	-0.5416	-0.0028	-0.5300	-1.3047*
Day -4	0.0092	1.3108*	0.3815	0.0741	3.7397***	-0.0247	0.0028	0.2968	1.2812	-0.0035	-0.6709	-1.3047*
Day -3	0.0102	1.4546*	0.6142	-0.0060	-0.3038	-0.3336	-0.0037	-0.3920	-0.2812	0.0044	0.8447	1.0805
Day -2	-0.0030	-0.4294	-0.6654	-0.0016	-0.0803	-1.5692*	0.0005	0.0485	0.7604	-0.0012	-0.2347	-0.1121
Day -1	-0.0006	-0.0913	0.4979	0.0043	0.2188	0.5931	-0.0001	-0.0061	0.5000	0.0018	0.3467	0.7823
Day 0	**-0.0063**	**-0.9061**	**-2.0612****	**-0.0128**	**-0.6452**	**-2.8048*****	**-0.0109**	**-1.1614**	**-1.3229***	**-0.0034**	**-0.6428**	**-1.3047***
Day 1	-0.0035	-0.4926	-1.8286**	0.0006	0.0311	0.2842	-0.0107	-1.1438	-3.9269***	-0.0030	-0.5646	-0.4102
Day 2	-0.0020	-0.2907	0.2652	-0.0029	-0.1461	1.2109	-0.0031	-0.3364	-0.5416	0.0007	0.1239	-1.3047*
Day 3	-0.0028	-0.4068	-0.2001	-0.0093	-0.4690	-0.3336	0.0014	0.1445	1.0208	0.0005	0.0992	-0.4102
Day 4	-0.0039	-0.5606	-0.0838	-0.0040	-0.2017	0.9020	-0.0111	-1.1874	-1.8437**	0.0025	0.4817	0.4842
Day 5	-0.0041	-0.5795	-0.8980	-0.0048	-0.2419	-1.8781**	-0.0085	-0.9132	1.2812	-0.0020	-0.3864	-2.1991**
Day (-5,5)	-0.0106	-0.4560	-1.5959*	0.0327	0.4981	-1.8781**	-0.0471	-1.5210*	-2.1041**	-0.0060	-0.3417	-1.0065
DJSI Exclusion												
Day -5	-0.0017	-0.3850	-0.4827	-0.0059	-0.8581	-0.9553	0.0031	0.4290	1.3649	0.0025	0.4644	1.5284*
Day -4	0.0018	0.4146	1.7163	0.0088	1.2734	2.6633***	0.0008	0.1137	-0.8712	-0.0056	-1.0478	-2.3150**
Day -3	0.0021	0.4818	0.2045	0.0021	0.3105	-1.2843*	-0.0040	-0.5599	-0.4240	0.0007	0.1321	-0.0730
Day -2	-0.0009	-0.2010	-0.4827	-0.0031	-0.4480	-1.2843*	-0.0019	-0.2674	-0.8712	-0.0001	-0.0123	1.2081
Day -1	0.0025	0.5761	-1.0324	0.0110	1.6026*	-1.9422**	0.0033	0.4525	-0.4240	0.0090	1.6786**	1.8487**
Day 0	**-0.0023**	**-0.5239**	**-1.0324**	**-0.0018**	**-0.2668**	**0.0316**	**0.0027**	**0.3725**	**0.9177**	**-0.0036**	**-0.6676**	**-1.0339**
Day 1	-0.0030	-0.6989	-1.0324	-0.0011	-0.1563	-0.6264	-0.0100	-1.3908*	-1.3184*	-0.0039	-0.7255	0.8878
Day 2	-0.0025	-0.5726	-1.4447*	-0.0063	-0.9082	-0.9553	-0.0054	-0.7453	0.0233	-0.0023	-0.4371	-0.3933
Day 3	0.0005	0.1113	1.1665	-0.0051	-0.7430	-0.6264	0.0132	1.8257**	1.8121**	0.0000	-0.0032	-0.3933
Day 4	-0.0032	-0.7386	-0.4827	-0.0030	-0.4401	0.3606	-0.0109	-1.5080*	-1.7656**	-0.0094	-1.7582**	-2.6353***
Day 5	-0.0012	-0.2764	-0.0704	-0.0061	-0.8832	-1.6133*	0.0022	0.3070	0.9177	0.0009	0.1667	-0.3933
Day (-5,5)	-0.0078	-0.5466	-0.0704	-0.0105	-0.4575	-0.9553	-0.0070	-0.2928	-0.8712	-0.0119	-0.6663	-0.7136

Table 11. (continued)

Panel A. (continued)

Year	**2003**			**2004**			**2005**			**2006**			**2007**		
Event days	MAR	t-statistic	sign z test	MAR	t-statistic	sign z test	MAR	t-statistic	sign z test	MAR	t-statistic	sign z test	MAR	t-statistic	sign z test
DJSI inclusion															
Day -5	-0.0097	-0.3550	0.0786	0.0038	0.9069	1.4243	-0.0045	-1.2547	-2.3087**	-0.0077	-0.1892	1.9305**	0.0006	0.0478	0.8883
Day -4	-0.0042	-0.1552	-0.3068	0.0011	0.2775	-0.1155	0.0070	1.9740**	2.7661***	-0.0124	-0.3022	-0.6347	-0.0062	-0.4815	-0.9113
Day -3	-0.0026	-0.0958	0.0786	-0.0001	-0.0258	1.0393	0.0032	0.8837	0.3979	0.1080	2.6412***	0.0982	0.0003	0.0230	-0.1915
Day -2	-0.0132	-0.4824	-1.0776	0.0004	0.0909	1.0393	0.0014	0.4046	0.3979	-0.0118	-0.2885	-0.2682	-0.0047	-0.3662	-1.2712
Day -1	-0.0051	-0.1865	-0.6922	0.0035	0.8522	1.8092**	-0.0007	-0.1901	0.0595	-0.0118	-0.2875	-1.3676*	-0.0010	-0.0793	-0.5514
Day 0	**-0.0075**	**-0.2738**	**0.4641**	**-0.0006**	**-0.1428**	**-1.2703**	**-0.0017**	**-0.4838**	**0.0595**	**-0.0042**	**-0.1020**	**1.1976**	**-0.0047**	**-0.3676**	**-0.1915**
Day 1	-0.0009	-0.0316	0.4641	0.0003	0.0765	0.2695	-0.0013	-0.3602	0.0595	-0.0086	-0.2094	-0.2682	0.0011	0.0846	-0.5514
Day 2	-0.0014	-0.0494	0.8495	0.0018	0.4328	0.2695	0.0072	2.0124**	1.4128*	-0.0127	-0.3118	-0.6347	-0.0066	-0.5177	-0.1915
Day 3	-0.0040	-0.1480	-0.3068	-0.0049	-1.1800	-1.2703	0.0033	0.9173	-0.2788	-0.0116	-0.2835	0.4647	-0.0026	-0.2061	0.1684
Day 4	-0.0001	-0.0019	0.0786	-0.0004	-0.1025	0.6544	-0.0022	-0.6287	-0.9554	-0.0150	-0.3680	-1.0012	0.0029	0.2244	1.9680**
Day 5	-0.0056	-0.2061	-0.3068	0.0028	0.6716	-0.5004	0.0010	0.2942	0.3979	-0.0074	-0.1819	0.4647	-0.0046	-0.3575	0.1684
Day (-5,5)	-0.0543	-0.5987	0.0786	0.0077	0.5600	1.0393	0.0127	1.0760	2.4277***	0.0048	0.0353	-0.6347	-0.0256	-0.6018	-1.6311*
DJSI Exclusion															
Day -5	0.0000	0.0023	-0.4589	-0.0122	-0.4544	-1.0290	-0.0050	-0.2533	-2.0228**	0.0096	2.6273***	1.5199*	-0.0066	-1.4765	-1.2213
Day -4	0.0019	0.3391	1.0811	0.0016	0.0611	-0.5114	0.0021	0.1057	2.6503***	0.0027	0.7510	1.5199*	0.0027	0.6108	0.1944
Day -3	0.0143	2.4846***	0.6961	-0.0049	-0.1823	0.0062	-0.0022	-0.1094	0.9813	0.0041	1.1285	0.1772	0.0054	1.2095	0.6663
Day -2	0.0015	0.2571	-0.0739	-0.0033	-0.1239	0.5238	-0.0009	-0.0460	-0.3538	0.0070	1.9182**	0.6248	-0.0069	-1.5426*	-1.2213
Day -1	0.0025	0.4308	0.3111	-0.0023	-0.0868	-1.0290	-0.0063	-0.3152	-1.0214	-0.0042	-1.1608	-0.7179	-0.0012	-0.2663	-0.2775
Day 0	**-0.0036**	**-0.6186**	**-0.0739**	**-0.0027**	**-0.1024**	**-0.5114**	**-0.0044**	**-0.2217**	**-1.0214**	**0.0018**	**0.4966**	**-0.2703**	**-0.0036**	**-0.7960**	**-0.7494**
Day 1	0.0017	0.2956	1.8511**	-0.0108	-0.4025	-1.5466**	-0.0025	-0.1239	-1.0214	0.0002	0.0471	-1.1655	-0.0025	-0.5471	-0.7494
Day 2	0.0030	0.5213	-0.0739	-0.0014	-0.0518	-1.5466**	-0.0006	-0.0299	-0.6876	0.0004	0.1081	0.6248	-0.0077	-1.7112**	-1.2213
Day 3	0.0024	0.4175	0.6961	0.0009	0.0318	1.0414	0.0008	0.0414	1.3151*	-0.0026	-0.7081	0.1772	-0.0015	-0.3364	-0.2775
Day 4	0.0009	0.1570	1.0811	-0.0026	-0.0981	0.5238	-0.0039	-0.1966	0.3138	0.0084	2.2972**	1.5199*	0.0007	0.1537	-0.2775
Day 5	-0.0032	-0.5622	-0.4589	-0.0011	-0.0407	-1.5466**	0.0014	0.0703	1.6489**	0.0005	0.1389	1.0724	-0.0035	-0.7815	0.1944
Day (-5,5)	0.0214	1.1230	2.2361**	-0.0389	-0.4372	-1.0290	-0.0215	-0.3253	0.6476	0.0278	2.3047**	1.5199**	-0.0247	-1.6534**	-1.2213

Table 11. (continued)

Panel B. Inclusions and exclusions from the FTSE4Good index over the period 2002-2007

Month/Year	**March/Overall**			**September/Overall**			**March/2002**			**September/2002**		
Event days	MAR	t-statistic	Sign z test	MAR	t-statistic	Sign z test	MAR	t-statistic	sign z test	MAR	t-statistic	sign z test
FTSE4Good inclusion												
Day -5	-0.0026	-0.7547	-2.3811	-0.0046	-1.1605	-2.5474***	-0.0043	-0.5220	-1.9078**	-0.0039	-0.4396	-2.2670**
Day -4	0.0034	0.9916	0.7241	0.0082	2.0688**	4.9059***	0.0188	2.2825**	3.6079***	0.0047	0.5287	0.2352
Day -3	0.0008	0.2226	-0.5180	0.0041	1.0221	0.5996	-0.0049	-0.5905	-1.2589	0.0081	0.9041	1.0693
Day -2	-0.0006	-0.1662	-0.5180	-0.0002	-0.0423	-1.0567	0.0058	0.7069	1.0123	-0.0108	-1.2139	-2.6840**
Day -1	-0.0001	-0.0249	-0.0522	-0.0042	-1.0431	-3.2099***	-0.0101	-1.2225	-2.8811***	-0.0061	-0.6854	-2.6840***
Day 0	**-0.0027**	**-0.7628**	**-1.9153****	**-0.0002**	**-0.0564**	**-2.0505****	**-0.0057**	**-0.6855**	**0.6878**	**0.0138**	**1.5472***	**1.4863***
Day 1	0.0053	1.5361	3.0531***	-0.0003	-0.0692	-1.0567	0.0041	0.4915	1.6612**	-0.0055	-0.6139	-1.0159
Day 2	-0.0037	-1.0558	-2.6916***	0.0045	1.1177	2.0902**	0.0011	0.1357	-0.6100	0.0164	1.8365**	2.3204**
Day 3	0.0019	0.5517	1.6557**	-0.0065	-1.6298	-1.5536**	-0.0114	-1.3752*	-2.5567***	-0.0153	-1.7163**	-2.2670**
Day 4	0.0028	0.7911	2.4320***	-0.0018	-0.4532	-0.2286	0.0039	0.4763	2.3101**	-0.0069	-0.7699	-0.1818
Day 5	-0.0011	-0.3225	-1.1390	-0.0057	-1.4190*	-2.3817***	0.0044	0.5314	1.0123	-0.0086	-0.9668	-2.2670**
Day (-5,5)	0.0035	0.3034	1.1899	-0.0066	-0.5020	-1.0567	0.0019	0.0690	-0.6100	-0.0142	-0.4792	-0.1818
FTSE4Good exclusion												
Day -5	0.0047	1.7088**	0.4094	-0.0028	-0.8395	-0.5786				0.0018	0.1110	0.0000
Day -4	-0.0049	-1.7595**	-2.8813***	0.0016	0.4686	-0.2834				-0.0015	-0.0967	-1.0000
Day -3	0.0024	0.8507	0.7384	0.0005	0.1577	0.0118				-0.0097	-0.6075	-1.0000
Day -2	-0.0025	-0.9030	-0.5778	-0.0052	-1.5402**	-2.0545**				-0.0253	-1.5797*	-1.0000
Day -1	-0.0005	-0.1678	-0.2488	-0.0031	-0.9114	-0.5786				-0.0073	-0.4581	-1.0000
Day 0	**-0.0011**	**-0.4136**	**0.0803**	**-0.0048**	**-1.4126***	**-2.0545****				-0.0150	-0.9336	-2.000**
Day 1	0.0009	0.3068	0.0803	0.0022	0.6539	0.8974				0.0035	0.2179	0.0000
Day 2	0.0015	0.5289	1.0675	0.0042	1.2469	2.9637***				-0.0270	-1.6861**	-1.0000
Day 3	-0.0017	-0.6033	-1.8941**	0.0015	0.4548	0.8974				0.0168	1.0512	-1.0000
Day 4	0.0055	1.9655**	1.3965*	0.0011	0.3203	1.1926				-0.0061	-0.3776	0.0000
Day 5	-0.0009	-0.3152	-0.2488	-0.0059	-1.7475**	-2.0545**				-0.0261	-1.6259*	-2.000**
Day (-5,5)	0.0033	0.3613	-1.2360	-0.0107	-0.9495	0.0118				-0.0959	-1.8046**	-1.0000

Table 11. (continued)

Panel B. (continued)

Month/Year	March/2003			September/2003			March/2004			September/2004		
	MAR	t-statistic	sign z test	MAR	t-statistic	sign z test	MAR	t-statistic	sign z test	MAR	t-statistic	sign z test
FTSE4Good Inclusion												
Day -5	-0.0108	-1.4292*	-2.0375**	-0.0124	-1.5515*	-2.8479***	0.0023	0.2318	0.3171	-0.0058	-0.5764	-2.2948**
Day -4	-0.0050	-0.6695	-1.6011*	0.0101	1.2596	1.6148*	-0.0054	-0.5516	-3.2565***	0.0120	1.1931	5.0638***
Day -3	0.0058	0.7680	0.1449	0.0030	0.3703	-1.1315	0.0076	0.7787	1.9414**	0.0014	0.1368	-0.3136
Day -2	-0.0033	-0.4374	-0.2916	0.0119	1.4944*	1.9581**	-0.0072	-0.7305	-2.6068***	-0.0004	-0.0364	-0.3136
Day -1	0.0029	0.3904	0.5814	0.0079	0.9838	1.2716	0.0030	0.3060	0.9668	-0.0130	-1.2966*	-4.2759***
Day 0	**0.0041**	**0.5379**	**-0.7281**	**0.0045**	**0.5591**	**0.2417**	**-0.0075**	**-0.7642**	**-2.2819****	**-0.0086**	**-0.8605**	**-3.7099*****
Day 1	0.0051	0.6741	0.1449	0.0118	1.4711*	2.3014**	0.0083	0.8496	3.2409***	-0.0017	-0.1746	-1.7287**
Day 2	-0.0127	-1.6843	-1.1646	0.0006	0.0740	-0.1016	0.0027	0.2731	0.3171	0.0052	0.5227	1.9506**
Day 3	0.0052	0.6883	0.5814	-0.0025	-0.3079	2.3014**	0.0100	1.0217	3.2409***	-0.0060	-0.6010	-2.2948**
Day 4	-0.0055	-0.7340	-1.1646	0.0061	0.7680	1.6148*	0.0058	0.5928	1.2917*	-0.0018	-0.1768	-0.5966
Day 5	0.0045	0.6003	1.0179	-0.0114	-1.4228**	-1.1315	-0.0043	-0.4408	-2.2819**	-0.0103	-1.0246	-4.5589***
Day (-5,5)	-0.0098	-0.3906	0.5814	0.0296	1.1150	2.6447***	0.0154	0.4723	1.9414**	-0.0290	-0.8727	-4.5589***
FTSE4Good Exclusion												
Day -5	0.0309	0.9463	0.8936	-0.0058	-0.7086	-0.7821	0.0045	0.9437	0.5226	-0.0184	-1.7463**	-0.5543
Day -4	0.0053	0.1611	0.8936	0.0069	0.8462	2.2351**	-0.0027	-0.5694	-0.5893	-0.0027	-0.2578	-1.7091**
Day -3	0.0594	1.8170**	0.8936	-0.0032	-0.3920	-0.1786	0.0035	0.7177	1.0786	0.0051	0.4829	0.6005
Day -2	-0.0189	-0.5779	-1.1190	-0.0005	-0.0577	-0.1786	-0.0050	-1.0393	-0.5893	-0.0042	-0.3994	-0.5543
Day -1	-0.0381	-1.1649	-1.1190	-0.0005	-0.0564	-0.1786	-0.0014	-0.2966	0.5226	0.0137	1.2992*	-0.5543
Day 0	**0.0138**	**0.4230**	**0.8936**	**-0.0048**	**-0.5927**	**-0.1786**	**-0.0077**	**-1.6045***	**-1.1453**	**0.0026**	**0.2507**	**-0.5543**
Day 1	0.0449	1.3744*	0.8936	0.0207	2.5421***	2.8386***	0.0008	0.1597	-0.0334	0.0128	1.2122	0.6005
Day 2	-0.0629	-1.9224**	-1.1190	0.0099	1.2159	1.6317*	0.0043	0.8906	1.0786	0.0010	0.0930	0.6005
Day 3	0.0295	0.9028	0.8936	-0.0066	-0.8137	-0.7821	-0.0016	-0.3278	-0.5893	-0.0080	-0.7596	-0.5543
Day 4	-0.0146	-0.4461	-1.1190	0.0103	1.2620	1.0283	0.0031	0.6352	1.0786	0.0091	0.8658	1.7553**
Day 5	0.0195	0.5961	0.8936	-0.0147	-1.8045**	-1.9889**	0.0010	0.2069	-0.0334	-0.0045	-0.4224	-0.5543
Day (-5,5)	0.0690	0.6360	0.8936	0.0117	0.4344	1.0283	-0.0014	-0.0856	-0.0334	0.0065	0.1864	0.6005

Table 11. (continued)

Panel B. (continued)

Month/Year	March/2005			September/2005			March/2006			September/2006		
	MAR	t-statistic	sign z test	MAR	t-statistic	sign z test	MAR	t-statistic	sign z test	MAR	t-statistic	sign z test
FTSE4Good Inclusion												
Day -5	0.0000	0.0009	-0.3459	0.0027	0.6303	-0.0951	-0.0039	-0.9310	-1.0486	0.0090	1.5123*	3.0382***
Day -4	0.0029	0.4993	1.7414**	0.0128	2.9767***	3.5229***	0.0051	1.2297	1.3787*	-0.0029	-0.4843	-0.5812
Day -3	-0.0033	-0.5723	-1.5386	0.0042	0.9787	0.9386	-0.0013	-0.3216	-0.5631	0.0103	1.7346**	2.0041**
Day -2	0.0014	0.2473	0.8468	-0.0026	-0.6010	-1.1288	0.0031	0.7513	0.4078	0.0010	0.1715	0.4529
Day -1	0.0031	0.5449	1.4432*	-0.0066	-1.5319*	-2.1625**	0.0024	0.5758	0.4078	0.0002	0.0362	0.9700
Day 0	**-0.0017**	**-0.3047**	**-1.5386***	**0.0010**	**0.2322**	**-0.6120**	**-0.0029**	**-0.6975**	**-1.0486**	**-0.0040**	**-0.6658**	**-1.0982**
Day 1	0.0049	0.8511	1.4432*	-0.0034	-0.7982	-1.1288	0.0058	1.3896*	0.4078	0.0017	0.2933	0.4529
Day 2	-0.0074	-1.2947*	-2.1349**	-0.0012	-0.2710	-0.6120	-0.0076	-1.8333**	-2.0195**	-0.0054	-0.9176	-0.0641
Day 3	0.0052	0.9083	1.7414**	-0.0024	-0.5532	0.4218	0.0003	0.0692	0.4078	-0.0097	-1.6412*	-2.1323**
Day 4	0.0016	0.2782	0.5486	0.0075	1.7394**	0.4218	0.0036	0.8604	0.8932	-0.0003	-0.0560	-0.5812
Day 5	-0.0034	-0.5893	-0.9422	0.0076	1.7699**	2.4892***	-0.0001	-0.0286	-0.0777	0.0016	0.2725	1.4870*
Day (-5,5)	0.0033	0.1716	-0.0477	0.0197	1.3785*	1.4555*	0.0044	0.3208	1.3787*	0.0015	0.0771	1.4870*
FTSE4Good Exclusion												
Day -5	0.0123	2.4570	-0.6394	0.0030	0.6109	0.5562	0.0023	0.4017	0.4108	0.0028	0.4729	0.9418
Day -4	-0.0050	-0.9925	-1.3467*	-0.0031	-0.6391	-0.7808	-0.0070	-1.2493	-2.9236***	-0.0009	-0.1479	-1.5108**
Day -3	-0.0050	-0.9947	-0.6394	-0.0030	-0.6057	-0.7808	-0.0001	-0.0094	-0.2561	-0.0038	-0.6445	-1.5108**
Day -2	0.0079	1.5726*	1.4825*	-0.0003	-0.0667	-2.1178**	-0.0028	-0.4983	-0.2561	-0.0050	-0.8473	-0.6933
Day -1	-0.0013	-0.2624	-1.3467*	-0.0016	-0.3375	1.2247	0.0072	1.2816	1.0777	0.0034	0.5689	1.7594**
Day 0	**0.0039**	**0.7811**	**0.7752**	**-0.0058**	**-1.1830**	**-2.1178****	**0.0044**	**0.7822**	**1.0777**	**0.0057**	**0.9675**	**0.9418**
Day 1	0.0025	0.4984	0.7752	-0.0059	-1.2170	-1.4493*	-0.0066	-1.1776	-0.9230	0.0077	1.2932*	0.9418
Day 2	0.0001	0.0232	-0.6394	0.0004	0.0900	-0.1123	0.0079	1.3996*	1.7446**	0.0125	2.1174**	2.5769***
Day 3	-0.0039	-0.7874	-2.0540	0.0054	1.1139	1.2247	0.0026	0.4652	-0.2561	-0.0009	-0.1505	0.1243
Day 4	0.0052	1.0406	0.7752	0.0026	0.5275	0.5562	0.0136	2.4161***	1.0777	0.0056	0.9408	1.7594**
Day 5	-0.0033	-0.6601	0.0679	-0.0082	-1.6868**	-2.1178**	-0.0023	-0.4072	-0.2561	-0.0054	-0.9131	0.1243
Day (-5,5)	0.0134	0.8068	0.0679	-0.0165	-1.0232	-1.4493*	0.0192	1.0265	-0.9230	0.0217	1.1027	1.7594**

Table 11. (continued)

Panel B. (continued)

Month/Year	**March/2007**			**September/2007**		
	MAR	t-statistic	sign z test	MAR	t-statistic	sign z test
FTSE4Good Inclusion						
Day -5	-0.0095	-1.3029*	-1.8477**	-0.0055	-0.4829	0.5129
Day -4	-0.0068	-0.9386	-1.0917	0.0006	0.0489	0.5129
Day -3	0.0103	1.4170*	0.4204	0.0024	0.2128	-0.1549
Day -2	-0.0133	-1.8316**	-1.0917	-0.0155	-1.3548*	-2.1585**
Day -1	0.0018	0.2434	-1.0917	0.0014	0.1186	0.5129
Day 0	**0.0146**	**2.0050****	**1.1764**	**-0.0029**	**-0.2557**	**-0.1549**
Day 1	-0.0011	-0.1577	-1.0917	-0.0223	-1.9462**	-2.1585**
Day 2	-0.0035	-0.4772	-1.8477**	0.0101	0.8783	1.1808
Day 3	0.0031	0.4291	0.4204	-0.0032	-0.2819	0.5129
Day 4	0.0100	1.3764*	2.6884***	-0.0370	-3.2278***	-2.1585**
Day 5	-0.0186	-2.5549***	-1.8477**	0.0149	1.2987*	1.8486**
Day (-5,5)	-0.0130	-0.5403	-0.3357	-0.0573	-1.5052*	-2.1585**
FTSE4Good Exclusion						
Day -5	-0.0055	-0.9592	0.1210	-0.0048	-0.6770	-1.2042
Day -4	-0.0079	-1.3680*	-1.5140*	0.0034	0.4844	0.4621
Day -3	0.0039	0.6773	0.9385	0.0102	1.4346*	2.1284**
Day -2	-0.0078	-1.3481*	-1.5140*	-0.0068	-0.9485	-0.6487
Day -1	-0.0025	-0.4347	-0.6965	-0.0119	-1.6649**	-2.3150**
Day 0	**-0.0045**	**-0.7792**	**-0.6965**	**-0.0075**	**-1.0536**	**-1.2042**
Day 1	0.0027	0.4712	0.1210	-0.0131	-1.8457**	-0.6487
Day 2	-0.0017	-0.2991	0.1210	0.0086	1.2020	2.6838**
Day 3	-0.0105	-1.8216**	-1.5140*	0.0044	0.6148	2.1284**
Day 4	0.0021	0.3652	0.1210	-0.0095	-1.3284*	-1.2042
Day 5	-0.0030	-0.5121	-0.6965	0.0087	1.2262	1.0175
Day (-5,5)	-0.0347	-1.8116**	-2.3315***	-0.0182	-0.7708	-0.6487

Note: The table presents the results for the total sample and the subsamples in each year. The event days refers to the days in the event window, where Day 0 is the announcement day of index composition, and Day (-5, 5) is the cumulated mean abnormal returns for 11 day which is from Day-5 to Day 5. The t-statistic values are calculated as in Brown and Warner (1980 and 1985), whilst the generalized sign statistic values are calculated as in Cowan (1992).The DJSI sample consists of 296 index inclusion and 212 index exclusion stocks and the FTSE4Good consists of 312 index inclusion and 83 index exclusion stocks. The two-tail t-test and z-test are used to test the statistical significance of the abnormal returns (AR) and cumulative abnormal returns (CAR). Superscripts *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

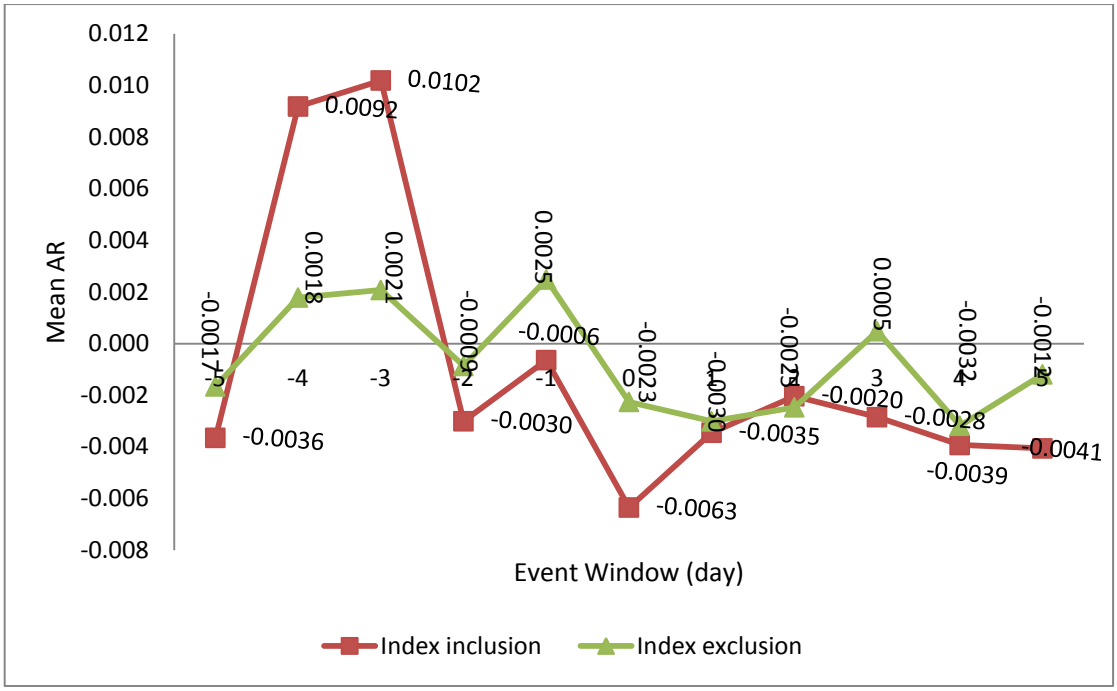


Figure 6. The mean abnormal returns (MARs) for inclusion and deletion from the DJSI from 2000 to 2007.

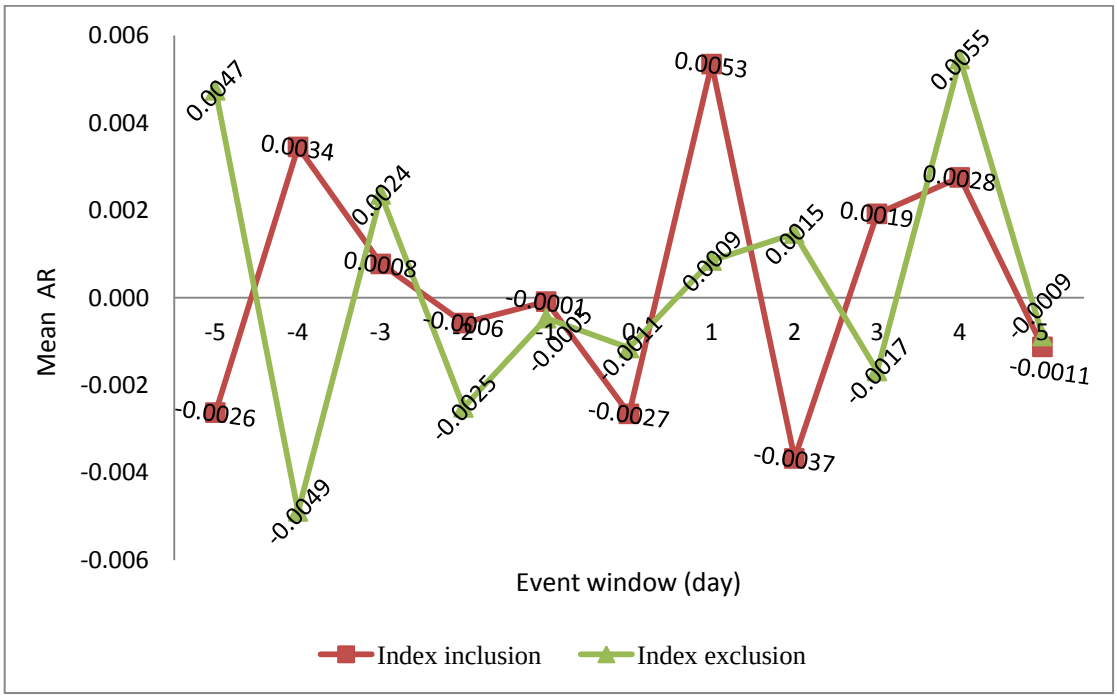


Figure 7. The mean abnormal returns (MARs) for inclusion and deletion in March from the FTSE4Good index from 2002 to 2007.

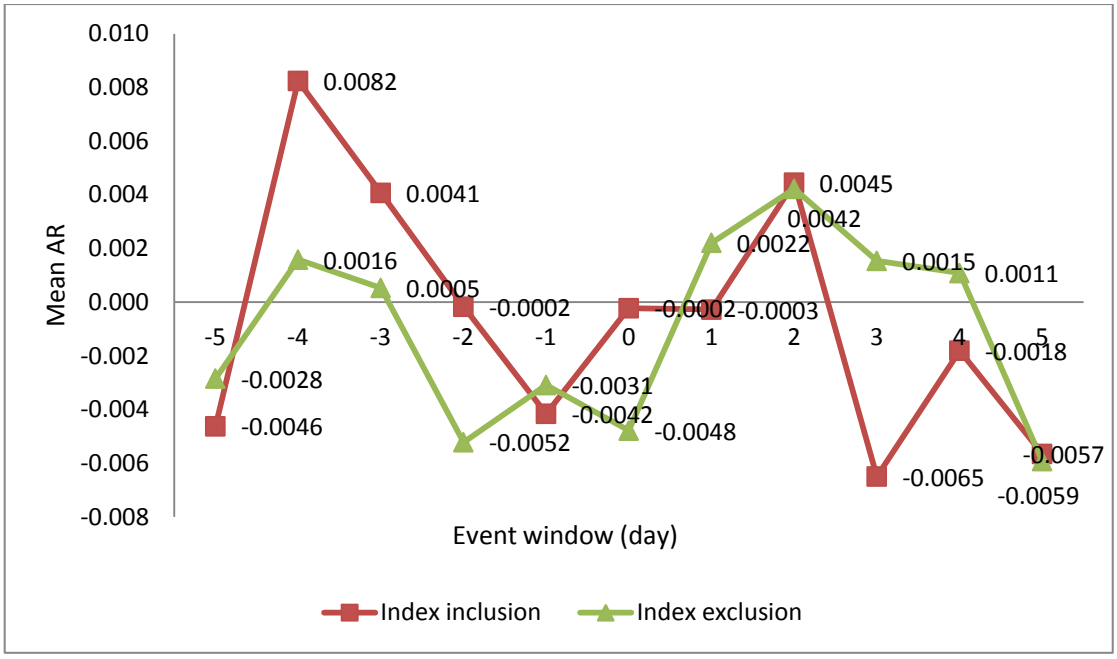


Figure 8. The mean abnormal returns (MARs) for inclusion and deletion in September from the FTSE4Good index from 2002 to 2007.

Panel B of table 11 presents the results for the mean abnormal returns (MARs) around the event days for addition to and deletion from FTSE4Good index over the period 2002 to 2007, for both the March and September announcements. In the case of inclusions in March, the non-parametric generalized sign z test, reports some statistical evidence in relation to index composition changes, with, for example, the return for the announcement day (i.e. Day 0) being negatively significant at the 5% level and the MAR registering -0.0027 with a generalized sign z-statistic of -1.9153. Further, the results for index membership in March show that the MARs are statistically significant on the post announcement days from Day 1 to Day 4, thus suggesting that market participants may have some expectation regarding inclusion announcements, but this is only temporary. In the case of exclusions, from 2003 to 2007 (company data for 2002 is unavailable) the MAR is insignificant on the announcement day, whereas other Days in the event window report these as statistically significant at the 10% significant level or better. Figure 7 graphically shows the behaviour of MARs for the event days from Day -5 to Day 5 and further, it shows they move in an opposite pattern before the announcement, whilst the MARs movements for inclusion show more volatility than for exclusion, post-announcement. Further, it is notable that the results indicate that market participants do not seem to be

affected by unfavourable news. For example, the MARs on the day of announcement is insignificant and subsequently actually increased until Day 2.

The September announcement day MARs for inclusions is significantly different from zero at the level 5%, and significance is also found for a number of the other event days (i.e. Day -5, -4, -1, 2, 3 and 5). For instance, these values are significantly positive for Day -4 and significantly negative for other event Days at the 10% significance level or better. In the outcomes for exclusions, the MARs on Day 0 is also significantly different from zero at the level 5%. More specifically, when considering the two statistical treatments, the MARs is -0.0048 with t-statistic value of -1.4126 and there is a generalized sign test value of -2.0545 on the announcement day. Further, it is significantly negative for Days -2 and 5, and significantly positive for Day 2.

The trend in share price for inclusion in the FTSE4Good index in September, around the announcement day, clearly shows that the share price increases, with this good news, but as with the DJSI and the FTSE4Good in March this effect is only temporary. That is, on announcement day the stock return for inclusions shows a significant increase, with the MAR values changing from -0.0042 to -0.0002 between Day-1 and Day 0, but subsequently levels off until eventually decreasing significantly on Day 5. Regarding exclusions in September, there would appear to be anticipation of bad news as the MAR drops on the day of the announcement from -0.0031 to -0.0048 between Day -1 and Day 0, but it bounces back immediately after this. The magnitude of these share price movements is illustrated in figure 8, where the difference in the trend of share prices for inclusion and exclusion stocks can clearly be seen. That is, the share price starts from negative territory for both inclusions and exclusions, followed by a mirrored up and down movement until the announcement day, but after this the inclusions are more volatile than the exclusions, which remain in positive territory until day 4. Subsequent to the announcement day, inclusion share price movements are in negative territory except Day 2, whereas exclusion stocks are positive until Day 4. Unlike the trend of MARs movements in figure 8, that in figure 7, the FTSE4Good index announcement in March, suggests that the market is not particularly sensitive to an exclusion announcement, that is, the share price increases from Day 0 until Day 2 and then diminishes. Further, the market reaction for addition announcements is

similar to that in the case in DJSI, but the movements are more volatile. Taking the results in panel B of table 11 together with those depicted in figure 7 and 8, they would appear to show that the announcement of index composition changing conveys new information to the market, for there is a significant but temporary price impact for index inclusion stocks. However, the outcomes for exclusions would seem to indicate that these do not have this affect on the market.

Market reaction to the FTSE4Good announcement of the index's constituents changing differs substantially across the years. In relation to inclusions in March, the subsamples for the years 2004, 2005, and 2007 in panel B of table 11 show that the announcement day MARs are significantly different from zero at the 10% level or better, positively or negatively. Comparing the behaviour of the MARs from Day -1 to Day 1 among these results except 2007, the trend of share price movements is to drop on the day of announcement and then increase on Day 1, indicating that the new information is not recognized immediately in the market. Moving on to inclusion in September, the MARs for the years 2002 and 2004 report that they are significant at the 10% and 5% level, respectively, with actual figures being 0.0138 and -0.0086, also respectively. Moreover, the significant level for 2002 presents in the t-statistic (1.5472) and the generalized sign z (1.4863) test, respectively, whilst it show in -0.8605 and -3.7099, respectively for 2004.

In relation to exclusions in March, the MARs for the year 2004 are negatively significantly different from zero at 10% level. In addition, these movements are temporary and further, the value in March 2004 (-0.0077) is very close with that in inclusion case (-0.0075). Next, regarding the cases of exclusions in September, the MARs for the years 2002 and 2005 are negatively significant. The results from the pre-announcement and post-announcement day periods by yearly subsample are mixed, with some years showing strong significant effects at the 1% level, but others being insignificant.

In general, the results from the event study have elicited the differences in share price movements around the time of announcements regarding changes in the composition of the DJSI and the FTSE4Good, in both March and September for the latter. For example, on the day of the DJSI announcement it has emerged that both included and

excluded companies experience a significant decrease in stock returns, but regarding the former this reverses immediately after, whereas for the latter there is little change for the most of the remainder of the event interval. However, in the cases of the FTSE4Good index announcements in both March and September, being added to and/or deleted from the index results in a statistically significant but much more random movement of share price, when compared to the DJSI results. Further, the evidence regarding FTSE4Good index change in March and September indicates that the market participants are more concerned with the latter announcements than the former. In other words, it suggests that there is some expectation of the announcement of index constituents changing in September as they register as significantly different from zero at the 1% level on Day -1 and at the 5% level on Day 0. This evidence from the FTSE4Good index is inconsistent with the earlier findings reported by Curran and Moran (2007), suggesting that there is insignificant market reaction to the announcements.

Table11-1. The average cumulative abnormal returns (CARs) for addition to and deletion from SRI indices in small event windows

DJSI				***FTSE4Good***					
Month	***September***			***March***			***September***		
Window	CAR	t-statistics	sign z test	CAR	t-statistics	sign z test	CAR	t-statistics	sign z test
Inclusion									
CAR (-1, 0)	-0.0070	-0.7053	-0.5297	-0.0027	-0.5570	-1.6108*	-0.0044	-0.7775	1.6677**
CAR (0, 1)	-0.0053	-0.8647	0.7751	-0.0003	-0.0756	-1.2826*	-0.0005	-0.0888	0.7308
CAR (-1, 1)	-0.0104	-0.8603	-1.2196	0.0026	0.4321	-1.0764	-0.0047	-0.6747	1.7079**
CAR (0, 2)	-0.0118	-0.9754	-1.9583**	-0.0010	-0.1631	-0.8075	0.0040	0.5728	1.4210*
Exclusion									
CAR (-1, 0)	0.0002	0.0369	1.8441**	-0.0016	-0.4111	-1.2826*	-0.0079	-1.6433*	-3.1142***
CAR (0, 1)	-0.0053	-0.8647	0.7751	-0.0003	-0.0756	-1.2826*	-0.0026	-0.5365	-3.3229***
CAR (-1, 1)	-0.0028	-0.3734	1.7031**	-0.0008	-0.1586	-1.5708*	-0.0057	-0.9642	-3.7289***
CAR (0, 2)	-0.0077	-1.0366	0.6716	0.0012	0.2436	-1.5708*	0.0017	0.2819	-3.3881***

Note: Superscripts *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

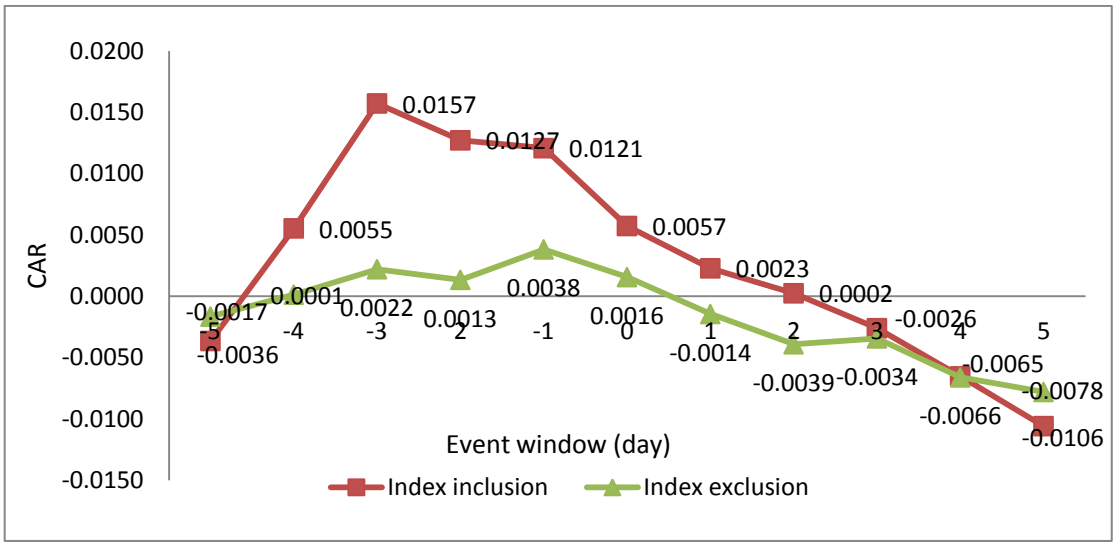


Figure 9. The average cumulative abnormal returns (CARs) for inclusion and deletion from the DJSI from 2000 to 2007.

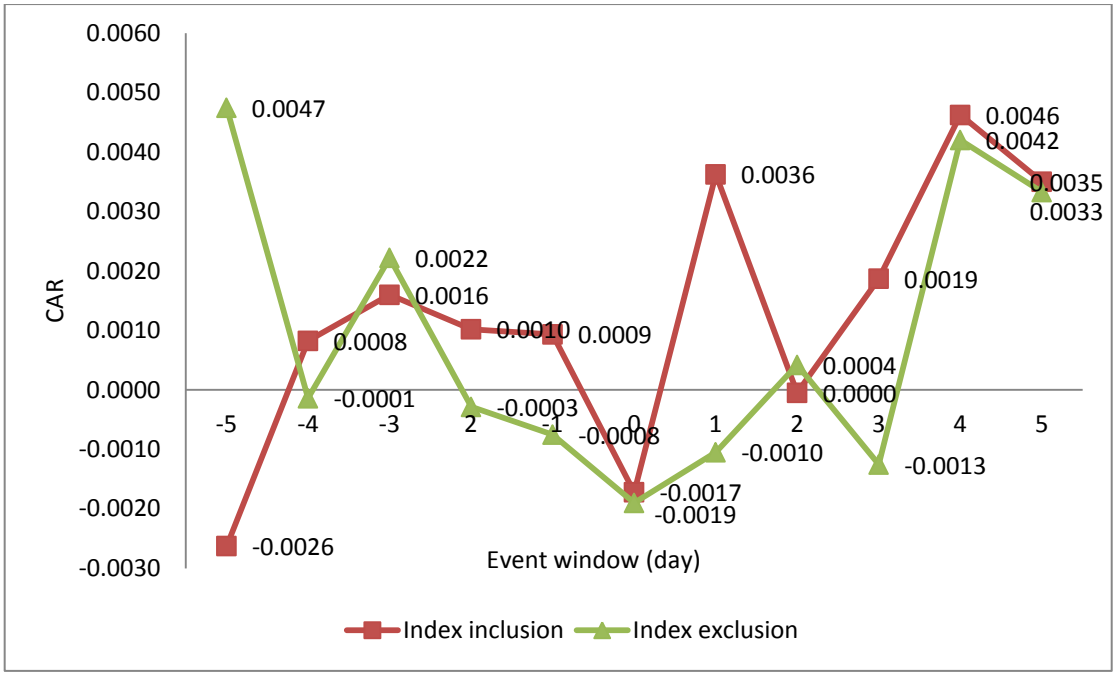


Figure 10. The average cumulative abnormal returns (CARs) for inclusion and deletion in March from the FTSE4Good index from 2002 to 2007.

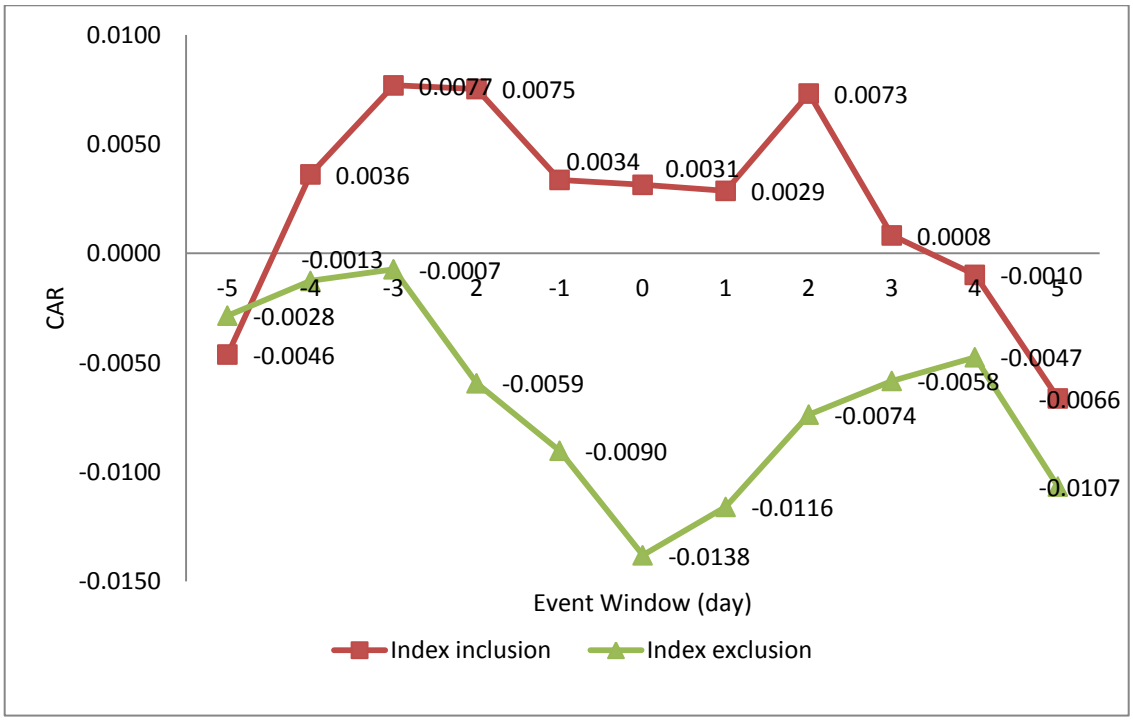


Figure 11. The average cumulative abnormal returns (CARs) for inclusion and deletion in September from the FTSE4Good index from 2002 to 2007.

To investigate whether there exists a trend in the announcement of membership of SRI indices in the event window, further analysis has been conducted on small windows (event days) using average cumulative abnormal returns (CARs), the results of which are presented in table 11-1. Further, the time-series behaviours of average CARs in the event window (are illustrated in figures 9, 10, and 11. Table 11-1 shows that the average CARs are negatively significant in the CAR (0, 2) window for the DJSI index inclusion, whereas they are positively significant in the CAR (-1, 0) and CAR (-1, 1) windows for exclusion stocks. The analysis of the behaviours of CSRs for the DJSI announcement, figure 9, suggests that they do not have a different trend regarding the inclusion in or exclusion from the index.

In the case of the FTSE4Good index, the average CARs for the March and September exclusion announcements are negatively significantly related at 10% level or better. Whilst the average CARs in the March inclusion announcement are negatively significant at the 10% level for CAR (-1, 0) and CAR (0, 1), those in September are positively related at the 10% level or better for CAR(-1,0), (-1,1) and (0, 2). This would appear to indicate that the September announcement has more impact on companies' stock prices than the March one. In general, unlike the trend of the CARs movement in figure 10, the findings in figure 11 suggest that the market is sensitive to the index membership announcement although the trend is diminished.

Taken as whole, Hypothesis 4a, which states that announcement of firms being included in an SRI index is associated with significant and positive share price change for those firms cannot be rejected in the cases of September announcements in FTSR4Good index. Further, Hypothesis 4b, stating that announcements of firms being deleted from the index are associated with significant and negative share price changes for those firms, cannot be rejected in the FTSE4Good index changing in September. The next section analyses whether the badge of index membership has value relevance or not, that is, whether investors can be expected increased future earnings from having it.

5.3.2 Accounting based measurement: value relevance of SRI index membership

Descriptive statistics and correlations

Descriptive statistics were calculated for the dependent and independent variables in order to obtain an overview of the nature of data to be analysed and the results are presented in table12. The outliers lying at an abnormal distance from other values that would distort the results were eliminated when calculating these statistics by using a graphical method: leverage versus squared residual plot. Further, all of these variables except index, a binary variable, are scaled by the closing book value per share for the period *t-1* (i.e. $BVPS_{i,\ t-1}$). Note that the number of observations reported in this section is not equal to the sample sizes in the event study, because of the exclusion of outliers and missing accounting performance data from DataStream.

Panel A of table 12 provides the descriptive statistics results for 704 observations for the DJSI over the period 2000 to 2007 and 549 observations for the FTSE4Good index from 2002 to 2007. For the sample firms, the market value for the DJSI is on average 3.5 higher than the book value and that for the FTSE4Good index is 2.9 higher, suggesting that firms included in the DJSI have a higher market value than those in the FTSE4Good index. Further, the median of the $MV_{i,t}/BVPS_{i,t-1}$ for both indices is less than the mean, being 2.4998 and 3.5177 for the DJSI, respectively and 2.2211 and 2.9256 for FTSE4Good index, indicating that the sample distribution is heavily concentrated on the left of the mean figure and that there are relatively few high values. In fact, the actual measures for skewness for each index are 2.6326 for the DJSI and 2.6212 for the FTSE4Good. However, the means and medians of $EPS_{i,t}/BVPS_{i,t-1}$ for both the DJSI and the FTSE4Good index are very close and negatively skewed, with skewness values of -0.2537 and -1.0614, respectively.

Panel B of table 12 shows the parametric (Pearson) and non-parametric (Spearman) correlation relationships between the chosen variables for the DJSI and the FTSE4Good index over the sampled period. The statistics show that $MV_{i,t}/BVPS_{i,t-1}$ is significantly different from zero at the 1% level for the parametric and non-parametric tests when correlated with inversed book value, $1/BVPS_{i,t-1}$, and earnings, $EPS_{i,t}/BVPS_{i,t-1}$, for both the DJSI and the FTSE4Good index. However, the $MV_{i,t}/BVPS_{i,t-1}$ is not significantly related to the dummy index variable, defined as a binary variable

which is assigned the value 1 if firms are included in an SRI index and 0 otherwise, with the exception being the Spearman correlation analysis for the DJSI, with a value of 0.0874 at the 5% level. The inversed book value, $1/BVPS_{i,\,t-1}$, is strongly related to earnings, $EPS_{i,t}\,/BVPS_{i,t-1}$, at the 1% level for the DJSI (0.1243) and the FTSE4Good (0.1507) index in the Pearson correlation test, but it is significantly different from zero at the 1% level for the DJSI (0.1187), in the Spearman test. It should be noted that the correlation analysis between the indices and $1/BVPS_{i,t-1}$ and $EPS_{i,t}\,/BVPS_{i,t-1}$ provides different results for the DJSI and the FTSE4Good index. That is, in the case of the parametric test for the DJSI, the index is negative and insignificantly related to $1/BVPS_{i,t-1}$ (-0.0092), but positively and significantly related to $EPS_{i,t}\,/BVPS_{i,t-1}$ (0.0767), at the 5% level. Whilst in the case of the FTSE4Good index, it is significantly related to $1/BVPS_{i,t-1}$ (0.1330) at the 1% level, but negatively and insignificantly related to $EPS_{i,t}\,/BVPS_{i,t-1}$ (-0.0060). This suggests that firms in the DJSI are positively associated with book value and profitability, whilst those in the FTSE4Good index are negatively associated with these two factors. The correlation matrix outcomes do not indicate the existence of any serious multicollinearity problems as no value of the variance inflation factor (VIF) is greater than 10. Next, to provide a more comprehensive analysis of the value relevance of SRI index membership, multiple regression analysis is conducted for the DJSI and the FTSE4Good index.

Table 12. Descriptive statistics

Panel A. All companies in the DJSI and the FTSE4Good index

Variables	Mean	Median	Standard Deviation	Min	Max	Skewness	Kurtosis
DJSI							
$MV_{i,t}$ / $BVPS_{i,t-1}$	3.5177	2.4998	3.4746	-4.6970	26.0490	2.6326	12.0294
1/ $BVPS_{i,t-1}$	0.3126	0.1459	0.6351	-1.6556	8.6957	6.9699	69.9719
$EPS_{i,t}$ / $BVPS_{i,t-1}$	0.1393	0.1321	0.2148	-1.3038	1.4790	-0.2537	11.7346
FTSE4Good							
$MV_{i,t}$ / $BVPS_{i,t-1}$	2.9256	2.2211	2.5532	-0.9688	17.1785	2.6212	11.1490
1/ $BVPS_{i,t-1}$	0.2678	0.1377	0.4470	-0.0548	5.8140	6.9190	73.1375
$EPS_{i,t}$ / $BVPS_{i,t-1}$	0.1173	0.1121	0.1722	-1.1403	0.8619	-1.0614	13.2746

Panel B. Correlation Analysis

Variables	1	2	3	4
DJSI				
1. $MV_{i,t}$ / $BVPS_{i,t-1}$	1	0.3115***	0.5943***	0.0874**
2. 1/ $BVPS_{i,t-1}$	0.3294***	1	0.1187***	0.0128
3. $EPS_{i,t}$ / $BVPS_{i,t-1}$	0.5106***	0.1243***	1	0.0840**
4. Index_*DJSI*	0.0431	-0.0092	0.0767**	1
FTSE4Good				
1. $MV_{i,t}$ / $BVPS_{i,t-1}$	1	0.1828***	0.7081***	-0.0596
2. 1/ $BVPS_{i,t-1}$	0.3173***	1	0.0307	0.1992***
3. $EPS_{i,t}$ / $BVPS_{i,t-1}$	0.5546***	0.1507***	1	-0.1255***
4. Index_*FTSE4Good*	0.0359	0.1330***	-0.0060	1

Note: market value (MV_{it}) is cum-dividend market value, which is three months after fiscal year-end share price plus dividend per share for the period *t*. Book value per share ($BVPS_{i,\,t-1}$) is firm *i*'s book value per share for the period *t-1* and earnings per share ($EPS_{i,t}$) is firm *i*'s earnings per share for fiscal period-end *t*. These variables are scaled by the ending of book value per share ($BVPS_{it-1}$). The index is a dummy variable that takes the value 1 if company *i* is included in the SRI index in year *t* and otherwise 0. Superscripts *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively. Pearson and Spearman correlation estimates (i.e. the top right half of correlation matrix above the main diagonal) are presented in the parentheses in panel B. The sample after dropping outliers comprises 704 observations drawn from 2000 to 2007 for the DJSI and 549 observations drawn from 2002 to 2007 for the FTSE4Good index.

Regression analysis

The purpose of this analysis is to test whether SRI index membership is relevant to company market value. In this regard, the financial statement information, book value and earnings per share explicated in model 3, were expected to be positively related to the market value, $P_{i,t}$ $+DPS_{i,t}$. Whilst a few studies have investigated whether the announcement of inclusions in or exclusions from SRI indices conveys new information, there is not much empirical evidence on whether this has a statistically significant positive or negative effect on the firm value. Hence, in this part of the thesis the analytical testing is aimed at addressing this gap in the literature. Panel A of table 13 provides the regression results for model 3, using the DJSI for the period 2000 to 2007, whereas panel B shows the same for the FTSE4Good index for the period 2002 to 2007. The second and third columns show the results for the earnings and the earnings plus SRI index status regressions, for the whole sample, respectively. The remainder of panels A and B contain the outcomes for the latter for the yearly subsamples.

The results presented in panel A of table 13, relating to the DJSI, show that the coefficients for the earnings and book values are substantially greater than zero (7.7150 and 1.4779, respectively) at the 1% significance level, which is consistent with prior studies (e.g. Hassel et al., 2005; Kallapur and Kwan, 2004; Schadewitz and Niskala, 2010). Moreover, the adjusted R^2 equals 33.06% and the *F*-statistic is significant (i.e. *p*-value is 0.0000). Adding the DJSI status variable slightly decreases the adjusted R^2 (32.98%), whilst the *F*-statistic is still significant (*p*-value 0.0000). Further, DJSI membership is positive but insignificantly different from zero, indicating that its status for the inclusions or exclusions does not provide significant incremental value to the firm. That is, this suggests that there is no difference in a firm's value in relation to being included in or removed from the DJSI, which corresponds with the findings of Moneva and Ortas (2008).

Moreover, when considering the yearly subsamples, the results also indicate that there are no differences between companies that are included in the DJSI and those that are not, with the exceptions being years: 2001, 2005 and 2006. Although the figures for the years 2003 and 2007 are not significant, the adjusted R^2 fell substantially to 13.6 % and 26.53%, respectively, after adding the index variable and further, the coefficients

of this variable are negatively related to firm value (-0.62 and -0.4155, respectively). For the year 2001, the evidence suggests that there is a weak significant relationship between DJSI membership and firm value, with the coefficient of the index being different from zero (1.0572) at the 10% level. Moreover, the results for 2005 show that the companies being included in the DJSI had higher market value than those being removed, but those for 2006 show a marked contrast. In this regard, the coefficients of the index membership variable for the 2005 and 2006 regressions are substantially different from zero in opposite directions, standing at 0.9797 and -2.2344 at the 5% significance level, respectively.

Panel B in table 13 provides the results of the regressions after changing the SRI index status measure to that of the FTSE4Good for the period 2002 to 2007. Using the same treatment, earnings and book values remain significantly greater than zero at the 1% level and the index variable still shows that there is no difference in market value between those companies being included in the FTSE4Good and those being removed from it. Further, as with the DJSI, the adjusted R^2 slightly decreases from 36.11% to 36%. The *F*-statistics are significant whether the index status variable is included or not. However, in contrast to the DJSI findings, the results from the subsamples of individual years report no significant difference between companies being added to or excluded from the FTSE4Good index, which is consistent with the findings of Curran and Moran (2007) for their event study.

Table 13. Valuation model regression results

Panel A. Regression for the DJSI, 2000 – 2007

	A	B	2000	2001	2002	2003	2004	2005	2006	2007
1/ $BVPS_{i,t-1}$	1.4779***	1.4788***	0.5573	1.2816***	2.8318**	1.0918*	1.1879	1.6164***	1.8543***	1.6312
	(4.71)	(4.70)	(0.79)	(3.52)	(2.96)	(1.89)	(0.55)	(3.02)	(3.86)	(1.21)
$EPS_{i,t}$ / $BVPS_{i,t-1}$	7.7150***	7.7034***	11.7530***	6.0948*	5.8686**	3.5813**	13.8270***	10.1826**	9.3308**	9.6611**
	(6.46)	(6.38)	(4.86)	(1.96)	(3.26)	(2.45)	(3.70)	(2.47)	(2.48)	(2.51)
Index_*djsi*		0.0638	0.1774	1.0572*	0.1994	-0.6200	0.4804	0.9797**	-2.2344**	-0.4155
		(0.28)	(0.34)	(1.66)	(0.51)	(-1.06)	(0.57)	(2.17)	(-2.21)	(-0.57)
_cons	1.9809***	1.9447***	1.3750***	1.4154***	1.3550***	3.0195***	0.8979	0.8092	3.5056***	1.8886**
	(11.81)	(10.26)	(2.87)	(4.04)	(4.35)	(5.88)	(1.06)	(1.45)	(4.03)	(2.42)
N	704	704	115	127	109	76	47	93	71	66
Adj. R^2	0.3306	0.3298	0.2956	0.3309	0.4834	0.136	0.4168	0.4148	0.4588	0.2653
F value	48.7031***	33.2477***	8.2761***	25.6271***	8.8322***	3.214**	5.2259***	14.1092***	63.4087***	3.526**

Panel B. Regression for the FTSE4Good index, 2002 – 2007

	A	B	2002	2003	2004	2005	2006	2007
1/ $BVPS_{i,t-1}$	1.3660***	1.3602***	0.7967	1.1910***	1.3906	1.0340***	2.8395**	1.0287
	(6.2)	(6.13)	(1.29)	(4.96)	(1.62)	(2.98)	(2.02)	(0.56)
$EPS_{i,t}$ / $BVPS_{i,t-1}$	7.6864***	7.6893***	2.8008***	6.1892**	8.4617***	14.3286***	8.4873***	10.1504***
	(7.23)	(7.21)	(2.66)	(2.29)	(3.69)	(6.15)	(2.81)	(3.98)
Index_*ftse4good*		0.0434	0.3453	-0.2774	0.3158	0.2300	0.2466	0.3943
		(0.25)	(0.80)	(-0.45)	(1.06)	(0.58)	(0.60)	(0.76)
_cons	1.6584***	1.6272***	1.2640***	1.9953***	1.0094**	0.6129	1.4121**	1.5273***
	(12.26)	(8.41)	(3.00)	(3.28)	(2.30)	(1.36)	(2.23)	(3.72)
N	549	549	85	91	135	104	66	68
Adj. R^2	0.3611	0.36	0.211	0.2613	0.2297	0.6062	0.2811	0.4245
F value	57.538***	39.576***	2.8232**	16.2869***	5.2625***	37.2633***	4.5471***	8.4373***

Note: market value (MV_{it}) is cum-dividend market value, which is the three months after fiscal year-end share price plus dividend per share for the period *t*. Book value per share ($BVPS_{i,t-1}$) is firm *i*'s book value per share for the period *t-1*, and earnings per share ($EPS_{i,t}$) is firm *i*'s earnings per share for fiscal period-end *t*. The index is defined as members of the DJSI or the FTSE4Good are assigned a 1, otherwise 0. Superscripts *, ** and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. T-statistics (in parentheses) were estimated using White's heteroscedasticity-corrected standard error in the regression. Sample size varies depending on the model and each model is checked for outliers each time by a graph. A total of 704 observations for the DJSI over the period from 2000 to 2007 and 549 for the FTSE4Good index from 2002 to 2007, were employed.

Taken together, these results lead to the conclusion that the null hypothesis, which is that SRI index membership is not relevant to the firm value, cannot be rejected. That is, the fifth hypothesis which states that membership of SRI indices is relevant non-financial information that has an impact on the market values of firms cannot be accepted owing to the results being statistically insignificant.

5.4 Discussion

SRI index membership could be an important part of brand-marketing by signalling sustainability leadership as well as having a positive effect on a firm's reputation. In this respect, some scholars have investigated these matters (Cho et al., 2012; Collison et al., 2009; Robinson et al., 2011) and reported that companies with good corporate responsibility standards are better able to attract stakeholders and hence, increase the value of the firm. The DJSI committee itself has pointed out that there are now more than 60 DJSI licenses held by asset managers worldwide, with an estimated value of these funds standing at around 8 billion USD, thus indicating the importance of this index to investors. Further, in the 10 years of impact and investment reports issued by the FTSE4Good index, these state that the total return on investment for its Global Index has been an impressively high 52.3% since its launch in 2001.

However, in the context of the SRI index membership status investigation, the findings cannot strongly support the assertion that firms with index membership experience an increase in their value. That is, the results indicate that companies are not always rewarded for being included in SRI indices nor are they penalized for being excluded from the DJSI and the FTSE4Good index in the March announcement, but they are if are ejected from the FTSE4Good index in the September announcement. However, its effects are temporary for both the SRI indices. These findings are not corroborated by similar studies that tested the DJSI (Cheung, 2011; Robinson et al., 2011) and FTSE4Good index announcement effects (Curran and Moran, 2007). This inconsistency may be due to the background noise of other events that have not been identified. In addition, investors who watch companies in SRI indices may still pay more attention to straightforward financial information when making investment decisions, rather than the CSR effects (Curran and Moran, 2007). However, the empirical evidence in this research indicates that the markets make

adjustments during the event window, thus suggesting that SRI index information is moderately useful to financial decision markers. More specifically, the results for the impact of the announcement of inclusion in the DJSI and the FTSE4Good index in March, as measured by the change in mean abnormal returns, are weakly significant, but opposite to what was expected regarding a firm's inclusion in SRI indices. That is, being added to the DJSI and the FTSE4Good index has a slightly negative impact, but both effects are temporary. However, the outcomes for the announcement of inclusion in the FTSE4Good index in September show that the share prices are increased on the event day, but the effect also is temporary. With regards to deletion from the indices, both produced negative outcomes and in the case of the FTSE4Good index in September this was significant, whereas for the latter's March announcement this was not so. This short term market reaction for inclusions indicates that investors do not consider this to be a key part of their information portfolio when making decisions. This could be because they have access already to reputational information regarding companies that have been built up over a number of years and hence, index membership does not significantly have an impact on their behaviour. In addition, in relation to the volatility of MARs for a firm's exclusion after announcement day this might relate to the wider qualification for the DJSI than for the FTSE4Good index. That is, the former is a sustainability index that does not restrict a company operating in unethical industries, such as weaponry, nuclear power, alcohol and so on and as such industries entertain high risk it could well be that their deletion from the index provokes a stronger and slightly longer negative reaction than being ejected from the much narrower FTSE4Good index.

Further, the results from the application of inclusions and exclusions from the SRI indices to the Ohlson (1995) model were insignificant, indicating that these actions have no impact on firm value. Prior research has produced inconsistent results regarding whether there is a significant difference in performance between firms that have the index badge and those that do not (Artiach et al., 2010; Collison et al., 2008; Lopez et al., 2007; Schroder, 2007). However, the outcome in this case supports one study by Artiach et al. (2010), who found that US companies included in the DJSI from 2002 to 2006 did not have higher free cash flows than those not included in the index.

The evidence in this chapter has shown that the announcement of SRI index membership has a relatively significant impact, albeit weak and temporary, on stock return on the event day. However, it has emerged that it is not relevant to firm value and could be that other CSR information is more important to investment decision making and hence, firm value (Stone, 2001). With respect to this, Fowler and Hope (2007) have criticized simply focussing on SRIs, because they lack clear consistent foundations owing to their having emerged from fund managers in the investment community, rather than being compiled based on robust theory. However, although the results obtained have indicated that companies would appear not to benefit from sustained increases in share prices, if they are included in an SRI index and do not generate higher firm values than for those being removed from such indices, membership could still be important, in the long run. This is because they can improve their reputation as they will they be considered to be ethical operators, which will have a more positive impact on their bottom line advantage, when compared to competitors who are not members of such indices (Collison et al., 2009; Curran and Moran, 2007; Robinson et al., 2011).

5.5 Chapter summary

In this chapter the announcement of index composition changing, in terms of companies being included in or excluded from SRI indices, namely, the DJSI and the FTSE4Good index has been investigated and by adopting an event study approach new understanding has been elicited regarding the impact of CSR performance the market. Further, the relationship between market value and SRI index membership, in conjunction with financial statement information, has been probed using an analytical approach suggested by Hassel et al. (2005).

The fourth tested hypothesis established whether companies are rewarded for inclusions in SRI indices or penalized when excluded. The findings have provided asymmetrical evidence regarding whether event announcements in relation to the DJSI and the FTSE4Good index status have a significant impact on stock returns. More specifically, in the case of the DJSI, companies subject to inclusion in the index experience a significant but temporary decrease in stock return on the announcement day. However, subsequent to this there is a temporary increase following positive

news (i.e. Day 1) (see figure 6). Further, in the case of the FTSE4Good index announcements, the changing MARs in March and September emerge as being differently on announcement days, but these effects are only temporary. For the composition changing announcement in March, the findings show that there is a significant decrease in stock return on the announcement day, whilst there is an increase on the following day of a firm's inclusion and notably there is also an increase at this time for exclusions, thus indicating that companies are not penalized for being deleted from this particular index. By contrast, the results in September indicate that companies experience significant negative impacts on the stock return for being deleted from index but these are also temporary. Moreover, even though temporary positive market reaction does occur on announcement day, the results indicate that there is some significant expectation before the event day. The fifth hypothesis involved testing whether the SRI index label is relevant to firm value and, in general, the outcomes indicate that this is not the case, but there is some weak significant evidence showing a relationship between DJSI status and firm value when it comes to the yearly subsamples. Hence, the results obtained by some similar studies are corroborated (Curran and Moran, 2007; Moneva and Ortas, 2008).

In sum, the findings for SRI membership, both inclusions and exclusions, are generally weak in that even where they revealed significant results they were only temporary for both applied methods. However, in the long run as these indices become more widely seen to reap reputational benefits, as suggested by some studies (Collison et al., 2009; Curran and Moran, 2007; Robinson et al., 2011), membership may prove to have a significant impact on firm value.

CHAPTER 6

Chapter 6. CSR ratings and share selection in SRI versus non-SRI funds

6.1. Introduction

In chapter 4 the link between the CSR representative measures and equity performance was investigated and further, chapter 5 presented tests on SRI index membership, as a measure of CSR, to evaluate its impact on market reaction, as well as examining whether CSR has value relevance, which was a pursuit in both of these chapters. Using Lipper's data on portfolio holdings for the years 2006 and 2007, this chapter explores whether the level of CSR positively influences the equity holdings decision by SRI funds more than in the case of non-SRI ones.

Although considerable research has been devoted to proving that socially responsible investments[24] (SRIs) are superior to their conventional counterparts, rather less attention has been paid to the difference in ownership holdings by SRI funds and their counterparts, regarding the level of CSR. Moreover, the few investigations that have been undertaken on the impact of institutional ownership holdings on CSR have produced contradictory results (Graves and Waddock, 1994; Johnson and Greening, 1999; Neubaum and Zahra, 2006). Further, one shortcoming of most of these previous studies is their failure to distinguish ownership holdings by SRI and non-SRI funds. In this respect, Benson et al. (2006) probed whether the portfolio allocation across industry sectors by SRI funds are really different from those by conventional funds and further whether the stock-picking ability of SRI fund managers is different in the two cases. These authors reported that they found that there is a weak difference in the portfolio composition across industries and little difference in the stock-picking skill of the fund managers. However, the study overlooked how the level of CSR impacts on the ownership holdings decisions by SRI funds and non-SRI ones. In sum, there is no clear evidence of there being a relationship between the level of CSR in terms of a distinction in the ownership decisions by SRI and non-SRI fund holders. Consequently, the key purpose of this chapter is to examine whether the level of a

[24] The term socially responsible investment (SRI) is used interchangeably with ethical or sustainable investment in this chapter.

firm's CSR leads to a difference in the percentage of ownership holdings of SRI funds and non-SRI ones.

A key theme that underpins all SRI funds is that they have a higher standard in relation to ethical issues (i.e. screened by ethical, social, or other preferences) than their conventional counterparts. However, the reasons why companies are listed in the portfolio of SRI funds are not available to the public in any great detail, as this is invariably decided by fund managers through an undisclosed screening process, which they report upon only in general terms. In this regard, Sandberg et al. (2009) criticized the lack of standardizing of SRI practical approaches used by these investors. Furthermore, Dillenburg et al. (2003) called for a new social scheme ratings methodology, which would provide robust quantitative outcomes for a wide range of audiences. Given the absence of such a mechanism, in this part of the empirical research four CSR representative ratings are used to investigate the aforementioned goal, each of which and the associated variables are discussed in detail prior to the computations.

Section 6.2 contains the research design, provides hypothesis development, data selection and empirical model. Subsequently, section 6.3 contains the results of the analysis of the correlations between the independent variables and the overall findings from the empirical model. Next, in section 6.4 there is a discussion of the findings and finally, section 6.5 contains the chapter summary.

6.2 Research Design

6.2.1 Hypothesis development

Socially responsible investment (SRI)

The phenomenon of socially responsible investing is not new, for its roots can be traced back to ancient religious traditions (Renneboog et al., 2008), where sets of values and beliefs were formulated to teach how money should be used and invested ethically. Understandably, this shows why the term "ethical investing" has often been used interchangeably with the term "socially responsible investing". From the beginning of the 18th century religious groups practiced SRI by avoiding sinful companies involved in the: alcohol, tobacco, abortion, pornography and gambling industries. During the Vietnam War, these groups and the anti-war movement also divested all stocks in weapons-related companies to protest against US involvement. Throughout the 1960s and 1970s anti-war, anti-racist, and civil-right movements made investors aware that their investments could generate negative externalities on society (Renneboog et al., 2008). With growing public awareness of investment consequences and with activity being dominated by institutional investors rather than individual on, its concept has broadened into the combination of social and environmental as well as financial objectives (Sparkes, 2001). For example, Sparkes (2001) clearly emphasized that SRI should be considered as a combination of financial and social returns, stating that "*the key distinguishing feature of socially responsible investment lies in its combination of social and environmental goals with the financial objective of achieving a return on invested capital approaching that of the market*" (p.201). Furthermore, recently the Social Investment Forum (SIF) defined it as "*an investment process that considers the social and environmental consequences of investments, both positive and negative, within the context of rigorous financial analysis*" (2006, p.2).

From the early 1970s onwards these concerns led to the introduction of SRI funds and services designed for those investors who wished to take account of the issues entailed when making investment choices, mainly in the UK and US (Sparkes, 2001; Renneboog et al., 2008). Since that time, socially responsible investments have experienced a continuous strong surge in popularity among mainstream investors

(Sparkes and Cowton, 2004). In fact, studies by the SIF (2007) and the European Social Investment Forum (Eurosif) (2008) reported that the total assets managed under SRI had reached around $2.71 trillion in the US and around €2.67 trillion in Europe as of December 2007. With the growing awareness of SRI, the SRI market has become noticeably dominated and driven by institutional investors, for Eurosif (2008) stated that 94% of market share is run by them compared to retail (e.g. individual) investors in Europe. In line with an increasing activism from institutional investors, the number of fund managers who have introduced SRI funds with: social, environmental or ethical criteria, has also grown. As of 2007, there were almost 100 funds available in the SRI market in the UK (Ethical Investment Research Service (EIRIS)) and 260 in the US (SIF 2008).

The SIF has stated that "SRI involves evaluating companies on CSR issues, analyzing corporate social and environmental risks, and engaging corporate social and environmental risks, and engaging corporations to improve their CSR policies and practices" (2006, p.2). This provides the positive direct link between SRI and CSR, with the former acting as a catalyst, which probably explains why both have been increasingly prominent in the last decade. SRI research is, in general, undertaken internally by fund managers as well as externally by ethical screening. Furthermore, the former usually apply their own different screening methods to exclude or include companies from their investment universes. However, these can be broadly classified into three groups: negative screens, positive ones, and engagement. Eurosif, a non-profit organization focusing on SRI investments, has classified the screening methods into three overall categories (Eurosif, 2006).

i. *Positive screening* involves the inclusion of companies that enhance or are committed to having a positive impact on SRI practices and only if they fulfill the criteria set by the SRI researchers can they be included in the fund. Another type of positive screening is *best-in-class screening,* users of which seek to invest in the leading companies on SRI issues within their industrial sector.

ii. *Negative screening* generally relates to excluding companies based on their involvement in certain industries or practices, with the most common being: alcohol, tobacco, and weapons. Another type of negative screening is *norm-*

based screening, which primarily excludes companies based on their violations of international standards and conventions, such as: the United Nations Universal Declaration of Human Rights, the UNICEF Convention on the Rights of the Child, and the ILO Labor Standards.

iii. *Engagement (or Shareholder advocacy)* is a method for fund managers to educate and influence investors and the rights of ownership, which is usually undertaken through a direct dialogue with the company or by using their shareholder votes.

The relationship between SRI and CSR

With a growing SRI market, researchers have become increasingly interested in the different performance of SRI funds and their counterparts, but the evidence, to date, has indicated that there does not appear to be any major variation (e.g. Kreander et al., 2005; Statman, 2006). However, whilst the comparative level of performance between these two has been investigated, there have been few empirical studies focussing on the relationship between the institutional ownership holdings decision and the level of CSR and these have produced inconsistent results. For instance, in hypothesis testing whether a higher level of CSR leads to an increase in institutional ownership, Graves and Waddock (1994) found that the number of institutions owning shares is positively and significantly related to CSR measured by KLD and financial performance, such as return on assets (ROA) and return on equity (ROE), and negatively related to the debt to asset ratio. However, they also reported that the percentage of shares owned by institutions is not significantly related to CSR and financial performance, except for the debt to asset ratio, which had a negative relationship with institutional ownership. In a more recent study, Mahoney and Roberts (2007) obtained results that supported the findings of Graves and Waddock. Moreover, these findings are consistent with earlier research by Fombrun and Shanley (1990), who elicited that a good corporate reputation, as shown in the Fortune survey, is significantly related to higher institutional ownership. Unfortunately, this study did not address the relationship between institutional ownership and a firm's financial performance. Furthermore, Coffey and Feyxell (1991) disclosed findings that there is a statistically positive relationship between institutional ownership and the number of women on the board of directors, but elicited no significant relationship with charitable contributions. Recently, Neubaum and Zahra (2006) stated that long-term institutional owners'

holdings (i.e. pension funds) is positively and significantly associated with CSR, as defined by the KLD, but that short-term institutional owners' holdings (i.e. mutual funds and investment banks) have a significantly negative relationship with CSR.

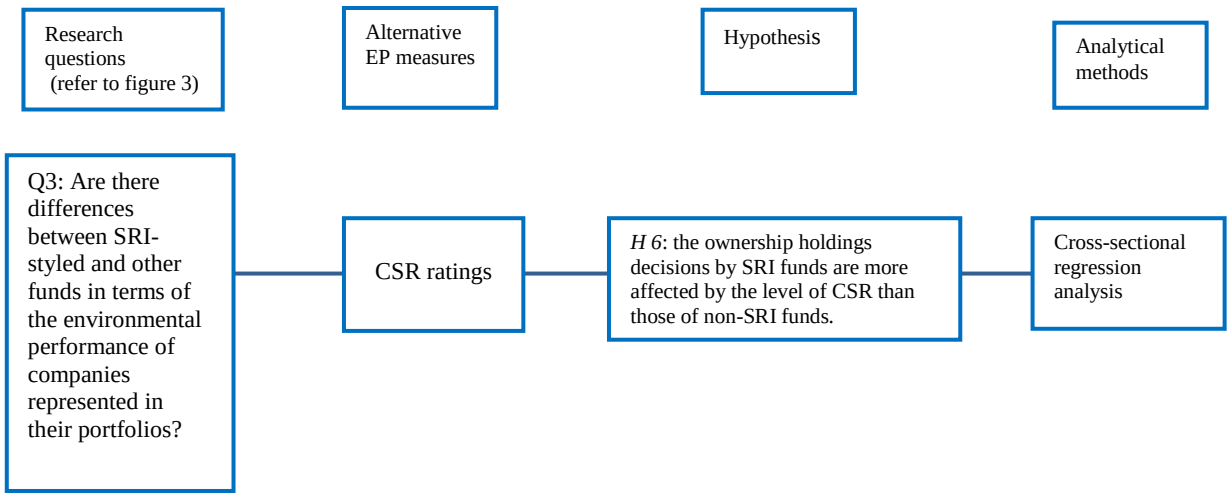
In general, these findings indicate that it is unclear as to what CSR issues institutional investors actually focus on when making investment decisions, but it should be noted that these studies did not distinguish SRI funds and non-SRI ones when conducting their investigations. Previous research into the link between CSR and financial performance has provided evidence of the presence of a positive, albeit sometimes weak, relationship (Orlitzky et al., 2003) and also for the view that the higher a firm's CSR the lower its financial risk (Orlitzky and Benjamin, 2001). With respect to this, professional investors, in general, will prefer to invest in companies that have higher CSR so as to reduce the investment risk, which they expect will bring higher returns, which corresponds to the utility maximisation in conventional theory. However, it cannot be deduced from these results whether or not SRI fund investors put more consideration into CSR for their investment decision-making than their counterparts, as this, as explained above, has received scant attention. Therefore, whether ownership holdings of SRI funds are really different from those of non-SRI ones regarding the level of CSR or whether the former are just brand names for attracting investors who are interested in responsible investment, is the key focus of this chapter,

Hence, this leads to the following hypothesis:

> *H6:* the ownership holdings decisions by SRI fund managers are more affected by the level of CSR than those with non-SRI funds.

The summarized hypothesis development is presented in figure 12 below.

Figure 12. Summary of hypotheses develpoments for the influence on investment decisions



6.2.2 Selected data measures and the empirical model

The mutual fund holdings data for this part of the research were provided by the Lipper Analytic Service (henceforth Lipper), a Reuters Company, and contained information on the monthly company's percentage ownership holdings, static one-off reports, of 30 SRI funds and 30 non-SRI funds. These funds were matched as pairs on the basis of their geographical investment focus, as well as their coming under the same management company, over the period 2006 to 2007. The reason they were not matched by fund size and age, the criteria employed by Mallin et al. (1995) and Kreander et al. (2005), is that the interest here is whether non-financial environmental performance (i.e. CSR reputation ratings) is perceived to be important in investment decision-making by SRI fund managers. Further, prior research has not yet provided clear guidelines on the correct length of the lagged effect of institutional ownership on CSR activities (Neubaum and Zahra, 2006). The time lag chosen for this study so as to examine the current trends in institutional ownership in response to the level of CSR performance is 1-year lags, during 2006 and 2007. Lipper also provided information on: the names of the fund and the management company, Lipper ID, portfolio ID, the reporting date, security holdings, portfolio holding ranks with percentages, portfolio holding shares with their market value, and holding market value currency. As monthly portfolios were not held for all funds, in some cases Lipper was not able to provide data all of the 24 months of the focal period.

Before the fund databases were obtained from Lipper, the ethical mutual funds were preselected from the green & ethical funds directory complied by EIRIS, the independent research company specializing in the assessment of the: social, environmental, and ethical performance of companies. This process of choosing SRI funds meant that possible problems associated with self-classification were avoided. As a market leader in the UK, with over 60% of SRI funds subscribing to its data, EIRIS launched this directory in 2008 to guide financial advisers and consumers. It includes detailed information on 78 UK ethical funds, but in eight cases only the website links were provided and on visiting these it emerged that, for various reasons, there was insufficient information and so they were excluded. Subsequently, after filtering the remaining 70 funds, by identifying the equity mutual funds that could be matched, as described above, 35 funds qualified. However, based on the data available from Lipper, only 30 ethical funds could be matched with non-ethical funds, according to their geographic focus and similar investment types (i.e. equity, cash, or equity and bond). Table 14 reports the name and investment universe for each fund, with there being a total of 60 for the years 2007, but only 58 in 2006, because the portfolio holding data on two funds was missing. As some of the funds emerged to be invested in bonds, or money market instruments, the final observation of the equities held by funds was reduced to 457 for the non-SRI funds and 354 in the case of the SRI ones. The size of observation for the empirical analyses was constrained by the number of companies listed in the CSR reputation ratings and the availability of the firms' financial data.

CSR reputations

To explore for the relationship between the level of CSR representational measures and institutional ownership holdings, four different CSR representational ratings, which comprise two global reputations listings and two UK based ones, were adopted as an exogenous variable: Fortune's WMAC environmental reputation; the Accountability Rating; the Environment Index (EI) issued by Business in the Community (BITC); and the Corporate Responsibility (CR) Index issued by BITC. Even though UK domicile mutual funds were selected, the investment universe was not restricted in the sample selection, so as to be able to investigate whether SRI and non-SRI fund managers react differently according to the scope of the reputation scales. Further, the CSR reputation ratings can be broadly categorized into two groups,

one measuring corporate environmental performance (i.e. Fortune's WMAC environmental reputation and the EI) and the other measured multidimensional CSR (i.e. the Accountability Rating and the CR Index). Fortune's WMAC environmental reputation scores have already been covered in detail in chapter 4 and so it they are only discussed briefly, whilst the Accountability Rating and the second two reputation scores in the UK based companies receive greater attention in this section.

Fortune's WMAC Environmental Reputation: Since 1997, Fortune published the companies rankings measured by nine factors: the ability to attract and retain talented people; the quality of management; social responsibility to the community and the environment; innovativeness; the quality of products or services; the wise use of corporate assets; financial soundness; long-term investment value; and the effectiveness in doing business globally. The last factor, social responsibility to the community and the environment, is used as a measure of a firm's environmental reputation.

Accountability Rating: Since 2004, the Accountability Rating, which was developed as a joint venture by both CSR consultancy *csrnetwork* and Accountability, has rated the world's largest companies as defined in the Fortune Global listing by how they integrate responsible business practices into their core processes. 100 companies' rating scores have been issued every year, except for 2006, which only had 64 company ratings, comprising 50 Fortune Global companies and 14 other companies. Until 2006, companies were evaluated on six key areas: accountability, non-financial performance: stakeholder engagement; governance; strategy; performance management; assurance; and public disclosure. The key rating criteria were subsequently changed to include four areas: strategy; governance, which was a combination of governance and performance management; engagement, which was pooled stakeholder engagement; public disclosure and assurance; and impact. The new domains focus on social and environmental issues, with each having a different maximum score that are then added together to become a company's overall score, with a maximum of 100. This analysis is based on a company's main reports and its sustainability reports, with natural logarithms being applied to the accountability scores so as to reduce the extreme impact of the values.

Table 14. Summary information of the sample funds

SRI funds	*Non-SRI funds*	*Investment Universe*
Aberdeen ethical engagement UK	Aberdeen UK growth fund	UK
Aberdeen ethical world	Aberdeen world equity	Global
Aegon ethical equity	Aegon UK equity	UK
Allchurches amity fund	Allchurches UK equity growth	UK
AXA ethical fund I	AXA UK opportunities fund	UK
CIS sustainable leaders trust	CIS UK growth trust	UK
CS fellowship fund	CS UK mid 250 fund	UK
F&C stewardship income	F&C growth & income fund	UK
F&C stewardship growth	F&C FTSE all-share tracker	UK
F&C stewardship international	F&C global growth fund	Global
FS Asia pacific sustainability	FS Asia pacific fund	Asia pacific excl. Japan
Halifax ethical	Halifax international growth	Global
Henderson global care growth	Henderson international fund	Global
Henderson industries of the future	Henderson global technology fund	Global
Henderson global care managed	Henderson emerging markets	Global
Henderson global care UK income	Henderson UK equity income	UK
Insight European ethical	Insight European small cap fund	UK
Insight evergreen	Insight global alpha	Global
Jupiter ecology Inc	Jupiter global managed fund	Global
Jupiter environmental income	Jupiter growth & income fund	UK
Marlborough ethical	Marlborough UK equity growth	UK
NU sustainable future UK growth	NU UK focus	UK
Old mutual ethical	Old mutual UK select equity	UK
Prudential ethical	Prudential higher income	UK
SW ethical	SW UK select growth	UK
SW environmental investor	SW UK tracker	UK
SWIP pan-European SRI equity	SWIP pan-European equity	Europe incl. UK
SWIP global SRI	SWIP global fund	Global
Standard life UK ethical	Standard UK equity growth	UK
SJP ethical	SJP international	Global

Notes: this table provides a summary of information about each fund in the sample, including: the name, the code and the investment universe, from 2006 to 2007. The 30 SRI funds were matched according to investment universe and similar investment objectives.

Corporate Responsibility Index and Environmental Index Ratings: Business in the Community (BITC) developed the voluntary benchmark for responsible business practice to help build a sustainable future. It provides benchmarking assessments for UK companies and it launched its Corporate Responsibility (CR) Index in 2002, having already established its Environment Index (EI) in 1996. The CR Index evaluates the responsible business performance of companies, which covers: responsible business strategy; integration of this strategy into the business and the management of corporate responsibility within the organisation. The top 100 companies' CR rankings are published on the BITC website and/or in the Sunday Times every year, with the 2005 and 2006 CR indices being published in May 2006 and 2007. Consequently, these scores are utilized in this study as reputation scores for the 2006 and 2007 fund portfolio holdings, respectively. From 2006 the rating system was changed to four performance bands rather than rankings: platinum indicated a score of 95% and above; gold, 90% to 94.5%; silver, 80% to 89.5%; and bronze, 70% to 79.5%. Thus, index scores used for each company are the median score for each band. That is, the companies listed in the platinum band obtained a 97% index score, those in the gold band, 93%, those in the silver band, 85%, and those in the bronze band, 75%. As another self assessed benchmarking tool, the Environment Index was used to evaluate: environmental management, environmental performance and impact, and corporate assurance and disclosure up until 2005, when two more sections were added, these being corporate strategy and the integration of environmental issues into the business. The results of the EI are published through the BITC website every year and as with the CR Index, the median scores of each band are used in this enquiry.

Control variables

Drawing on existing studies of the relationship between CSR and a firm's financial performance and the work by Graves and Waddock (1994 and 1997) and Falkenstein (1996), this researcher employed the six characteristics of a firm: profitability, debt level, size, risk, BV/MV, and dividend yield and extracted the figures for these from DataStream.

Profitability: A firm's profitability was measured by return on equity (ROE). Regarding this, although extant studies have shown a mixed relationship between CSR and ROE (see Appendix I for more details), a positive relationship between

institutional ownership and ROE is expected (Graves and Waddock, 1994; Johnson and Greening, 1999).

Debt level: Debt level was measured by the ratio of total debt to total assets and this could indicate whether the institutional holdings affect the level of debt ratio (Grier and Zychowicz, 1994). A low ratio will lead to institutional investors placing a higher value on a stock, because of the perceived lower investment risk (Graves and Waddock 1994) and hence, debt ratio is expected to be negatively related with both ownership holdings and CSR (Falkenstein, 1996: Graves and Waddock, 1994).

Size: Size was measured by market capitalization and to reduce the impact of extreme values as well as to linearise the variables, natural logarithms were applied to the market value, after Gompers and Metrick (2001). A positive relationship between a firm's size and ownership is expected (Cox et al., 2004; Graves and Waddock, 1994; Neubaum and Zahra, 2006).

Risk: Risk was obtained by running a time series regression over the sixty months prior to the test period, using the market model, which is commonly undertaken in this context and the FTSE All-World index was utilized to measure the monthly market factor. In general, the higher the observed variation, the higher the risk involved in holding the equity. It is expected to be negatively related with ownership (Falkenstein 1996; Graves and Waddock, 1994).

BV/MV and *DY*: the book value to market value (BV/MV) and dividend yield (DY), as the growth potential, were used to find the preferred portfolio holdings. In general, growth stocks have a low book to market ratio and value stocks have a high ratio. There is a negative relationship between the dividend yield (DY) and ownership (Gompers and Metrick, 2001) and the book to market ratio is expected to be positive, as with Gompers and Metrick's (2001) work.

Empirical model

The empirical analysis is in two parts, with the first comprising an investigation to explore the CSR impacts, if any, on the relationship between the ownership holdings of SRI funds and those of non-SRI ones, for the sample period and two yearly subsamples. For the second part, the same procedure using only the overall sample period is performed to elicit whether or not the investment universe of the fund influences the scope of the CSR reputation focussed on by both types of fund managers. That is, for example, are fund holders with global operations more interested in global than UK reputation. The CSR reputation is separately investigated and is reported in the descriptive and regression analyses in the next section. The dependent variable is defined as the institutional ownership holdings by SRI and non-SRI funds and is measured by the sum of the weighted average of a company's holdings owned by each institutional investor.

The following multiple regression equation is constructed with all variables measured at the corporate level.

$$IO_{i,t} = \beta_0 + \beta_1 CSR_{i,t} + \beta_2 ROE_{i,t} + \beta_3 DY_{i,t} + \beta_4 Beta_{i,t} + \beta_5 Debt\ level_{i,t} + \beta_6 {}^{BV}/_{MV_{i,t}} + \beta_7 size_{i,t} + \epsilon_{i,t} \quad (model\ 4)$$

where $IO_{i,t}$ is the level of mutual fund ownership holdings stock *i* in the period *t* by SRI funds or non-SRI ones. The average institutional ownership holdings (*IO*) of the equity stock are measured as the sum of each fund's weighted average of its holdings during a year divided by the total holding months for that year. $CSR_{i,t}$ is the CSR reputation of firm *i* in the period *t* and except for Fortune's global reputation scores, the reputation variables are measured by the natural logarithm of their scores in order to minimize the impact of extreme values. $ROE_{i,t}$ is the return on equity of a firm *i* in the period *t*. $Beta_{i,t}$ is obtained by running a time series regression over the 60 months prior to the test period, using the market model. $DY_{i,t}$ is the dividend yield of a firm *i* for the period *t*. *Debt* $level_{i,t}$ is measured as the ratio of total debt to total assets. $BV/MV_{i,t}$ is the ratio of the book value to market value. $Size_{i,t}$ is the natural logarithm of the market capitalization of a firm *i* for the period *t*. Note that ROE and debt level

are not used in the percentage form available on DataStream so as to minimize the impact of extreme values.

6.3. Empirical analysis and results

Descriptive statistics and correlation analysis

Table 15 separately presents the descriptive analysis for the non-SRI and SRI funds, including the: means, standard deviations, and intercorrelations among the variables. Moreover, it reports these statistics in relation to the four CSR reputation tools over the sample period 2006-2007; with Fortune's WMAC environmental reputation scores being in panel A, those for the Accountability Rating in panel B, whilst the Corporate Responsibility (CR) Index outcomes are in panel C, and the Environmental Index results in panel D. The sample sizes for which all variables were available after the elimination of outliers vary in each panel. Further, the table includes the results from the tests, i.e. the t-test and the Wilcoxon rank test, in relation to the difference in variable scores between non-SRI funds and SRI ones.

The data in panel A, the Fortune's WMAC environmental reputation scores, indicate that there is no statistically significant relationship between ownership holdings and the level of CSR for both groups. When comparing ownership holdings with other variables between fund groups, this would appear to show that institutional investors, on aggregate, prefer to have greater holdings with companies with higher dividend yield and larger company size, which is consistent with previous studies (e.g. Gompers and Metrick, 2001; Graves and Waddock, 1994). The debt level (i.e. the ratio of total debt to total assets) is significantly and negatively correlated with the ownership holdings by non-SRI funds at the 5% level (-0.1009), but insignificantly and positively related to those by SRI funds. Further, when considering the relationship between CSR reputation and the other variables, beta, BV/MV and size are significantly different from zero at the 5% level or better, with same direction movements in the two different fund groups except for the ROE in non-SRI funds (i.e. significantly different from zero at the 5% level). In general, these results are consistent with previous studies on the link between CSR and financial performance (McGuire et al., 1988 and 1990; Robert and Dowling, 2002; Waddock and Graves, 1997).

Panel B, reporting the results from the descriptive analysis of the Accountability Rating, as with panel A, shows that there is not much difference in the means and standard deviations between the two fund holding types. However, unlike in panel A, a higher level of CSR is significantly associated with higher ownership holdings by both non-SRI and SRI funds, at the 1% level (0.4329) and 5% level (0.2658), respectively. Further, the correlation outcomes of holdings with the other control variables report that the dividend yield and the debt level are significantly different from zero at the 10% level or better for both groups. In addition, the ROE and size in the non-SRI funds are statistically significant at the 10% and 1% level, respectively. Moreover, regarding the relationship between CSR and financial performance, a firm's risk is only significantly related at the 5% level in the case of SRI funds, whilst the DY and size are related at the 10% level or better in case of the non-SRI funds.

The data in panel C for the Corporate Responsibility Index illustrates that, as with the two previous panels, the means and standard deviations for the SRI and non-SRI funds are similar and further, the ownership holdings variable is statistically significant at the 1% level (0.3557 for the non-SRI funds and 0.3182 for the SRI ones). Moreover, the ownership holdings are significantly related to the other variables (e.g. ROE, BV/MV, and size), at the 5% level or better, for both fund groups. When considering the relationship between CSR and the other variables, the results show that they are statistically different from zero at the 10% level or better, except for ROE and BV/MV in the case of SRI funds. Panel D, the Environmental Index ratings which are measured by the same organization, BTIC, as the CR Index ratings, provides the same evidence to those in panel C regarding the relationship between ownership holdings and CSR. That is, these are significantly greater than zero at the 1% level for both non-SRI funds (0.2743) and SRI ones (0.2952). Further, the results in relation to the link between the CSR and the financial performance variables, report that they are significantly correlated at the 10% level or better, except in the case the beta for both fund types.

Table 15. Means, Standard Deviations, and correlations among the variables according to CSR ratings scales over the period 2006-2007

Panel A. Fortune's WMAC environmental reputation (N=527)

Non-SRI funds (N=303)

Variables	Mean	SD	1	2	3	4	5	6	7	8
1. Ownerships (*IO*)	6.2261	11.8655	1	0.0189	0.2217***	0.07	0.3389***	-0.1686***	-0.2378***	0.4794***
2. CSR reputation (*CSR*)	5.9691	0.9474	0.0506	1	-0.0434	-0.2330***	0.1776***	-0.0902	-0.2141***	0.2997***
3. DY	2.2944	1.4857	0.2589***	-0.0514	1	0.0997*	0.0315	0.1570***	0.1847***	0.2556***
4. Beta	1.1198	0.7029	-0.0446	-0.2129***	0.0907	1	-0.0227	-0.1347**	0.1643***	-0.0403
5. ROE	0.2061	0.1294	0.1838***	0.1289**	-0.0302	-0.0848	1	-0.0657	-0.5715***	0.2664***
6. Debt level	0.2186	0.1462	-0.1009*	-0.0586	0.1559***	-0.1317**	0.0127	1	0.059	-0.0686
7. BV/MV	0.4821	0.2499	-0.1024*	-0.1885***	0.1548***	0.1225**	-0.4993***	0.0828	1	-0.1924***
8. Size	17.6503	1.0601	0.2989***	0.2792***	0.2355***	-0.0544	0.2054***	-0.0366	-0.1924***	1

SRI funds (N=224)

Variables	Mean	SD	1	2	3	4	5	6	7	8
1. Ownerships (*IO*)	5.3276	9.0485	1	-0.0286	0.2525***	0.084	0.2499***	-0.0244	-0.1112*	0.3318***
2. CSR reputation (*CSR*)	6.0329	0.9514	-0.0668	1	-0.048	-0.3094***	0.1216*	-0.0195	-0.2209***	0.3047***
3. DY	2.4571	1.5385	0.2932***	-0.0689	1	0.0845	0.0316	0.1677**	0.2951***	0.2232***
4. Beta	1.1402	0.71	-0.0094	-0.2968***	0.0806	1	-0.041	-0.1774***	0.2122***	-0.118*
5. ROE	0.2175	0.1363	0.1079	0.073	-0.0395	-0.1086	1	-0.0928	-0.5806***	0.2299***
6. Debt level	0.2047	0.1459	-0.0419	-0.0092	0.1252*	-0.1857***	0.0269	1	0.0818	0.0032
7. BV/MV	0.4465	0.2286	-0.0059	-0.1693**	0.2555***	0.1448**	-0.5339***	0.0505	1	-0.1455**
8. Size	17.7468	0.9795	0.1980***	0.2934***	0.1686**	-0.0988	0.1423**	-0.0235	-0.1016	1

Tests for difference: Non-SRI vs. SRI

Variables	*t*-Test *(p-value)*	Wilcoxon Rank test (*z-value*)
1. Ownerships (*IO*)	0.3437	0.8456
2. CSR reputation (*CSR*)	0.4447	0.5261
3. DY	0.2213	0.1693
4. Beta	0.7422	0.73
5. ROE	0.3266	0.3179
6. Debt level	0.2784	0.2266
7. BV/MV	0.0949*	0.1587
8. Size	0.2864	0.3584

Table15. (continued)

Panel B. The Accountability Rating (N=162)

Non-SRI funds (N=94)

Variables	Mean	SD	1	2	3	4	5	6	7	8
1. Ownerships (*IO*)	9.3735	17.3852	1	0.3023***	0.2330**	0.022	0.3602***	-0.3616***	-0.3103***	0.4006***
2. CSR reputation (*CSR*)	3.6629	0.3384	0.4329***	1	0.2295**	-0.1945*	0.1962*	-0.1164	-0.1396	0.2242**
3. DY	2.9537	1.5817	0.2573**	0.2546**	1	0.1884*	0.1005	0.0207	0.1851*	0.0493
4. Beta	1.1786	0.5882	-0.1036	-0.1651	0.2024*	1	-0.1738*	0.0806	0.1736*	-0.4414***
5. ROE	0.1786	0.0824	0.1828*	0.1469	0.0571	-0.1232	1	-0.2901***	-0.5612***	0.3081***
6. Debt level	0.2554	0.14	-0.2978***	-0.0944	0.0493	0.0291	-0.3057***	1	0.1499	-0.2563***
7. BV/MV	0.5482	0.2328	-0.1104	-0.0465	0.1067	0.1355	-0.5020***	0.2285**	1	-0.2977***
8. Size	18.3239	0.7517	0.2730***	0.1780*	0.0357	-0.3948***	0.3463***	-0.2210**	-0.4141***	1

SRI funds (N=68)

Variables	Mean	SD	1	2	3	4	5	6	7	8
1. Ownerships (*IO*)	7.2748	11.6676	1	0.2859**	0.2186*	0.0751	0.2222*	-0.204*	-0.0804	0.0623
2. CSR reputation (*CSR*)	3.702	0.3347	0.2658**	1	0.1561	-0.3596***	0.2046*	-0.0404	-0.2472**	0.1819
3. DY	3.131	1.4941	0.3357***	0.1969	1	0.1825	0.0809	-0.0927	0.2573**	0.0995
4. Beta	1.2018	0.5992	0.0592	-0.2927**	0.1877	1	-0.2454**	0.0765	0.2304*	-0.4643***
5. ROE	0.1792	0.0823	0.0262	0.129	0.0555	-0.1413	1	-0.2434**	-0.4972***	0.2696**
6. Debt level	0.2504	0.1464	-0.2190*	-0.0166	-0.0335	-0.0088	-0.2875**	1	-0.0094	-0.1045
7. BV/MV	0.5349	0.2125	0.0378	-0.1369	0.1896	0.1478	-0.4347***	0.0956	1	-0.2428**
8. Size	18.35	0.7316	0.0113	0.1005	0.0594	-0.3782***	0.3226***	-0.0681	-0.3836***	1

Tests for difference: Non-SRI vs. SRI

Variables	*t*-Test*(p-value)*	Wilcoxon Rank *(z-value)*
1. Ownerships (*IO*)	0.3888	0.5686
2. CSR reputation (*CSR*)	0.4657	0.4511
3. DY	0.4722	0.3803
4. Beta	0.8066	0.8479
5. ROE	0.9606	0.7458
6. Debt level	0.8258	0.7203
7. BV/MV	0.7101	0.7497
8. Size	0.8257	0.8373

Table 15. (continued)

Panel C. The Corporate Responsibility Index ratings (N=205)

Non-SRI funds (N=106)

Variables	Mean	SD	1	2	3	4	5	6	7	8
1. Ownerships (*IO*)	9.0934	9.0803	1	0.3702***	0.0245	0.1098	0.2654***	0.1098	-0.2757***	0.5994***
2. CSR reputation (*CSR*)	4.4887	0.0847	0.3557***	1	0.1777*	-0.143	0.1956**	0.1839*	-0.1989**	0.5343***
3. DY	2.9753	1.5021	0.1166	0.2248**	1	-0.0244	-0.0107	0.3246***	-0.0413	0.0259
4. Beta	0.9382	0.6938	0.0475	-0.1901*	-0.0367	1	-0.2801***	-0.2887***	0.3222***	-0.0922
5. ROE	0.3172	0.3017	0.3313***	0.1742*	0.1478	-0.1272	1	0.1015	-0.5755***	0.2998***
6. Debt level	0.2595	0.174	0.1296	0.2036**	0.3560***	-0.2725***	0.2374**	1	-0.1373	-0.0614
7. BV/MV	0.4038	0.2606	-0.3071***	-0.1931**	-0.0649	0.2373**	-0.4366***	-0.1225	1	-0.2221**
8. Size	16.2715	1.4187	0.5994***	0.4934***	0.0253	-0.0967	0.2132**	-0.072	-0.2195**	1

SRI funds (N=99)

Variables	Mean	SD	1	2	3	4	5	6	7	8
1. Ownerships (*IO*)	7.5965	8.0385	1	0.2596***	0.2806***	0.0325	0.0858	0.2355**	-0.2088**	0.1387
2. CSR reputation (*CSR*)	4.4854	0.0877	0.3182***	1	0.2378**	-0.1441	0.1138	0.2050**	-0.1415	0.4839***
3. DY	3.0393	1.4856	0.3203***	0.2754***	1	0.0072	0.0509	0.3302***	-0.1089	0.0644
4. Beta	0.9054	0.6958	-0.0554	-0.1839*	-0.0205	1	-0.2830***	-0.2840***	0.3444***	-0.0727
5. ROE	0.3176	0.3056	0.2770***	0.1383	0.1937*	-0.1098	1	0.1228	-0.5464***	0.2308**
6. Debt level	0.2677	0.1759	0.1692*	0.2345**	0.3607***	-0.2614***	0.2529**	1	-0.1571	-0.0779
7. BV/MV	0.4054	0.2616	-0.2587***	-0.1452	-0.134	0.2505**	-0.4113***	-0.1359	1	-0.2010**
8. Size	16.2836	1.403	0.2039**	0.4430***	0.0601	-0.0717	0.1623	-0.0791	-0.1951*	1

Tests for difference: Non-SRI vs. SRI

Variables	*t*-Test *(p value)*	Wilcoxon Rank *(z value)*
1. Ownerships (*IO*)	0.2141	0.2314
2. CSR reputation (*CSR*)	0.7853	0.8482
3. DY	0.795	0.7105
4. Beta	0.7360	0.6905
5. ROE	0.9918	0.9587
6. Debt level	0.7387	0.7594
7. BV/MV	0.9654	0.9803
8. Size	0.9513	0.9455

Table 15. (continued)

Panel D. The Environmental Index ratings (N=311)

Non-SRI funds (N=160)

Variables	Mean	SD	1	2	3	4	5	6	7	8
1. Ownerships (*IO*)	10.002	12.0542	1	0.3874***	0.1684**	0.1026	0.1705**	-0.0186	-0.1079	0.5645***
2. CSR reputation (*CSR*)	4.4391	0.1268	0.3025***	1	0.2332***	-0.1031	0.2532***	0.1851**	-0.1746**	0.4658***
3. DY	2.8435	1.4704	0.2776***	0.2032***	1	-0.12	0.0008	0.2033***	0.0523	0.0542
4. Beta	0.9824	0.6648	0.0077	-0.1009	-0.1093	1	-0.1885**	-0.2483***	0.1967**	0.0021
5. ROE	0.3143	0.371	0.1198	0.1665**	0.0676	-0.0242	1	0.1103	-0.5217***	0.1771**
6. Debt level	0.2532	0.1727	0.0256	0.1579**	0.2303***	-0.2275***	0.2389***	1	-0.1441*	-0.1527*
7. BV/MV	0.404	0.273	-0.1185	-0.2019**	0.0128	0.1082	-0.3428***	-0.1328*	1	-0.1441*
8. Size	16.2963	1.5407	0.5535***	0.4191***	0.0654	0.0032	0.102	-0.1396*	-0.067	1

SRI funds (N=151)

Variables	Mean	SD	1	2	3	4	5	6	7	8
1. Ownerships (*IO*)	8.5535	11.137	1	0.2759***	0.2446***	0.0913	0.0221	0.0054	0.0182	0.3047***
2. CSR reputation (*CSR*)	4.4319	0.1359	0.2566***	1	0.2590***	-0.1424*	0.2197***	0.1796**	-0.1616**	0.4438***
3. DY	2.9634	1.4456	0.3218***	0.2139***	1	-0.0231	0.0367	0.1703**	0.0209	0.1364*
4. Beta	0.9351	0.6403	0.0102	-0.1264	-0.029	1	-0.2187***	-0.1978**	0.2320***	-0.0458
5. ROE	0.3123	0.379	0.057	0.1522*	0.0763	-0.0215	1	0.1403*	-0.4945***	0.1415*
6. Debt level	0.2641	0.1751	-0.0287	0.1385*	0.2008**	-0.1935**	0.2475***	1	-0.1618**	-0.1279
7. BV/MV	0.4108	0.2767	-0.0725	-0.1816**	-0.025	0.1506*	-0.3333***	-0.1537*	1	-0.1618**
8. Size	16.233	1.5087	0.4073***	0.3785***	0.1386*	-0.0513	0.0866	-0.108	-0.0443	1

Tests for difference: Non-SRI vs. SRI

Variables	*t*-Test *(p value)*	Wilcoxon Rank *(z value)*
1. Ownerships (*IO*)	0.2726	0.0545*
2. CSR reputation (*CSR*)	0.6251	0.7225
3. DY	0.4693	0.3951
4. Beta	0.5236	0.5489
5. ROE	0.9629	0.843
6. Debt level	0.5806	0.5557
7. BV/MV	0.8281	0.8321
8. Size	0.7148	0.7324

Notes: the table reports the descriptive analysis on institutional ownership holdings by SRI funds and non-SRI ones, using institutional-holdings data from Lipper and financial information from DataStream for 2006 to 2007. Each panel presents the CSR reputations, covering: Fortune's WMAC environmental reputation score in panel A, Accountability ratings in panel B, Corporate Responsibility index from BITC in panel C, and environmental index ratings also from BTIC in panel D. The number of observations in each panel is not identical, because of the variability in scope of the institutional holdings between the CSR scales. The dividend yield is the ratio of dividend per share to market price at year end (Worldscope item 09404). The risk is measured by the market model beta. The return on equity (ROE) used is Worldscope item 08301 in DataStream. The debt level is the total debt divided by the total assets (Worldscope item 08236). The variables ROE and debt level are not used as a percentage of the figures extracted from DataStream, so as to minimize the impact of extreme values. The book to market value is the common equity of a company divided by the market value of common equity (i.e. the inverse of the value of Worldscope item 03501 in DataStream). The size is the logarithm of the market capitalization (Worldscope item 08001). The top right half of the correlation matrix, above the main diagonal: provides the non-parametric spearman correlation estimations. The symbols *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

The main deductions from table 15 are that, on average, institutional investors in SRI and non-SRI funds prefer to have higher holdings in companies with higher levels of CSR reputation than in their counterparts, which is consistent with Graves and Waddock (1994) and Mahoney and Roberts (2007), but this evidence is only weak in the case of the Fortune's WMAC reputation scores. However, when considering the difference in the means for non-SRI funds and SRI ones, the results reveal this is insignificant in all cases. One explanation for this, which illustrates the weakness of this part of the enquiry, is that companies may well belong to the portfolios of both SRI funds and non-SRI ones and thus, it is virtually impossible to distinguish between them, in terms of the differences in their means. Next, to explore further whether CSR reputation has a different influence on the ownership holdings decision for non-SRI funds and SRI ones, comprehensive regression analysis is conducted.

Regression analysis

The dependent variable in the regression is institutional ownership holdings scaled by the weighted average of the percentage holdings at period *t*. The independent variables are the level of firms' CSR reputations for the period *t* and firms' financial performance variables (i.e. dividend yield, beta, return on equity (ROE), debt level, book value-to-market value, and size). Recall that the variables, ROE and debt level, are not used as percentage figures so as to minimize the impact of extreme values. Firstly, the funds are separated into two groups and defined as 1 if they were managed under SRI categories and 0 otherwise, with the subsequent regression being separately performed on each fund holding type in relation to CSR. Furthermore, to determine whether the problem of multicollinearity exists or not, variable inflation factors (VIFs)

are performed in the regression analysis and as reported in each panel are all below 3, thus indicating that severe collinearity is not a serious issue. To examine whether the results are driven by a time trend, the same regression tests are undertaken for each subsample period, that is, 2006 and 2007 as well as for the overall sample period and these outcomes can be seen in each panel. Panels A and B in table 16 report the results of the OLS regression analysis. In this analysis, to avoid heteroskedastic uncorrelated errors, all regressions are conducted by the robust option, which gives standard errors. Columns 1 to 3 show the results, including the yearly subsamples, for the institution ownership holdings for the non-SRI funds and columns 4 to 6 those for the SRI funds.

Panel A, in table 16, reports the results from the analysis using Fortune's WMAC environmental reputation scores. The overall results from the OLS regression show that the ownership holdings of SRI funds are negatively and significantly greater than zero at the 10% level, whilst those of non-SRI funds are consistently negative and insignificant. For example, the CSR in SRI funds is significantly negative (-1.171) at the 10% level, whereas that for its counterparts is insignificantly negative (-0.505). However, this significant relationship between holdings by SRI funds and CSR is not found in the yearly subsample analysis. Further, when looking at a firm's other characteristics that could affect ownership holdings decisions: dividend yield, debt level, and size, the results in most cases are significantly greater than zero at the 10% level or better. These results indicate that institutional investors, as a whole, choose to invest in firms: with higher dividend yield, of large size and with lower debt levels. Regarding the other characteristic variables, beta, ROE and BV/MV, these revealed no power in the estimations (i.e. insignificant).

Panel A also presents that the results from the regression analysis using the Accountability Rating and the overall results show that CSR is statistically significant at the 5% level or better. For example, it is positively related to its holdings by non-SRI funds at the 1% level (17.167) and SRI ones at the 5% level (8.261). Further, this significant relationship between holdings and the CSR holds in the yearly subsamples, in the case of non-SRI funds, whilst this is not so for SRI funds. That is, the CSR in the case of non-SRI is significantly different from zero at the 5% level in 2006 and the 10% level in 2007, whilst for SRI these subsample outcomes are insignificant.

Moreover, regarding the other characteristics, a firm's debt level is significant at the 5% level or better for both groups over the sample period, suggesting that the institutional investors, on aggregate, prefer companies with lower debt levels. However, dividend yield and firm size are only statistically and positively significant at the 10% level or better for the non-SRI funds for the entire sample period. The other results provide no evidence of the existence of a significant relationship with ownership holdings for either group.

The results from the Corporate Responsibility (CR) Index are reported in Panel B and they show that CSR is significantly different from zero at the 5% level or better for the overall estimation as well as for 2006, in the case of SRI funds, but there is no evidence of a relationship between CSR and its holdings for non-SRI funds in any of the calculations. For the other control variables, the results of the measure of risk (i.e. beta and debt level) in the case of non-SRI funds would appear to indicate that there is an institutional preference toward corporations with more market risk. That is, they are significantly and positively greater than zero at the 5% level or better. Further, institutional investors involved in non-SRI funds prefer companies of a larger size, given this outcome is strongly significant at the 1% level for the overall sample and the yearly subsamples. Although the results from panel B present some evidence of a positive link between CSR and ownership holdings of managers involved to SRI funds, the Environmental Index (EI) results measured by BITC, which as mentioned above is the same organization that measures the CR Index, report that CSR is insignificantly different from zero in the overall and yearly subsample estimations. For the control variables, the results appear to indicate that institutional investors, on aggregate, prefer companies with higher dividend yield and ones that are large sized. Moreover, similar to the results in the other panels, no significance is found for the other control variables.

Table 16. Effects of CSR ratings in relation to differences in the institutional holdings of SRI funds and Non-SRI funds[25]

Panel A. Fortune's WMAC environmental reputation and the Accountability Rating

	Fortune's WMAC environmental reputation						**The Accountability Rating**					
	Non-SRI			***SRI***			***Non-SRI***			***SRI***		
Variables	overall	2006	2007	Overall	2006	2007	overall	2006	2007	overall	2006	2007
CSR	-0.505	-0.026	-1.185	-1.171*	-1.12	-1.361	17.167***	25.275**	13.794*	8.261**	9.119	10.222
	(-0.73)	(-0.02)	(-1.51)	(-1.79)	(-1.21)	(-1.38)	(3.04)	(2.51)	(1.79)	(2.37)	(1.64)	(1.28)
DY	1.934***	2.038**	1.847**	1.655***	1.593**	1.723**	2.012*	2.901	1.968	2.133	1.671	2.962
	(3.38)	(2.53)	(2.20)	(3.13)	(2.36)	(2.17)	(1.76)	(1.64)	(1.31)	(1.50)	(1.16)	(1.28)
Beta	-1.157	-1.012	-1.277	-0.708	-0.477	-1.072	-0.625	0.708	-1.462	1.296	4.24	-1.498
	(-1.61)	(-1.16)	(-1.02)	(-1.06)	(-0.54)	(-0.96)	(-0.27)	(0.17)	(-0.49)	(0.59)	(1.48)	(-0.36)
ROE	12.895**	12.077	13.566*	5.918	5.032	6.856	-0.658	-25.512	0.164	-11.027	-15.356	-17.477
	(2.42)	(1.47)	(1.84)	(1.09)	(0.55)	(1.02)	(-0.04)	(-0.77)	(0.01)	(-0.67)	(-0.49)	(-0.63)
Debt level	-11.579***	-14.118***	-8.825	-5.336*	-5.786	-4.754	-30.296***	-34.337**	-29.107**	-18.095**	-15.206	-23.343*
	(-3.05)	(-2.65)	(-1.57)	(-1.94)	(-1.62)	(-1.11)	(-3.38)	(-2.25)	(-2.42)	(-2.50)	(-1.49)	(-2.05)
BV/MV	-0.772	-1.367	-0.009	-0.869	-1.888	0.661	0.272	-2.046	-0.196	-0.077	-1.033	-3.997
	(-0.45)	(-0.63)	(-0.00)	(-0.42)	(-0.87)	(0.16)	(0.05)	(-0.26)	(-0.02)	(-0.01)	(-0.21)	(-0.27)
Size	2.375***	2.318***	2.585***	1.517***	1.516**	1.598**	3.406*	6.983*	1.459	0.087	2.097	-3.000
	(3.97)	(2.88)	(2.77)	(2.76)	(2.07)	(2.06)	(1.70)	(1.94)	(0.61)	(0.04)	(0.66)	(-0.78)
_cons	-35.580***	-36.857**	-36.074**	-17.600*	-17.178	-18.739	-113.425**	-203.151**	-65.695	-26.598	-67.557	26.947
	(-3.29)	(-2.39)	(-2.27)	(-1.91)	(-1.52)	(-1.26)	(-2.37)	(-2.30)	(-1.19)	(-0.56)	(-0.94)	(0.38)
N	303	159	144	224	126	98	94	40	54	68	35	33
Adj. R^2	0.149	0.145	0.116	0.109	0.07	0.091	0.249	0.322	0.133	0.114	0.028	0.013
F value	6.033***	3.068***	2.968***	3.193***	1.516	1.658	2.614**	1.445	1.311	2.047***	0.835	1.309

Table 16. (continued) [25]

Panel B. The Corporate Responsibility Index and the Environmental Index

	The Corporate Responsibility Index						**The Environmental Index**					
	Non-SRI			***SRI***			***Non-SRI***			***SRI***		
Variables	overall	2006	2007	overall	2006	2007	overall	2006	2007	overall	2006	2007
CSR	3.529	6.364	9.435	18.473**	18.039*	28.432	1.14	-3.329	16.039	6.233	3.838	19.316
	(0.43)	(0.72)	(0.44)	(2.13)	(1.78)	(0.92)	(0.16)	(-0.38)	(1.04)	(1.08)	(0.59)	(1.17)
DY	0.095	0.369	-0.293	1.157**	1.025	1.512**	1.939***	2.016**	1.732*	2.085***	2.197***	1.967**
	(0.21)	(0.60)	(-0.47)	(2.56)	(1.55)	(2.13)	(3.19)	(2.31)	(1.96)	(3.88)	(2.89)	(2.45)
Beta	2.680***	2.392**	3.788**	0.488	1.149	-0.397	0.934	0.822	1.484	0.733	1.102	0.248
	(2.88)	(2.07)	(2.38)	(0.45)	(0.95)	(-0.16)	(0.84)	(0.56)	(0.78)	(0.60)	(0.73)	(0.10)
ROE	3.788*	3.102	13.053**	3.801	3.064	8.598	0.37	-0.337	3.322	-0.229	-1.166	1.714
	(1.73)	(1.25)	(2.23)	(1.21)	(0.91)	(0.67)	(0.22)	(-0.20)	(0.81)	(-0.13)	(-0.66)	(0.30)
Debt level	8.589**	0.044	18.736***	0.204	-1.113	-1.035	2.932	1.334	6.295	-3.537	-1.276	-8.31
	(1.99)	(0.01)	(3.14)	(0.04)	(-0.21)	(-0.11)	(0.82)	(0.31)	(0.98)	(-1.14)	(-0.35)	(-1.23)
BV/MV	-5.277**	-4.372*	-1.88	-4.323*	-2.129	-6.353	-3.511*	-3.095	-4.026	-2.197	-0.347	-6.184
	(-2.54)	(-1.81)	(-0.44)	(-1.89)	(-0.74)	(-1.12)	(-1.83)	(-1.39)	(-1.01)	(-1.07)	(-0.14)	(-1.55)
Size	3.548***	2.774***	4.034***	0.311	0.055	0.454	4.164***	4.426***	3.685***	2.476***	2.660**	2.061*
	(5.47)	(3.81)	(3.45)	(0.69)	(0.11)	(0.53)	(5.15)	(3.33)	(3.53)	(3.32)	(2.26)	(1.99)
_cons	-68.576**	-67.462*	-109.817	-83.794**	-78.354*	-131.621	-68.791***	-52.685*	-129.126**	-64.218***	-58.138**	-112.949*
	(-2.05)	(-1.82)	(-1.29)	(-2.29)	(-1.87)	(-0.94)	(-2.68)	(-1.81)	(-2.19)	(-2.98)	(-2.31)	(-1.78)
N	106	59	47	99	57	42	160	82	78	151	80	71
Adj. R^2	0.427	0.348	0.502	0.158	0.109	0.119	0.347	0.299	0.36	0.212	0.163	0.214
F value	11.585***	5.784***	7.967***	3.278***	1.882*	2.455**	8.785***	3.571***	5.693***	5.000***	2.158**	3.014***

Notes: The table includes the results of the Ordinary Least Squares (OLS) regression. It reports the estimates of regressions of institutional holdings on CSR reputations with the control variables and also estimates of the separate annual regressions. Each panel presents the results of regressions for the four measures of CSR reputation: Fortune's WMAC environmental reputation and the Accountability Ratings in Panel A, and the corporate responsibility index ratings and environmental index ratings in panel B. The number of observations in each panel is not identical, because of the variability of scope of the holdings portfolio across the reputation instruments. The dividend yield is the ratio of dividend per share to market price at year end (Worldscope item 09404). The risk is measured by the market model beta. For the return on equity (ROE) Worldscope item 08301 in DataStream is used. The debt level is the total debt divided by the total assets (Worldscope item 08236). The variables, ROE and debt level, are not used as a percentage of the figures extracted from DataStream, so as to minimize the impact of extreme values. The book to market value is the common equity of a company divided by the market value of common equity (i.e. inverse value of Worldscope item 03501 in DataStream). The size is the logarithm of the market capitalization (Worldscope item 08001).T-statistics (in Parentheses) are estimated using White's (1980) standard error as calculated during the regression. The symbols *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

[25] The regression was rerun using a year dummy variable rather than subsample year for the period 2006 and 2007, but the outcomes show the same results as table 16 and that a year variable in each panel is not significant.

The results in table 16, in general, show that the level of CSR ratings has a different impact on the ownership holdings decisions when non-SRI and SRI funds are compared. In particular, it emerges that institutional investors are more interested in the CSR measured by the Accountability Rating and the Corporate Responsibility Index than that of the other two reputation scales, thus indicating that multidimensional CSR measures are more attractive to investors than a narrower one. For example, the results indicate that the institutional investors involved in non-SRI prefer companies with a higher level of the Accountability Rating than other CSR ratings and those associated with SRI tend towards investing in companies with higher scores on both the CR Index and the Accountability Rating. It should be noted that, as mentioned above, the CSR reputations selected can be put into two different categories: global (i.e. Fortune's WMAC and Accountability Rating) verses the UK based measures of reputation (i.e. the Corporate Responsibility Index and the Environmental Index). Therefore, to investigate whether the scope of the CSR reputation is associated with the investment universe, the same regression methods are performed separately according to the: UK and global investment universes.

Although the fund holder portfolios used in the first regression included Asian and European investments, when the four universes are separated, the data for these two is insufficient to provide meaningful results through OLS estimation and hence, have been dropped from the analysis. Table 17 presents the results of the ownership holdings decision on the level of CSR for the two investment universes: global and UK and they seem to indicate that there is no consistent evidence that institutional investors have a particular preference with regards to this aspect. For example, the CSR measured by the Accountability Rating is statistically significant at the 10% level in the UK for non-SRI funds. Further, weak evidence can be found of the same result for Fortune's WMAC, i.e. it is negatively significant at the 10% level in the global universe for non-SRI funds. The CSR measured by the CR Index is significantly greater than at the 5% level in the UK investment universe of SRI funds, whilst the other measure of CSR, namely EI, is insignificant for both fund types.

Table 17. Results of regression analyses for the investment universe

Variables / Region	Fortune's WMAC				The Accountability Rating				The Corporate Responsibility Index				The Environmental Index			
	Non-SRI		*SRI*		*Non-SRI*		*SRI*		*Non-SRI*		*SRI*		*Non-SRI*		*SRI*	
	Global	UK	Global	UK	Global	UK	Global	UK	Global	UK	Global	UK	Global	UK	Global	UK
CSR	-1.058*	2.943	-1.258	1.533	2.917	72.381*	1.079	-22.383	26.984	-2.808	17.549	26.413**	7.111	-3.048	33.024	1.757
	(-1.85)	(1.14)	(-1.37)	(0.86)	(0.99)	(2.40)	(1.50)	(-1.71)	(1.24)	(-0.34)	(0.46)	(2.22)	(0.32)	(-0.58)	(1.70)	(0.27)
DY	1.202*	2.465	0.623	5.048***	1.627	6.216	-0.055	-6.206	2.869	0.015	2.368	0.739	6.192***	0.651	7.871*	1.301**
	(1.92)	(1.55)	(1.30)	(3.54)	(1.28)	(0.58)	(-0.22)	(-0.92)	(1.73)	(0.04)	(0.87)	(1.63)	(3.96)	(1.49)	(2.07)	(2.45)
Beta	-0.186	3.915	-0.069	5.906**	0.909	16.813	1.871***	-29.453**	9.853**	1.911**	7.334	0.715	1.447	1.512	-1.427	0.506
	(-0.41)	(1.06)	(-0.10)	(2.51)	(0.75)	(0.82)	(3.10)	(-2.64)	(2.67)	(2.19)	(1.25)	(0.55)	(0.64)	(1.47)	(-0.53)	(0.41)
ROE	4.250*	5.663	0.892	5.204	-5.277	168.455	2.84	-279.957*	-25.412	3.265	-12.623	3.266	-3.485	2.477	-21.25	-1.935
	(1.81)	(0.23)	(0.43)	(0.39)	(-0.43)	(1.00)	(0.88)	(-2.42)	(-1.27)	(1.59)	(-0.49)	(0.78)	(-1.12)	(1.24)	(-0.63)	(-1.40)
Debt level	-3.992	-43.904*	-2.361	10.199	-6.348	-12.285	0.382	-80.287	22.143	2.276	32.335	-6.669	12.215	-0.174	23.542	-7.471**
	(-1.56)	(-1.91)	(-1.39)	(0.66)	(-1.22)	(-0.18)	(0.16)	(-1.44)	(1.48)	(0.69)	(1.80)	(-1.32)	(0.69)	(-0.06)	(1.10)	(-2.45)
BV/MV	-0.545	-28.921*	-0.672	2.952	2.847	-97.58	-0.429	112.518	-49.987***	-5.328***	-35.879*	-5.175**	-12.919	-6.401***	-20.893	-4.304**
	(-0.40)	(-1.78)	(-0.55)	(0.20)	(0.77)	(-1.19)	(-0.39)	(1.67)	(-3.64)	(-2.79)	(-2.22)	(-2.16)	(-0.95)	(-3.48)	(-1.21)	(-2.02)
Size	1.658***	10.835***	1.247***	2.342	2.961*	7.153	-0.164	-5.943	5.107**	4.611***	-0.678	0.689	2.328	5.987***	-0.087	3.890***
	(3.65)	(3.87)	(3.10)	(1.24)	(2.00)	(0.50)	(-0.37)	(-1.20)	(2.17)	(6.69)	(-0.36)	(0.94)	(1.03)	(6.75)	(-0.09)	(4.03)
_cons	-20.685***	-177.652***	-11.614***	-64.708*	-63.887*	-407.992	-0.007	298.067**	-194.486*	-53.105	-59.914	-121.337**	-74.462	-72.933***	-147.336	-60.849***
	(-2.84)	(-3.83)	(-2.80)	(-1.85)	(-1.85)	(-1.22)	(-0.00)	(2.69)	(-1.79)	(-1.64)	(-0.35)	(-2.55)	(-0.97)	(-3.68)	(-1.53)	(-2.70)
N	234	39	126	53	70	11	37	13	22	80	16	74	38	118	22	116
Adj. R^2	0.123	0.453	0.089	0.198	0.061	0.753	0.095	0.582	0.398	0.618	0.095	0.179	0.252	0.574	0.228	0.326
F value	6.67***	6.886***	4.21***	2.847**	3.179***	10.239**	3.319**	7.333**	5.147***	14.025***	2.918*	2.632**	7.183***	13.719***	0.738	5.732***

Notes: The table reports the estimates of the regressions of institutional holdings on CSR reputation, with control variables by the investment universe for the four different measures of CSR reputation: Fortune's WMAC environmental reputation, the Accountability Rating, the Corporate Responsibility Index and the Environmental Index. The dividend yield is the ratio of dividend per share to market price at year end (Worldscope item 09404). The risk is measured by the market model beta. For the return on equity (ROE) Worldscope item 08301 in DataStream is used. The debt level is the total debt divided by the total assets (Worldscope item 08236). The variables ROE and debt level, which are obtained from DataStream, are not used as a percentage of the figures so as to minimize the impact of extreme values. The book value to market value is the common equity of a company divided by the market value of common equity (i.e. inverse value of Worldscope item 03501 in DataStream). The size is the logarithm of the market capitalization (Worldscope item 08001). T-statistics (in parentheses) are estimated using White's (1980) standard error as calculated during the regression. Sample size varies in each panel because of the different CSR ratings employed and each model has been checked for outliers. The symbols *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

Table 17-1. Results of regression analyses for the investment universes when substituted as a dummy variable

	Fortune's WMAC		The Accountability Rating		The Corporate Responsibility Rating		The Environmental Rating	
Variables	***Non-SRI***	***SRI***	***Non-SRI***	***SRI***	***Non-SRI***	***SRI***	***Non-SRI***	***SRI***
CSR	-0.272	-1.07	9.963**	-1.238	3.403	24.571**	-1.88	3.795
	(-0.37)	(-1.46)	(2.33)	(-0.45)	(0.44)	(2.32)	(-0.27)	(0.66)
DY	1.448**	1.607***	1.407	1.779*	0.108	0.786*	1.805***	1.639***
	(2.50)	(2.85)	(1.13)	(1.81)	(0.24)	(1.81)	(2.88)	(3.05)
Beta	-0.659	0.353	-1.244	0.185	2.658***	0.863	1.418	0.87
	(-1.05)	(0.48)	(-0.59)	(0.11)	(2.88)	(0.74)	(1.36)	(0.74)
ROE	9.423**	-0.011	-2.086	-17.99	2.44	2.025	0.301	-2.156
	(2.19)	(-0.00)	(-0.13)	(-1.32)	(1.22)	(0.49)	(0.26)	(-1.61)
Debt level	-7.892**	-3.922	-7.743	6.263	4.456	-1.201	-0.295	-4.735
	(-2.33)	(-1.38)	(-0.92)	(0.93)	(1.03)	(-0.24)	(-0.08)	(-1.52)
BV/MV	-0.45	0.012	5.069	0.035	-7.077***	-5.543**	-5.710***	-3.473*
	(-0.21)	(0.01)	(0.93)	(0.01)	(-3.37)	(-2.41)	(-2.89)	(-1.73)
Size	2.845***	1.515**	4.966***	-2.353	4.277***	0.534	5.381***	3.304***
	(4.06)	(2.51)	(2.70)	(-1.28)	(7.09)	(0.80)	(6.49)	(3.89)
Invest- universe	14.694***	6.451***	30.157***	23.191***	4.623**	0.891	7.440***	4.694
	(4.46)	(3.58)	(3.74)	(5.01)	(2.1)	(0.31)	(2.84)	(1.61)
_cons	-46.635***	-19.845*	-124.609***	46.824	-80.870**	-112.861**	-78.875***	-67.667***
	(-3.51)	(-1.92)	(-3.01)	(1.24)	(-2.55)	(-2.55)	(-3.13)	(-3.34)
N	273	179	81	50	102	90	156	138
Adj. R^2	0.32	0.234	0.508	0.584	0.5	0.132	0.417	0.264
F value	7.479***	3.937***	5.347***	9.965***	13.092***	2.712**	10.613***	5.292***

The weak evidence from table 17 might be because the sample size of the CSR rating group is small for each subgroup (i.e. Global and UK). Thus, further analysis was conducted using a dummy variable, defined 0 for Global and 1 for the UK and the results are presented in table 17-1. It can be seen that the results are similar to those in table 17, although the investment universe dummy variable is significant at the 5% level or better, except for the corporate responsibility rating and the environmental rating in the SRI cases. That is, the evidence also indicates that non-SRI fund managers are not particularly concerned with the CSR ratings regarding their investment universe. Overall, the results from tables 16, 17 and 17-1 would appear to demonstrate that there is weak evidence of a relationship between institutional ownership holdings by SRI funds and the level of CSR.

6.4. Discussion

In the investigation into whether or not information concerning CSR ratings is appreciated by fund managers, either for sustainability or financial reasons, the results suggest that there is weak evidence that this is the case for both SRI and non-SRI fund holders. Considering these findings, one clear explanation for this relates to the lack of a standard procedure for assessing SRI (Sandberg et al., 2009), as discussed above. Moreover, according to previous studies (e.g. Shane and Spicer, 1983; Spicer, 1978, see Appendix I for more details), improving the level of CSR can reduce the investment risk and increase financial performance. Therefore, from the view of the rational investor, institutional investors involved in non-SRI may well have a preference towards companies with higher CSR as long as expected returns are met. This would explain why some companies are in the portfolios of both SRI and non-SRI funds and hence, why previous studies have provided only weak evidence of any difference in performance (Kreander et al., 2005) or stock-picking ability (Benson et al., 2006) between SRI funds and their counterparts. Moreover, it has not yet emerged that institutional investors who manage SRI funds prefer to take CSR representative measures into account more when investment decision-making than their counterparts.

Further, the results for the weak relationship might relate to the use of percentage-of-shares holdings for the institutional investors (Graves and Waddock, 1994). With regards to this, Graves and Waddock (1994) and Mahoney and Robert (2007), using the KLD measures of CSR for a sample of US firms, showed that there is no significant relation between the percentage of ownership holdings by institutional investors and CSR and yet at the same time eliciting that there is a significant relationship between the number of institutions and CSR. Graves and Waddock (1994) explained this contrast in these findings as being because decision-making regarding the percentage-of-shares holdings may be more complicated than simply a binary one (i.e. buy or not buy), owing to other factors (e.g. regulations, financial performance, or customer preference) needing to be considered. In addition, a number of researchers have identified a range of different motivations for SRI preference among individual investors on the customer side apart from the desire for a reasonable return for their investments (Lewis, 2001; Lewis and Webley, 1994; Mackenzie and Lewis, 1999). Hence, SRI fund managers have to consider the covariance in returns between firms as well as a firm's financial health, if two firms have similar levels of CSR, if they are to satisfy their customers.

The findings from this analysis also most likely indicate that there is the co-existence of value-driven and profit-seeking investors in the SRI market, as claimed in a study by Derwall et al. (2011). That is, the former are willing to trade-off financial return for non-pecuniary utility and use a negative screening approach to avoid sin industries, whereas the latter pursue a stronger financial motive using a positive screening (i.e. best-in-class) approach. However, because the results indicate that this type of fund manager is not sensitive to CSR ratings, this suggests that this market is dominated by profit-seeking investors and hence, the decisions of the minority of value-driven ones are unable to affect the share price (Derwall et al., 2011; Heinkel et al., 2001). Regarding this, in a theoretical paper, Heinkel et al. (2001) argued that at least 10% of the financial market being represented by value-driven investors is required for CSR ratings to have an impact on share price. Moreover, the lack of a distinction regarding the ratings between SRI and non-SRI funds is consistent with findings reported in chapter 2, where some scholars could not provide robust evidence of there being a significant difference in performance between SRI and non-SRI funds (e.g. Kreander et al., 2005; Mallin et al., 1995). Further, the data analysis of the mean difference portfolio holding ownerships between the two types of funds also reveals

that there is no significant difference between them. It should be noted that given the nature of this particular investigation it was not possible to distinguish value-driven from profit-seeking SRI fund holders and hence, no conclusions can be drawn regarding the value relevance of ratings information to the former type.

In addition, if the CSR is related to risk, as suggested in some studies (Boutin-Dufresne and Savaria, 2004; Derwall et al., 2005; Heinkel et al., 2001; Lee and Faff, 2009; Manescu, 2011), including this one, then managers of non-SRI funds will choose to spread their portfolio ownership holdings to include SRI industries with high levels of CSR ratings so as to reduce the investment risk. Indeed, the data in this study indicated that companies are often owned by both funds and this fund mixing provides further explanation for why no distinction was found between the types of funds as well as why the reaction to the CSR ratings proved to be insignificant. Further, following the line of comparison of the investment strategies of non-SRI and SRI fund holders, some scholars (e.g. Renneboog et al, 2008; Rudd, 1981) have claimed that the latter may be less adequately diversified than their counterparts, because of the integration of ESG criteria in the investment process. However, Bello (2005) has argued against this assertion, empirically showing that SRI funds do not suffer the disadvantage of greater restrictions imposed by ESG criteria, in terms of the degree of portfolio diversification or investment performance, when compared to non-SRI ones. Regarding this matter, it has yet to emerge conclusively whether a diversification strategy in SRI may affect ownership holdings decisions when fund managers are taking into account the level of CSR ratings. However, since it has been elicited by some scholars that the higher the CSR ratings the lower the investment risk (e.g. Boutin-Dufresne and Savaria, 2004; Lee and Faff, 2009), it might be the case that non-SRI fund managers will more broadly diversify their investment universe than SRI ones. Regarding this, table 15 shows that there is a significant relationship between ownership holdings and CSR rating in non-SRI and this is a little higher than those for SRI, although the correlation analysis between the two for the latter is less than 50% (i.e. not perfectly diversified). On the other hand, since SRI fund managers' investment decision conditions are imposed by ESG criteria, they may be less volatile to the level of CSR ratings regarding their ownership holding decision. Overall, following this last line of reasoning, it is concluded that the findings provide no strong evidence of there being an impact on the investment decision by the level of CSR ratings.

6.5 Chapter summary

In this chapter the results have been reported of an investigation into how CSR ratings affect institutional ownership holdings decisions by SRI and non-SRI funds. These ratings were measured by using the following data: the Fortune's WMAC environmental reputation, the Accountability Rating, the Corporate Responsibility Index, and the Environmental Index, for the years 2006 and 2007. Further, results have been presented regarding whether institutional investors involved in SRI or non-SRI funds are influenced by the different investment universe of the CSR in relation to their ownership holding decisions.

The sixth tested hypothesis aimed at establishing whether institutional investors involved in SRI funds have a greater preference towards companies with higher levels of CSR than those engaging in non-SRI ones. The correlation table 15 shows a strong relationship between the ownership holdings decision and the level of CSR, except in the case of Fortune's WMAC environmental reputation. However, the regression results in tables 16 and 17 are inconsistent with these correlation findings, in that in most cases only weak evidence of the level of CSR on this decision emerged. Further, the different CSR measures only revealed a weak relationship between the ownership holdings decision by SRI and non-SRI funds and the investment universe. In general, the results have shown that the institution ownership holdings decision relating to SRI funds is associated with higher levels of CSR, as measured by the CR Index and further, that both SRI and non-SRI fund managers are also attracted to higher levels according to the Accountability Rating, a multi-dimensional CSR type.

In sum, the evidence in this chapter has shown that the results weakly support for the sixth hypothesis. Consequently, it can be concluded that it is beneficial to a company, in terms of its attractiveness to institutional investors, for both SRI and non-SRI fund managers, to pursue higher levels of CSR rating.

CHAPTER 7

Chapter 7. Discussion

7.1 Introduction

This chapter has two main aims as follows:

- To summarize the empirical findings in chapters 4 to 6, thus fleshing out the overall picture that has emerged within the prescribed thesis boundaries;
- To discuss the findings from the empirical studies.

To begin with, in section 7.2, by focusing on the outcomes of the hypotheses put forward in each empirical chapter, a general picture of the focal issues in this research endeavour is elicited. Following this, section 7.3 concentrates on the outcomes in relation to market incorporation of corporate environmental performance information and section 7.4 contains the chapter summary.

7.2 Summary of the empirical findings

At the outset of this thesis it was contended that there is still limited knowledge regarding the influence of environmental performance on stock market performance, in particular, because of the lack of a robust conceptual framework distinguishing the quality of corporate environmental/CSR reporting from other representations of performance, such as reputation and SRI index membership. Moreover, this lack of a framework means there is little understanding of the relation, if any, between investors' decision making and environmental performance. Further, when applying such a framework a comprehensive set of measures to establish the nature of any relations between these variables is essential, but to date this has been missing. That is, despite the substantial body of research into the relationship between CSR/environmental performance and firm performance, financial performance and equity performance, up until now little is known about investors' decision making regarding environmental performance. This thesis has had the aim of shedding light on these deficiencies. Next, the outcomes relating to the hypotheses put forward in chapters 4 to 6 are summarized, with the first hypothesis to be addressed being:

Hypothesis 1: The informativeness of accounting earnings as an explanatory variable for returns is systematically related to a firm's environmental reputation, its environmental disclosures, and/or its physical performance.

The results from chapter 4 have indicated that the level of environmental reputation does not monotonically increase with the level of accounting earnings, whereas the other proxies, environmental disclosure (DJSI) and physical (i.e. pollution) performance (revenue/GHG emissions) have been found do so in the case of DJSI listing. Further, the evidence appears to show that extensive environmental disclosures (DJSI) lead to a higher correlation between earnings and returns, but it is not the case for the other variables. This evidence at the global level does not support the findings of a previous US study conducted by Belkaoui (2004), who elicited that the level of the environmental reputation is systematically and significantly related to the level of earnings as well as the level of the returns, but he did not use multiple measures of environmental performance. In sum, the finding here is that the first hypothesis does not hold for all the proxies of environmental performance.

Hypothesis 2: there is a positive association between company market value and corporate environmental reputation, environmental disclosures and/or physical performance.

Environmental reputation and physical performance were found to be negatively and significantly related to stock returns, inconsistent with the earlier studies which found a positive relationship between them (e.g. Freedman and Patten, 2004; Freedman and Stagliano, 1991; Klassen and McLaughlin, 1996; Herrmans et al., 1993; Orlitzky et al., 2003), but in line with Brammer et al. (2006). Further, the results regarding different industry are somewhat counterintuitive, in that firms with high levels CSR have low stock performance, also consistent with Brammer et al. (2006). However, the environmental disclosure emerged to be positively, but insignificantly, related to stock returns for the OLS method, thus suggesting that investors do not seem to give more credit to companies that have extensive environmental disclosure than to their counterparts, which is in contrast with the findings in several works on CSR disclosures (e.g. Al-Tuwaijri et al., 2004; Belkaoui, 1797; Ingram, 1979; Toms, 2002).

Hypothesis 3: *representational non-financial information (i.e. corporate environmental reputation, environmental disclosures, or/and physical performance) is relevant to firm value.*

In contrast to the two previous outcomes, environmental reputation, physical environmental performance and environmental disclosures (GRI Guidelines) emerged as being highly value relevant to investors. That is, it has been revealed that investors do rely on non-financial information when making investment decisions, which is consistent with several previous studies on value relevance (Black et al., 2000; Cormier et al., 1993; King and Lenox, 2002; Hughes II, 2000; Smith et al., 2010). In addition, the three variables, earnings, book value, and industry effects, were also found to be positively associated with firm value.

Hypothesis 4a (4b): Announcements of firms being included in (deleted from) an SRI index are associated with their experiencing significant and positive (negative) share price changes.

The findings have provided asymmetrical evidence regarding whether event announcements in relation to DJSI and FTSE4Good index status have a significant impact on stock returns. That is, companies subject to inclusion in (exclusion from) the DJSI experience a significant (insignificant) but temporary decrease in stock return on the announcement day. Subsequent to this it emerged that there is a temporary increase following positive news, but there is no effect for negative news. By contrast, companies being added to (removed from) the FTSE4Good index in the March announcement results in a temporary decrease in stock return, but only the inclusion effects are significant and further, the findings show that there is a increase in stock return on the day after exclusions, thus indicating that companies are not penalized for being deleted from this particular index. Further, in contrast to the outcomes for March announcements, those for September show logically expected MARs behaviours for both good news (i.e. inclusion in the index) and bad news (i.e. exclusion from the index), but these effects are only temporary. Hence, in general, the evidence from the results does not strongly support the fourth hypothesis.

Hypothesis 5: Membership of an SRI index is relevant information in that it has an impact on the market value of firms

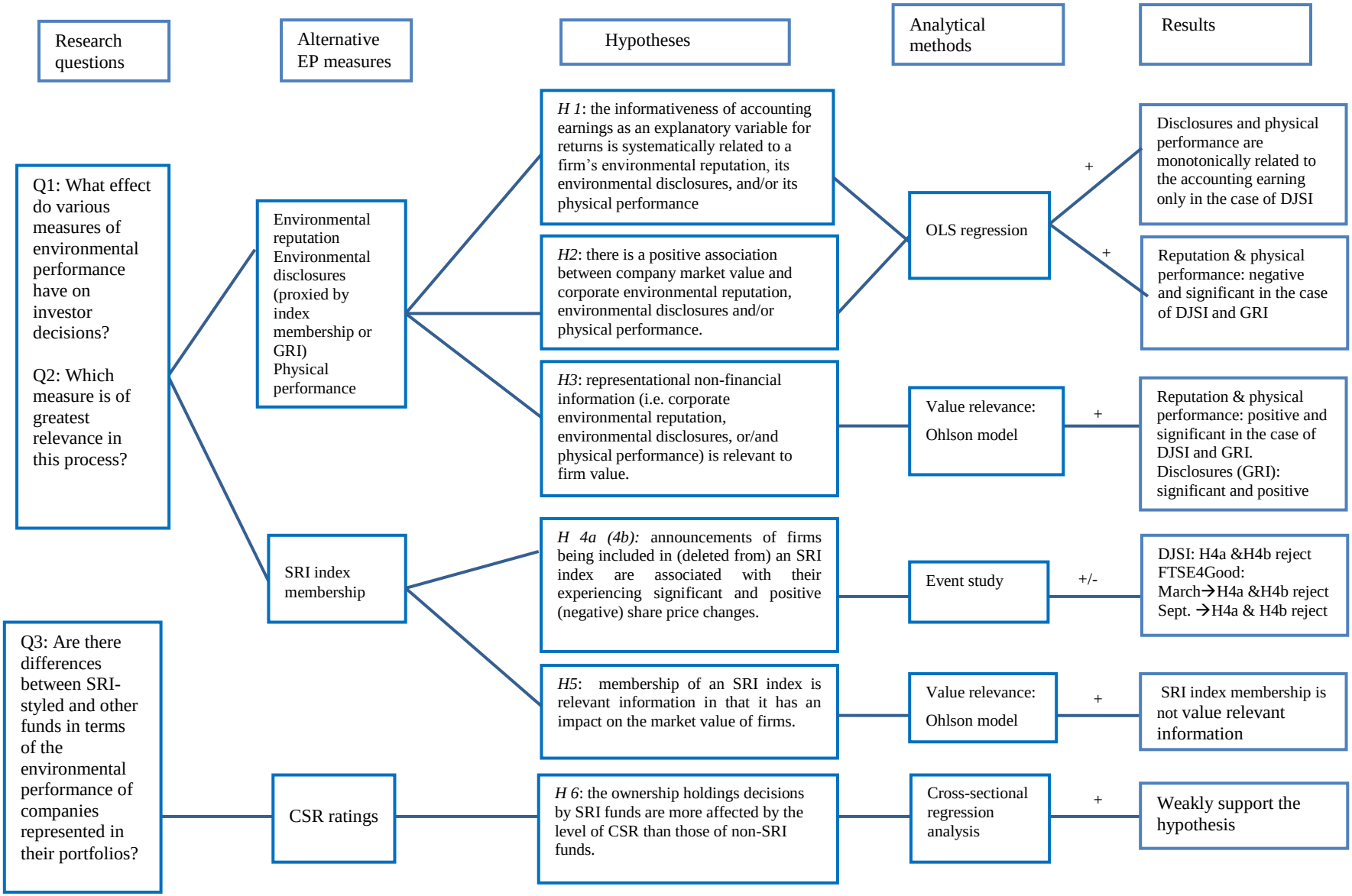
It was elicited that membership of SRI index has no value relevance for both the DJSI and FTSE4Good index, which concurs with the revelations in some studies (Curran and Moran, 2007; Moneva and Ortas, 2008), although some weak significant evidence was found in the relationship between DJSI status and firm value when it came to the yearly subsamples.

Hypothesis 6: the ownership holdings decisions by SRI funds are more affected by the level of CSR than those of non-SRI funds.

Regarding this hypothesis, the findings indicate that the level of CSR has a weak influence on the ownership holdings decisions taken by SRI fund managers and further, they show that, on aggregate, they prefer to take into account multidimensional CSR measurements when making investment choices.

Figure 13 shows an overall view of the research design, which outlines the: main research questions, key issues, hypotheses, analytical methods and the results. In the following three sections the research questions and propositions pertaining to the findings for each empirical study are addressed in some detail.

Figure 13. Overview of research design



7.3 Do market securities incorporate the value of corporate environmental performance?

Financial markets have been increasingly responding to corporate environmental performance, as one of the ESG factors. Nevertheless, this aspect and its impact on stock markets remains the subject of ongoing debate in academic studies, because the effect of CSR policies on traditional economic theory in relation to returns on investment remains unresolved. In particular, previous studies have provided inconclusive evidence regarding the relationship between environmental performance and firm performance, although the results of these studies would appear to indicate that the relationship between the two is positive. If so, this would open up new horizons for financial decision-makers, because information on corporate environmental performance could be incorporated into their investment options as a means of increasing shareholder value. However, even if it is value relevant to financial decision-makers and incorporated into the market, it may be the case that when balancing returns and risk in the market, possession of environmental performance information does not lead to higher shareholder value.

The evidence from the results in this study suggest that corporate environmental reputation and physical performance are value relevant (i.e. investors positively expect future cash flows from them) and further, they shows that they are negatively significantly related to returns. That is, companies with high environmental performance experience lower returns than those with low performance. In this respect, recently some scholars have attempted to find plausible explanation for this link between the two by considering firm risk (Boutin-Dufresne and Savaria, 2004; Derwall et al., 2005; Heinkel et al., 2001; Lee and Faff, 2009; Manescu, 2011). More specifically, whereas some earlier research activities probed indirectly the implication of firm-specific risk on CSR (Herremans et al., 1993; McGuire et al., 1988; Spicer, 1978 and 1978a), these more recent ones have focused on explicitly eliciting the relationship between environmental performance and firm risk, in terms of systematic risk and/or idiosyncratic risk in order to understand better the firm performance implications of CSR and they elicited that high returns for low level CSR companies reflects high idiosyncratic risk and vice versa. Furthermore, in Lee and Faff's (2009) work a positive relationship was found between firm-specific risk and stock returns and thus these authors concluded that leading CSR firms by their nature are reducing risk and hence, lowering the cost of equity.

As a slightly different view of the market's incorporation of ESG factors, Edmans (2011) asserted that the market may not incorporate these factors fully into stock valuation, but rather they will affect stock price when they are incorporated into tangible outcomes (e.g. earnings announcements) and empirically showed that the stock market does not fully value employee satisfaction, even though it is highly related to the shareholder returns. This line of argument has been supported by Manescu (2011), who found that certain ESG factors, as measured by the KLD, are not efficiently incorporated into stock price. Further, Edmans contended that even though investors are aware of a firm's CSR performance they may be unaware of the benefits of CSR, because the extant theory provides ambiguous predictions on its worth. The findings from the membership of SRI indices in this research could provide support for these perspectives. That is, financial decision-makers are probably aware of the SRI index and the announcements of their constitutions changing, but the findings from chapters 4 and 5 suggest that investors do not see these as value relevant and hence, do not appreciate company efforts to maintain up to date environmental performance reporting. Moreover, although investors do not appear to value the badge of index membership in this study, this cannot be entirely discounted as other studies have revealed the opposite result. In sum, it is too early to conclude whether the market is insensitive to SRI index membership, as clearly further investigation needs to be conducted on this matter.

Overall, there is robust evidence as to whether the securities markets incorporate corporate environmental performance into share price. However, there is some indication from the results of this study in relation to two of the three measures of environmental performance information employed (i.e. the corporate environmental reputation and physical performance). In addition, in chapter 1 it was the issue of whether there is a link between environmental reputation and actual environmental performance was raised and what was its direction. The evidence from the results in table 6 indicates that environmental reputation is negatively significantly related to physical performance until industry effects are included. That is, without industry effects companies with higher environmental reputation have lower physical performance, regardless of whether this refers to the DJSI or use of the GRI Guidelines. Further, the significant positive link between environmental reputation and its disclosure for the cases of the DJSI and the GRI fades way when other control variables are included. Moreover, the results indicate that physical

performance is significantly positively correlated with environmental disclosure for both the DJSI membership and the GRI Guidelines usage. These outcomes are not consistent with the findings of Cho et al. (2012), who elicited that voluntary environmental disclosure mitigates the effects of poor corporate environmental performance on environmental reputation, but rather suggest that these factors have varying impacts depending on the industry concerned.

7.4 Chapter summary

The purpose of this chapter has been to set the background to the conclusions presented in chapter 8 as well as shaping the proposals for future policies and practices. More specifically, after a summary of the empirical findings from chapter 4, 5, and 6, which also contained the hypothesis outcomes, there was a detailed discussion on these.

CHAPTER 8

Chapter 8. Conclusion

8.1 Introduction

This chapter pulls together the main findings and contributions of the thesis. More specifically, the research avenues identified in the literature review, chapter 2, are linked with the conceptual development in chapter 3 and the subsequent empirical research presented in chapters 4, 5, and 6. To start with, there is a summary of the findings based on the propositions developed in chapter 3 and this is followed by consideration of the implications for policy makers and practitioners. In addition, the limitations of the research are discussed and subsequently, there suggestions put forward for future potentially fruitful research avenues.

8.2 Summary of findings

The literature review in chapter 2 and the conceptual framework devised in chapter 3 helped to shape this enquiry into the nature of the influence of environmental performance on stock market performance and the effect of corporate environmental performance on investors' decision making. It was reported that prior studies have presented mixed results covering all the possible outcomes regarding the relationship between corporate environmental performance and stock market performance, that is, positive (e.g. Belkaoui, 2004; Freedman and Patten, 2004), neutral (e.g. Lorraine et al., 2004; Murray et al., 2006), and negative (e.g. Brammer et al., 2006). Further, regarding conceptual development, scholars have faced difficulty in constructing robust models, in particular, because of the lack of consensus on how ethical/sustainable preferences modify conventional economic rationale and the lack of standardised measures of non-financial performance aspects of business activity (Ullman, 1985). In spite of this, it is generally accepted amongst researchers that there exists a relationship between environmental performance and stock market performance (e.g. Orlitzky et al., 2003), but its sign is still disputed in the empirical outcomes. Investigation into this relation is particularly crucial for profit-seeking investors, because if it is irrefutably found that corporate environmental performance is value relevant to investors, then having access to high quality disclosure would increase their utility. However, it is hard to establish which information is value relevant to investment decision making, because

corporate environmental performance is difficult to measure owing to its complexity and the lack of financial equivalence for non-financial performance. Moreover, as discussed in chapter 2, a standardised measure of this performance remains elusive and the various proxy measures used by scholars have been insufficient, which perhaps explains the variance in the outcomes (see Appendix I for examples). However, investors are heterogeneous and so they are expected to value the available information differently. In this respect, the evidence from the results in chapter 4 suggests that environmental reputation and physical environment performance are highly relevant information sources for investors in their decision making process. That is, they (i.e. profit-seeking investors) believe that such information has value relevance as it can affect expected future earnings and also stock market returns, leading to utility maximization. Regarding this, whilst some of the outcomes of this research on stock market performance have concurred with this perspective, others have not. More specifically, investors with holdings in firms with high levels of CSR (i.e. environmental reputation and physical performance) appear to experience low stock market returns, although such firms may generate high firm value, when compared with their counterparts. However, the outcomes for value relevance are consistent with what was expected.

Moreover, in the capital market, financial reports and disclosures are premier sources of a company's performance information and it can use the latter performance information, including environmental performance to minimize information asymmetry between it and outside investors, thereby increasing market value (Healy et al., 1999; Healy and Palepu, 2001). Therefore, managers have the responsibility of deciding whether to report and if so, what content to disclose. Further, as there are no commonly accepted guidelines for reporting, corporate managers often disclose their environmental performance according to a variety of voluntarily adopted procedures, including, set guidance on formats, (e.g. DEFRA and the GRI guidelines), environment management systems (e.g. International Organization for Standardization (ISO) 14001), and/or they can apply to join an SRI index, which requires achieving certain standards on ESG issues and economic performance. Being proactive towards these goals, implies that a company manager believes that environmental performance disclosure is value relevant information. However, because of the voluntary basis of these procedures, each manager chooses which form to employ depending on their strategic positions. In this respect, the results

in chapter 4 suggest that the GRI Guidelines are value relevant to investment decisions even though they are not incorporated into share prices. However, the evidence from chapters 4 and 5 indicates that membership of an SRI index (e.g. the DJSI or the FTSE4Good index), as one of the possible corporate environmental performance measures that could influence investors' decision making, has no value relevance. In other words, it would appear that index membership information does not capture information that helps to determine firm value (Francis and Schipper, 1999) and hence, is of little use to investors when making investment decisions. These results are inconsistent with those of Al-Najjar and Anfimiadou (2011), who found the converse, i.e. membership does lead to an increase in the market value of a firm. Further, the event study carried out in chapter 5, which involved testing market reaction to the announcement of SRI index membership or exclusion, did not provide strong evidence of any impact. In sum, the research findings here do not strongly corroborate the view that the badge of index membership affects investors' decision making.

In addition, with the strengthening link between social and environmental issues and the investment process, an SRI approach incorporating both financial and social value is increasingly being adopted by investors, including individuals and institutions (e.g. NGOs or institutional investors), with the latter providing the lead in the SRI market (Louche, 2009; Sparkers and Cowton, 2004). Various forms of SRI initiatives has been promulgated by some in the investor community as potentially offering a more straightforward means of understanding and incorporating ESG issues into investment decision making. Regarding this, Waddock (2008) has noted that such initiatives have grown in number owing to there being no standardized normative framework for SRI investors, regarding ESG issues, so as to keep up with changing public expectations and also because companies are seeking positive feedback from outside investors. However, despite these initiatives aimed at facilitating SRI and possibly because of their proliferation, it is unclear as to which of their aspects have value relevance in the decision making process. In chapter 6 it emerged that the CSR ratings used in this study weakly affected the portfolio ownership holdings decisions of SRI fund managers. More specifically, the tests to see if SRI fund managers are more sensitive to the CSR ratings than non-SRI ones, regarding their portfolio of ownership holdings, reveal only weak evidence for this to be the case. This was put down to SRI funds being owned by both value driven and profit-seeking investors, with the

latter spreading their portfolios to include SRI companies with low firm-specific risk. Further, it emerged that both SRI and non-SRI fund managers are attracted to multidimensional CSR type ratings (i.e. Accountability Rating), which provides support for their enhancement.

8.3 Contributions of this study

This thesis has contributed to knowledge in a number of ways. First, it has enhanced the current financial theory regarding investor decision making by employing multiple measures of non-financial environmental information, including: environmental reputation, environmental disclosure, and physical performance, at the global level. Second, there has been an investigation into market reaction on announcements of addition to or deletion from SRI indices, namely, the DJSI or the FTSE4Good index, for a longer sample period than that employed previously. Third, there has been comprehensive elicitation of which environmental performance information is more value relevant to investors when making investment decisions. Fourth, as far as it has been possible to ascertain, this is the first study in which SRI and non-SRI funds have been distinguished by using a matched–pairs approach to investigate whether CSR ratings are more closely related to the former's managers' investment decisions regarding portfolio ownership holdings than the latter's.

Several scholars have contended that extensive disclosure will reduce information asymmetry and agency conflict between corporate managers and outside investors and thereby, enhance firm value and stock market performance (e.g. Gelb and Zarowin, 2002; Healy and Palepu, 2001; Healy et al., 1999). However, in reality, the onus is on corporate managers to decide how much to report on environmental policy, but given the lack of any robust disclosure framework that indicates the value relevance of different types of information and the fact that investors are heterogeneous, they have imperfect knowledge of how what they provide will be interpreted by investors or how it could affect future earnings. The results from the studies carried out in this thesis have indicated that the badge of SRI index membership brings no immediate economic benefit to a company, but the use of GRI Guidelines can do (i.e. value relevant to investors). That is, these outcomes imply that these current procedures on a voluntary basis are effectual in their current form for distinguishing environmental performance that increases firm value from

that which does not, if they are to be of use to managers whilst pursuing profitability. Furthermore, the results from the studies have indicated that environmental reputation and physical performance are value relevant to investors when making investment decisions. Hence, by taking a more proactive role with regards to building a good environmental reputation and providing extensive environmental disclosures, managers may be able to communicate a firm's environmental performance more efficiently to outside investors.

In addition, the outcomes from this study are informative to policymakers in relation to whether or not to legislate on the disclosure of communication of corporate social and environmental information. That is, the research findings in this study indicate that voluntary disclosures (i.e. GRI Guidelines) on ESG issues are value relevant to investors but have no influence on stock market performance. However, in the case of the DJSI, it has emerged that investors do not value corporate environmental disclosures as well as their having no influence on stock market performance, which may be because they feel that the information required by the DJSI is not enough to have an impact on their decision making, it is not comprehensively understood by investors, or information disclosure by itself says nothing about environmental performance. Hence, this result draws attention to the need to encourage managers to adopt voluntary disclosures and, meanwhile, press for the development of clear standards or guidelines for environmental disclosures that can have an influence on stock market performance as well as firm value. Further, the results have revealed that SRI fund managers are not much more sensitive to the level of CSR rating than non-SRI ones, regarding the investment decision on portfolio ownership holdings. This implies that there is no clear distinction between the two types of funds. It may be argued that there should be action taken to ensure that those with holdings in sin industries are not able to hold both types, which appears to be the case at present.

8.3 Limitations

A number of limitations can be identified in this research that could have impacted on the outcomes and acknowledgement of them could provide the basis for future research, as discussed in the section. More specifically, each empirical study contained several shortcomings which are considered next.

Sampling and data collection issues

For the proxy for the reputational aspect of environmental performance data was substantially obtained from Fortune and although this is a premier source of corporate reputation, using it alone restricted the accuracy of this measure. For example, even though the environmental reputation score is less related to a firm's financial performance than other attributes (Brown and Perry, 1995; Wood, 1995), consideration of firm size has been neglected here, because the Fortune and Hay Group pre-selected the largest companies with the greatest revenues. Further, because reputation taken from this source is based on the evaluators' perception, it is not possible to conclude that it is unbiased.

Further, as a measure of a firm's disclosure, membership of the DJSI, defined as 1 if a company is a member and 0 otherwise, was used rather than the content analysis of a firm's CSR/environmental performance disclosures, which has mostly been utilized in the extant studies. Consequently, even though this researcher has attempted to avoid subjectivity by employing multi-dimensional aspects measured by a third party, the DJSI and SAM, this potential problem has not been entirely eradicated, because the contents of the questionnaires that firms have to complete when applying for membership are provided and reviewed by their respective committees, i.e. they determine the qualification criteria. Moreover, as with Fortune, the large company size bias of the DJSI, whereby it includes the 2,500 largest companies within the Dow Jones Global Total Stock Market Index[26], probably distorted the overall outcomes in terms of the levels of CSR reporting, because these firms have greater inclination to use resources for environmental activities owing to their higher level of public exposure and their consequent need to gain or maintain their legitimacy.

[26] See more detail: http://www.sustainability-index.com/07_htmle/assessment/startinguniverse.html

Another limitation is with regard to the duration of the analysis period used in chapter 6. That is, the data for measuring fund managers' portfolio holdings was provided by Lipper from 2006 to 2007 and whilst they are global leaders in supplying mutual fund information, this was probably too short a period to capture fully how the CSR ratings affect fund ownership holdings decisions by SRI and non-SRI fund managers.

Methodological issues

Regarding the methodology employed in this research, firstly, the use of multiple regression analysis did not allow for consideration of the causal relationships between the dependent and independent variables. In particular, it was not possible to identify the nature of the vector between environmental performance and firm performance. Secondly, the decision to use an event study in order to measure whether the market responds to CSR information did not allow for control for the possible impact of other events that could have been having an impact on stock market returns. That is, even though the addition and deletion of samples was benchmarked against two SRI indices (i.e. DJSI and FTSE4Good index), it was not possible to completely rule out other explanations for what was observed. Further, even though the SRI indices were treated separately, no control was made for companies gaining membership the second of these indices having already been a member of the first, for such occurrences most likely would have dampened overall market response. Finally, in chapter 6 even though the research design issues and tests considered thoroughly whether heteroscedasticity and/or multicollinearity existed in the data or not, it was not able to control completely for such matters, because a company often holds both SRI and non-SRI funds.

8.4 Directions for future research

The findings of the study, as well as the limitations considered in section 8.3, provide the bases for a number of future research avenues. First, the most recent Lipper database of fund portfolio ownership holdings could be used to extend scholarship in SRI. In particular, triangulation of the results obtained in this study could be undertaken considering other perspectives, such as: using

other countries' funds, including bond investment, and/or applying different criteria for a matched-pairs approach.

Second, the number of variables employed in this research could be extended to include such as: the KLD ratings, the DSI (another sustainability index), and CDP (Carbon Disclosure Project), which would provide more robust outcomes regarding the relationship between corporate environmental performance and stock market performance. Further, incorporating another environmental performance measure, such as that of a quality of disclosure rating by an information intermediary, would provide a different perspective on the relation between environmental performance and stock market performance.

Finally, future research could examine the impact of idiosyncratic risk on corporate environmental performance, using the data employed in this study or expanding upon it. Little attention has been paid to research of this type, with the exceptions being a recent few studies that have probed the relationship between CSR, using the KLD, and risk (see for example Lee and Faff, 2009; Manescu, 2011). By considering this risk factor, scholars and practitioners could gain useful insights into how and why environmental performance impacts differently at the firm-level.

Appendix I. Summary of literature on the environmental performance and firm performance

							proxies of environmental performance (CSR)				Firm performance measures		
	Study	**sample**	**test years**	**Event study (event day)**	**Method**	**Theoretical/ Hypothesis frameworks**	**objectives /3rd parties**	**reputation (Rep)**	**Disclosures (Dis.)**	**SRI Indices**	**Market perform measures**	**Accounting performance measure**	**Control/ Others variables**
1	Vance, 1975	45	1974		Replicating Moskowitz	Trade-off theory	Ratings by corporate staff members and business students				Share per price change		
2	Belkaoui, 1976	100 (match paired, 50 firms with & without disclosure)/ S&P 500	1970	24 months (t-12, t+12) event day: annual report announce month	Event study	Efficient market view. (semi-strong) Ethical investor hypothesis			Whether pollution expenditures were disclosure in annual report		Risk-adjusted stock return (market model), Beta period: 24 months		
3	Ingram, 1978	287 / Fortune 500 annual report	01/05/ 1970-30/04/ 1976		Event study	Capital market (Information content)			Monetary vs. non-monetary in 5 categories		Monthly returns: 9 mo. Prior and 3 mo. After fiscal year end, Beta period: 60 months		Excess earnings , Year, Industry
4	Spicer, 1978a	18/ pulp & paper industry	1968 - 1973		Spearman correlation analysis, Stepwise regression		1970 pollution index report released by CEP (product capacity)				Monthly return (market model), Beta period:1968-1973, Total risk	Earning variability, ROE, Size (log TA), Leverage, Payout Current ratio	
5	Spicer, 1978b	18/ pulp & paper industry	1968-1973		Spearman rank order correlation, Mann-whitney U test	Capital market (ethical investor hypothesis)	1970 and 1972 pollution indices by CEP (product capacity, mills)				Monthly return (market model), Beta period: 1968-1973, Total risk	Size (log TA,) ROE, P/E ratio	

6	Alexander & Buchholz, 1978	40 / survey ranking by students & businessmen (studied by Vance(1975))	1970 - 1974 1971 - 1973 (CSR : 1971, 1972)		Replicating Vance study	Capital market	Ratings by corporate staff members in year 1971 year and business students in 1972				Risk-adjusted return (CAPM), Beta period: 1970 -74 & 1971 -73		
7	Anderson & Frankle, 1980	314/ Fortune 500 campiness listed on the NYSE for the calendar year-end	July 1972 - June 1973		Matched portfolios	Capital market			Based on Beresford social involvement disclosures scales 1.Dis. vs. nondis. 2. Financial vs. non finance 3. continuous vs. new disclosure		Monthly return (CAPM) Beta: from Merrill Lynch Securities research	EPS, DPS	
8	Chen & Metcalf, 1980	18/ Pulp & paper industry	1968-1973			Re-working of Spicer 1978b data	Pollution index by CEP in 1970 & 1972 (product capacity, mills)				Monthly return (market model) Beta period: 1968-1973	ROE, P/E ratio	Size
9	Jaggi & Freedman, 1982	105/ chemical, paper & pulp, oil refining, & steel industries	1973-1974	21 months (t-10, t+10) event day: 10-K report filing month	Event study	Ethical investor hypothesis Rational investor hypothesis			Disclosed (84 firms) vs. Non-disclosed (21 firms)		Monthly returns (market model) Beta period: 120 months		
10	Bowen et al., 1983	28 / electric utility firms which have at least 20% of capacity of unclear	1978-1979	28/03/1979 accident day	Event study	Capital market	Environ. accident (Three Miles Island)				Daily abnormal return (Market model) beta period: 01/06/1977 - 27/03/1979		

11	Shane & Spicer, 1983	58/ paper, power, steel, & oil industries	1970-1977	6days (t-4 to t+1)	Event study	Efficient capital market	Pollution index by CEP				Mean-adjusted returns, Beta period: 100 days		
12	Cochran & Wood, 1984	39 or 36/ US industry firms	1970-1974 1975-1979		OLS regression of CFP on CSR, Logit regression of CSR on CFP		Moskowitz ratings					Earnings/assets, Earnings/sales, Sales/assets, Net fixed assets/gross fixed assets, Excess market valuation	Industry
13	Stevens, 1984	58/ pulp& paper, petroleum, steel, & electrical utilities industries	1972-1977	t-11 to t+6 around CEP reporting issuing month	Event study	Capital market, Ethical investor hypothesis	Pollution control costs by CEP				Monthly 18 month (t-11 to t+6), Beta period:60 months excluding 12 months Prior to portfolio formation date		
14	Mahapatra, 1984	67 / chemical, iron & steel, paper, petroleum refining, primary non-ferrous metals, and textile firms listed on NYSE	1967-1978		Spearman rank Correlation analysis	Ethical investors hypothesis	Pollution control expenditure				Average monthly returns (market model) Beta period: 1967-1978		
15	Freedman & Jaggi, 1986	88/ chemical, paper & pulp, oil refining, & steel firms	1973 - 1974	t-8 to t+8 around disclosing month	Event study	Efficient market hypothesis.			Extensive vs. minimal pollution disclosures		Returns (market model) Beta period:120 periods before the disclosure date		

16	Freedman & Jaggi, 1988	108/ Chemical & electrical utilities, paper and pulp, oil refining, steel firms	1973-1974		Correlation				The amount of pollution emission & capital expenditures for pollution abatement disclosures in 10K and annual reports, weighted schemes			ROA, ROE, Cash basis ROA: ((NI+Depr.)/TA), Cash basis ROE: ((NI+Depr.)/ Equity), (NI+taxes+IE) /TA, (NI+taxes+IE)/ equity	
17	McGuire et al., 1988	98 or 131/ firms listed on Fortune ratings	1977 - 1981 1982 - 1984		Regression (CSR on Acct & Market perform.)	Stakeholder theory		Fortune's Rep ratings of community and environ. Rep. from 1983 to 1985			Standard deviation of total return, Alpha Beta: from COMPUSTAT database	ROA, Operating leverage, Asset growth, sales growth, operating income growth, debt/asset, Standard deviation of operating income	
18	Belkaoui & Karpik, 1989	23/ Leading corporations surveyed both by Business and Society Review's 1972 "Industry Rates Itself" and Ernst and Ernst 1973 survey of social responsibility disclosure	1973		Regression (social disclosure on perform.)	Agency theory		Business & society (1972)	Scale by Ernst & Ernst (1973)		Stock price change,1970 -1974 Beta period: 1970 -1974 (market model)	Size (log TA), ROA, Debt/asset, Dividends/ unrestricted retained earnings, Capital intensity (gross fixed assets/sales), Net Incomes/total assets	
19	McGuire et al., 1990	131/ Fortune survey for 1983	1982 - 1984 (post-survey) 1977 - 1982 (pre-survey)		Regression (Rep. on perform.)	Attribution theory		Fortune's Rep ratings			Monthly return (market model) Alpha, beta: from COMPUSTAT and CRSP databases	ROA, Leverage, Sales, operating income, & asset growth Debt/asset, Average assets	

20	Freedman & Stagliano, 1991	27 / firms in Cotton textile Mill & Knitting mill industries	4-day period (t+0 to t+3)	t+0 to t+3	Event study	Efficient capital market			10-K report 1. Insignificant or immaterial disclosures 2. Non-quantitative & material disclosures 3. Quantitative & material disclosures 4. no disclosures		Daily return (market model) Beta period: 200-day trading period preceding the date of the court decision		
21	Jaggi & Freedman, 1992	13/ firms in pulp & paper industry	1975-1980		Pearson correlation	Efficient capital market	emissions (water pollutants)				PE ratiobeta period: 60 months (market model)	Net income, ROA, ROE, Cash flow /equity, Cash flow /assets	
22	Patten, 1992	21 / firms (exc. Exxon) in the petroleum segment of the 1989 Fortune 500	1988-1989		t-test Regression	Legitimacy theory			The amount of pages on Environ. disclosure, classified by Wiseman (1982) study				Size (log of revenues), Dummy variable, 1 a firm is a part-owner Alyeska, 0 otherwise
23	Cormier et al., 1993	74/ Canadian firms in pulp and paper, Steel, metals and mines, and chemicals and oil industries	1986-1988			Value relevance	Emission ratio (actual pollution level/pollution standard set by Environ. ministries					Net monetary working capital, Book value of inventories, PE ratio, Book value Debt, Book value of preferred stock	
24	Herremans et al., 1993	96/ 76 US manufacturing firms rated by Fortune; matched pairs good and bad reputation in same industry	1982 - 1987		Analysis of difference, Correlation	Agency theory		Community and environ. ratings by Fortune			Abnormal return (CAPM) Beta period: 60 months (market model)	ROA, ROE, Operating margin (operating profit before depreciation, as % of sales), Net margin (after-tax profit as % of sales)	Industry, Size

25	Blacconiere & Patten, 1994	47 / Chemical firms similar to Union Carbide (NYSE/ASE firms and at least 10% of their revenues in chemical and industrial gases)	3/12-1984-7/12/1984	event day: 03/12/1984 5-day windows (t+0, t+4)	Event study	Legitimacy theory			5 aspects of environmental disclosures in 10-K prior to chemical leak		Daily abnormal return (market model)		Ratio of chemical segment revenues to total revenues, Size (log revenues)
26	Brown & perry, 1994	234 / firms rated by Fortune	1988 - 1991		Regression		KLD	Fortune				ROA, Debt/equity, Market to book value, Sale growth log(sales)	
27	Hamilton, 1995	436 / Firms in EPA's first Toxic Release Inventory (TRI) data release of June 19, 1989	6-day periods around the event day (19/06/1989)	6 days (-1 to +5)	logit regression, OLS regression	Efficient capital market	TRI				Abnormal return (Market model), Beta period: 1/3/1989 - 5/24/1989		
28	Klassen & Mclaughlin, 1996	96 for positive events; 16 for negative events/ NYSE or AMEX firms	1985 - 1991 for +ve events; 1989 - 1990 for –ve events	3 days (t-1 to t+1)	Event study	Stakeholder theory (operation strategy) & Efficient market	Environ. events from NEXIS database				Abnormal return (Market model), Beta period: 200 days (t-209, t-10)		
29	Hammond & Slocum, 1996	149/ firms by Fortune lists in 1993	1981, 1986		correlation regression	Stakeholder theory, Slack resource		4 attributes of Fortune			Beta: dividing the sum of the covariance of the market and the covariance of the firm by the squared variance of the market	ROE, ROS, Leverage (assets/equity), Asset turnover (sales/assets), Retention rate (1-(dividends/NI))	

30	Cormier & Magnan, 1997	154 firm-year observations from three major Canadian industries (Pulp &paper, Chemicals &oil refining, and steel, metals and mines)	1986-1991			Value relevance	Water pollution level					Book value , Market value, Net monetary working capital, Inventories, Fixed assets, Other assets /liabilities, Debt, Preferred stocks, Minority interests, EPS	Industry
31	Waddock & Graves, 1997	469 / S&P 500 firms high vs. low in KLD screens	1990 for KLD, and 1989 & 1991 for Acct. data		Correlation regression	Slack resource, Good mgt.	KLD rating					ROA, ROE, ROS	Size (TA, total sales), Risk (LT debt/ TA), Industry
32	Russo & Fouts, 1997	243/ Large US firms rated by the Franklin Research and Development Corporation (FRDC)	1991-1992			Resource-based perspective	Environ. rating by FRDC					ROA	Size (log sales), Industry growth rate, Industry concentration, Capital intensity, Firm growth rate, Advertising intensity
33	Konar & Cohen, 1997	130/firms from NYSE & AMEX subject to reporting requirements of toxic emissions	1988 - 1990 1991 - 1992	event day 19/07/1989, 6 days (-1 to +5)		Efficient capital market	TRI				Abnormal return (Market model) Beta period: 240 day period (t-250 to t-10)		

34	Neu et al., 1998	33/ Canadian firms operating in polluted industries	1982-1991		Regression	Stakeholder theory, Legitimacy theory, Political economy			Number of words included in annual report			NI after tax, log (total debt/total equity), log (revenues)	Number of fines, Number of articles of Environ. criticisms in CBGA electronic database, Number of words on other CSR topics, Number of articles in Canadian newspaper and periodicals
35	Patten & Nance, 1998	25 / firms listed in 1989 Fortune 500 petroleum segment & S&P	15 days periods : 27/03/ 1989-10/04/ 1989	27/03/1989 (on event day 24/03/1989, stock exchange with closed for Good Friday)	Event study	Capital market, Legitimacy theory			12 aspects of environmental disclosures in 1988 annual report and 10-K		Daily abnormal return (market model) Beta period 200 days trading period (-210 to -11)		Size (log revenues), whether firms disclosed the operation in Alaskan 1988 and 1989 financial reports
36	Stanwick & Stanwick, 1998b	111 in 1987 102 in 1988; 120 in 1989; 125 in1990; 118 in 1991; 121 in 1992/ top 500 firms listed in fortune	1987-1992		Correlation	Social responsible principles	Emission from EPS's TRI reports	Fortune				Earning (annual profits/ annual sales)	Size (Sales)
37	Hughes II, 2000	44 US electric utilities firms targeted by Phase One of 1990 Clean Air Act & 46 non-Phase One US firms	1986-1993			Value relevance	Sulfur dioxide emission # of superfund sites % of power generated by nuclear unit to total power generated by the firm Value line of assessment of the regulatory climate					Book value, Market value	

38	McWilliams & Siegel, 2000	524 / firms listed in KLD	1991-1996		Correlation Regression					DSI 400		Accounting profit, R&D intensity (R&D /Sales)	Industry, Risk (Debt/assets), Adverting intensity, Size (total sales, TA)
39	Konar & Cohen, 2001	233/ S&P 500 firms in polluting industries	1988-1989		Regression	Efficient capital market	Investor Responsibility Research Center: the pounds of toxic chemicals emitted per dollar revenue of firm (TRI data) and number of environmental lawsuits pending in 1989				Tobin Q	R&D expenditures, Advertising expenditures, Sales growth Import-consumption ratio	Size (log assets), Market share, Capital expenditures /depreciation differential
40	Ruf et al., 2001	488/ firms in KLD database	1990-1995		Regression	Stakeholder theory	KLD ratings					Change in ROE, Change in ROS, Growth in sales	Industry, Size (log sales), Prior year's financial performance
41	Toms, 2002	215/ FTSE 100 UK firms	1996 - 1997		Regression	Resource-based view, Positive accounting theory		Community and environmental ratings by Mgt. Today	Survey for quality of environ. disclosure to fund managers		Risk: company's beta factor	Average ROE for previous 3 years	Size (log sales turnover), Industry, Environ. Audit, Ownership, Quality environ. Obtained a Environ. quality kitemark or not, whether Environ. Reporting published separately or not
42	Roberts & Dowling, 2002	300/firms listed in Fortune	1984 - 1998		Regression	Resource-based view		Fortune				ROA, Market to Book	Size (total sales)

43	Belkaoui, 2004	404 / US firms listed in Fortune	1994 - 1998		Correlation OLS regression	Information of earnings		Community and environ. rating by Fortune			Annual returns (9 months prior and 3 months after fiscal year end) Beta period: 60 months (Market model)	Market to Book, TD/ TA, EPS	Size (log MV), Earning variability (STDV of earnings), Earning persistence (first-order autocorrelation in earnings)
44	Clarkson et al., 2004	29 US pulp and paper mill firms	1989-2000			Value relevance	Environmental capital expenditure					Book value, Market value, Abnormal earnings	high-low polluting firms: divided the sample at the mean of emission data from TRI and BOD (Biological Oxygen Demand), LT debt / Equity, Cash flow from operations to sales, Net capital equipment to gross capital equipment
45	Freedman & Patten, 2004	112/ top 500 firms listed on the EPA in 1987 and available 10-K report in 1988	12/06/ 1989 (Clean Air Act)		Regression	Capital market (quasi-regulatory mechanism), Legitimacy theory	TRI		10-K report (content analysis)		Abnormal return (3 days cumulative AR: Market model)		Size (log sales), Industry
46	Lorraine et al., 2004	32 / firms exposed any environmental issues by Financial Times, The Times, & Environ. agency from 04/1995 to 08/2005	12/ 1993 - 08/ 2000	21 days (t-10 to t+10)	Event study	Efficient capital market	Environmental news by Financial Times, The Times & Environ. Agency				Abnormal returns(t-10 to t+10) Beta period: day t-310 to day t-11 (Market model)		Industry, Fine, News

47	Al-Tuwaijri et al., 2004	198 /S&P 500 firms listed in the IRRC's 1994 environ. profiles directory; had annual reports; and appeared in the Wall Street Journal Index	1994		Regression	Stakeholder theory	Recycling ratio by IRRC		10-K report (disclosure-scoring based on 4 environ. Indicators)		Industry-adjusted annual return		Unexpected earnings, Pre disclosure environment , Growth opportunity, Profit margin, Environ. exposure, Environ. concern, Pubic visibility Size (MV)
48	filbeck & Gorman, 2004	300/ S&P 500 firms related to environ. in the IRRC data base	1999 - 2001	21 days (t-10 to t+10)	Event study	Efficient capital market	IRRC database				Abnormal return (Market model)		
49	Elsayed & Paton, 2005	227 UK firms	1994-2000		OLS regression panel data analysis: dynamic estimation	theory of the firm: win-win perspective		Community and environ. rating by Mgt. Today				ROA, ROS, LN (TA), TD/TA	R&D/total sales, Net fixed Assets/total Assets, Industry
50	Hassel et al., 2005	71 Swedish firms	30/06/ 1998-30/09/ 2000			Value relevance	Ratings from Caring Company (CC) Research					Book value, Dividend, Market value, Net income	Industry, Year
51	Hasseldine et al., 2005	139/ UK firms listed in Management Today 2000	2000		Content analysis, Regression Adopted Toms(2002) study	Positive accounting theory, Signaling theory		Community and environ. rating by Mgt. Today 2000	Environ. disclosures by sentences: quantity and quality measure		Beta: from London Business school Risk mgt. services	3 year average ROE (1998-2000), Size (log sales), R&D	Industry, Diversification, Ownerships
52	Brammer & Pavelin, 2006	210 / UK firms listed in Management Today in 2002	1998 - 2002		Regression	Social responsible principles	EIRIS database	Community and environ. rating by Mgt. Today			Beta period: 1998-2002 (Market model)	ROA, Total debt/TA	Size (log TA), Industry, Advertising intensity, Visibility, R&D intensity (R&D costs/ TA), Institutional ownership
53	Brammer et al., 2006	451/ UK firm listed in FTSE All Share index	07/ 2002-12/ 2005		Regression	Capital Market	EIRIS database on 07/2002				Monthly return beta, CAPM	Size (Market Capitalization), Price to book value	

54	Murray et al., 2006	100 / Top 100 firms from The Times 1000 from 1988 to 1997	1988 - 1997		Correlation Regression	Ethical investors hypothesis			CSEAR database (page numbers)		Annual return		Year, Size (Sales)
55	Inglis et al., 2006	77 / firms listed on Australian stock exchange and rated by RepuTax	2003-2004		Regression			Ratings from RepuTax				ROA, ROE, Market value - Book value Return on invested capital	
56	Cormier & Magnan, 2007	580 Canadian 237 French 308 German firm-year observations	1992 /1993 -1998			Value relevance	Environ. reporting		Ratings by 13 items of environment al disclosures			MV/BV	Ln (total assets), Age of fixed assets, Industries, Public media exposure
57	Curran & Moran, 2007	Firms added to or deleted from FTSE4Good UK 50 index	2001-2002	Announce day of index membership	Kolmogorov -Smirnov one sample test	Capital market				FTSE4Good UK50	Daily abnormal return (Market model)		
58	Lopez et al., 2007	55 European firms of similar size & capital structure from DJSI and DJGI (total 110)	1998-2004		Regression Hypothesis test(Mann-Whitney U)	Economic theory & sustainable develop. :value creation				DJSI		Profit/Loss before taxes Revenue	Size, Debt/TA, Industry
59	Moneva & Ortas, 2008	142/ European quoted firms	2003-2005		Correlation Regression	Stakeholder theory	Social & environmental ratings from SIRI group		GRI	DJSI	Annual returns		
60	Sinkin et al., 2008	431 firms listed in 2003 Fortune 500	2003			Value relevance	Eco-efficiency : ISO 14001 & issued CER reports					BVPS, EPS	LT debt/equity, R&D expense/TA, Advertising expense/TA

61	Chatterji et al., 2009	350 / firms listed by KLD	1991-2003		Poisson regression, Probit regression		Environmental rating by KLD Emission as pounds toxic chemicals reported by TRI Number and values of penalties by TRI Annual number of spill, permit denials, and shut-ins by CEDP					Net income, Total net sales	Industry, Size (log revenue, log assets), Total common equity
62	Collison et al, 2009	7 (interview) 440 (survey) / Firms listed in FTSE4Good index	12/ 2003-07/ 2004		Interviews, Survey	Legitimacy theory				FTSE4Good			
63	Consolandi et al., 2009	16-30/ firms being included to and excluded from DJSSI	2001-2006	Announce day of index membership & effective of index revision	Event study: t-test sign-test	Capital market				DJSSI	Daily abnormal return (Market model)		
64	Doh et al., 2010	65 deleted from & 56 added to index		announce day of index	Regression		KLD ratings			Calvert social index	Daily abnormal return		Size (ln (MV)), Sales growth (% change in revenue between year -5 and year -1)
65	Guidry & Patten, 2010	474/ 500 firms listed in the Newsweek ratings in 2009	2006-2008		Correlation Regression			Environ. reputation by Newsweek				ROA, Market to Book value, Growth (3 years average % change in sales), Debt to equity	Industry
66	Hussainey & Salama, 2010	129/ non-financial firms listed in MAC survey from 1996 to 2002	1996-2001		Regression Panel-data analysis	Signaling theory		Community and environ. Rep. ratings by Mgt. Today			Annual returns	EPS, Growth rate of book value of total assets	

67	Cheung, 2011	40-61/ US firms added to or deleted from DJSI World	2002-2008	Announce day of index membership & effective of index revision	Event study: t-test Sign-test					DJSI World	Daily abnormal return (Market model)		
68	Clacher & Hagendorff, 2011	356 firms/ included in FTSE4Good UK index	07/ 2001-03 /2008	Announce day of index membership	Event study : t-test Sign-test Regression					FTSE4Good UK index	Daily abnormal retune (Market model)	Ln(TA), total debt/TA, ROE	EBIT/# of employees, Firm visibility in FT Liquidity (average daily ratio of absolute stock return to trading volume), Sales/ TA, CF/TA, Growth(%) in TA over 3yrs before inclusion # of employees / TA, (MV+LT debt)/TA, GDP (inflation-adjusted GDP growth before inclusion), Industry & Year
69	Lackmann et al., 2011	359/ European firms added to DJSI STOXX from 2001 to 2008	2001-2008	Announce day of index membership	Multiple regression (CARs for 5, 11, 21 days)	Capital market				DJSI STOXX	Daily abnormal return (Market model) Beta: CAPM	Leverage (total debt/total asset)	Country, Industry, Other market variables
70	Robinson et al., 2011	43 or 48/ North America firms added to or deleted from DJSI World	2003-2007	Announce day of index membership & effective of index revision	Event study					DJSI World	Daily abnormal retune (Market model)		

71	Salama et al., 2011	1625 observations/ UK firms	1944-2006		Regression			Community and environ. ratings by Mgt. Today			Market model beta period: 24 months		log(# of employees), Dividend payout, Current ratio, log (equity gearing), log(asset growth), Return on capital employed Industry
72	Cho et al., 2012	92 US firms the basic materials, oil and gas, and utility industries listed in Newsweek rating 2009	2009		Path analysis		Ratings by Newsweek		Scoring of environ. disclosure (GRI) in repotting	DJSI			Media exposure

Data definitions:
CEP: Council on Economic Priorities
CSR: Corporate social responsibility
DJSI: Dow Jones Sustainability Index
DJSSI: Dow Jones Sustainability Stoxx Index
EIRIS: The Ethical Investment Research Services
FTSE4Goood: Financial Times Stock Exchange for Good
GRI: Global Reporting Initiative
KLD: Kinder, Lydenberg, Domini & Co Ltd
TRI: Toxics Release Inventory
TA: Total assets
EBIT: Earnings before interest and tax
TD: Total debt
ROS: Return of sales
ROE: Return on equity
ROA: Return on assets
IE: Interest expense

Appendix II. Summary of literature on SRI performance and the effect of CSR on institutional ownership

	Study	Purpose	Test period	Country	N/ sample
1	Teoh & Shiu, 1990	Attitudes towards CSR		Australia	38 investment companies
2	Coffey & Fryxell, 1991	Institutional ownership and CSR	1984	US	110 firms from Fortune 500
3	Luther et al., 1992	The performance of ethical units trust	1984-1990	UK	15 SRI funds
4	Hamilton et al., 1993	The performance difference in SRI and non-SRI funds	1981 - 1985 & 1986 - 1990	US	32 SRI & 320 non-SRI funds, randomly selected
5	Graves & Waddock, 1994	Institutional ownership and CSR	1990	US	430 firms from S&P 500
6	Mallin et al., 1995	The performance difference in SRI and non-SRI funds	1986 - 1993	UK	29 SRI funds & 29 non-SRI funds matched by size and age
7	Gregory et al., 1997	To re-evaluate the Mallin et al. (1995) study by controlling size and risk adjusted benchmark	1986-1994	UK	18 SRI funds & 18 non-SRI funds, matched by funds size, age, investing area, and fund type
8	Johnson & Greening, 1999	The institutional investor ownership types and CSR (KLD database)	1993	US	252 companies
9	Statman, 2000	The performance of SRI funds	1990-1998	US	31 SRI & 62 non-SRI funds, matched by fund size
10	Cox et al., 2004	The Patten of institutional ownership and its relationship with CSR behaviour	2001 - 2002	UK	678 companies
11	Bauer et al., 2005	The performance difference in SRI and non-SRI funds	1990-2001	German, UK and US	103 SRI funds & 4384 non-SRI funds, including dead funds
12	Kreander et al., 2005	The performance difference in SRI and non-SRI funds	1995 - 2001	European countries (UK, Sweden, German, Dutch)	30 SRI & 30 non-SRI funds, matched by age, size, country, and investment university
13	Neubaum & Zahra, 2006	The relationship between institutional owners' holdings and CSR (KLD)	1990 - 1992/ 1995 - 1997/ 1993 - 1995/ 1998 - 2000	US	Fortune 500 (357 in 1995 & 383 in 2000)
14	Benson et al., 2006	Managers' stock picking ability between SRI and non-SRI fund managers	1994 - 2003	US	different number of SRI and non-SRI funds, the data extracted from Morningstar database
15	Bauer et al., 2007	The performance difference in Canadian SRI and non-SRI funds	1994-2003	Canada	8 SRI funds & 267 non-SRI funds
16	Henningsson, 2008	To explore how fund managers are influenced by the CSR information when making investment decision	2005-2007	Sweden	14 Swedish fund managers

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