Corporate Social Responsibility and Stock Prices: The Environmental Awareness of Shareholders

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Abstract

This study examines whether shareholders are sensitive to corporations' environmental footprint. Specifically, we conduct an event study around the announcement of corporate news related to environment for all U.S. publicly-traded companies from 1980 to 2009. Consistent with the view that environmental corporate social responsibility (CSR) generates new and competitive resources for firms, we find that companies reported to behave responsibly towards the environment experience a significant stock price increase, whereas firms that behave irresponsibly face a significant stock price decrease. Extending this view of "environment-as-a-resource," we posit that the value of environmental CSR depends on external and internal moderators. First, we argue that external pressure to behave responsibly towards the environment—which has increased dramatically over the past decades—exacerbates the punishment for eco-harmful behavior and reduces the reward for eco-friendly initiatives. This argument is supported by the data: over time, the negative stock market reaction to eco-harmful behavior has increased, while the positive reaction to eco-friendly initiatives has decreased. Second, we argue that environmental CSR is a resource with decreasing marginal returns. Consistent with this view, we find that the positive (negative) stock market reaction to eco-friendly (-harmful) events is smaller for companies with higher levels of environmental CSR.

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Corporate Social Responsibility (CSR) has received increasing attention in the past decades, both among practitioners and in the academic literature. While the original focus of CSR was on "social" responsibility (e.g., paying fair wages to employees, community-based programs), a recent development is the inclusion of environmental responsibility (e.g., the reduction of CO_2 emissions). This "environmental CSR" is becoming an integral part of CSR and plays an increasingly important role in the corporate landscape. For example, in a recent of survey of 766 CEOs conducted by Accenture and United Nations Global Compact (UNGC), 93% of the CEOs surveyed believe that sustainability will be critical to the future success of their businesses, and 91% report that their company will employ new technologies (e.g., renewable energy) to address sustainability issues over the next five years (Accenture & UNGC, 2010).

The increasing importance of environmental CSR among practitioners is receiving considerable attention in academic research. A growing literature examines the reasons why companies engage in environmental CSR and how it relates to corporate performance (for recent reviews see, e.g., Ambec & Lanoie, 2008; Berchicci & King, 2007; Etzion, 2007). Yet, relatively little is known about the relationship between environmental CSR and stock prices.

A large body of anecdotal evidence suggests that a company's environmental footprint can affect stock prices. Perhaps one of the most prominent examples is British Petroleum's (BP) oil spill incident in April 2010. This oil spill contaminated a large area of marine environment along the Gulf of Mexico, and is currently the biggest off-shore oil spill in U.S. history. On the day of the incident, BP's stock price was $59.5. By the end of June 2010, the stock price had dropped to $28.9—about half of its pre-incident value. As this example illustrates, environmental issues can have dramatic implications for stock prices. Yet, another set of anecdotes suggests that it may not always have been the case, or at least not in such magnitude. For instance, 11 years

earlier, Exxon's oil spill in March 1989 was considered one of the most damaging incidents to the environment. However, Exxon's stock price decreased only marginally. On the day of the incident, Exxon stock price was $44.5. It went down to $41.75 in April, and quickly recovered to its pre-incident level by June 1989.

Arguably, BP and Exxon are very different companies, and such differences may partly explain the different stock market reaction (e.g., they may differ in their ability to manage PR crises, the strength of their environmental management, etc.). Also, BP's oil spill was of more severe magnitude, which may have triggered a relatively stronger stock market reaction. Nevertheless, these arguments are unlikely to account for such large differences. Rather, these two examples suggest that shareholders' perception of environment-related corporate behavior may have shifted considerably over the years.

In this study, we extend existing theories to derive hypotheses on how the relationship between environmental CSR and stock prices may have evolved over time. We then systematically investigate whether shareholders reward or penalize corporations for their behavior towards the environment and how such rewards and punishments have changed over the past decades.

To identify events that reveal information about the firms' environmental CSR, we search the *Wall Street Journal* (WSJ) for relevant press coverage on responsible and irresponsible behavior towards the environment for the whole universe of U.S. publicly-traded companies from 1980 to 2009. We then analyze how the stock market reacts to these events by conducting an event study around the dates of the WSJ articles. We perform our analysis separately for the announcement of eco-friendly corporate initiatives (e.g., the introduction of a recycling

program), and the announcement of eco-harmful corporate behavior (e.g., the release of hazardous waste into the environment).

Our conceptual framework builds on the argument that environmental CSR generates new and competitive resources for firms. This argument is exemplified in Porter (1991), in instrumental stakeholder theory (e.g., Jones, 1995), the natural resource-based view of the firm (e.g., Hart, 1995; Russo & Fouts, 1997), and in the recent literature on sustainability in business (e.g., Clelland, Dean, & Douglas, 2000; Rusinko, 2007; Russo & Harrison, 2005). Consistent with this argument, we find that the stock market reacts positively to the announcement of eco-friendly initiatives, and negatively to the announcement of eco-harmful behavior.

We then extend this framework by assuming that the value of "environment-as-a-resource" depends on both *external* (i.e., across-firm) norms of environmental CSR and *internal* (i.e., within-firm) levels of environmental CSR.

First, from an across-firm perspective, we assume that external pressure to becoming green (e.g., environmental regulations, media attention to the environment, customers' sensitivity to environment-related issues, etc.) is setting the institutional norm of environmental CSR. The more becoming green is institutionalized as the norm, the more negative news has a negative effect on perceptions of the firm, because firms are punished for not following the norm. Similarly, the more companies are enacting the institutional norm of going green, the less reactive shareholders are to the announcement of eco-friendly initiatives. We provide several stylized facts suggesting that external pressure—and hence the norm of becoming green—has increased tremendously over the past decades. Consistent with the above arguments, we find that the positive stock market reaction to eco-friendly initiatives has decreased over time, while the negative reaction to eco-harmful behavior has become more negative.

Second, from a within-firm perspective, we argue that environmental CSR is a resource with decreasing marginal returns. The higher the "stock" of this resource, the lower the additional value generated by additional investments in environmental CSR. Hence, the lower the reward for eco-friendly initiatives and the lower the punishment for eco-harmful behavior. In support of these arguments, we find that firms with stronger environmental performance—measured by firm-level indices of environmental strengths and concerns from Kinder, Lydenberg, Domini Research & Analytics (KLD)—experience a smaller increase following the announcement of eco-friendly initiatives as well as a smaller stock price decrease following the announcement of eco-harmful behavior.

Overall, the findings of this study support the view of environment-as-a-resource, and shed light on how the value of this resource depends on external and internal moderators. In the following, we develop our theoretical arguments in detail, describe the methodology, present the empirical results, and conclude by discussing the implications and limitations of our findings.

THEORY AND HYPOTHESES

Environmental CSR and Stock Prices

The link between environment and management has been an active area of research. The early literature, in the spirit of Friedman's (1962, 1970) view that the "social responsibility of business is to increase its profits," sees CSR as a cost of doing business. CSR would decrease profits and hereby violate the contractual relationship with shareholders. For instance, the introduction of a new recycling program requires the installation of new physical capital, the training of employees, etc., all of them being costly to the firm.

This view has been challenged in subsequent research. Freeman's (1984) stakeholder theory suggests that companies should consider the interests of a broader group of stakeholders, i.e. everyone who can substantially affect, or be affected by, the welfare of the company. Several extensions of stakeholder theory have been proposed (for a review, see Agle, Donaldson, Freeman, Jensen, Mitchell, & Wood, 2008). In particular, in Jones' (1995) instrumental stakeholder theory, CSR efforts can be instrumental in obtaining necessary resources or stakeholder support. For example, the introduction of a new recycling program may improve the company's reputation and appeal to new customers who are concerned about the environment.

Related literature in management further challenges Friedman's view. In particular, Porter (1991) argues that profitability and pollution reduction may not be mutually exclusive goals. In Porter's view, pollution is a waste of resources (e.g., energy, material, etc.). Accordingly, efforts to reduce pollution (e.g., through improved products or processes) may not only reduce a company's environmental footprint but also strengthen its competitiveness.[1]

A growing literature extends Porter's view.[2] For instance, the literature on sustainability in business examines ways how companies can become more sustainable (i.e., "green"), and how these greening initiatives influence financial performance. In particular, companies can become more sustainable by leveraging, e.g., the low hanging fruits of efficiency and waste management to achieve significant financial benefits (e.g., Clelland et al., 2000; Rusinko, 2007; Russo & Harrison, 2005). More complex initiatives include efforts to integrate sustainability into product design (e.g., Lenox, King, & Ehrenfeld, 2000; Waage, 2007), pursue environmental management

[1] In a related argument, Porter (1991) and Porter and van der Linde (1995a, 1995b) propose that properly designed environmental regulations can stimulate innovation and enhance competitiveness. This proposition, known as the "Porter Hypothesis," has spurred a large debate in the literature on environmental regulations (for a recent review, see Ambec, Cohen, Elgie, & Lanoie, 2011).

[2] For detailed reviews of this literature, see, e.g., Berchicci and King (2007), Etzion (2007), Ambec and Lanoie (2008).

systems (e.g., Melnyk, Sroufe, & Calantone, 2003; Sroufe, 2003), and to green the supply chain (e.g., Linton, Klassen, & Jayaraman, 2007).[3] An explanation for how and why corporations would pursue environmental CSR derives from the natural resource-based view of the firm (e.g., Hart, 1995; Russo & Fouts, 1997). This theory recognizes that heterogeneity of resources in a firm is a driver of competitive differences within an industry; those companies that foster resources in support of environmental awareness are likely to gain competitive advantages and hence achieve higher profits.[4]

In the spirit of this literature, we argue that *a company's positive engagement with the environment generates new and competitive resources for the firm*. Accordingly, we hypothesize a positive relationship between environmental CSR and stock prices:

Hypothesis 1. Shareholders react positively to the announcements of eco-friendly corporate initiatives.

Hypothesis 2. Shareholders react negatively to the announcements of eco-harmful corporate events.

[3] Perhaps the most visible effort is Walmart. In October 2005, Walmart launched an ambitious sustainability program with three broad objectives: 1) be supplied 100% by renewable energy, 2) create zero waste, and 3) sell products that sustain people and the environment (Walmart, 2009). As part of this program, Walmart announced in early 2010 its objective to cut some 20 million metric tons of greenhouse gas emissions from its supply chain by the end of 2015. Several commentators emphasized the potential benefits of this initiative. For example, the *New York Times* (2010) comments that "[...] while the initiative may be good for the environment, it may also be good for Wal-Mart. Driving costs out of the supply chain could result in savings for Wal-Mart that can be passed along to consumers—enabling the company to uphold its reputation as a destination for rock-bottom prices."

[4] Several extensions of the natural resource-based view of the firm have been proposed (for a review, see Hart & Dowell, 2011). Some of the most recent studies have moved beyond the question of whether it pays to be green to the question of *when* it pays to be green. In particular, King & Lenox (2002) extend the original framework to propose and show evidence that only proactive measures (e.g., waste prevention) lead to superior financial performance.

This view of "environment-as-a-resource" is the underlying framework in our analysis. In the following, we extend this framework by arguing that the value of environment-as-a-resource depends on both external (across-firm) norms of environmental CSR and internal (within-firm) levels of environmental CSR.

External Pressure

Corporations are facing external pressure to behave responsibly towards the environment, which in turn may affect the value of environmental CSR. Such external pressure can come from many different stakeholders. It includes, e.g., environmental regulations, media attention to environmental CSR, and customers' sensitivity to environmental concerns.

Over the past decades, external pressure to engage in environmental CSR has increased tremendously. In the following, we document several stylized facts that confirm this trend.

Environmental regulations. In their analysis of environmental regulations, Allen and Shonnard (2011: 71) document that the number of federal environmental laws and amendments has increased almost continuously over the years. In particular, they report that this number has increased from about 70 in the early 1980s to roughly 120 in the early 2000s.

Media attention to environmental CSR. Companies' behavior towards the environment has come under increasing scrutiny by the media. To obtain a quantitative proxy for media attention, we search through Factiva and count, for each year, the number of unique newspaper articles that reference the expressions "environment" and "corporate social responsibility" from five of the most widely followed newspapers (*New York Times*, *Washington Post*, *USA Today*, *Wall Street Journal*, and *Financial Times*). The article counts are plotted in Figure 1 (solid line) for the sample years (1980–2009). As can be seen, there has been a substantial increase in the

number of articles on environmental CSR over the years: while the average number of articles was 20 in the 1980s, it is about six times higher (117) in the 2000s.

Insert Figure 1 about here

Environmental performance. Parallel to the increase in external pressure, companies seem to be implementing more green initiatives. This trend is consistent with anecdotal evidence (e.g., *The Economist*, 2011) and survey evidence (e.g., Accenture & UNGC, 2010). To further document this trend towards stronger environmental performance, we look at the evolution of the KLD subindex of environmental strengths in our sample (this index is described below in the data and methodology section). Specifically, the average number of strengths increases from 0.62 in the 1990s to 1.02 in the 2000s. This 64% increase is significant at all reasonable significance levels ($p = 0.000$).

Shareholder proposals on environmental CSR. A more direct way to quantify shareholders' consciousness towards the environment is by looking at the number of shareholder proposals pertaining to the environment. To do so, we use data from RiskMetrics that cover all shareholder proposals of S&P 1500 companies that are related to either corporate governance or corporate social responsibility from 1997 onward. For each proposal, the data include a short description ("resolution type") that we use to determine whether a given proposal pertains to environmental CSR (as opposed to social responsibility). In each calendar year, we then count the number of such proposals and express it as a fraction of all proposals listed in the database. This measure is plotted in Figure 1 (dashed line). As is shown, the fraction of proposals has increased substantially over the years. It increases by roughly four times from 1997 (the starting year of the RiskMetrics database) until 2009 (the last year of our sample).

As these examples illustrate, there has been a general trend towards higher environmental consciousness over the past decades.[5] The evidence suggesting that companies are reacting to stronger external pressure by implementing more green initiatives is consistent with institutional theory—the view that companies do what is most legitimized in their field and that (changes in) institutional conditions may lead companies to engage in environmental CSR (e.g., Bansal, 2005; Bansal & Roth, 2000; Barnett & King, 2008; Chatterji & Toffel, 2010; Delmas & Toffel, 2004; Hoffman, 1999, 2001; Jennings & Zanbergen, 1995).[6] While these studies focus on the motivation for companies to go green, much less is known about whether external pressure affects the relationship between environmental CSR and stock prices. Our view of environmental CSR as a resource helps us characterize this relationship. Arguably, external pressure affects the value of environmental CSR. In particular, higher external pressure may amplify shareholders' negative reaction to the announcement of eco-harmful behavior; in times of higher environmental awareness, such announcements are more likely to deteriorate the company's reputation, scare off customers, suppliers, strategic partners, etc.[7] In other words, the more becoming green is institutionalized as the norm and the more eco-friendly behavior is widespread across firms, the more shareholders punish companies for eco-harmful behavior. This leads to the following hypothesis:

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[5] In addition to these stylized facts, other recent developments also suggest an increase in environmental consciousness. An example is the rise of the "green consumer," (i.e., consumers who are supportive of environmental causes to the extent of switching allegiance from one product to another even if doing so entails higher cost) and the corresponding literature on "green marketing" (e.g., Miles & Covin, 2000). Also, the fact that CSR is beginning to include environmental responsibility (as opposed to only social responsibility) is rather recent and suggests an important shift in environmental consciousness. This shift is reflected in, e.g., the literature on social entrepreneurship, where environmental stewardship is increasingly seen as an aspect of social action (see, e.g., Hall, Daneke, & Lenox, 2010).

[6] Similarly, research in stakeholder theory argues that stakeholder pressure may lead companies to go green (e.g., Kassinis & Vafeas, 2006; Sharma & Henriques, 2005).

[7] In their meta-analysis of the literature, Orlitzky, Schmidt, and Rynes (2003) suggest that reputation may be an important mediating variable of the relationship between corporate social responsibility and financial performance. Relatedly, in the aforementioned survey of 766 CEOs by Accenture and UNGC (2010), 72% of the CEOs cite "brand, trust, and reputation" (p. 14) as one of the main factors driving them to take action on sustainability issues.

Hypothesis 3. External pressure to behave responsibly towards the environment has increased over time. Accordingly, shareholders' negative reaction to the announcement of eco-harmful corporate events is increasing over time.

Similarly, the more companies are enacting the institutional norm of going green, the lower the competitive value of eco-friendly initiatives, and the less shareholders reward companies for eco-friendly behavior. Thus, we propose the following hypothesis:

Hypothesis 4. External pressure to behave responsibly towards the environment has increased over time. Accordingly, shareholders' positive reaction to the announcement of eco-friendly corporate initiatives is decreasing over time.

Environmental Strengths and Concerns

Arguably, the value of "environment-as-a-resource" not only depends on external norms of environmental CSR, but also on internal levels of environmental performance, as measured by, e.g., KLD scores on environmental strengths and concerns.

To see why, we use an argument in the spirit of neoclassical economic theory. Standard neoclassical models typically assume decreasing marginal returns of production factors (e.g., capital and labor). By the same reasoning, environmental resources may exhibit decreasing marginal returns as well: as companies keep "investing" in green initiatives, the marginal return of an additional green initiative decreases. Intuitively, in early stages of, e.g., pollution reduction, it is fairly easy and inexpensive to improve environmental performance by harvesting the "low-

hanging fruit". As the company's environmental footprint improves, it may become progressively more difficult and costly to reduce pollution.

Accordingly, companies with stronger environmental performance (i.e., companies with a larger "stock" of environmental resources) may benefit relatively less from the introduction of an additional green initiative. In contrast, companies subject to more severe environmental concerns may benefit relatively more from the introduction of an eco-friendly initiative. Thus, we propose the following hypothesis:

> *Hypothesis 5. Shareholders of companies with strong environmental performance react less positively to the announcements of eco-friendly initiatives. Conversely, shareholders of companies subject to more severe environmental concerns react more positively to eco-friendly initiatives.*

Finally, a similar argument can be made for the announcement of eco-harmful behavior. Shareholders of companies with stronger environmental performance may react less negatively to the announcement of eco-harmful corporate behavior. Firms that are subject to more severe environmental concerns, in contrast, may experience a more dramatic stock price decrease upon the announcement of eco-harmful events. This leads to the following hypothesis:

> *Hypothesis 6. Shareholders of companies with strong environmental performance react less negatively to the announcements of eco-harmful behavior. Conversely, shareholders of companies subject to more severe environmental concerns react more negatively to eco-harmful events.*

DATA AND METHODOLOGY

Eco-Friendly and -Harmful Corporate Events

In this study, we examine the stock market reaction to the announcement of corporate news related to the environment. For this purpose, we use Factiva, one of the major newspaper databases, to search the *Wall Street Journal* (WSJ) for relevant press coverage, and obtain the stock market data from the Center for Research in Security Prices (CRSP). Our sample period is from January 1, 1980 to December 31, 2009. This period is determined by the availability of the data; 1980 is the first year in which Factiva has full coverage of the WSJ, 2009 is the last year of the CRSP data.

To identify WSJ articles about environment-related corporate issues, we perform a search in Factiva using the following keywords (variations of these keywords are indicated in parentheses): pollution, contamination (radiation), oil spill, hazardous waste (toxic waste), ecosystem preservation, recycling, emission (carbon), global warming (climate change). For each keyword, we also consider basic variations of the word (e.g., for the word "pollution", we also search for "polluted", "pollutes", etc.). This can easily be done in Factiva by using so-called wildcards (e.g., searching for "pollut*", where * is the wildcard). We then read each article to ensure that it is indeed about environment-related corporate behavior.[8]

[8] The data were collected by a faculty and three graduate assistants. Each keyword was processed by at least two researchers. Inter-rater agreement was 99%. In almost all cases, whether an article was relevant or not, was a straightforward decision. Articles were typically rejected because 1) the keyword was used in a different context (e.g., "contamination" can be used in the medical context as opposed to the environmental context), and 2) the article was not referring to a specific company, but instead to the government (e.g., in the context of legislations), society, a particular industry, etc.

A potential concern with our analysis—as with any keyword search—is that our keyword list may be too narrow. Nevertheless, there is no reason to believe that our keyword selection would introduce any systematic bias into the analysis. It only reduces the power of our tests (since potentially relevant articles are omitted), which goes against finding any significant results.

The identified articles can refer to either eco-harmful or -friendly corporate behavior. For example, hazardous waste is generally assumed to be harmful to the environment. However, if a company decides to reduce its hazardous waste, then this event is considered to be eco-friendly. Accordingly, when reading the articles, we classify them as "eco-friendly events" or "eco-harmful events". We exclude articles that report about both types of behavior at the same time.[9]

To obtain our final dataset, we apply standard data filters. Specifically, articles are excluded in the following cases: 1) other significant activities (e.g., leadership changes, earnings announcements, etc.) are mentioned in the article (see McWilliams & Siegel, 1997), 2) the company is not publicly traded at one of the U.S. stock markets, 3) no stock market information is available during the estimation period, and 4) the article was already previously published in the WSJ. (We will show in robustness checks that our results are robust to using additional data filters.) These criteria leave us with a sample of 273 WSJ articles on corporate news regarding environmental issues: 117 referring to eco-friendly events and 156 referring to eco-harmful events. Appendix A provides the list of all these events as well as the corresponding keyword category.

[9] Inter-rater agreement for categorizing the articles was 96%. We obtain similar results throughout if we include only those events with 100% agreement.

Having compiled the list of relevant articles, we then extract the company name from each article and match it to the corresponding company name in CRSP. We then use firm-level identifiers from CRSP to link our dataset to other databases (Compustat, IBES, and KLD) that are described in the section below on regression specification.

Event Study

The event study methodology examines the stock price reaction to news or events. The stock market reaction is captured by the average cumulative abnormal return (CAR) during the so-called "event window". CAR is a measure of how much the stock price deviates from its expected value during the event window. The calculation of CAR is described in detail in Appendix B.

A large literature in finance uses event studies to quantify the market reaction to the announcement of corporate news in the WSJ. This literature examines a broad variety of issues including, e.g., the announcement of stock splits, equity issues, credit rating downgrades, etc. (for review articles see, e.g., Kothari & Warner, 2007; MacKinlay, 1997). The common practice in this literature is to set the event date (i.e., day 0) as the day of the article's publication in the WSJ. One drawback is that the publication date is not necessarily the date of the *actual* event, as it may have happened on the previous day (before the closing of the stock exchange). This problem is known as "event uncertainty" in the finance literature. The usual method of handling this issue is to expand the event window to two days (day –1 and day 0), thus considering the 2-day interval [–1, 0] as event window (for a discussion, see MacKinlay, 1997). Another common approach is to consider the 3-day interval [–1, 1]. In this paper, we use the 2-day event window [–1, 0] in our main specification and show that our results are virtually identical if we use [–1, 1]

instead. We also experiment with longer event windows and show that our results are robust (albeit a bit weaker) if we use the windows [–1, 2] and [–1, 3] instead. Such extensions of the event window account for the fact that it may take time to establish the characteristics of certain events (e.g., eco-harmful incidents) and therefore the market may still receive information in the few days following the events (for a similar argument, see Barnett & King, 2008: 1169).[10]

Regression Specification

To empirically examine whether the stock market reaction to the announcement of eco-friendly and -harmful corporate behavior has changed over time, we report the average CAR for each of the three decades covered by our sample (1980–1989, 1990–1999, and 2000–2009). To refine this analysis—and importantly to rule out alternative stories—we also use a regression-based approach. Specifically, we estimate the following regression (separately for eco-friendly and -harmful events):

$$CAR_{ijst} = \alpha_j + \alpha_s + \beta \times Trend_t + \boldsymbol{\gamma}'\mathbf{X}_{ijst} + \varepsilon_{ijst} ,$$

where i indexes firms, j indexes events, s indexes industries, and t indexes years. α_j and α_s are event and industry fixed effects, respectively, *CAR* is the individual cumulative abnormal return in the 2-day event window [–1, 0], *Trend* is a linear time trend (i.e., *Trend* = 1980, 1981, …, 2009), **X** is a vector of control variables, and ε is the error term. We use heteroskedasticity-robust

[10] Further extending the event window may be problematic. Several studies in the finance literature show that using longer event windows severely reduces the power of event study tests such as the z-statistics (e.g., Brown & Warner, 1980, 1985; Campbell, Lo, & MacKinlay, 1997; Kothari & Warner, 2007; MacKinlay, 1997). Similarly, in the management literature, McWilliams and Siegel (1997) advocate the use of an event window that is as short as possible, arguing that the stock price may in fact fully adjust within a few minutes or hours (p. 636). A key argument in their article—similar to the power issue emphasized in the finance literature—is that longer event windows will be more likely to capture confounding effects, making it harder to obtain reliable statistical inference.

standard errors. (We obtain similar results if instead we cluster standard errors at the industry or event level.) The coefficient of interest is β which measures how the stock market reaction has evolved over time.

The control variables in **X** include size, age, profitability, the market-to-book ratio, and the number of analysts following the company ("analysts following"). These variables are obtained from Standard and Poor's Compustat, except analysts following which is obtained from Thomson Reuters' IBES. Size is the logarithm of total assets; age is the logarithm of the number of years since the company is covered in Compustat; profitability is the return on assets (ROA) defined as is the ratio of net income to total assets; market-to-book ratio is the ratio of the market value of equity to the book value of equity; analysts following is the logarithm of the number of analysts following the company in IBES.

Given the sample size of 117 eco-friendly and 156 eco-harmful events, including industry fixed effects requires a broad industry classification. Accordingly, we partition industries at the SIC (Standard Industrial Classification) division level.[11] Lastly, we include event fixed effects that are defined at the "environmental issue" level (see Appendix A). Including event fixed effects mitigates concerns that our results could be driven by unobserved heterogeneity at the event level. Importantly, such fixed effects control for differences in the size of the events across categories (e.g., oil spills may be more detrimental to the environment than pollution and therefore yield more negative CARs).[12]

[11] SIC divisions are broader than 2-digit SIC codes. The 10 SIC divisions are as follows (the corresponding 2-digit SIC codes are indicated in parentheses): agriculture, forestry, and fishing (01-09); mining (10-14); construction (15-17); manufacturing (20-39); transportation, communications, and public utilities (40-49); wholesale trade (50-51); retail trade (52-59); finance, insurance, and real estate (60-67); services (70-88); public administration (91-99).

[12] Including event fixed effects controls for the size of the events *across* categories. Ideally, one would also control for the size of the event *within* each category. However, on the basis of the information provided in the newspaper reports, it is very difficult to construct a metric that objectively quantifies the "size" of the eco-harmful or -friendly behavior and would be comparable across the variety of events in our sample.

Finally, to test Hypotheses 5 and 6, we augment the above specification by including firm-level measures of environmental performance as additional explanatory variables. The Kinder, Lydenberg, Domini Research & Analytics (KLD) database provides two indices of environmental performance: "environmental strengths" and "environmental concerns". The index of environmental strengths ranges from 0 to 7, adding one index point for each of seven possible strengths. Similarly, the index of environmental concerns ranges from 0 to 7, adding one index point for each of seven potential concerns. The specific strengths and concerns are described in Appendix C, based on the description in KLD (2006). To ensure that the KLD indices are not affected by the events, we lag the KLD indices by one year. Since KLD data are available as of 1991 and cover a subset of the companies in our sample, merging our dataset with KLD data reduces our sample size to 55 eco-friendly and 47 eco-harmful events.[13]

Table 1 provides summary statistics (means, standard deviations, and pairwise correlations) for all variables described in this section. These statistics are reported separately for the 117 eco-friendly events (upper panel of the table) and the 156 eco-harmful events (lower panel). As can be seen, the summary statistics are suggestive of our six hypotheses. In particular, we find that the mean CAR is positive (negative) for the announcement of eco-friendly (-harmful) events, consistent with the view that shareholders reward companies for eco-friendly initiatives and punish them for eco-harmful behavior (Hypotheses 1 and 2). Further, the correlation between CAR and the time trend is negative for both eco-friendly and -harmful events, suggesting that the reward for eco-friendly initiatives has decreased over time while the punishment for eco-harmful behavior has increased (Hypotheses 3 and 4). Finally, the

[13] A few of the specific strengths and concerns are not surveyed every year from 1991 to 2009, which could lead to inconsistencies in the measurement of environmental performance over time. However, we have verified that we obtain similar results if instead of using the full indices, we construct strength and concern indices that consist only of those items that are surveyed in all years.

correlations between CAR and the KLD indices of environmental strengths and concerns are consistent with the decreasing marginal return argument (Hypotheses 5 and 6). In the next section we provide more rigorous tests of our hypotheses using the event-study and regression-based methodology outlined above.

Insert Table 1 about here

RESULTS

Stock Market Reaction to Environmental Issues

Our event study analysis starts with a test of Hypothesis 1—whether shareholders react positively to the announcement of eco-friendly corporate initiatives. The results are presented in the left-hand panel of Table 2. For each event window, we report the average CAR in percent (with the corresponding z-statistics in parentheses), as well as counts of positive and negative individual CARs (with the corresponding generalized sign z-statistics in parentheses). In support of Hypothesis 1, the average CAR in the 2-day event window is 0.84% and significant at the 1% level ($z = 3.57$). In addition, a large majority of the 117 individual CARs are positive (79 positive CARs versus 38 negative CARs). All other intervals before and after the 2-day event window yield CARs which are small and insignificant. This confirms that our results are not driven by unrelated trends around the event dates.

Insert Table 2 about here

The announcement of eco-harmful corporate behavior, in contrast, leads to negative abnormal returns. As is shown in the right-hand panel of Table 2, the average CAR is negative (–0.65%) and significant at the 1% level (z = –3.49). Furthermore, 96 out of 156 individual CARs are negative. Finding a negative average CAR is supportive of Hypothesis 2, namely shareholders react negatively to the announcements of eco-harmful corporate behavior. Lastly, the CARs in the intervals before and after the 2-day event window are again all small and insignificant.

We have performed a series of robustness checks that address potential concerns. These robustness checks are presented in Table 3. In the following, we briefly discuss each of them in turn.

Insert Table 3 about here

Cross-sectional correlation. Standard event study methodology assumes that the sample consists of independent events. Since some of the events cluster around certain dates, this assumption may be violated. Nevertheless, in row 1 of Table 3 we show that our results are robust if z-statistics are computed using the "crude dependence adjustment" (CDA) of Brown and Warner (1980, 1985). This procedure takes into account cross-sectional dependence in the data by computing standard errors from the time series of portfolio mean abnormal returns during the estimation period.

Precision-weighted CARs. When computing the average CAR, each stock is given the same weight. However, not all individual CARs are estimated with the same level of precision. An alternative is to compute the precision-weighted average CAR, which gives more weight to

less volatile (i.e., more precisely estimated) abnormal returns. As is shown in row 2 of Table 3, our results are robust to using precision-weighted average CARs.

Exxon's oil spill. As can be seen from the event list in Appendix A, Exxon received a lot of press coverage regarding its environmental footprint after the 1989 oil spill incident. Thus, one may be concerned that the sample is dominated by this one firm. A related concern is that, although all these articles convey relevant new information about Exxon's behavior, they may be all somewhat related to the original oil spill incident. To ensure that our results are not driven by these articles, we re-estimate the CARs excluding all events pertaining to Exxon. As is shown in row 3 of Table 3, excluding Exxon has little impact on our results.

Alternative asset pricing models. So far, we used the market model to estimate abnormal returns (see Appendix B). A concern is that the abnormal returns may reflect other factors (e.g., size, book-to-market, or past performance) that are priced during the sample period. However, we show in rows 4 and 5 of Table 3 that we obtain very similar results if instead of the market model, we use the 3-factor model of Fama and French (1993), and the 4-factor model of Carhart (1997), respectively.[14]

Industry-adjusted CARs. To ensure that our results are not driven by industry effects, we re-run our event study using industry-adjusted returns at the 3-digit SIC level (industry-adjusted returns are obtained by subtracting the average return across all stocks on a given trading day and in a given 3-digit SIC industry). As can be seen in row 6 of Table 3, the CARs are very similar to before. We have also verified that our results are robust if instead we define industries at the 2- and 4-digit SIC level, or if we use the 48 industries of Fama and French (1997).

[14] The Fama-French 3-factor model includes, in addition to the market factor, the size factor (SMB, "small minus big") and the book-to-market factor (HML, "high minus low"). Carhart's 4-factor model extends Fama-French 3-factor model by adding a fourth factor: the momentum factor (UMD, "up minus down"). Including these factors is similar to controlling for size, book-to-market, and past performance in a cross-sectional regression. We obtain the data on the SMB, HML, and UMD factors from Kenneth French's website.

Confounding events. A concern with the event study methodology is that confounding events may complicate statistical inference (McWilliams & Siegel, 1997). This concern is very much minimized here, for two reasons. First, when selecting WSJ articles, we excluded articles that reference other significant corporate events (e.g., leadership changes, earnings announcements; see the methodology section). Second, the short (2-day) event window considered in this study reduces the likelihood of confounding events. Nevertheless, one remaining concern is that confounding events not mentioned in the WSJ articles may be affecting our results. To address this concern, we use data from CRSP on dividend announcements, data from IBES on earnings announcements, as well as data from SDC Platinum on acquisition and merger announcements. We then re-estimate the CARs excluding events for which such announcements coincide with the 2-day event window. Only six events are excluded when applying this filter. As is shown in row 7 of Table 3, the CARs are virtually identical.

Alternative event windows. In our main specification, we rely on a 2-day event window. This follows common practice in the finance literature when conducting event studies around the publication date of WSJ articles (see, e.g., MacKinlay, 1997). Nevertheless, in rows 8-10 of Table 3 we show that our results are robust if instead we use the 3-day window [–1, 1], the 4-day window [–1, 2], or the 5-day window [–1, 3].

Changes in Shareholders' Reaction to Environmental Issues over Time

In the theory section, we indicated several stylized facts suggesting that external pressure to behave responsibly towards the environment has increased tremendously over the past decades. In turn, such external pressure may influence the value of environmental CSR. Since our dataset spans several decades (from 1980 to 2009), it provides the opportunity to study how

an increase in external pressure affects the relationship between environmental CSR and stock prices. Accordingly, we repeat the analysis in Table 2 separately for events that occurred in the first decade of our sample (1980–1989), the second decade (1990–1999), and the third decade (2000–2009).

The results are presented in Table 4. For eco-harmful events, we find that the average CAR in the 2-day event window in the years 1980–1989 is –0.42%, which is insignificant (z = –1.11). The negative impact of eco-harmful behavior becomes stronger and increasingly significant over time. In the years 1990–1999, average CAR is –0.66%, which is significant at the 5% level (z = –2.53). In the most recent years (2000–2009), average CAR is –1.12%, which is significant at the 1% level (z = –2.69). This pattern suggests that, over time, companies have been increasingly penalized by their shareholders for irresponsible behavior towards the environment. This pattern is supportive of Hypothesis 3.

Insert Table 4 about here

As for eco-friendly events, the stock price increase is strongest in the earlier years (1980–1989). Specifically, the average CAR is equal to 1.19%, and is significant at the 1% level (z = 2.72). Over time, this positive stock market reaction has monotonically decreased: average CAR is 0.89% (z = 2.04) in the years 1990–1999, and 0.68% (z = 1.76) in the years 2000–2009. Importantly, although the stock market reaction to the announcement of eco-friendly initiatives has weakened over time, the effect is still positive and significant in the most recent decade. This pattern, which suggests that the reward for eco-friendly behavior has decreased over time, is consistent with Hypothesis 4. For brevity, in Table 4 we do not report CARs in the windows

preceding and following the 2-day event window [–1, 0]. However, we have verified that the corresponding CARs are always small and insignificant.[15]

To assess the robustness of these findings—and in particular to rule out alternative explanations of our findings—we use the regression-based approach described in the methodology section, i.e. we regress the 2-day CAR on a time trend and controls. The results are presented in Table 5 for three variations of the regression specification introduced above. In model 1, we include only firm-level controls. In model 2, we also include industry fixed effects. Finally, in model 3, we further include event fixed effects.

Insert Table 5 about here

The results for eco-harmful events are reported in the left-hand panel of Table 5. As is shown, in model 1 the coefficient on the time trend is –0.04% and is highly significant (t = 3.52). This coefficient corresponds to a decrease of –0.04% × 10 = –0.40% from one decade to the next, which is in the ballpark of what we found in Table 4 when comparing decades.[16] The control variables are insignificant, except for size which is significantly positive. This may indicate that larger firms are better able to mitigate the negative reaction to eco-harmful events (e.g., through more sizeable PR departments). More importantly, controlling for size allows us to rule out alternative scenarios in which a trend towards bigger firms over time would be driving our results. Lastly, our results are very similar in models 2 and 3, suggesting that our findings are not driven by unobserved heterogeneity at the industry and event level, respectively.

[15] We have also verified that the results in Table 4 are robust if we conduct the robustness checks used in Table 3.
[16] We obtain qualitatively similar results if, instead of using a time trend as proxy for external pressure, we use the number of newspaper articles referencing environmental CSR or the number of shareholder proposals pertaining to the environment (from Figure 1).

In the right-hand panel of Table 5, we repeat the same analysis for eco-friendly events. As can be seen, the coefficient on the time trend is negative and significant, regardless of the model specification. The economic magnitudes are consistent with the CARs in Table 4. For example, in model 1, the coefficient on the time trend is –0.025%, which corresponds to a decrease of –0.025% × 10 = –0.25% from one decade to the next. This decrease is again in the ballpark of what we found in Table 4 when comparing decades.

Environmental Strengths and Concerns

In Table 6, we examine how our analysis changes if we control for environmental performance, as proxied by the KLD indices on environmental strengths and concerns in the year preceding the event. Since these indices are only available for a subset of firms as of 1991, the relevant sample size is smaller than in the previous analysis.[17]

Insert Table 6 about here

The results for eco-harmful events are presented in the left-hand panel of Table 6. In model 1, we replicate the regression form model 1 of Table 5 with the smaller sample size. As is shown, the coefficient on the time trend is similar to before, albeit a bit larger. This coefficient remains negative and significant when we include the KLD indices as explanatory variables in model 2. Importantly, the coefficient on environmental strengths is significantly positive, while the coefficient on environmental concerns is significantly negative. These findings are consistent with Hypothesis 6 as they suggest that shareholders of companies with stronger environmental

[17] Due to the reduced sample size, we do not include industry and event fixed effects in the regressions.

performance (i.e., companies with more environmental strengths or fewer environmental concerns) react less negatively to the announcement of eco-harmful behavior.

In the right-hand side panel of Table 6, we repeat the analysis for eco-friendly events. The coefficients on the time trend in models 1 and 2 are again similar to the full sample estimate from model 1 of Table 5. In model 2, we find that the coefficient on environmental strengths is significantly negative, while the coefficient on environmental concerns is significantly positive. These findings are supportive of Hypothesis 5, according to which companies with stronger environmental performance benefit relatively less from the introduction of additional eco-friendly initiatives.

Interestingly, once we control for environmental performance, the coefficient on the time trend drops substantially from –0.034% in model 1 to –0.023% in model 2, and is only marginally significant (t = 1.89). This finding is not surprising given our proposition that the decrease in CARs over time may be due to companies becoming increasingly eco-friendly. More precisely, we introduced two channels through which the trend towards eco-friendlier behavior can reduce shareholders' positive reaction to the announcement of eco-friendly initiatives: 1) as companies are increasing their stock of green initiatives (i.e., *within firm*), the marginal return of an additional green initiative likely decreases, and 2) as eco-friendly behavior becomes more widespread *across firms*, the competitive value of an additional green initiative is likely smaller. The specification in model 2 disentangles these two channels by including both the time trend and environmental performance as explanatory variables. Our finding that stronger environmental performance is significantly negative is consistent with the first channel, while our finding that the coefficient on the time trend remains negative and significant is supportive of the second channel.

DISCUSSION AND CONCLUSION

Are shareholders sensitive to the announcement of eco-harmful corporate behavior and eco-friendly corporate initiatives? And if so, has their perception changed over time? Our study suggests that the answer to these questions is yes. In this study, we argue that a company's positive engagement with the environment generates new and competitive resources for the firm. Extending this view of "environment-as-a-resource," we further argue that the value of environmental CSR depends on both external (across-firm) norms of environmental CSR and internal (within-firm) levels of environmental CSR. By developing this framework and empirically testing its predictions, we obtain three main insights.

First, consistent with the view that environmental CSR is a resource for firms, we find that shareholders react positively to the announcement of eco-friendly initiatives, and negatively to the announcement of eco-harmful behavior.

Second, we argue that external pressure to becoming green is setting the institutional norm of environmental CSR. The more becoming green is institutionalized as the norm, the more eco-harmful behavior has a negative effect on perceptions of the firm, because firms are punished for not following the norm. Similarly, the more companies are enacting the institutional norm of going green, the less shareholders reward firms for eco-friendly initiatives. In support of these hypotheses, we show that over time the positive reaction to the announcement of eco-friendly initiatives has significantly decreased, while the negative reaction to the announcement of eco-harmful behavior has significantly increased.

Third, we posit that environmental CSR is a resource with decreasing marginal returns. Consistent with this view, we find that the higher the stock of environmental CSR, the less

shareholders reward companies for eco-friendly initiatives, and the less they punish them for eco-harmful behavior.

These findings make several contributions to the literature. To the best of our knowledge, our study is the first to theorize and provide empirical evidence on how the relationship between environmental CSR and stock prices has evolved over time. The comprehensive nature of our dataset makes this analysis possible since it spans three decades from 1980 to 2009. Also, our study is the first to examine how shareholders' reaction depends on environmental performance (as measured by KLD scores on environmental strengths and concerns). These specific findings are related to recent research in the context of general CSR that examines how CSR affects shareholders' reaction to the announcement of (socially) irresponsible behavior. Specifically, a strand of literature studying the value of CSR for companies during crises views CSR as a risk-management tool (e.g., Fombrun, Gardberg, & Barnett, 2000; Godfrey, 2005; Peloza, 2006). The argument is that CSR can develop goodwill and trust that protects the company in case of a negative event (i.e., CSR acts as "insurance").[18] An empirical test is provided by Godfrey, Merrill, and Hansen (2009), who show that the negative stock market reaction to the announcement of legal actions against companies (e.g., patent infringements, quality control issues, bribery, etc.) is significantly mitigated for firms that participate in institutional CSR activities.[19] An open question is how to empirically distinguish between the marginal return argument provided in this study and the insurance-based view. Nevertheless, our finding that the positive reaction to eco-friendly behavior is smaller for companies with higher environmental

[18] Another strand of literature (e.g., Baron, 2009; Baron & Diermeier, 2007) makes the opposite claim: CSR may increase a company's vulnerability as it faces increased public demands and scrutiny, thereby increasing the risk of not meeting the public's expectations.

[19] Further evidence for the insurance-based view is provided in Bansal and Clelland (2004), who show that environmentally legitimate firms incur less unsystematic risk than illegitimate firms.

performance is supportive of the marginal return argument, while the insurance-based view makes no equivalent prediction.

As for the analysis of shareholders' reaction to the announcement of eco-harmful and -friendly events on average (i.e., the average CAR across all years), our results are consistent with the findings from three related articles. First, Klassen and McLaughlin (1996) examine whether the announcements of environmental awards affect stock prices. Using a sample of 140 award announcements from 1987 to 1991, they find a positive stock market reaction, similar to our finding of a positive reaction following the announcement of eco-friendly corporate initiatives. Unlike our study, their analysis focuses on awards instead of actual events. Second, Hamilton (1995) examines how the stock market reacted to the release of data on toxic chemical releases by the Environmental Protection Agency (EPA) in June 1989. He documents a decrease in stock prices, similar to our finding that the announcement of eco-harmful behavior triggers a negative stock market reaction. Unlike Hamilton, our analysis is not limited to toxic chemical releases but covers a comprehensive range of eco-harmful events. Third, Gunthorpe (1997) investigates whether the detection of illegal corporate activities affects stock prices using a sample of 69 announcements (including 3 EPA violations) from 1988 to 1992. She obtains a negative stock market reaction, consistent with our findings. However, shareholders' reaction to illegal activities (that include mainly white-collar violations such as corporate fraud, bribery, etc.) may not be representative of shareholders' reaction to (illegal *and* legal) eco-harmful corporate events.

A limitation of our analysis—like any event study—is that our results only speak to the short-run stock market reaction. A related question is whether environmental CSR affects shareholder value and firm performance in the long-run. To examine this question, one could

regress long-run measures of firm value (e.g., Tobin's Q) and firm performance (e.g., return on assets, net profit margin, etc.) on proxies for environmental CSR or, more broadly, on proxies for general CSR (for reviews of the literature that examine the relationship between CSR and accounting measures of performance, see Margolis, Elfenbein, & Walsh, 2007; Margolis and Walsh, 2001, 2003). However, CSR is likely endogenous with respect to firm value and firm performance, which makes such analysis difficult. Overcoming this challenge is an interesting avenue for future research.

Another interesting avenue is whether our conceptual framework would apply to CSR *in general*. In particular, how has shareholders' perception of CSR evolved over time? Also, does CSR exhibit decreasing marginal returns? These are interesting questions for future research.

Finally, our findings have potentially significant implications for many areas of management including strategy, innovation, intrapreneurship, and corporate venturing. For instance, since shareholders value eco-friendly behavior, managers and boards of directors may find it worthwhile to design and implement effective environmental CSR policies. The same applies to innovation and R&D programs targeted at improving environmental performance. Furthermore, since eco-friendly and -harmful business strategies matter to shareholders, research in management science could benefit from explicitly considering the environmental implications of managerial decision-making. Finally, and perhaps most importantly from a policy perspective, legislators may benefit from coordinating environmental regulations with companies; since legislators and shareholders seem to share basic views of the environment, increased cooperation may prove to be fruitful.

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APPENDIX A

Insert Table A1 about here

Insert Table A2 about here

APPENDIX B

Calculation of Cumulative Abnormal Returns

The event study methodology examines the stock price reaction around the announcement of an event. We follow common practice by using the publication date of the corresponding WSJ article as the event date (day 0). Furthermore, we account for the possibility that the event documented in the WSJ article may have happened on the previous day by including the previous trading day (day –1) in the event window (see MacKinlay, 1997). This 2-day event window is denoted by [–1, 0]. To see if there is any impact of the event on the stock

price before or after the 2-day event window, we also consider the time intervals [–40, –21], [–20, –11], [–10, –6], [–5, –2] prior to, and the time intervals [1, 5], [6, 20] after the event window. In robustness checks, we also consider the event windows [–1, 1], [–1, 2], and [–1, 3].

For each firm i, we compute the abnormal returns using the market model. The coefficients α_i and β_i of the market model are estimated by Ordinary Least Square (OLS) on the basis of 200 trading days prior to the first time interval (i.e., the 200 trading days used in the estimation correspond to the interval [–240, –41]) using daily return data from CRSP. Formally, we estimate

$$R_{it} = \alpha_i + \beta_i \times R_{mt} + e_{it} ,$$

where R_{it} is the return on the stock of company i on day t, α_i is the intercept, β_i is the systematic risk of stock i, R_{mt} is the daily return of the equally weighted CRSP market portfolio, and e_{it} is the daily risk-adjusted residual for firm i. The corresponding estimated return on the stock of firm i on day t is given by

$$\hat{R}_{it} = \alpha_i + \beta_i \times R_{mt} .$$

We can then calculate the abnormal daily return (AR) of company i on day t as follows:

$$AR_{it} = R_{it} - \hat{R}_{it} .$$

Finally, we compute the cumulative abnormal returns (CAR) for each time interval by summing up the abnormal returns within the specific time window (e.g., [–1, 0]).

To examine whether eco-friendly and -harmful behavior is perceived differently by the stock market, we divide the sample into eco-friendly and -harmful events. Accordingly, we compute the CARs separately for both types of events. To examine whether shareholder's perception has changed over the past decades, we further split the sample into three decades (1980–1989, 1990–1999, and 2000–2009) and compute CARs separately for each decade.

APPENDIX C

KLD's Environmental Strengths and Concerns

The KLD index of environmental strengths consists of the following strengths (see KLD, 2006):

- *Beneficial products and services.* The company derives substantial revenues from innovative remediation products, environmental services, or products that promote the efficient use of energy, or it has developed innovative products with environmental benefits. (The term "environmental service" does not include services with questionable environmental effects, such as landfills, incinerators, waste-to-energy plants, and deep injection wells.)
- *Pollution prevention.* The company has notably strong pollution prevention programs including both emissions reductions and toxic-use reduction programs.
- *Recycling.* The company either is a substantial user of recycled materials as raw materials in its manufacturing processes, or a major factor in the recycling industry.

- *Clean energy.* The company has taken significant measures to reduce its impact on climate change and air pollution through use of renewable energy and clean fuels or through energy efficiency. The company has demonstrated a commitment to promoting climate-friendly policies and practices outside its own operations.
- *Communications.* The company is a signatory to the CERES Principles, publishes a notably substantive environmental report, or has notably effective internal communications systems in place for environmental best practices.
- *Property, plant, and equipment.* The company maintains its property, plant, and equipment with above-average environmental performance for its industry.
- *Other strength.* The company has demonstrated a superior commitment to management systems, voluntary programs, or other environmentally proactive activities.

The KLD index of environmental concerns consists of the following concerns (see KLD, 2006):

- *Hazardous waste.* The company's liabilities for hazardous waste sites exceed $50 million, or the company has recently paid substantial fines or civil penalties for waste management violations.
- *Regulatory problems.* The company has recently paid substantial fines or civil penalties for violations of air, water, or other environmental regulations, or it has a pattern of regulatory controversies under the Clean Air Act, Clean Water Act or other major environmental regulations.
- *Ozone-depleting chemicals.* The company is among the top manufacturers of ozone-depleting chemicals such as HCFCs, methyl chloroform, methylene chloride, or bromines.

- *Substantial emissions.* The company's legal emissions of toxic chemicals (as defined by and reported to the EPA) from individual plants into the air and water are among the highest of the companies followed by KLD.
- *Agricultural chemicals.* The company is a substantial producer of agricultural chemicals, i.e., pesticides or chemical fertilizers.
- *Climate change.* The company derives substantial revenues from the sale of coal or oil and its derivative fuel products, or the company derives substantial revenues indirectly from the combustion of coal or oil and its derivative fuel products. Such companies include electric utilities, transportation companies with fleets of vehicles, auto and truck manufacturers, and other transportation equipment companies.
- *Other concern.* The company has been involved in an environmental controversy that is not covered by other KLD ratings.

FIGURE 1

Evolution of Media Attention and Shareholder Proposals Related to Environmental CSR

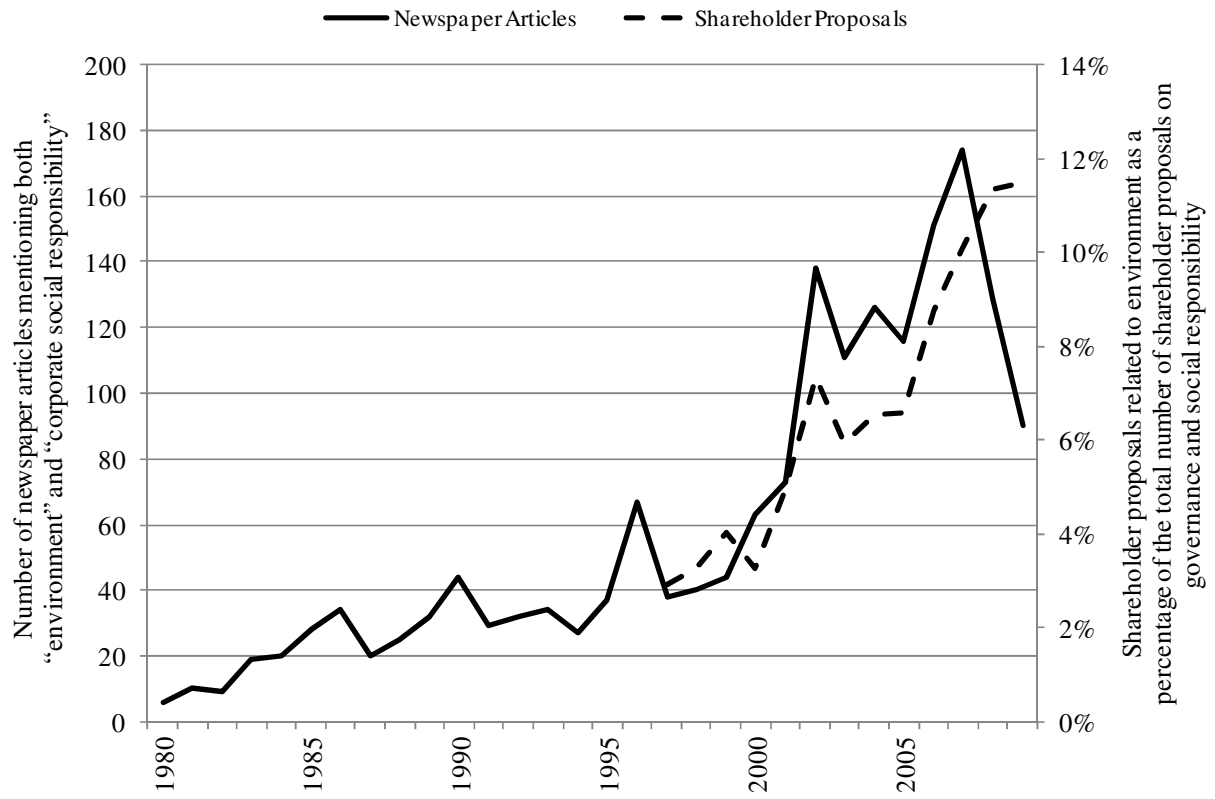

TABLE 1

Descriptive Statistics and Correlations

Eco-Friendly Events[a]

Variable	Mean	s.d.	1	2	3	4	5	6	7	8
1. CAR[-1, 0]	0.84	1.96								
2. Trend	1997.45	8.41	-0.37							
3. Size[b]	10.24	1.91	-0.29	0.52						
4. Age[b]	3.59	0.44	-0.20	0.14	0.40					
5. Profitability	0.05	0.05	-0.01	0.04	0.08	0.07				
6. Market-to-Book	2.51	2.28	0.10	0.07	-0.05	-0.09	0.58			
7. Analysts Following[b]	2.02	1.41	0.02	0.19	0.14	0.19	0.20	0.19		
8. KLD Environmental Strengths	0.95	1.03	-0.24	0.35	0.01	0.19	0.04	0.21	-0.07	
9. KLD Environmental Concerns	2.49	1.73	0.16	0.03	0.03	0.26	0.02	-0.19	0.10	0.07

[a] $n = 117$ ($n = 55$ in rows 8-9); all correlations larger than |0.18| (|0.27| in rows 8-9) are significant at $p < 0.05$.

[b] Natural logarithm.

Eco-Harmful Events[c]

Variable	Mean	s.d.	1	2	3	4	5	6	7	8
1. CAR[-1, 0]	-0.65	2.42								
2. Trend	1991.73	6.06	-0.21							
3. Size[d]	9.75	2.00	0.23	0.31						
4. Age[d]	3.57	0.47	0.14	0.18	0.54					
5. Profitability	0.04	0.07	-0.05	0.24	0.21	0.35				
6. Market-to-Book	2.10	1.53	-0.12	0.29	0.18	0.12	0.40			
7. Analysts Following[d]	1.25	1.50	0.06	0.35	0.01	0.13	0.12	0.23		
8. KLD Environmental Strengths	0.75	1.01	0.19	0.17	0.01	0.10	0.02	0.18	-0.07	
9. KLD Environmental Concerns	2.74	1.57	-0.27	0.06	0.15	0.24	0.04	-0.14	0.11	0.13

[c] $n = 156$ ($n = 47$ in rows 8-9); all correlations larger than |0.16| (|0.29| in rows 8-9) are significant at $p < 0.05$.

[d] Natural logarithm.

TABLE 2

CAR around the Announcement of Eco-Friendly and -Harmful Corporate Behavior[a]

	Eco-Friendly Events				Eco-Harmful Events			
Event Time (days)	CAR (in %)		Positive : Negative		CAR (in %)		Positive : Negative	
[-40, -21]	0.17	(0.12)	64 : 53	(1.43)	-0.88	(-0.92)	73 : 83	(-0.41)
[-20, -11]	0.32	(0.62)	60 : 57	(0.69)	0.75	(0.39)	72 : 84	(-0.57)
[-10, -6]	-0.45	(-1.18)	55 : 62	(-0.23)	0.05	(-0.12)	79 : 77	(0.55)
[-5, -2]	-0.20	(-0.77)	57 : 60	(0.14)	-0.12	(-0.86)	75 : 81	(-0.09)
[-1, 0]	0.84***	(3.57)	79 : 38***	(4.21)	-0.65***	(-3.49)	60 : 96**	(-2.49)
[1, 5]	0.16	(0.38)	59 : 58	(0.51)	-0.15	(-0.47)	74 : 82	(-0.25)
[6, 20]	-0.49	(-1.21)	54 : 63	(-0.42)	-0.04	(-0.26)	73 : 83	(-0.41)

[a] Eco-friendly events: $n = 117$; eco-harmful events: $n = 156$.

* $p < 0.10$

** $p < 0.05$

*** $p < 0.01$

TABLE 3

Robustness

	Eco-Friendly Events CAR (in %)		Eco-Harmful Events CAR (in %)	
1. Cross-sectional correlation	0.84***	(3.81)	-0.65***	(-3.01)
2. Precision-weighted CARs	0.65***	(3.27)	-0.57***	(-2.82)
3. Excluding Exxon's oil spill	0.89***	(3.50)	-0.61**	(-2.49)
4. 3-factor model of Fama and French	0.91***	(4.70)	-0.70***	(-3.47)
5. 4-factor model of Carhart	0.89***	(4.60)	-0.69***	(-3.41)
6. Industry-adjusted CARs	0.82***	(3.89)	-0.61***	(-3.73)
7. Excluding confounding events	0.82***	(3.83)	-0.60***	(-3.59)
8. Alternative event window: [-1, 1]	0.83***	(2.88)	-0.76***	(-3.83)
9. Alternative event window: [-1, 2]	0.67**	(2.13)	-0.78***	(-3.17)
10. Alternative event window: [-1, 3]	0.66*	(1.93)	-0.62**	(-2.48)

* $p < 0.10$
** $p < 0.05$
*** $p < 0.01$

TABLE 4

CAR[–1, 0] Across Decades

Time Period	Eco-Harmful Events		Eco-Friendly Events	
1980 – 1989	-0.42	(-1.11)	1.19***	(2.72)
1990 – 1999	-0.66**	(-2.53)	0.89**	(2.04)
2000 – 2009	-1.12***	(-2.69)	0.68*	(1.76)

* $p < 0.10$
** $p < 0.05$
*** $p < 0.01$

TABLE 5

Regression Analysis of CAR[–1, 0]

	Eco-Harmful Events						Eco-Friendly Events					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
Time Trend	-0.040***	(3.52)	-0.043***	(3.69)	-0.049***	(3.90)	-0.025***	(3.23)	-0.021**	(2.49)	-0.026***	(3.15)
Size	0.410***	(3.57)	0.403***	(3.21)	0.634***	(4.22)	-0.069	(0.60)	-0.147	(1.09)	-0.224	(1.53)
Age	0.125	(0.25)	0.235	(0.46)	0.416	(0.78)	-0.526	(1.22)	-0.481	(1.02)	-0.579	(1.19)
Profitability	-0.067	(0.21)	-0.059	(0.16)	0.326	(0.82)	-0.284	(0.69)	0.048	(0.11)	0.210	(0.44)
Market-to-Book	-0.173	(1.28)	-0.212	(1.52)	-0.235	(1.27)	0.124	(1.32)	0.036	(0.38)	0.057	(0.60)
Analysts Following	0.103	(0.77)	0.183	(1.20)	0.176	(1.07)	0.085	(0.69)	0.028	(0.20)	0.033	(0.23)
Industry Fixed Effects	No		Yes		Yes		No		Yes		Yes	
Event Type Fixed Effects	No		No		Yes		No		No		Yes	
Observations	156		156		156		117		117		117	
R-squared	0.15		0.20		0.34		0.18		0.26		0.36	

* $p < 0.10$

** $p < 0.05$

*** $p < 0.01$

TABLE 6

Regression Analysis of CAR[–1, 0] Controlling for Environmental Strengths and Concerns

	Eco-Harmful Events				Eco-Friendly Events			
	Model 1		Model 2		Model 1		Model 2	
Time Trend	-0.052***	(3.10)	-0.038**	(2.18)	-0.034***	(2.79)	-0.023*	(1.89)
KLD Environmental Strengths			0.259*	(1.75)			-0.206*	(1.90)
KLD Environmental Concerns			-0.286**	(2.31)			0.128*	(1.85)
Size	0.294	(0.99)	0.518	(1.64)	0.073	(0.45)	0.069	(0.42)
Age	1.093	(1.45)	1.407	(1.53)	0.277	(0.42)	0.343	(0.47)
Profitability	0.552	(0.64)	1.506	(1.60)	-0.110	(0.23)	-0.426	(0.81)
Market-to-Book	-0.344	(1.24)	-0.384	(1.40)	0.172	(1.38)	0.210	(1.42)
Analysts Following	-0.001	(0.00)	0.050	(0.20)	0.065	(0.33)	-0.020	(0.10)
Observations	47		47		55		55	
R-squared	0.29		0.40		0.24		0.30	

* $p < 0.10$

** $p < 0.05$

*** $p < 0.01$