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Do Corporations Invest Enough in Environmental Responsibility?

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Abstract Proponents of corporate environmental responsibility argue that corporations shortchange shareholders by investing too little in environmental responsibility. They claim that corporations can improve their financial performance by increasing their investment in environmental responsibility. Opponents of corporate social responsibility argue that corporations shortchange shareholders by investing too much in environmental responsibility. They claim that corporations can improve their financial performance by reducing their investment in environmental responsibility. Yet, others claim that corporations serve their shareholders well by investing just enough in social responsibility, not too little and not too much. If so, corporations increase their investment in environmental responsibility when an increase improves financial performance and reduce their investment in environmental responsibility when a decrease improves financial performance. Our evidence is consistent with this last claim. We find that the behavior of corporations is consistent with the claim that they act in the interest of shareholders, increasing or decreasing their investment in environmental responsibility as necessary to improve their financial performance.

Keywords Corporate environmental responsibility · Corporate financial performance · Causality · Corporate social responsibility

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BP's disastrous oil spill into the Gulf of Mexico and Goldman Sachs' hand in the disastrous global financial crisis prompted critical reflection on corporate social responsibility and its tradeoffs with corporate profits. BP's "Beyond Petroleum" campaign positioned it as the leading environmentally responsible energy company before its slogan turned into a bitter punch line. Goldman's "10,000 Women" project promised business education of women, before it was revealed that Goldman's business practices serve as poor foundations for business education. Freeland (2010) concluded that the BP and Goldman business disasters were "facilitated by the mini-industry of corporate social responsibility—known as CSR by those in the trade—a fetish encouraged by the philanthropies that feed off it and funded by the corporate executives who have found that it serves their bottom line."

How do corporations balance profits and social responsibility? And how should we, as a society, assure a proper balance? We find the corporations are not willing to sacrifice profits for environmental responsibility. Corporations adjust their investment in social responsibility up or down to maximize profits, adding to their investment when additions increase profits and subtracting from their investment when subtractions increase profits. The events of BP and Goldman indicate that corporate investments in social responsibility might be too low when considered by society, even if they are considered adequate by corporations. This implies that government has a crucial role in assuring that corporations increase their investment in social responsibility to levels adequate for society.

Proponents of corporate environmental responsibility (CER) and, more generally, corporate social responsibility, often claim that corporations face no tradeoff between improving their corporate social responsibility and increasing their financial performance. They rely on studies

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such as those by Russo and Fouts (1997) and Guenster et al. (2006) who find that high corporate environmental ratings are associated with high financial performance. Russo and Fouts concluded that "[m]anagers who… resist and contest pressures for environmental improvement risk not only a profound loss of productive energy, but also a bottom-line loss of equal proportions" (p. 554). Guenster et al. concluded that "managers have little reason to worry that an environmental policy conflicts with the company's primary objectives" (p. 25). Weber et al. (2008) stated that "Today, the positive correlation between environmental performance and financial performance is widely accepted, even though the strength of the correlation and its genesis are still often unclear."

The theory underlying the no-tradeoff claim is dubious because the marginal returns of investments in corporate social responsibility diminish as the quantity of investments increase. As Kolstad (2007) wrote, "Put simply, company profits do not increase indefinitely in the number of schools and hospitals it funds." There would have been no need for public funding of schools and hospitals if companies were eager to undertake these socially responsible investments, confident that they would boost company profits.

The empirical evidence on the no-tradeoff claim is conflicting. Some empirical studies do show that high corporate social responsibility is associated with high corporate financial performance but others do not. Moreover, empirical studies generally employ cross-section techniques, controlling for factors such as R&D intensity that are associated with both corporate social responsibility and corporate financial performance, but failing to control for other factors which cannot be as easily identified or measured.

Some, most notably, Friedman (1970), have recognized the tradeoff between corporate social responsibility and corporate financial performance and called on corporations to focus on financial performance. Reich (2007) noted that corporations are bound by their obligations to shareholders to pursue financial performance whether tradeoffs exist between financial performance and social responsibility or not. Reich concluded that prodding corporations toward financial responsibility is counterproductive, and urged governments to direct corporations toward social responsibility by regulations, not exhortations. However, Pava (2008) disagreed with Reich, concerned that Reich's argument might lead us to "give up on the possibilities of business playing an important role in building a better future" (p. 811).

The call to focus on financial performance is common in finance textbooks. Brealey et al. (2006) asked: "How can the financial manager help the firm's stockholders? There is only one way," they answered, "by increasing the market value of each stockholder's stake in the firm. The way to do that is to seize all investments opportunities that have a positive net present value" (p. 24). The evidence of Wang et al. (2008) implies that managers apply the prescriptions in finance textbooks. They found a nonlinear relation between corporate philanthropy and corporate financial performance. Too little philanthropy detracts from financial performance, but too much also detracts from corporate financial performance.

Freireich and Fulton (2009) offered a useful distinction between "impact first" and "financial first" investors. This distinction applies to corporate managers as well. The distinction relates to the willingness to accept investments with lower than normal returns. Investments with normal returns leave unchanged the value of a company and the wealth of its shareholders. Investments with returns higher than normal returns increase value and wealth, while investments with returns lower than normal returns diminish value and wealth.

Impact-first investors seek investments which maximize social or environmental impact, as long as financial returns exceed a floor they set. However, that floor set by impact-first investors is at returns lower than normal returns they can obtain in equally risky alternative investments which have no positive social impact or even in investments which have a negative social impact. Philanthropy, where donors do not even expect a return of their principal, is the extreme form of impact-first investing. In effect, donors set the floor at a loss of their entire donation, expecting nothing but social or environmental impact. In contrast, financial-first investors seek investment projects with social or environmental impact which exceeds a floor they set, but they invest only in projects with financial returns which, at a minimum, equal normal returns. For example, financial-first investors might seek investments in clean technology with returns which, at a minimum, equal normal returns.

Are corporate managers impact-first managers or are they financial-first managers? Do managers act as financial-first managers, engaged in improving the environmental responsibility of their companies only when returns associated with such improvements equal or exceed normal returns? Do managers act as impact-first managers, engaged in improving environmental responsibility even when associated returns fall below normal returns? Or do managers act as ineffective managers, failing to engage in improving the environmental responsibility of their companies even when associated returns exceed normal returns, making them neither impact first nor financial-first managers? These are the questions we address in this study.

We offer answers based on an examination of the relation between changes in CER and changes in corporate financial performance. Our measures of CER are the environmental rating of companies by KLD Research and

Analytics. Our measures of corporate financial performance are return on assets (ROA) and Tobin's Q. The first reflects the profitability of companies and the second reflects the perception of current and future profitability in the eyes of investors.

We offer three hypotheses and begin with ROA. The first hypothesis is that increases in CER are followed by increases in ROA, and decreases in CER are followed by decreases in ROA. This is the case where managers are currently ineffective, acting as neither impact-first managers, nor as financial-first managers. These are managers who could have increased the financial performance of their companies by improving environmental responsibility. We depict this hypothesis in Fig. 1 as the region between A and B. These are the managers described by Russo and Fouts and by Guenster et al. as those who consistently underestimate the benefits of being environmentally responsible or overestimate its costs.

Environmental responsibility is intangible capital. Edmans (2011) noted that managers might act as if they underestimate the value of intangible capital because its costs are immediately obvious in reductions in current earnings, while its benefits are less obvious and lie in the future. This is consistent with the finding of Lev et al. (2005) that investors focus on reported profitability measures and underestimate the benefits of R&D expenditures which are expensed immediately but enhance measured profitability only years later. Managerial myopia has been documented by Mas (2008) who found that labor unrest at Caterpillar reduced product quality, and it has been formalized in models by Narayanan (1985) and Stein (1988, 1989) and in a survey by Graham et al. (2005). Edmans (2011) and Derwall et al. (2005) provide evidence consistent with managerial myopia. Edmans (2011) showed that stocks of companies with satisfied employees earned higher returns than stocks of companies with less satisfied employees. Derwall et al. (2005) found that stocks of companies with good environmental records earned higher returns than stocks of companies with poor environmental

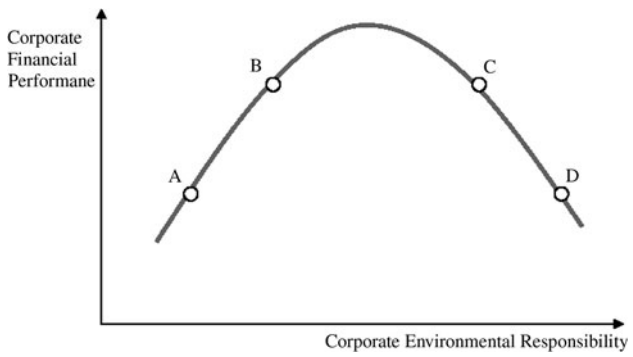

Fig. 1 The relation between corporate environmental responsibility and corporate financial performance

records. Kempf and Osthoff (2007) found that stocks of companies that ranked high overall on community, diversity, employee relations, environment, human rights, and products did better than stocks that ranked low.

The second hypothesis is that increases in CER are followed by decreases in ROA and decreases in CER are followed by increases in ROA. This is the case where managers are impact-first managers, improving CER but hurting financial performance. We depict this hypothesis in Fig. 1 as the region between C and D. This hypothesis might be true if corporate managers invest in corporate social/environmental responsibility even when the benefits of investments that tilt it toward environmental responsibility fall short of the costs of these investments. For instance, Abowd (1989) found that increases in employee pay increase the costs borne by a company without increasing the benefits to shareholders. Hence, employee gains come at the expense of shareholders' returns. Jensen and Meckling (1976) and Bertrand and Mullainathan (2003) argued that managers might prefer to submit to employee demands for higher pay because higher pay fosters a more pleasant working environment for themselves, even though the money comes from the pockets of shareholders who gain nothing from it. Barnea and Rubin (2010) argued that company insiders, such as managers, are willing to engage in socially responsible actions whose costs exceed the benefits to shareholders because they reap private benefits, such as awards and other expressions of appreciation, from those promoting social responsibility. Barnea and Rubin found empirical support for their argument in evidence that insiders in companies that rank relatively high on social responsibility hold relatively small portions of their company shares, so they bear relatively little of the cost of accolades they receive for their socially responsible actions.

In the third hypothesis, managers aim for the level of CER that maximizes ROA, no more than that and no less. Changes in the economy or society can cause discrepancy between current levels of CER and levels that maximizes ROA. Managers adjust CER up or down to levels which maximize ROA. This is the case where managers are financial-first managers, willing to improve environmental responsibility but unwilling to sacrifice financial performance for it. If this hypothesis is true we should find that increases in CER are followed by increases in ROA and decreases in CER are also followed by *increases* in ROA, as managers trim investments which improve environmental responsibility but diminish ROA. We depict this hypothesis in Fig. 1 as the region between B and C.

Investments in CER are not likely to affect ROA instantaneously. Changes in ROA following changes in CER might well take several years. In contrast, changes in Tobin's Q would be instantaneous if the stock market is

perfectly efficient since stock prices can adjust instantaneously in response to new information. Tobin's Q is the ratio of the total value of the securities of a company, such as stocks and bonds, to the replacement value of its assets. Companies with high Tobin Q are companies that are judged by investors as having bright futures. For instance, Google has a higher Tobin's Q than Ford. A company's Tobin's Q can change instantaneously as stock and bond prices increase if the future of a company is judged brighter or decrease if the future of the company is judged less bright. Toyota's Tobin's Q was high before defects were uncovered in its cars, and not as high later, as its stock price declined.

Our three Tobin's Q hypotheses are based on the premise that the stock market is not perfectly efficient and stock prices adjust to environmental information only with a lag. Therefore, the three Tobin's Q hypotheses parallel the ROA hypotheses.

The three hypotheses about ROA and Tobin's Q are formally stated as follows:

Hypothesis 1 Corporate managers are neither impact-first, not financial-first.

Increases in corporate environmental responsibility are followed by increases in ROA and decreases in corporate environmental responsibility are followed by decreases in ROA.

Increases in corporate environmental responsibility are followed by increases in Tobin's Q and decreases in corporate environmental responsibility are followed by decreases in Tobin's Q.

Hypothesis 2 Corporate managers are impact-first.

Increases in corporate environmental responsibility are followed by decreases in ROA and decreases in corporate environmental responsibility are followed by increases in ROA.

Increases in corporate environmental responsibility are followed by decreases in Tobin's Q and decreases in corporate environmental responsibility are followed by increases in Tobin's Q.

Hypothesis 3 Corporate managers are financial-first.

Increases in corporate environmental responsibility are followed by increases in ROA and decreases in corporate environmental responsibility are also followed by increases in ROA.

Increases in corporate environmental responsibility are followed by increases in Tobin's Q and decreases in corporate environmental responsibility are also followed by increases in Tobin's Q.

We find strong evidence that companies that increased their levels of CER during a year increased their corporate financial performance, measured by ROA, in subsequent 3 and 5-year periods by more than companies that did not change their levels of CER. We also find strong evidence that companies that decreased their levels of CER increased their corporate financial performance, measured by ROA, in subsequent 3 and 5-year periods by more than companies that did not change in their levels of CER. These findings are consistent with the financial-first hypothesis that corporate managers shift levels of CER up or down to maximize corporate financial performance.

We also find evidence consistent with the financial-first hypothesis when we measure corporate financial performance by Tobin's Q. We find strong evidence that companies that increased their environmental responsibility increased their financial performance in subsequent 3 and 5-year periods by more than companies that did not change their levels of environmental responsibility. We find weaker evidence that companies that decreased their levels of CER increased their financial performance in subsequent 3 and 5-year periods by more than companies that did not change in their levels of environmental responsibility. These findings are also consistent with the financial-first hypothesis that managers shift levels of environmental responsibility up or down to maximize financial performance.

The Literature

Several studies employed cross-section analysis of levels of CER and corporate financial performance to uncover the relation between the two. Russo and Fouts (1997) used ROA of companies as their measure of corporate financial performance, and environmental ratings by the Franklin Research and Development Corporation as their measure of CER. Their data include 477 companies over 2 years, 1991 and 1992. Aware of the problem of spurious correlation between CER and corporate financial performance due to common factors, Russo and Fouts controlled for company growth rate, advertising intensity, company size, capital intensity, industry concentration, and industry growth rate in a regression of ROA on environmental ratings. They found that the coefficient of environmental ratings was positive and statistically significant. However, it is not clear that the set of controls used by Russo and Fouts is complete and so we are left with the possibility that the relation between CER and corporate financial performance is due to missing controls. Moreover, the study leaves us wondering about the direction of causality between CER and corporate financial performance.

Event studies have the potential to uncover the direction of causality between CER and corporate financial performance. Klassen and McLaughlin (1996) found that environmental awards to companies were followed by positive

returns of their stocks and environmental crises were followed by negative returns. However, it is hard to interpret these findings as evidence that increases in CER cause increases in corporate financial performance and decreases in CER cause decreases in corporate financial performance. Klassen and Mc Laughlin identified environmental crises from keywords such as "oil," "chemical," "gas leak," or "explosion" along with the words "spill" and "environment." It is not surprising to find that news about an oil spill is followed by negative returns. However, this finding does not necessarily imply that reductions in CER are followed by reductions in corporate financial performance. It might well be that reductions in CER are generally followed by increases in corporate financial performance. The negative returns of companies that were unfortunate enough to have a spill might be small relative to the savings of companies which skimped on CER but were fortunate enough to avoid a spill. The finding that environmental award are accompanied by positive returns might indicate that increases in CER are rewarded by increases in corporate financial performance but it might also be that they indicate no more than the effect of investors drawn into buying the stock because it is in the news (see Barber and Odean 2008). The 5-day window after the announcement of the award might be too short to observe reversal of returns.

Hart and Ahuja (1996) and Waddock and Graves (1997) found that high CER correspond to high corporate financial performance but expressed doubts about the direction of causality. Dowell et al. (2000) employed lagged variables in an attempt to determine the direction of causality between CER and corporate financial performance but they noted the "unit root" problem in their results. Dowell et al. (2000) tried to overcome the problem by examining companies that experienced changes over time in their levels of environmental responsibility but were hampered by the small number of such companies.

Analysis of *changes* in environmental responsibility and subsequent *changes* in financial performance has a great advantage over analysis of *levels* in environmental responsibility and contemporaneous *levels* of financial performance since factors such as growth rate, advertising intensity, company size, capital intensity, industry concentration, and industry growth rate and possibly many unidentified factors are generally stable in a company, at least relative to other companies during the same period. This alleviates the concern, present in analysis of *levels*, that what we attribute to environmental responsibility should, in fact, be attributed to some unidentified or missing factors.

Clarkson et al. (2011), unlike Russo and Fouts, Hart and Ahuja, and Waddock and Graves, studied the relation between *changes* in CER, measured by the sum of all chemicals (in pounds) released by a company into air, water, and land in each year, and subsequent *changes* in corporate financial performance, measured by profitability, cash flows, and Tobin's Q. They found that increases in CER are followed by increases in corporate financial performance and decreases in CER are followed by decreases in corporate financial performance. Why would managers ever decrease levels of CER or refrain from increasing them if higher levels of CER lead to higher levels of corporate financial performance? Clarkson et al. (2011) found the answer in a resource-based view of companies. Specifically, companies with constrained resources find it difficult to increase levels of environmental responsibility even if such increases lead to increases in financial performance. They found support for their hypothesis in evidence that companies that improved their relative environmental performance have higher levels of cash flows, lower leverage, higher levels of growth and higher Tobin's Q immediately prior to the improvement. Our analysis, like that of Clarkson et al., focuses on *changes* rather than on *levels*.

Data and Analysis

Our data on CER are from the KLD database.[1] Data are at the end of each calendar year. Since 1991, KLD compiled data about approximately 650 companies comprising the Domini 400 Social Index and S&P 500 Index. Beginning in 2001, KLD expanded its coverage to all the companies in the Russell 1000 Index and in 2003 KLD expanded it further to all the companies in the Russell 3000 Index. We end our KLD period in 2000, before the expansion of coverage, since our analysis requires several years of ROA and Tobin's Q data beyond the KLD period.

KLD rates each company on five indicators of environmental strength and six indicators of environmental concerns. KLD's list of environment strengths includes:

> *Beneficial products and services*. The company derives substantial revenues from innovative remediation products, environmental services, or products that promote

[1] To date, KLD data have been used extensively in scholarly research to operationalize the CSR construct. Szwajkowski and Figlewicz (1999) show that KLD social ratings are not highly correlated with Fortune reputation data, indicating that the KLD ratings are not substantially influenced by a firm's financial success. Some researchers call the KLD data "the de facto research standard" for measuring CSR in scholarly research (e.g., Waddock, 2003, p. 369). However, KLD ratings as a proxy for corporate environmental performance are far from perfect. In particular, KLD's measure is not readily comparable across industries because of industry variations in pollution propensity, and variations among companies in disclosure policies. We control for industry variation in our multivariate regressions.

the efficient use of energy, or it has developed innovative products with environmental benefits.

Pollution prevention. The company has notably strong pollution prevention programs including 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.

Alternative fuels. The company derives substantial revenues from alternative fuels. The term "alternative fuels" includes natural gas, wind power, and solar energy. The company has demonstrated an exceptional commitment to energy efficiency programs or the promotion of energy efficiency.

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.

KLD's list of environmental concerns includes:

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 recently has 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 Environmental Protection Agency 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) 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.

KLD assigns "1" when a company demonstrates strength on an indicator (e.g., pollution prevention) and zero if it does not. Similarly, it assigns "1" when a company's record raises concern on an indicator (e.g., regulatory problems) and zero otherwise. We calculate environmental scores as the number of strengths minus the number of weaknesses. We calculate the changes in environmental scores as changes in the environmental scores relative to scores in the prior year.

Our measures of corporate financial performance are Tobin's Q and ROA. We adopt Chung and Pruitt's (1994) measure of Tobin's Q as {[Market value of common stock + Book value of preferred stock + Book value of long-term debt + Book value of current liabilities − (Book value of current assets − Book value of Inventories)]/Book value of total assets}. This measure of Tobin's Q is analogous to those used in Gompers et al. (2003) and Oxelheim and Randøy (2003). ROA measured as net income before extraordinary items divided by total assets at the end of the year. Financial data are from Compusat.

We obtain 5,879 company-years between 1992 and 2000 from the KLD database. In addition, we use 1991 KLD data to calculate changes in environmental scores from 1991 to 1992. If a company has no reported strength or weakness in any of five categories (community, diversity, employee, environment, and product), we eliminate that company for that year. This elimination excludes companies for which KLD might not have analyzed information in a given year. This procedure leaves us with 5,537 company-years. Changes in environmental scores cannot be calculated for 372 company-years because companies included in 1 year are not included in the subsequent year. Data for the calculation Tobin's Q are available for 4,103 of the remaining 5,165 company-years, and data for the calculation of ROA are available for 4,894 company-years. Several additional company-years are lost when changes in Tobin's Q and changes in ROA are calculated. In Panel A of Table 1, we report a summary of our sampling process and the sample distribution by year.

We present descriptive statistics of key variables in Panels B and C of Table 1. The mean value of CER in the full sample is negative, indicating that on average our sample firms have more environmental concerns than environmental strengths. The mean value of changes in CER in the full sample is also negative, indicating that decrease in CER is at least as frequent in increase in CER. The mean and median values of Tobin's Q for the full sample are 1.67 and 1.20, respectively. The mean and median values of ROA for the full sample are 5.1 and 4.6%, respectively. These statistics indicate that our sample firms are on average profitable.

Consider a hypothetical company, ABC, whose KLD-environmental score increased from 2 at the end of 1995 to 3 at the end of 1996. We want to examine whether this increase in environmental score leads to an increase or decrease in Tobin's Q in subsequent years (starting with

Table 1 Description of the data

Year	Number of companies in the KLD database	Less: Companies with no reported strengths or concerns in any social category	Companies with at least one strength or concern in any social characteristic	Less: Companies with unavailable score changes	Companies with available score changes	Companies with Tobin's Q at year(0)	Companies with ROA at year(0)
Panel A: Sample selection and distribution							
1992	652	87	565	15	550	434	527
1993	651	50	601	12	589	464	559
1994	643	27	616	13	603	476	570
1995	648	29	619	47	572	456	535
1996	652	41	611	48	563	449	535
1997	653	31	622	62	560	445	530
1998	658	30	628	69	559	446	528
1999	662	24	638	51	587	469	555
2000	660	23	637	55	582	464	555
Total over 1992–2000	5,879	342	5,537	372	5,165	4,103	4,894

Year	CER			Changes in CER			Q (0)			ROA (0)		
	N	Mean	Median	N	Mean	Median	N	Mean	Median	N	Mean	Median
Panel B: Descriptive statistics by year												
1992	527	−0.2391	0	527	−0.2391	0	434	1.4588	1.0707	527	0.0463	0.0410
1993	559	−0.2451	0	559	−0.0250	0	464	1.4657	1.1536	559	0.0460	0.0417
1994	570	−0.2491	0	570	−0.0316	0	476	1.3321	1.0661	570	0.0542	0.0477
1995	535	−0.1570	0	535	0.0654	0	456	1.5208	1.2040	535	0.0550	0.0519
1996	535	−0.0953	0	535	0.0505	0	449	1.5955	1.2718	535	0.0510	0.0497
1997	530	−0.0792	0	530	0.0151	0	445	1.8322	1.4555	530	0.0483	0.0486
1998	528	−0.0455	0	528	0.0322	0	446	1.9722	1.3026	528	0.0447	0.0422
1999	555	−0.1676	0	555	−0.1315	0	469	1.9673	1.2453	555	0.0589	0.0460
2000	555	−0.1622	0	555	−0.0144	0	464	1.9153	1.1852	555	0.0529	0.0433
Total	4,894	−0.1612	0	4,894	−0.0311	0	4,103	1.6728	1.1992	4,894	0.0509	0.0462

Table 1 continued

Industry	CER			Changes in CER			Tobin's Q			ROA		
	N	Mean	Median	N	Mean	Median	N	Mean	Median	N	Mean	Median
Panel C: Descriptive statistics by industry												
Agriculture, forestry, and fishing	4	−1.0000	−1	4	−0.2500	0	4	3.6999	3.7280	4	0.1518	0.1542
Mining, construction	214	−0.4206	0	214	−0.0794	0	185	1.3673	1.2784	214	0.0069	0.0260
Light manufactured products	1176	−0.4184	0	1176	−0.0536	0	1131	1.9770	1.5089	1176	0.0754	0.0710
Heavy manufactured products	1320	−0.1000	0	1320	−0.0205	0	1255	1.6579	1.1843	1320	0.0562	0.0571
Transportation, communications, and utilities	740	−0.1284	0	740	−0.0554	0	678	1.0105	0.9164	740	0.0348	0.0368
Wholesale and retail trade	525	0.0705	0	525	−0.0019	0	514	1.7595	1.3766	525	0.0602	0.0646
Finance, insurance, and real estate	593	0.0287	0	593	0.0084	0	54	1.3687	1.0208	593	0.0192	0.0125
Service industries	246	0.0163	0	246	−0.0081	0	225	2.1885	1.4331	246	0.0501	0.0521
Other services	49	0.0612	0	49	0.0204	0	48	2.2182	1.5290	49	0.0442	0.0478
Public administration and other	27	−1.3704	−1	27	−0.2222	0	9	1.8580	1.7908	27	0.0318	0.0288
Total	4,894	−0.1612	0	4,894	−0.0311	0	4,103	1.6728	1.1992	4,894	0.0509	0.0462

We begin with 5,879 company-years. We exclude companies with no reported strength or concern in any of five social responsibility categories (community, diversity, employee, environment, and product). This leaves 5,537 company-years. We calculate the change in the environmental scores of a company as the change in the environmental scores relative to the pervious year. We could not calculate changes in environmental scores for 372 company-years when companies appear in only one of two consecutive years. Data for the calculation of Tobin's Q are available for 4,103 company-years, and data for the calculation of ROA are available for 4,894 company-years. We calculate corporate environmental responsibility (CER) as the number of environmental strengths minus the number of environmental concerns. We calculate Tobin's Q as {[Market value of common stock + Book value of preferred stock + Book value of long-term debt + Book value of current liabilities − (Book value of current assets − Book value of Inventories)]/Book value of total assets} at the end of each year. ROA is return on assets, measured as net income before extraordinary items divided by total assets at the end of the year. Year(0) is the year that the environment score is measured. $Q(0)$ is Tobin's Q in the current year (when CER is measured). ROA(0) is ROA in the current year (when CER is measured). In Panels B and C, we provide descriptive statistics of CER, Changes in CER, and ROA based on 4,894 company-years. Descriptive statistics of Tobin's Q are based on 4,103 company-years

1997). An increase in environmental scores from the end of 1995 to the end of 1996 reflects an increase in environmental performance during 1996. Tobin's Q measured at the end of 1996 might already reflect the increase in environmental score from 1995 to 1996 and cannot serve as a benchmark for future changes in Tobin's Q associated with the increase in the environmental score. Therefore, we use Tobin's Q measured at the end of 1995 as the benchmark and examine the change in Tobin's Q from the end of 1995 to the end of 1997 associated with the increase in environmental scores between the end of 1995 and the end of 1996. We refer to this change in Tobin's Q as F1Q, to denote a change in Tobin's Q 1 year into the future. We refer to the change in Tobin's Q 3 years into the future, through the end of 1999, as F3Q. Similarly, F5Q denotes the change in Tobin's Q 5 years into the future, through the end of 2001. We use F0Q to denote the change in Tobin's Q from the end of 1995 to the end of 1996. Changes in ROA are similarly measured and referred to as F0ROA, F1ROA, F3ROA, and F5ROA. F0ROA is the change in ROA from 1995 to 1996. F1ROA is the change in ROA from 1995 to the average ROA in 1996 and 1997. F3ROA is the change from ROA in 1995 to the average ROA in 1996, 1997, 1998, and 1999. F5ROA is the change from ROA in 1995 to the average ROA in 1996, 1997, 1998, 1999, 2000, and 2001.

We begin with an examination of the relation between *levels* of CER and *levels* of corporate financial performance to confirm the positive correlation between the two, documented in earlier studies. We compare Tobin's Q of companies with negative environmental scores (i.e., firms with more concerns than strengths) to those of companies with positive environmental scores (i.e., firms with more strengths than concerns). We make a similar comparison by ROA. We denote by year(0) the year when the environmental score is measured and examine its relation to Tobin's Q and ROA from year(−5), 5 years before year(0), through year(5), 5 years after. The results are reported in Table 2.

Tobin's Q is higher for companies with positive environmental scores than for companies with negative scores not only in year(0), but also in years prior to and subsequent to year(0). Differences in Tobin's Q between companies with positive environmental scores and companies with negative scores are statistically significant at the 1% level based on t test and Wilcoxon rank sum test for all years under investigation. We find similar results for ROA. Differences in ROA are statistically significant for all years except year(−5). However, an analysis of levels cannot identify causality. Such identification requires analysis of changes.

We present the analysis of the relation between changes in CER and subsequent changes in Tobin's Q and ROA in Table 3. We find that companies that increased their levels of CER experienced an increase in their Tobin's Q in the following 1, 3, and 5 years relative to companies that had no change in their levels of CER. Similarly, we find that companies that *decreased* their levels of CER experienced an increase in their Tobin's Q relative to companies that had no change in their levels of CER. Differences are statistically significant. The differences between firms that increase CER and those that do not change CER are statistically significant at the 1% level based on t test and Wilcoxon rank sum test. The differences between firms that decrease CER and those that do not change CER are also significant at the 1% level based on t test and Wilcoxon rank sum test.

The results of the analysis of the relation between changes in CER and changes in subsequent ROA are similar to those of changes in Tobin's Q. Companies that increased their levels of CER and companies that decreased their levels of CER increased their ROA in subsequent years relative to companies that did not change their levels of CER. Differences are statistically significant at the 1 or 5% level based on t test and Wilcoxon rank sum test.[2]

Although analysis of changes as opposed to levels alleviates concerns about the proper control for unidentified or missing factors that influence environment responsibility as well as financial performance, univariate analyses in Table 2 may still suffer from the omitted correlated variable problem. Thus, we run multivariate regressions to rule out the possibility of the lack of controls and omitted variables contributing to the results in Table 3. We regress the natural logarithm of subsequent changes in Tobin's Q on the indicator for the group of firms that increase CER, D1, the indicator for the group of firms that decrease CER, D2, and a set of control variables. Control variables include R&D intensity in year(−1) (Hirschey 1982; Cockburn and Griliches 1988; Cohen and Klepper 1992), advertising expense scaled by sales in year(−1) (Hirschey 1982), average of annual percentage growth rate in sales (Hirschey 1982), firm size, and industry indicators. More specifically, we estimate the following regression model:

$$\begin{aligned}\mathrm{LN(FtQ)} = {} & \beta_1 + \beta_2 \mathrm{D1} + \beta_3 \mathrm{D2} + \beta_4 \mathrm{RD\_1} + \beta_5 \mathrm{AD\_1} \\ & + \beta_6 \mathrm{ASGROt} + \beta_7 \mathrm{SIZE\_1} \\ & + \text{Industry dummies} + e, \end{aligned} \quad (1)$$

where LN(FtQ) is the natural logarithm of changes in Tobin's Q from year(−1) to year(t), where $t = 0, 1, 3,$ and 5; D1 is an indicator variable that takes a value of one if changes in CER < 0, and zero otherwise; D2 is an indicator variable

[2] We also repeat our univariate analysis by year and by industry group and find the results that are qualitatively similar to those reported in Tables 2 and 3.

Table 2 The relation between levels of corporate environmental responsibility (CER) and levels of corporate financial performance in concurrent, preceding and subsequent years

	Mean Q for companies with positive and negative CER				Median Q for companies with positive and negative CER			
	Positive CER in year (0)	Negative CER in year (0)	Mean difference	t test significance	Positive CER in year (0)	Negative CER in year (0)	Median difference	Wilcoxon rank sum test significance
Panel A: The relation between levels of CER and levels of Tobin's Q in concurrent, preceding, and subsequent years								
$Q(-5)$	1.3472	1.1518	0.1954	***	1.0928	0.9330	0.1598	***
$Q(-3)$	1.4028	1.2225	0.1803	***	1.1437	0.9942	0.1495	***
$Q(-1)$	1.4528	1.2798	0.1730	***	1.1406	1.0349	0.1057	***
$Q(0)$	1.4763	1.2905	0.1858	***	1.1609	1.0401	0.1208	***
$Q(1)$	1.4853	1.3037	0.1816	***	1.1554	1.0475	0.1079	***
$Q(3)$	1.5083	1.3188	0.1895	***	1.1489	1.0413	0.1076	***
$Q(5)$	1.5560	1.3134	0.2426	***	1.1554	1.0219	0.1335	***
	Mean ROA for companies with positive and negative CER				Median ROA for companies with positive and negative CER			
	Positive CER in year (0)	Negative CER in year (0)	Mean difference	t test significance	Positive CER in year (0)	Negative CER in year (0)	Median difference	Wilcoxon rank sum test significance
Panel B: The relation between levels of CER and levels of ROA in concurrent, preceding, and subsequent years								
ROA(−5)	0.0539	0.0507	0.0032		0.0470	0.0468	0.0002	*
ROA(−3)	0.0559	0.0451	0.0108	***	0.0491	0.0425	0.0066	***
ROA(−1)	0.0511	0.0408	0.0103	***	0.0450	0.0395	0.0055	***
ROA(0)	0.0495	0.0419	0.0076	***	0.0439	0.0407	0.0032	***
ROA(1)	0.0482	0.0418	0.0064	***	0.0438	0.0402	0.0036	***
ROA(3)	0.0469	0.0406	0.0063	**	0.0436	0.0386	0.0050	***
ROA(5)	0.0492	0.0410	0.0082	***	0.0441	0.0365	0.0076	***

In Panel A, the number of observations ranges from 625 to 792 for the positive CER group and from 813 to 990 for the negative CER group. In Panel B, the number of observations ranges from 666 to 842 for the positive CER group and from 905 to 1,102 for the negative CER group. We calculate corporate environmental responsibility (CER) as the number of environmental strengths minus the number of environmental concerns. We calculate Tobin's Q as {[Market value of common stock + Book value of preferred stock + Book value of long-term debt + Book value of current liabilities − (Book value of current assets − Book value of Inventories)]/Book value of total assets} at the end of each year. ROA is return on assets, measured as net income before extraordinary items divided by total assets at the end of the year. Year(0) is the year that the environment score is measured. All other years are similarly indexed relative to year(0). $Q(0)$ is Tobin's Q in the current year (when CER is measured). $Q(-5)$ is Tobin's Q 5 years earlier. $Q(-3)$ is Tobin's Q 3 years earlier. $Q(-1)$ is Tobin's Q 1 year earlier. $Q(5)$ is Tobin's Q 5 years later. $Q(3)$ is Tobin's Q 3 years later. $Q(1)$ is Tobin's Q 1 year later. ROA(0) is ROA in the current year (when CER is measured). ROA(−5) is the mean ROA during the preceding 5 years. ROA(−3) is the mean ROA during the preceding 3 years. ROA(−1) is the mean ROA during the preceding year. ROA(5) is the mean ROA during the subsequent 5 years. ROA(3) is the mean ROA during the subsequent 3 years. ROA(1) is the mean ROA during the subsequent year

*** Significant at the 0.01 level, ** significant at the 0.05 level, and * significant at the 0.10 level

that takes a value of one if changes in CER > 0, and zero otherwise; RD_1 is R&D expense divided by sales for year(−1). AD_1 is advertising expense divided by sales for year(−1); ASGROt is the average of annual percentage growth rate in sales over year(−1) to year(t), where $t = 0$, 1, 3, and 5; and SIZE_1 is the natural logarithm of total assets at the end of year(−1). Industry dummies are based on Campbell's (1996) 12-industry classification.

The intercept captures changes in Tobin's Q for firms that do not change CER. The coefficient on D1 captures the difference in changes in Tobin's Q between firms that decrease CER and those that do not change CER, while the coefficient on D2 captures the difference between firms that increase CER and those that do not change CER. We report the results in Table 4. Consistent with the results reported in Table 3, we find positive and statistically significant (at the 1 or 5% levels) coefficients on D1 and D2 for subsequent years 1, 3, and 5, indicating that firms decreasing or increasing CER perform better than firms that do not change CER.

We also regress subsequent changes in ROA on the indicator for the group of firms that decrease CER, D1, the indicator for the group of firms that increase CER, D2, and a set of control variables. Control variables in the

Table 3 The relation between changes in corporate environmental responsibility (CER) and subsequent changes in corporate financial performance

Variables	Differences between changes in Q when CER increases and when it is unchanged				Differences between changes in Q when CER decreases and when it is unchanged			
	Mean difference	t test significance	Median difference	Wilcoxon test significance	Mean difference	t test significance	Median difference	Wilcoxon rank sum test significance
Panel A: The relation between changes in CER and subsequent changes in Tobin's Q								
F0Q	0.0756	***	0.0198	**	0.0180		0.0135	
F1Q	0.1005	***	0.0429	***	0.0403		0.0505	***
F3Q	0.1803	***	0.0505	***	0.0659		0.0694	***
F5Q	0.1826	***	0.0785	***	0.0930	*	0.0738	***

Variables	Differences between changes in ROA when CER increases and when it is unchanged				Differences between changes in ROA when CER decreases and when it is unchanged			
	Mean difference	t test significance	Median difference	Wilcoxon test significance	Mean difference	t test significance	Median difference	Wilcoxon rank sum test significance
Panel B: The relation between changes in CER and subsequent changes in ROA								
F0ROA	0.0066	**	0.0019	**	0.0047	*	0.0028	***
F1ROA	0.0059	***	0.0023	**	0.0037	*	0.0033	***
F3ROA	0.0069	***	0.0016	***	0.0068	***	0.0030	***
F5ROA	0.0088	***	0.0053	***	0.0082	***	0.0045	***

In Panel A, the number of observations ranges from 302 to 377 for the CER increase group, from 2,610 to 3,295 for the no change in CER group and from 303 to 385 for the CER decrease group. In Panel B, the number of observations ranges from 353 to 406 for the CER increase group, from 3,248 to 3,859 for the no change in CER group and from 351 to 406 for the CER decrease group. We calculate the changes in corporate environmental responsibility (CER changes) as the changes in the environmental scores from the previous year, where the environmental scores are calculated as the number of strengths minus the number of weaknesses in environment area. We calculate Tobin's Q as {[Market value of common stock + Book value of preferred stock + Book value of long-term debt + Book value of current liabilities − (Book value of current assets − Book value of Inventories)]/Book value of total assets} at the end of each year. ROA is return on assets, measured as net income before extraordinary items divided by total assets at the end of the year. Year(0) is the year that the changes in environmental score is measured from the previous year (i.e., year(−1)). All subsequent and concurrent changes in Tobin's Q and ROA are measured as the changes from year(−1). F0ROA is the change in ROA in the current year from the previous year (i.e., year(−1)). F1ROA is the change in ROA, averaged over the current and the following year, from ROA in year(−1). F3ROA is the change in ROA, averaged over the current and subsequent 3 years, from year(−1). F5ROA is the change in ROA, averaged over the current and subsequent 5 years, from ROA in year(−1). Differences between changes in Q (ROA) when CER increases and when it is unchanged are calculated as changes in Q (ROA) when CER increases minus changes in Q (ROA) when CER is unchanged. Differences between changes in Q (ROA) when CER decreases and when it is unchanged are calculated as changes in Q (ROA) when CER decreases minus changes in Q (ROA) when CER is unchanged

*** Significant at the 0.01 level, ** Significant at the 0.05 level, * significant at the 0.10 level

regression of ROA change include average of annual percentage growth rate in sales (Rangan 1998; Jo et al. 2007), average annual percentage growth rate in capital expenditure (Rangan 1998; Jo et al. 2007), the firm size, and industry indicators. We estimate the following regression model:

$$\begin{aligned}\text{FtROA} = {} & \beta_1 + \beta_2 \text{D1} + \beta_3 \text{D2} + \beta_4 \text{ASGROt} \\ & + \beta_5 \text{ACAPGRt} + \beta_6 \text{SIZE\_1} \\ & + \text{Industry dummies} + e \end{aligned} \quad (2)$$

where FtROA is the changes in ROA, averaged over the current and subsequent t years, where $t = 0, 1, 3$, and 5 and ACAPGRt is the average of annual percentage growth rate in capital expenditures over year(−1) to year(t), where $t = 0, 1, 3$, and 5. Other variables are as defined earlier.

Again consistent with the results reported in Table 3, we find that positive and statistically significant (at the 1 or 5% levels) coefficients on D1 and D2 for subsequent years 1, 3, and 5, except the coefficient on D1 being insignificant for year 1. These results are consistent with the financial-first hypothesis that managers change levels of CER to maximize corporate financial performance, increasing levels of CER when they are too low and decreasing them when they are too high.

Our results require no reliance on a resource-based view of companies. They are consistent with a world where

Table 4 Multivariate regression of subsequent changes in corporate financial performance on changes in corporate environmental responsibility (CER)

Dependent variables	LN(F0Q)			LN(F1Q)			LN(F3Q)			LN(F5Q)		
	Parameter estimates	*t* value	*p* value	Parameter estimates	*t* value	*p* value	Parameter estimates	*t* value	*p* value	Parameter estimates	*t* value	*p* value
Panel A: Regression of subsequent changes in Tobin's *Q*												
Intercept	−0.1180	−2.99	0.0028	−0.2010	−3.66	0.0003	−0.2064	−2.91	0.0036	−0.3219	−4.08	<0.0001
D1	0.0140	0.81	0.4185	0.0509	2.11	0.0348	0.0682	2.20	0.0281	0.0714	2.07	0.0385
D2	0.0323	1.88	0.0602	0.0507	2.12	0.0337	0.0902	2.93	0.0034	0.0916	2.68	0.0074
RD_1	0.7681	6.07	<0.0001	0.8456	4.81	<0.0001	0.5057	2.23	0.0256	0.3484	1.38	0.1662
AD_1	−0.0583	−0.37	0.7127	0.1070	0.49	0.6268	0.6476	2.29	0.0224	1.3404	4.26	<0.0001
ASGROt	0.0161	0.76	0.4481	0.0097	0.27	0.7883	0.1665	2.60	0.0093	0.1007	1.18	0.2372
SIZE_1	0.0098	2.59	0.0097	0.0135	2.56	0.0104	0.0119	1.75	0.0802	0.0212	2.80	0.0051
Industry dummies		Yes			Yes			Yes			Yes	
Adjusted R^2		0.0148			0.0130			0.0158			0.0200	

Dependent variables	F0ROA			F1ROA			F3ROA			F5ROA		
	Parameter estimates	*t* value	*p* value	Parameter estimates	*t* value	*p* value	Parameter estimates	*t* value	*p* value	Parameter estimates	*t* value	*p* value
Panel B: Regression of subsequent changes in ROA												
Intercept	−0.0169	−2.17	0.0299	−0.0177	−2.32	0.0202	−0.0269	−3.32	0.0009	−0.0313	−3.76	0.0002
D1	0.0005	0.14	0.8870	0.0038	1.08	0.2818	0.0078	2.07	0.0383	0.0081	2.13	0.0332
D2	0.0047	1.27	0.2028	0.0081	2.28	0.0226	0.0116	3.10	0.0020	0.0098	2.59	0.0097
ASGROt	0.0125	2.76	0.0057	0.0141	2.56	0.0106	0.0172	2.10	0.0359	0.0241	2.36	0.0181
ACAPGRt	−0.0004	−0.20	0.8378	0.0063	2.48	0.0131	0.0176	4.07	<0.0001	0.0166	2.87	0.0042
SIZE_1	0.0006	0.80	0.4254	0.0006	0.82	0.4113	0.0011	1.41	0.1589	0.0016	2.00	0.0455
Industry dummies		Yes			Yes			Yes			Yes	
Adjusted R^2		0.0018			0.0070			0.0147			0.0145	

This table shows the results of multivariate regressions. We regress subsequent changes in Tobin's *Q* on changes in CER and control variables in Panel A. In Panel B, we regress subsequent changes in ROA on changes in CER and control variables. LN(FtQ) is the natural logarithm of changes in Tobin's *Q* from year(−1) to year(*t*), where $t = 0$, 1, 3, and 5. D1 is an indicator variable that takes a value of one if changes in CER < 0, and zero otherwise. D2 is an indicator variable that takes a value of one if changes in CER > 0, and zero otherwise. RD_1 is R&D expense divided by sales for year(−1). AD_1 is advertising expense divided by sales for year(−1). ASGROt is the average of annual percentage growth rate in sales over year(−1) to year(*t*), where $t = 0$, 1, 3, and 5. SIZE_1 is the natural logarithm of total assets at the end of year(−1). FtROA is the changes in ROA, averaged over the current and subsequent *t* years, where $t = 0$, 1, 3, and 5. ACAPGRt is the average of annual percentage growth rate in capital expenditures over year(−1) to year(*t*), where $t = 0$, 1, 3, and 5. Industry dummies are based on Campbell's (1996) 12-industry classification

companies have access to resources necessary for increases or decreases in levels of CER and choose increases and decreases that maximize levels of corporate financial performance. The resource-based hypothesis is the claim that companies with relatively high levels of corporate financial performance are more likely to increase CER than companies with low levels of corporate financial performance and that companies that experienced increases in levels of corporate financial performance are more likely to increase their levels of CER than companies that experienced decreases in their levels of corporate financial performance.

We find that companies with higher *levels* of corporate financial performance, whether ROA or *Q*, are no more likely to increase subsequent CER than companies with lower levels of corporate financial performance. Table 5 shows the relation between levels of ROA in 1 year and changes in CER in the following year. Similarly, Table 5 shows the relation between levels of Tobin's *Q* in 1 year and changes in CER in the following year. We see that the proportion of companies that increased their CER is unrelated to preceding levels of corporate financial performance. The differences in frequency of firm-years that decrease, do not change, and increase CER in the following year between firms with better financial performance and those with lower levels of financial performance are not statistically significant at the conventional levels based on χ^2 test.

Table 5 The relation between levels of corporate financial performance and subsequent changes in corporate environmental responsibility (CER)

Levels of Q and ROA	Frequency of company-years			χ^2 test of differences in frequency between decreases and increases in CER
	Subsequent changes in CER:			
	Decrease	No change	Increase	Test statistic (p value)
PLQ(−6)				
<Median	244	1,544	240	0.33 (0.5660)
≥Median	142	1,727	128	
PLQ(−4)				
<Median	241	1,584	230	0.05 (0.8317)
≥Median	139	1,733	137	
PLROA5				
<Median	230	1,962	240	0.78 (0.3762)
≥Median	195	2,071	180	
PLROA3				
<Median	230	2,001	244	1.33 (0.2485)
≥Median	200	2,090	181	

This table shows the frequency of company-years of levels of corporate financial performance and subsequent changes in CER. We calculate the changes in environmental score relative to the pervious year. We calculate Tobin's Q as {[Market value of common stock + Book value of preferred stock + Book value of long-term debt + Book value of current liabilities − (Book value of current assets − Book value of Inventories)]/Book value of total assets} at the end of each year. ROA is return on assets, measured as net income before extraordinary items divided by total assets at the end of the year. Year(0) is the year that the environment score is measured. PLQ(−6) is Tobin's Q 6 years earlier. PLQ(−4) is Tobin's Q 4 years earlier. PLROA5 is the average ROA over the past 5 years ending 2 years earlier. PLROA3 is the average ROA over the past 3 years ending 2 years earlier

Table 6 The relation between changes in corporate financial performance and subsequent changes in corporate environmental responsibility (CER)

Changes in Q and ROA	Frequency of company-years			χ^2 test of differences in frequency between decreases and increases in CER
	Subsequent changes in CER:			
	Decrease	No change	Increase	Test statistic (p value)
P5Q				
<Median	187	1,589	179	0.02 (0.8833)
≥Median	184	1,576	180	
P3Q				
<Median	189	1,637	186	0.11 (0.7358)
≥Median	189	1,612	177	
P5ROA				
<Median	241	1,999	205	5.31 (0.0212)
≥Median	182	2,015	213	
P3ROA				
<Median	237	2,033	205	3.93 (0.0474)
≥Median	191	2,035	217	

This table shows the frequency of company-years of the changes in corporate financial performance and subsequent changes in CER. We calculate the changes in environmental score relative to the pervious year. We calculate Tobin's Q as {[Market value of common stock + Book value of preferred stock + Book value of long-term debt + Book value of current liabilities − (Book value of current assets − Book value of Inventories)]/Book value of total assets} at the end of each year. ROA is return on assets, measured as net income before extraordinary items divided by total assets at the end of the year. Year(0) is the year that the environment score is measured. All changes in Tobin's Q and ROA are measured as changes relative to year(−1). P5Q is the change in Tobin's Q in year(−1) from Tobin's Q 5 years earlier. P3Q is the change in Tobin's Q in year(−1) from Tobin's Q 3 years earlier. P5ROA is the change in ROA in year(−1) from the average ROA during the preceding 5 years. P5ROA is the change in ROA in year(−1) from the average ROA during the preceding 3 years

We also examine whether *changes* in corporate financial performance are associated with subsequent changes in CER. Consider the ABC company example, where a CER change is measured as the change from the end of 1995 to the end of 1996. We refer the change in Q from 1992 to 1995 as P3Q. Similarly, we refer to a change in Q from 1990 to 1995 as P5Q. Changes in ROA are measured similarly. P3ROA is the change from the average ROA in 1992, 1993, and 1994 to the ROA in 1995. P5ROA is the change from the average ROA in 1990, 1991, 1992, 1993, and 1994, to the ROA in 1995. We find that companies with improved corporate financial performance, measured by *changes* in Tobin's Q are no more likely to increase subsequent CER by more than companies with deteriorated Tobin's Q. The differences in frequency of firm-years that decrease, do not change, and increase CER in the year following changes in Tobin's Q between firms that improve and those that deteriorate Tobin's Q are not statistically significant at the conventional levels based on χ^2 test. However, we find that companies with improved corporate financial performance, measured by *changes* in ROA, are more likely to increase CER than companies with deteriorated ROA (see Table 6).

Conclusion

Proponents of CER often portray corporate managers as people who resist investment in CER despite its positive contribution to corporate financial performance. Opponents of CER are usually concerned that corporate managers invest too much in CER, diminishing benefits to shareholders while garnering accolades for themselves as stewards of the environment. We find that neither the portrayal of proponents of CER nor the concerns of opponents of CER are consistent with the evidence.

We study the relation between changes in CER, measured by changes in KLD's environmental scores, and subsequent changes in corporate financial performance, measured by changes in Tobin's Q and ROA. We find evidence consistent with the hypothesis that corporate managers act in the interest of shareholders, adjusting CER up or down to enhance corporate financial performance. Specifically, we find that both companies that increased their levels of CER and corporations which decreased these levels enjoyed subsequent increases in corporate financial performance that exceeded those of companies that did not change their levels of CER. We also find that companies that experienced increases in ROA were more likely to increase subsequent levels of CER by more than companies that experienced decreases in ROA. This finding suggests that enhancements in corporate financial resources, reflected in increased ROA, facilitate enhancements of CER.

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