How Firms Respond to Being Rated

Aaron K. Chatterji
Fuqua School of Business, Duke University, 1 Towerview Drive, Durham, NC 27708, ronnie@duke.edu

Michael W. Toffel
Harvard Business School, Soldiers Field, Boston, MA 02163, mtoffel@hbs.edu

August 28, 2008

While many independent rating systems are designed primarily to help buyers overcome information asymmetries when making purchasing decisions, we investigate whether these same ratings might also influence the companies being rated. We focus on corporate environmental ratings, the primary purpose of which is to help investors select "socially responsible," and avoid "socially irresponsible," companies. We hypothesize that company ratings are particularly likely to spur responses by firms that receive poor ratings, especially those that face lower cost opportunities to improve and that operate in highly regulated industries. Our empirical analysis examines how nearly 600 firms in the United States respond to corporate environmental ratings issued by a prominent independent social rating agency, and avoids selection issues by taking advantage of a natural experiment that arose when the agency expanded the scope of its ratings. We find empirical support for our hypotheses, and present implications for managers of rated companies and of private and public rating agencies. While negative ratings may "shame" firms that are performing poorly, the threat of regulatory action and the presence of "low hanging fruit" are important drivers of how firms respond to information-based incentives.

Keywords: industry self-regulation, company ratings, social investing, environmental performance, corporate social responsibility

1. Introduction

Information asymmetry has long been understood to complicate market transactions (Akerlof, 1970). Incomplete information prevents buyers from knowing when to believe suppliers' claims about product attributes that are not directly observable prior to the purchase. These problems pertain to products with important attributes that are not observable prior to purchase, and are particularly acute in markets where suppliers of experience goods (e.g., restaurants) and credence goods (e.g., surgeons) are less reliant on repeat customers. To overcome such information asymmetries, suppliers rely on branding and advertising, premium pricing, and generous warranties to signal that their products' unobservable attributes are of high quality.

Independent agencies that rate and rank products and companies can also help consumers overcome information asymmetries. Such agencies operate in a wide variety of contexts. Consumer products, for example, are rated by *Consumer Reports* and J.D. Power and Associates, services by

Michelin's guidebooks and AAA's tour books. Some agencies issue ratings at the company level. Moody's and Standard and Poor's, which rate corporate debt, are among the best known. In fact, companies are subjected to an increasing number of ratings and rankings on a broadening array of issues from "Best Places to Work," both overall (Fortune, 2008) and for particular subsets of employees (HRC, 2008), to the extent to which company practices are deemed environmentally and socially responsible (Chatterji & Levine, 2006). A recent survey counted more than 183 public lists across 38 countries that rate or rank companies based on their reputation for corporate citizenship, employee relations, leadership, innovation, and other characteristics (Fombrun, 2007). The Internet has facilitated the emergence of more democratic, online rating mechanisms: homeowners rate contractors on Angie's List; travelers rate hotels and restaurants on TripAdvisor; and online auction buyers and suppliers rate each other on eBay. All of these rating schemes are institutions designed to achieve a common objective: to provide credible information about companies to help potential buyers, employees, investors, and other external stakeholders overcome their information disadvantage. Better informed stakeholders can make better decisions about which products to purchase, in which stocks or bonds to invest, and with which companies to seek employment.

Prior scholarship has found evidence that independent company ratings can affect the behavior of consumers and investors, but little empirical evidence is available to suggest whether they also affect the rated companies. Because their fortunes rise and fall with these key stakeholder groups, companies have an interest in paying attention to these ratings.[1]

Surprisingly, little academic research has focused on how rated organizations respond to these independent ratings, a question arguably more central to the study of firm strategy. Do restaurants that receive poor ratings by Zagat's fire their chefs or change cuisines? Do producers of coffee makers rated poorly by *Consumer Reports* cut short their production runs? Do firms rated as demonstrating a weak

[1] This is not to suggest that all firms strive to receive straight "A" ratings. Firms (like students) face different costs and benefits of earning different ratings, and might incorporate these costs and benefits into their investment decisions. Thus, except for measurement error, independent ratings can be viewed as a reflection of endogenous choices firms make.

commitment to diversity by social investment rating agencies subsequently place women or minorities on their boards of directors? Management scholars have barely begun to explore such questions, despite some promising results emerging from public policy research that suggests that government regulations mandating information disclosure have "shamed" managers of poorly rated companies to invest in improving their companies' behavior.

Our research addresses this gap by examining how firms respond to corporate environmental ratings, the primary objective of which is to guide individuals and fund managers who want to invest in environmentally responsible companies. We propose that these ratings, beyond their stated objective of influencing investors, also influence the rated firms. We argue that just as government disclosure regulations can require firms to disclose information that is potentially embarrassing, managers can be spurred to respond to poor ratings that shame their firms by implementing practices that will improve their standing with the independent rating agencies. We further propose that the subset of poorly rated firms that face lower-cost improvement opportunities and are in highly regulated industries will be especially likely to make the investments needed to improve their ratings. We test our hypotheses using data from one of the world's foremost rating agencies that discloses its assessments of firms' corporate social performance. We examine how hundreds of organizations responded to being involuntarily included in this annual rating scheme when the agency expanded the number of firms it rates. Rarely used in prior research in this domain, this kind of natural experiment resolves the empirical challenge described earlier and constitutes an important empirical contribution to the extant literature.

We find evidence that firms initially rated poorly subsequently improved their performance more than two groups of comparison firms: those never rated, and those initially rated more positively. We discovered that this main effect was driven by firms in highly regulated industries or that faced less costly opportunities to improve. Based on these results, we provide insights for management scholars as well as policymakers who seek to understand how firms respond to public and private regulatory schemes.

2. Literature

2.1 Independent Company Rating and Ranking Schemes

Prior scholarship on independent company rating and ranking schemes has examined the extent to which they fulfill their primary objective of influencing consumers' and investors' decisions. Some studies have found that investors (Becchetti, Ciciretti, & Hasan, 2007; Rock, 2003) and consumers (Sen & Bhattacharya, 2001) respond to social information disclosure, whereas others yielded mixed or no results (Curran & Moran, 2007; Takeda & Tomozawa, 2007).

We are aware of only two studies that have examined how firms respond to independent agents' ratings and rankings. Both focused on graduate schools' responses to independent rankings. Elsbach and Kramer (1996) investigated how deans, professors, and students at "top 20" business schools personally reacted to changes in their schools' *Business Week* rankings. They found that individuals at schools ranked towards the bottom of the elite list felt threatened by the ranking and deflected the threat (1) by arguing that key dimensions of their schools' strengths were omitted from the ranking criteria, and (2) by referring to comparison groups that raised their ranking or status.

Espeland and Sauder (2007) study how law schools responded to *U.S. News and World Report* rankings. Their study is also based on interviews with deans and faculty members, but their sample included schools from a much wider spectrum of the rankings. The main effect of poor rankings was diminishing the law school's attractiveness to external funders and high quality applicants and, in some cases, university presidents responsible for allocating resources. These effects precipitated a "self-fulfilling prophesy" whereby poor rankings impeded enlistment of the personnel and resources needed to deliver high quality education. The authors also found evidence that rankings affected management decisions within law schools. In particular, school administrators began to consider how management decisions such as changes in their admissions criteria might affect their rankings.

Although they shed light on how organizations respond to independent rankings and ratings, these studies leave many questions unanswered. It is unclear to what extent these findings, being based on

responses of non-profit organizations to ratings, are generalizable to for-profit companies. Perhaps most importantly, neither study directly examined how their rankings affected the schools' performance. We address these gaps in the prior literature by examining how the responses of hundreds of companies across a variety of industries to a wide range of ratings were reflected in changes in performance.

2.2 Government Mandatory Information Disclosure Programs

Our research also relates to policy analyses of government mandatory information disclosure programs that require organizations to disclose activities that pose risk. These transparency regulations "rely on responses to new information by users whose subsequent actions create market or political incentives for disclosers" (Weil, Fung, Graham, & Fagotto, 2006:158) to modify their behavior to satisfy these users. Thus, like independent rating agencies, many of these transparency regulations seek to directly influence the behavior of organizations' *stakeholders*, and empirical studies have identified several instances in which this has occurred, including investors in, and home owners living near, companies that were required to disclose toxic chemical pollution (Hamilton, 1995; Khanna, Quimio, & Bojilova, 1998; Oberholzer-Gee & Mitsunari, 2006).

Many of these regulations have the additional explicit objective of leveraging stakeholder responses to information to "change the practices of targeted organizations in order to achieve specified policy aims" (Weil et al., 2006:158). For example, restaurant grade cards based on health inspections seek not only to reduce consumers' health risks from unhygienic practices, but also to create stronger incentives for restaurant operators to maintain high standards of hygiene (Jin & Leslie, 2003). Similarly, regulations that require factories to report toxic chemical pollution are intended not to only satisfy communities' "right to know" about the toxins in their environment, but also to pressure factories to reduce their emissions. A number of studies have found that organizations do respond to information disclosure programs. After finding that a state regulation requiring companies to warn consumers about toxic materials in their products inspired "a flurry of efforts" to reduce or eliminate these materials from products, Graham (2000) concluded that regulation by shaming" was "a newly potent political force." Bennear and Olmstead (forthcoming) found that a new regulation that mandates disclosure to customers

of information about regulatory violations and contaminant levels has led many utilities to improve their regulatory compliance. Other studies have found that that government information disclosure programs have spurred companies to improve their environmental performance (Blackman, Afsah, & Ratunanda, 2004; Konar & Cohen, 1997; Scorse, 2007), food and water safety (Bennear & Olmstead, Forthcoming; Jin & Leslie, 2003), and surgical outcomes (Cutler, Huckman, & Landrum, 2004; Hannan, Kilburn, Racz, Shields, & Chassin, 1994; Peterson, DeLong, Jollis, Muhlbaier, & Mark, 1998).

These empirical results suggest that information about a company's management practices and performance disclosed pursuant to government regulations can stimulate management to pursue changes in practices and performance. Our paper is among the first to explore whether information about companies management practices and performance disclosed by non-governmental, independent rating agencies might stimulate similar changes in management practices and performance.

3. Firm Responses to Independent Ratings

3.1 Responding to Poor Ratings

By defining widely accepted standards of behavior and comparing organizations' adherence to these standards, independent rating agencies help prospective consumers, employees, and investors identify which organizations possess high quality, but difficult-to-observe, management practices. The financial credit rating firm Moody's, for example, describes itself as providing "credit ratings and research [to] help investors analyze the credit risks associated with fixed-income securities" (Moodys.com, 2008). Similarly, *U.S. News & World Report* maintains that its college and graduate program rankings are intended not to "transform schools" or "hold them accountable," but rather to "provide accessible information to educational consumers" (Espeland & Sauder, 2007: 5).

In the face of growing investor interest in "socially responsible investing," and a desire by some to avoid investing in firms deemed socially irresponsible (Barnett & Salomon, 2006), social rating agencies emerged to "identify which firms are more or less responsible" (Vogel, 2005: 39). Such agencies conduct in-depth analysis of companies' management practices and social performance by interviewing

company managers, reviewing media reports, and synthesizing company records from various regulatory agencies. The social rating firm KLD Research & Analytics, the focus of our empirical analysis, describes its mission purely in terms of serving investors as "providing management tools to professionals integrating environmental, social and governance factors (ESG) into their investment decisions" (KLD.com, 2006).

Granting that pressuring companies is not the explicit mission of social rating agencies, we argue that such agencies' ratings nevertheless elicit responses from some companies. Like Rao (1994: 32), we view these ratings as "social tests," where favorable ratings bestow a high status upon firms, which are then presumed to be superior to other firms on the dimension of interest. In contrast, the management practices and performance of poorly rated firms are construed to lie outside the boundaries deemed by the rating agency to be "desirable, proper, [and] appropriate" (Bansal, 2004). In such cases, managers of poorly rated firms are more likely to suffer "public humiliation" (Graham, 2000) and become more motivated to implement more robust environmental management practices to improve their companies' ratings.

Stephan (2002: 194) argued that a facility's pollution levels "may signal to the market the overall economic health of a given industrial plant...[and] inefficient pollution output may signal reduced profit margins, increased liabilities, and ineffective management." A poor reputation for environmental performance and corporate social responsibility can also undermine employee morale (Ramus & Killmer, 2007; Savitz & Weber, 2007), innovativeness, and willingness to engage in participatory problem-solving (Ramus & Steger, 2000). Similarly, a poor environmental rating can trigger concerns by current and potential investors that the firm might be overlooking opportunities to invest in environmental management activities that might reduce costs, preempt competition, and spur higher-order learning (Hart, 1995; King & Lenox, 2002; Sharma & Vredenburg, 1998). Investors might also perceive firms with poor environmental ratings to face higher risks of business interruptions and legal costs, since poor ratings can erode their relationships with regulators and local communities (Coglianese & Nash, 2001; Delmas & Toffel, Forthcoming).

Firms with poor environmental ratings might also be perceived to be operating with unusually high risks of accidents and resulting liability exposure (Delmas, 2002). More broadly, poor environmental ratings might sully companies' overall reputations. Hamilton (1995) found that when new environmental performance information is disclosed, the firms with the worst records were more likely to attract negative media coverage. Beyond reputational concerns, negative media coverage on environmental issues is associated with greater stock price volatility (Bansal & Clelland, 2004). Poor environmental reputations are also likely to put companies on environmental activists' radar screens and make them targets of their lawsuits, protests, boycotts, letter writing campaigns, and proxy votes (Lenox & Eesley, Forthcoming). Companies with poor environmental ratings also risk alienating buyers who incorporate environmental and social considerations into their procurement criteria, and risk being excluded from the rapidly growing market for "green funds" (Norton, 2007). All of these factors can lead companies to fear that poor environmental ratings might erode their stock market value, which was the case for some companies revealed by a government information disclosure program to have poor environmental performance (Hamilton, 1995; Khanna et al., 1998).

The growing interest in corporate social responsibility (CSR) and socially responsible investment (SRI) has increased both the salience of independent ratings agencies and companies' responsiveness to risks to their brand reputations. The *Financial Times* noted that "in post-industrial society, brands have replaced factories as companies' most valuable assets.... [C]hief executives...dare not risk damaging their brands by being seen as hostile to people or the planet" (Tomkins, 2001). According to Gunningham, Kagan, and Thornton (2004: 308), "corporate executives increasingly talk about the importance of…[avoiding] activities that societies (or influential elements within them) deem unacceptable." In his comprehensive assessment of the literature on CSR, Vogel (2005: 52) observed that "[m]any companies now regard it as in their self-interest to be, or at least appear to be, responsive to NGO and media criticism, lest their reputations suffer significant damage." Even the mere threat of protest campaigns by NGOs has prompted many companies to make policy changes and enact more stringent social and environmental management practices (Vogel, 2005).

The above arguments imply that firms that receive poor ratings are more likely to respond by taking management actions to bolster their ratings. Because environmental ratings are based largely on environmental performance, such management actions will focus on improving environmental performance. Taken together, this implies that the worse a firm's initial environmental rating, the more likely its management will respond with actions to improve the firm's environmental performance. As a result, we predict:

> HYPOTHESIS 1. *Firms that receive a poor environmental rating will subsequently improve their environmental performance more than will other firms.*

3.2 Differential Benefits of Responding to Poor Ratings

We do not, however, expect firms to respond uniformly to poor environmental ratings. Firms face differential benefits and costs of responding to a negative rating, in part due to differences in the political and regulatory environments they face. In addition, firms face a dynamic regulatory environment, as regulatory thresholds and enforcement stringency change over time. Compliance with government regulations is costly, and these costs vary substantially across industries (Leone, 1981, 1986). Relative to those in other industries, firms in highly regulated industries "face greater exposure to the public policy process" (Cho & Patten, 2007: 642) and thus greater risks that a poor rating might provoke concerns among communities surrounding their plants as well as negative media coverage. Both of these forces can stimulate political pressure to increase the frequency or intensity (and thus cost) of regulatory inspections, and might even lead regulators to consider tightening compliance thresholds. As such, firms that face greater regulatory threats are more likely to invest in environmental improvements (Cho & Patten, 2007; Lyon & Maxwell, 2001; Short & Toffel, 2008), establish industry self-regulation schemes, and adopt voluntary environmental programs (Corbett, Montes-Sancho, & Kirsch, 2005; King & Lenox, 2000). As a result, we propose that poor environmental ratings will especially motivate firms in highly regulated industries to significantly improve their environmental performance in order to forestall greater regulatory scrutiny they might otherwise accrue.

> HYPOTHESIS 2. *In highly regulated industries, firms that receive a poor environmental rating will subsequently improve their environmental performance more than will other firms.*

3.3 Differential Costs of Responding to Poor Ratings

We also expect that some firms will be able to make environmental improvements at lower costs. Just as firms face different costs and benefits to comply with environmental regulations (Terlaak, 2007), firms face different sets of opportunities to improve their environmental performance (Levi & Nault, 2004). Firms also possess different capabilities that affect the cost of pursuing these opportunities. Firms that have already made substantial investments in mitigating their environmental impacts find that additional improvements require the adoption of increasingly costly new technologies and management programs (Darnall & Edwards, 2006; Graham & Miller, 2001; Hart & Ahuja, 1996).

"[E]asy and inexpensive behavioral and material changes that result in large emission reductions relative to costs" (Hart & Ahuja, 1996:32) are more likely to be accessible to environmentally inefficient firms because they have a greater opportunity to exploit "low hanging fruit" (Darnall & Edwards, 2006; King & Lenox, 2000; Reinhardt, 1998; Terlaak, 2007). "[E]asy and inexpensive behavioral and material changes that result in large emission reductions relative to costs" are thus more likely to be accessible to less environmentally inefficient firms (Hart & Ahuja, 1996). Similarly, according to Terlaak (2007: 977), "firms with higher inefficiencies...may benefit more from codified practices because their marginal costs for improving efficiency are smaller. Presumably, firms with substandard practices have more opportunities to exploit low-hanging fruit."

Beyond the availability of more low cost improvement opportunities, laggards might further benefit by leveraging the experience of leaders. Technological laggards, von Hippel (1988) observes, can learn from leaders in the field, borrow off-the-shelf technologies, or tap existing internal know-how at far lower cost than firms that have already achieved superior performance. We believe the same mechanisms apply to environmental technologies and management techniques that can improve environmental performance.

We thus extend our first hypothesis, that poorly rated firms will subsequently improve their environmental performance more than will other firms, by suggesting that this relationship is especially

likely to be present among less efficient firms because they are more likely to face lower cost opportunities to improve.

> HYPOTHESIS 3. *Among less environmentally efficient firms, those that receive a poor environmental rating will subsequently improve their environmental performance more than will other firms.*

4. Data and Measures

Environmental performance. We measure environmental performance using corporate-wide toxic pollution, an outcome metric employed by many other scholars (Delmas, Russo, & Montes-Sancho, 2007; Kassinis & Vafeas, 2006; King & Lenox, 2002; Klassen & Whybark, 1999; Russo & Harrison, 2005). We use the total pounds of toxic chemical emissions each firm reported to the U.S. Environmental Protection Agency's Toxic Release Inventory (TRI) as production waste, transfers, and releases. *Toxic emissions* based on TRI data are among the most commonly used outcome measures of environmental performance, in part, because the data is legally required to be disclosed in a consistent manner across a wide array of industries.[2] We obtained toxic chemical emissions data from the Corporate Environmental Profiles Directory (CEPD) created by the Investor Responsibility Research Center, which aggregates facility-level data from a variety of US EPA databases for all domestic subsidiaries of all members of the S&P 500 Index, S&P SmallCap 600 Index, and S&P MidCap 400 Index. To reduce the impact of outliers on our results, we take the log after adding 1, a common practice in empirical analyses that employ TRI data (Kassinis & Vafeas, 2006; King & Lenox, 2000; Russo & Harrison, 2005).

Environmental ratings. We obtained environmental ratings from KLD Research & Analytics, Inc. (KLD), "the largest multidimensional CSP [corporate social performance] database available to the public" (Deckop, Merriman, & Gupta, 2006: 334). KLD has been issuing annual environmental ratings for all members of the S&P 500 Index and Domini Social 400 Index since 1991. KLD expanded its coverage in 2001, when it began including ratings for Russell 1000 Index members in its KLD STATS

[2] Whereas some studies apply various weights to these chemicals to account for differences in toxicity, simply summing the pounds of emissions was a method commonly used by the media and prominent non-profit organizations and in government publications during the sample period (Toffel & Marshall, 2004).

database. KLD added ratings for Russell 2000 Index members to KLD STATS in 2003. Because KLD's decision to begin rating these additional firms was unrelated to the firms' behavior or performance, and because the firms had no influence on the decision to be rated, we avoid the selection problems common to many program evaluations.

KLD ratings are widely known in social investing circles: 15 of the world's top 25 institutional financial managers use KLD research, and more than $10 billion is invested in funds based on its ratings (KLD.com, 2006). For example, the Teachers Insurance and Annuity Association-College Retirement Equities Fund (TIAA-CREF) uses KLD ratings as the basis for including equities in its Social Choice Equity fund (Baue, 2003) which has $550 million in assets under management (TIAA-CREF, 2008). When KLD downgraded its rating of The Coca-Cola Company in 2006 due to concerns about labor and environmental practices in the developing world, TIAA-CREF divested more than $50 million worth of the company's stock (Wilbert, July 19th, 2006). Widely used in studies of corporate social responsibility and socially responsible investing (Berman, Wicks, Kotha, & Jones, 1999; Margolis & Walsh, 2003), KLD ratings have been referred to as "the *de facto* research standard" in those domains (Waddock, 2003: 369).

We obtained annual company environmental ratings data for each of KLD's 14 dichotomous environmental "strength" and "concern" variables from the KLD STATS database. The seven environmental "strength" variables are: Beneficial products and services; Pollution prevention; Recycling; Clean energy; Communications; Property, plant, and equipment; and Other strengths. The seven environmental "concern" variables are: Hazardous waste; Regulatory problems; Ozone-depleting chemicals; Substantial emissions, Agricultural chemicals, Climate change, and Other concerns. Detailed descriptions of these ratings are provided in Table A1 of the Online Appendix.

Following Cho and Patten (2007), we created a dummy variable, *initial rating poor*, to indicate firms that had initial KLD environmental ratings consisting only of concerns (no strengths). Such a rating suggests corporate behavior that violates taken-for-granted norms (Scott, 1987). Another dummy variable, *initial rating mixed or good*, was created to identify firms that had initial environmental ratings consisting

of only strengths (no concerns), of both strengths and concerns, or of neither strengths nor concerns. In our empirical analysis, we interact these firm-level variables with a time varying dummy variable, *KLD rated*, coded "1" in years in which firms were rated by KLD (regardless of the actual rating), and "0" otherwise.

Regulatory scrutiny. We identified firms that operate in a highly environmentally regulated context based on a classification devised by Cho and Patten (2007). A dichotomous variable, *highly environmentally regulated*, was coded "1" for companies with a primary industry classification of mining (SIC Code 10), oil exploration (13), paper (26), chemical and allied products (28), petroleum refining (29), metals (33), or utilities (49), and "0" otherwise. We created a second dichotomous variable, *low environmentally regulated*, to which we applied the inverse of the aforementioned coding scheme.

Environmental efficiency. Environmental efficiency (or "eco-efficiency") refers to the extent to which a firm's environmental impacts or resource intensity are minimized, normalized by its production level (Ayres, 1995; Starik & Marcus, 2000). We operationalize this as the ratio of each firm's toxic chemical emissions to revenues. We obtained these data from the TRI database and Compustat, respectively. We calculated each firm's average ratio during 1999-2000, the two-year period immediately before any firms in our sample were rated by KLD, and compared these ratios to the corresponding industry median value during that period. This yielded two firm-level dummy variables: *less environmentally efficient* was coded "1" for firms with a ratio that exceeded its industry median, and "0" otherwise; *more environmentally efficient* was coded "1" for firms with ratios less than its industry median, and "0" otherwise (see Panel A of Table 1).

Control variables. We control for several other factors that might influence environmental performance including regulatory context (Delmas & Toffel, Forthcoming), and organization size (Goodstein, 1994). We control for regulatory context by including firm fixed effects and year dummies, and for organization size by including the logarithmic transformations of annual *employment, revenues*, and *assets* (Christmann, 2000; King, Lenox, & Terlaak, 2005; Russo & Fouts, 1997; Sharma, 2000; Waddock & Graves, 1997), obtained from Compustat. Because a firm's acquisitions or divestitures of

TRI-reporting facilities can also affect its aggregate TRI emissions, we control for the *number of TRI-reporting facilities,* obtained from the CEPD.

5. Methods and Results

Because we are interested in how firms respond to their initial KLD ratings, we compare firms first rated due to KLD's expansion with firms not rated by KLD during our sample period. Including the latter as our control group enables us to control for performance changes attributable to the availability of new technologies or changes in regulations that could affect the environmental performance of all, not just the rated, firms.

Our analysis begins in 1999, two years before KLD expanded its scope, and extends through 2004 (the most recent data available from CEPD). Our sample includes 598 companies from a wide variety of industries[3] that meet all of the following criteria: the company has at least one subsidiary regulated by the US EPA; the company is a member of either the S&P SmallCap 600 Index or S&P MidCap 400 Index; and the company was not listed in the Domini Social 400 Index prior to 2001. Summary statistics and correlations are provided in Table 1.

5.1 Empirical Models

We test our hypotheses using a difference-in-differences approach to compare firms' environmental performance before being rated to their performance after being rated, and use as a reference group firms that were not rated. We estimate the following model to test Hypothesis 1:

$$Y_{i,t} = \beta_1 \textbf{ KLD rated}_{i,t} \times \textbf{Initial rating poor}_i + \beta_2 \textbf{ KLD rated}_{i,t} \times \textbf{Initial rating mixed or good}_i$$

$$+ \beta_3 X_{i,t} + \beta_4 \gamma_t + \alpha_i + \nu_{i,t} \text{ s} \qquad \textbf{(1)}$$

$Y_{i,t}$ refers to the TRI emissions of facility i in year t. $X_{i,t}$ refers to the facility's annual log of assets, revenues, employment, and number of TRI-reporting facilities. Firm fixed effects (α_i) control for time-invariant factors at each firm (such as corporate culture and geographic location) that might affect

[3] The industry composition of the sample is provided Table A2 of the Online Appendix.

emissions. We include a full set of year dummies (γ_t) to account for annual technological and policy changes that might affect emissions. Hypothesis 1 predicts that β_1 will be negative, indicating that firms for which the initial KLD rating was poor subsequently improved their environmental performance more than unrated firms. It also predicts that β_1 will be significantly smaller than β_2, indicating that firms with poor initial KLD ratings poor subsequently improved their environmental performance more than firms with mixed or good initial KLD ratings.

To test the moderating effects described in Hypotheses 2 and 3, we estimate models that are similar to Equation (1), but fully interact all variables with two dummy variables. Our model that tests Hypothesis 2 interacts all variables with *highly environmentally regulated industry* and *low environmentally regulated industry*; the model that tests Hypothesis 3 interacts all variables with *less environmentally efficient* and *more environmentally efficient*. These specifications, like the specification that tests Hypothesis 1, identify changes in performance levels between (1) firms initially rated as poor, (2) firms initially rated as mixed/good, and (3) unrated firms. Our interaction terms enable us to make these comparisons *within* these additional subcategories. For example, in testing H3, our estimates compare performance *within* the less environmentally efficient subset of firms and *within* the more environmentally efficient subset of firms. These empirical specifications are virtually identical to running separate regressions on split samples (e.g., the less efficient subsample and then the more efficient subsample), but employing a single fully interacted model facilitates comparing coefficients.

5.2 Empirical Results

We estimated our models using Stata 10, employing ordinary least-squares (OLS) regression with firm-level fixed effects. Our estimation technique is predicated on the assumption that the environmental performance of each group of newly-rated firms would have followed the trend of the unrated firms had KLD not expanded the scope of its coverage. Although not directly testable, this assumption would be strengthened if the performance trends of these three groups were similar during the pre-rating period. To test this, we compared the trends from 1999 to 2000, the period before any of the firms in our sample

were rated, among our three focal groups of firms, (1) those eventually rated poorly, (2) those eventually rated mixed/good, and (3) those never rated. T-tests performed to compare the percent change in emissions per sales from 1999 to 2000 revealed the pre-period trends of the three groups to be statistically indistinguishable.

Table 2 presents the results of the model that tests Hypothesis 1. Firms initially rated as poor subsequently reduced their emissions more than never-rated firms ($\beta = -0.66$; $p=0.01$). The coefficient value (our difference-in-differences estimate) indicates that emissions were reduced 0.66 log points more by poorly rated than by unrated firms, a magnitude equal to one-sixth of a standard deviation (calculated as $\beta = -0.66$ divided by SD of log toxic emissions = 4.18). A Wald test that compared the coefficients on the two interaction terms revealed that the firms initially rated poor also reduced their emissions more than the firms initially rated mixed or good ($F=15.63$; $p<0.01$). These results support Hypothesis 1.

Table 3 presents the results of the fully interacted model that tests Hypothesis 2. The negative statistically significant coefficient on the first interaction term (*KLD rated* × *Initial rating poor* × *Highly environmentally regulated*) indicates that emissions were reduced by 1.03 log points ($p<0.01$)—just under one quarter of a standard deviation (calculated as $\beta = -1.03$ / sd=4.18)—more by the highly regulated firms initially rated poor than by the highly regulated firms that were never rated. A Wald test comparing the coefficient on this first interaction term to the coefficient on the second interaction term (*KLD rated* × *Initial rating mixed or good* × *Highly environmentally regulated*) revealed that emissions were also reduced to a greater extent by the highly regulated firms that were initially rated poor than by the highly regulated firms that were initially rated mixed or good (Wald test $F = 24.43$; $p<0.01$). The insignificant coefficients on the third and fourth interaction terms indicate a lack of evidence that either newly-rated group of less regulated firms performed any differently than the less regulated firms that were never rated. Taken as a whole, the results presented in Table 3 support Hypothesis 2 by indicating that poor initial ratings were particularly associated with performance improvement among highly regulated firms.

The fully interacted model that tests Hypothesis 3 is estimated on a slightly smaller sample than our earlier models (2,068 versus 2,412 firm-year observations) because we omitted from the sample in this model those firms that lacked the 1999 or 2000 emissions and revenue data needed to classify them as being more or less environmentally efficient. As depicted in Table 4, the negative statistically significant coefficient on the first interaction term (*KLD rated* × *Initial rating poor* × *Less environmentally efficient*) indicates that emissions were reduced by 0.77 log points more by the less efficient firms initially rated poor than by the less efficient firms that were never rated. The magnitude of this difference is just under one-sixth of a standard deviation (calculated as $\beta = -0.77 / \text{sd}=4.18$). Comparing the coefficient on the first interaction term to the coefficient on the second interaction term (*KLD rated* × *Initial rating mixed or good* × *Less environmentally efficient*) using a Wald test revealed that the less efficient firms initially rated poor also reduced their emissions to a greater extent than the less efficient firms initially rated mixed or good (Wald test $F = 16.60$; $p<0.01$). For completeness, we also note that the insignificant coefficients on the two *KLD rated* variables interacted with the *more environmentally efficient* group in Table 4 indicate a lack of evidence that either of the newly-rated groups of more efficient firms (those initially rated poor and those initially rated mixed or good) subsequently performed any differently than the more efficient firms that were never rated. The results presented in Table 4 indicating that poor ratings are associated with performance improvement among the less efficient firms and that no such improvement is observed among the more efficient firms support Hypothesis 3.

5.3 Robustness Tests

We performed several robustness tests to assess the extent to which our results were sensitive to plausible alternative measures of our independent and dependent variables and to changes in our sample. First, we investigated whether our results were sensitive to the manner in which we categorized firms as more or less environmentally efficient. In our main analysis, we categorized each firm as being less or more environmentally efficient based on whether its average ratio of toxic chemical emissions to revenues during 1999-2000 was above or below its industry median (50^{th} percentile) value. We also tried

categorizing firms based on whether they were above or below their industry's 40th percentile. We used the 60th percentile as a second alternative threshold. Our results using these alternative thresholds were similar to our main results.

We also tested the robustness of our results to several changes to our sample. We re-estimated our models testing Hypothesis 1 on the slightly smaller samples used to test Hypothesis 3 by omitting firms we could not classify as being more or less environmentally efficient because they lacked emissions and revenue data for 1999 or 2000. We also re-estimated the models on the subsample that excluded firms with initial ratings that contained neither environmental strengths nor environmental concerns because such "null ratings" might be due to KLD being unable to acquire the needed information rather than making an informed determination that these firms actually had no strengths and no concerns. Finally, we re-estimated the models using the subsample that excluded the firms that were never rated during our sample period. All firms in this subsample went through the transition of being unrated to being rated during the sample period, and all were members of (a) the S&P 600 Index or S&P 400 Index, and (b) the Russell 1000 Index or Russell 2000 Index. The results of our models estimated on all three of these alternative samples continued to provide statistically significant support for our three hypotheses.

There might be concern that our results are driven by mean reversion, as might be the case in the following scenario. Suppose that annual emission level changes are largely a random process whereby firms rated poorly by KLD, due in part to exhibiting unusually high emission levels, would subsequently exhibit reduced emissions due simply to random fluctuations. By the same logic, mean reversion would predict that firms KLD rated favorably would subsequently exhibit higher emissions. Empirical evidence from prior research and the robustness tests we conducted lead us to believe that mean reversion is not driving our results. Prior research observed *higher* subsequent emissions levels by firms KLD rated on an ongoing basis that received poor ratings (Chatterji, Levine, & Toffel, 2008), providing evidence contrary

to a mean reversion hypothesis.[4] Further, we performed a robustness test that compared newly-rated firms to an alternative comparison group, S&P 500 Index member firms that received KLD ratings throughout our sample period. The results indicated that newly-rated firms with poor initial KLD ratings subsequently improved more than the always-rated firms that had poor initial KLD ratings in the pre-rating period, and that no such difference existed between the newly-rated and always-rated firms rated, initially or during the pre-period, mixed or good. Because these models compare treatment and control firms with similar initial or pre-period ratings, the subsequent performance differences among the poorly rated group are not driven by mean reversion. These robustness tests are described more fully in the Online Appendix, which also displays the results in Column 1 of Tables A3-A5.

Finally, we considered an alternative measure of environmental performance based on environmental regulatory compliance (Helland, 1998; Sharma, 2000; Short & Toffel, 2008). We obtained the *annual number of penalties* each firm accrued for violating regulations associated with all nine major U.S. federal environmental regulations included in the CEPD database.[5] Because this is a count dependent variable, we estimated these models using a conditional fixed effects negative binomial specification. The results were similar to those obtained in our main analysis. That firms initially rated poor subsequently accrued significantly fewer penalties than both the never-rated firms and the firms initially rated mixed or good provides additional support for Hypothesis 1. Similarly, less environmentally efficient firms initially rated poor subsequently accrued significantly fewer penalties than other less environmentally efficient firms, but we found no evidence of this pattern within the more environmentally efficient group of firms, which further supports Hypothesis 3. In contrast to our main results, we found that poorly rated firms experienced significant reductions in penalty rates in both highly *and* less intensively regulated industries,

[4] The results of the prior research are based on assessing the ongoing dynamic relationship between annual ratings and subsequent annual emissions over a 13-year period (Chatterji, Levine, & Toffel 2008). Our current analysis examines the relationship between ratings and subsequent emissions for *newly-rated firms*, a small fraction of the firms KLD rates.

[5] These include the Atomic Energy Act; Clean Air Act; Clean Water Act; Endangered Species Act; Federal Insecticide, Fungicide, and Rodenticide Act; Mine Safety and Health Act; Resource Conservation and Recovery Act; Safe Drinking Water Act; and Toxic Substances Control Act.

which did not support Hypothesis 2.[6] The results of these penalty models are displayed in Column 2 of Tables A3-A5 in the Online Appendix.

Overall, the results of these tests indicate that our main results are robust to a variety of plausible alternative independent measures and several alternative samples. In addition, two of our three main results were robust to an alternative dependent variable.

6. Discussion

We find that environmental performance subsequently improved more for firms that initially received poor KLD ratings than for other firms, and that such improvements were driven by firms in highly regulated industries and firms with more low cost opportunities to exploit. Our research design is based on a natural experiment that exploits an exogenous change in the rating status of some firms in our sample. This empirical strategy moves us closer to the ideal of a randomized experiment that is still rare in management research.

Our paper contributes to a nascent literature that examines the impact of ratings on the rated organizations. In contrast to our predictions and results, Espeland and Sauder (2007) found that low rankings expedited the decline of law schools by eroding their ability to attract high quality applicants and raise funds. The opposite pattern is observed in our results: poorly rated firms subsequently improved their performance. Further research is needed to understand the circumstances under which poor ratings will motivate or enervate organizations. Nor is much known about how organizations respond to positive ratings. Positive ratings might elevate performance by enabling organizations to raise capital more cheaply and attract higher quality talent and higher quality and more prestigious supply chain partners. On the other hand, positive ratings may lead some organizations to rest on their laurels and experience a

[6] An important caveat, when comparing the results of these negative binomial models to those obtained from the OLS models used in the main analysis, is that the conditional fixed effects negative binomial models are estimated based on data only for firms in the sample that exhibited variation in the number of penalties during the sample period. In fact, less than half the firms in the sample exhibited such variation, which might account for some of the differences in results between the emissions and penalty regressions.

subsequent decline in performance. Further research is needed to understand how positive ratings affect organizations.

Our results reveal that changes in organizational performance are associated with ratings issued by an independent rating agency. Although this study is one of the first to identify this effect with independent, non-governmental rating agencies, our results are consistent with the findings of prior research that examined the effects of governmental information disclosure programs on firm behavior (e.g., Greenstone, Oyer, & Vissing-Jorgensen, 2006; Jin & Leslie, 2003). Our findings are most similar to those of a study that found that companies rated by a government program in Indonesia as having the worst environmental performance with respect to water pollution subsequently realized the greatest improvements (Blackman et al., 2004).

Although our study is the first to examine organizational response to third party ratings, distinctions between government and third party efforts are not necessarily hard and fast. KLD's environmental ratings are based in part on historical government data (e.g., regulatory compliance records, number of Superfund sites), and much of its ability to predict environmental outcomes derives from its aggregation of historical environmental data extracted from government databases (Chatterji, Levine, & Toffel, 2008). This highlights an opportunity for policy makers to partner with other stakeholder groups: governments can exercise their coercive power to gather data from companies, and stakeholder groups can focus on communicating the data to the public.

Examples can be found of non-governmental entities doing this with little involvement by government. Consider that the data the US EPA requires annually from tens of thousands of facilities on their toxic emissions and use of more than 600 chemicals (termed TRI data) languishes on two fairly obscure EPA Web sites (www.epa.gov/tri and www.epa.gov/enviro). To make this data more visible and useful, Environmental Defense and The Right-to-Know Network each created user-friendly Web portals (www.scorecard.org and www.rtknet.org, respectively), a team of academics created a Google Map mashup of the data (www.mapecos.org; see Walker (2007)), and the Investor Responsibility Research Center aggregated the factory-level data to the parent companies to create the CEPD. In this spirit,

Wikinomics author Anthony Williams foresees a future in which non-governmental organizations and other sectors create user-friendly Web portals to aggregate data from government and other sources to create and distribute information of public value (Williams, 2007).

The results of our study have policy implications for boosting the effectiveness of government information disclosure programs. Government agencies striving to leverage mandatory information disclosure programs to improve the environmental performance of laggard enterprises might take recourse to information-based incentives such as "shaming," a strategy that might be particularly effective in highly regulated industries.

Regulators might accompany the "stick" of information-based incentives with a "carrot" in the form of helping firms identify opportunities for low cost improvements. In practical terms, policymakers can promote change by lowering the cost of investments in environmental performance improvements, such as by providing technical assistance or subsidies to facilitate knowledge transfer to or between firms. Government technical assistance programs (O'Rourke & Lee, 2004) might be ideally suited to help companies, especially those not yet shamed by an external rating, identify opportunities for low cost improvements. Targeting scarce technical assistance resources to help less environmentally efficient firms improve their performance could yield much greater aggregate performance improvement than dispensing such resources on a first-come-first-served basis. Alternatively, governments might promote technical assistance through subsidies, as the Pakistan and Singapore governments have done in subsidizing the training associated with companies' adoption of international environmental and labor standards and the US EPA has done in sponsoring its "National Environmental Partnership Summit" to facilitate the sharing of best practices among industry participants. These mechanisms will be especially pertinent in technology intensive industries in which much knowledge is tacit and difficult to transfer.

The insights yielded by this study can also be broadly applied in other policy arenas, notably in education policy. For example, the No Child Left Behind Act, a U.S. law passed in 2001, uses shaming mechanisms to identify failing schools, arguably without providing the necessary resources for improvement (Linn, Baker, & Betebenner, 2002). Our work suggests that this kind of policy would be

more effective if failing schools were provided with increased funding to identify low cost opportunities to raise student achievement.

We acknowledge a number of limitations to our study. First, because our dataset ends in 2004, we are unable to determine whether the firms in which we observed improvements maintained those improvements. Future work could analyze organizational responses to ratings over longer periods of time. Our empirical analysis employs firm-level fixed effects to examine performance differences within firms over time. Firm fixed effects control for any influence of managerial effectiveness that might also affect environmental performance, environmental efficiency, or the KLD ratings, to the extent that this influence within firms remains constant over time throughout our sample period. That said, it is possible that during our sample period some firms independently improve (or worsen) their managerial effectiveness, which we do not observe, and that these changes affect environmental performance, environmental efficiency, or the KLD ratings. In that case, our results could suffer omitted variable bias. To affect the inferences from our analysis, however, this would have to occur disproportionately among the newly-rated (treatment) group or the never-rated (control) group. We have no reason to suspect this concern to be seriously biasing our results, but nonetheless acknowledge it is a possibility.

Although we have relied on a natural experiment and employed a quasi-control group, we cannot be sure whether firms are responding directly to these ratings or to other forces in the political, economic, or social environment that might be related to these ratings. Future research could further illuminate organizational responses to ratings by studying firms that initially received positive ratings and yet improved further, and firms that initially received poor ratings and yet failed to improve. Understanding how and why firms respond differently to negative ratings also represents an important avenue for future research. Finally, although there is no single, ideal, corporate environmental rating, we believe KLD's ratings to be a reasonable choice, especially given empirical confirmations of construct validity (Sharfman, 1996) and predictive validity (Chatterji et al., 2008), which overcomes limitations associated with many other measures (Chatterji & Levine, 2008).

7. Conclusion

Company ratings and rankings have a long history and continue to proliferate. Our paper is among the first to document the impact of independent company ratings on firm performance. Future research should investigate whether other kinds of independent raters and market intermediaries have a similar impact. Independent raters in other domains that might make worthy candidates for such research include Moody's and Standard and Poor's as well as agencies that consolidate user-based ratings such as Zagat's and Angie's List. Future research could also examine the relationships we explored in other domains including education (e.g., how public schools respond to ratings from the No Child Left Behind program) and product quality (e.g., how manufacturers respond to *Consumer Reports* ratings). More broadly, we hope our work is part of a nascent literature that will help to identify the conditions under which company ratings are most likely to achieve their goals. In our view, this line of inquiry has great potential to inform both scholars of business strategy and policymakers.

References

Akerlof, G. A. 1970. The Market for 'Lemons': Quality Uncertainty and the Market Mechanism. Quarterly Journal of Economics, 84(3): 488-500.

Ayres, R. U. 1995. Achieving Eco-Efficiency in Business. Report of the WBCSD Second Antwerp Eco-Efficiency Workshop. Paper presented at the Geneva: World Business Council for Sustainable Development. (March 14-15).

Bansal, P. 2004. Evolving Sustainably: A Longitudinal Study of Corporate Sustainable Development. Strategic Management Journal, 20(5): 197-218.

Bansal, P. & Clelland, I. 2004. Talking Trash: Legitimacy, Impression Management, and Unsystematic Risk in the Context of the Natural Environment. Academy of Management Journal, 47(1): 93-103.

Barnett, M. & Salomon, R. 2006. Beyond Dichotomy: The Curvilinear Relationship Between Social Responsibility and Financial Performance. Strategic Management Journal, 27: 1101-1122.

Baue, W.; TIAA-CREF Adds Positive Screens and Replicates Russell 3000 Performance; http://www.socialfunds.com/news/article.cgi/1128.html. , 2003.

Becchetti, L., Ciciretti, R., & Hasan, I. 2007. Corporate Social Responsibility and Shareholder's Value: An Event Study Analysis, Federal Reserve Bank of Atlanta Working Paper.

Bennear, L. S. & Olmstead, S. M. Forthcoming. The Impacts of the "Right to Know": Information Disclosure and the Violation of Drinking Water Standards. Journal of Environmental Economics and Management.

Berman, S. L., Wicks, A. C., Kotha, S., & Jones, T. M. 1999. Does Stakeholder Orientation Matter? The Relationship between Stakeholder Management Models and Firm Financial Performance. Academy of Management Journal, 42: 488-506.

Blackman, A., Afsah, S., & Ratunanda, D. 2004. How Do Public Disclosure Pollution Control Programs Work? Evidence from Indonesia. Human Ecology Review, 11(3): 235-246.

Chatterji, A. K. & Levine, D. I. 2006. Breaking Down the Wall of Codes: Evaluating Non-Financial Performance Measurement. California Management Review, 48(2): 29-51.

Chatterji, A. K. & Levine, D. I. 2008. Imitate or Differentiate: Evaluating the Validity of Corporate Social Responsibility Ratings. Haas School of Business Working Paper.

Chatterji, A. K., Levine, D. I., & Toffel, M. W. 2008. How Well Do Social Ratings Actually Measure Corporate Social Responsibility?, Journal of Economics and Management Strategy. Forthcoming.

Cho, C. H. & Patten, D. M. 2007. The Role of Environmental Disclosures as Tools of Legitimacy: A Research Note. Accounting, Organizations, and Society, (32): 639-647.

Christmann, P. 2000. Effects of "Best Practices" of Environmental Management on Cost Advantage: The Role of Complementary Assets. Academy of Management Journal, 43(4): 663-680.

Coglianese, C. & Nash, J. (Eds.). 2001. Regulating from the Inside: Can Environmental Management Systems Achieve Policy Goals? Washington D.C.

Corbett, C. J., Montes-Sancho, M. J., & Kirsch, D. A. 2005. The Financial Impact of ISO 9000 Certification in the United States: An Empirical Analysis. Management Science, 51(7): 1046-1059.

Curran, M. M. & Moran, D. 2007. Impact of FTSE4Good Index on Firm Price: An Event Study. Journal of Environmental Management, 82: 529-537.

Cutler, D. M., Huckman, R. S., & Landrum, M. B. 2004. The Role of Information in Medical Markets: An Analysis of Publicly Reported Outcomes in Cardiac Surgery. AEA Papers and Proceedings, 94(2): 342-346.

Darnall, N. & Edwards, D. 2006. Predicting the Cost of Environmental Management System Adoption: The Role of Capabilities, Resources, and Ownership Structure. Strategic Management Journal, 27: 301-320.

Deckop, J. R., Merriman, K. K., & Gupta, S. 2006. The Effects of CEO Pay Structure on Corporate Social Performance. Journal of Management, 32(3): 329-342.

Delmas, M. 2002. The Diffusion of Environmental Standards in Europe and in the United States. Policy Sciences, 35: 91-119.

Delmas, M., Russo, M. V., & Montes-Sancho, M. J. 2007. Deregulation and Environmental Differentiation in the Electric Utility Industry. Strategic Management Journal, 28(2): 189-209.

Delmas, M. & Toffel, M. W. Forthcoming. Organizational Response to Environmental Demands: Opening the Black Box., Strategic Management Journal.

Elsbach, K. D. & Kramer, R. M. 1996. Members' Responses to Organizational Identity Threats: Encountering and Countering the Business Week Rankings. Administrative Science Quarterly, 41(3): 442-476.

Espeland, W. N. & Sauder, M. 2007. Rankings and Reactivity: How Public Measures Recreate Social Worlds. American Journal of Sociology, 113(1): 1-40.

Fombrun, C. J. 2007. List of Lists: A Compilation of International Corporate Reputation Ratings. Corporate Reputation Review, 10(2): 144-153.

Fortune; 100 Best Places to Work For; http://money.cnn.com/magazines/fortune/bestcompanies/2008/; July 16, 2008.

Goodstein, J. D. 1994. Institutional Pressures and Strategic Responsiveness: Employer Involvement in Work-Family Issues. Academy of Management Journal, 37(2): 350-382.

Graham, M. 2000. Regulation by Shaming. The Atlantic Monthly, 285(4): 36-40.

Graham, M. & Miller, C. 2001. Disclosure of Toxic Releases in the United States. Environment, 43(8): 8-20.

Greenstone, M., Oyer, P., & Vissing-Jorgensen, A. 2006. Mandated Disclosure, Stock Returns, and the 1964 Securities Acts Amendments. The Quarterly Journal of Economics.

Gunningham, N., Kagan, R. A., & Thornton, D. 2004. Social License and Environmental Protection: Why Businesses Go Beyond Compliance. Law & Social Inquiry, 29(2): 307-341.

Hamilton, J. T. 1995. Pollution as News: Media and Stock Market Reactions to the Toxics Release Inventory Data. Journal of Environmental Economics and Management, 28(1): 98-113.

Hannan, E. L., Kilburn, H., Racz, M., Shields, E., & Chassin, M. R. 1994. Improving the Outcomes of Coronary Artery Bypass Surgery in New York State. Journal of the American Medical Association, 271(10): 761-766.

Hart, S. L. 1995. A Natural Resource-Based View of the Firm. Academy of Management Review, 20: 986-1014.

Hart, S. L. & Ahuja, G. 1996. Does It Pay to be Green? An Empirical Examination of the Relationship between Emission Reduction and Firm Performance. Business Strategy and the Environment, 5(1): 30-37.

Helland, E. 1998. The Enforcement of Pollution Control Laws: Inspections, Violations, and Self-Reporting. The Review of Economics and Statistics, 80(1): 141-153.

HRC; Human Rights Campaign Best Places to Work; http://www.hrc.org/issues/workplace/best_places_to_work_2008.asp; July 22, 2008.

Jin, G. Z. & Leslie, P. 2003. The Effect of Information on Product Quality: Evidence from Restaurant Hygiene Grade Cards. Quarterly Journal of Economics, 118(2): 409-451.

Kassinis, G. & Vafeas, N. 2006. Stakeholder Pressures and Environmental Performance. Academy of Management Journal, 49(1): 145-159.

Khanna, M., Quimio, W. H., & Bojilova, D. 1998. Toxics Release Inventory: A Policy Tool for Environmental Protection. Journal of Environmental Economics and Management, 36(3): 243-299.

King, A. & Lenox, M. 2002. Exploring the Locus of Profitable Pollution Reduction. Management Science, 48(2): 289-299.

King, A. A. & Lenox, M. J. 2000. Industry Self-Regulation without Sanctions: The Chemical Industry's Responsible Care Program. The Academy of Management Journal, 43(4): 698-716.

King, A. A., Lenox, M. J., & Terlaak, A. 2005. The Strategic Use of Decentralized Institutions: Exploring Certification with the ISO 14001 Management Standard. Academy of Management Journal, 48(6): 1091-1106.

Klassen, R. D. & Whybark, D. C. 1999. The Impact of Environmental Technologies on Manufacturing Performance. The Academy of Management Journal, 42(6): 599-615.

KLD.com; KLD Research & Analytics, Inc.; www.kld.com; September 11, 2006.

Konar, S. & Cohen, M. A. 1997. Information As Regulation: The Effect of Community Right to Know Laws on Toxic Emissions. Journal of Environmental Economics and Management, 32(1): 109-124.

Lenox, M. J. & Eesley, C. E. Forthcoming. Private Environmental Activism and the Selection and Response of Firm Targets. Journal of Economics and Management Strategy.

Leone, R. A. 1981. Government Regulation of Business: Developing the Managerial Perspective. Boston: Harvard University.

Leone, R. A. 1986. Who Profits: Winners, Losers, and Government Regulation. New York: Basic Books.

Levi, M. D. & Nault, B. R. 2004. Converting Technology to Mitigate Environmental Damage. Management Science, 50(8): 1015-1030.

Linn, R., Baker, E., & Betebenner, D. 2002. Accountability Systems: Implications of Requirements of the No Child Left Behind Act of 2001. Educational Researcher, 31(6): 3-16.

Lyon, T. P. & Maxwell, J. W. 2001. "Voluntary" Approaches to Environmental Regulation: A Survey. In M. Franzini & A. Nicita (Eds.), Economic Institutions and Environmental Policy. Aldershot, Hampshire: Ashgate Publishing Ltd.

Margolis, J. D. & Walsh, J. P. 2003. Misery Loves Companies: Rethinking Social Initiatives by Business. Administrative Science Quarterly, 48(2): 268-305.

Moodys.com; "About Moodys"; http://www.moodys.com/moodys/cust/AboutMoodys/; July 17, 2008.

Norton, F. 2007. "Green" Investments Growing in Popularity, The Philadelphia Inquirer. August 21, 2007

O'Rourke, D. & Lee, E. 2004. Mandatory Planning for Environmental Innovation: Evaluating Regulatory Mechanisms for Toxics Use Reduction. Journal of Environmental Planning and Management 47(2): 181-200.

Oberholzer-Gee, F. & Mitsunari, M. 2006. Information regulation: Do the victims of externalities pay attention? Journal of Regulatory Economics, 30(2): 141-158.

Peterson, E. D., DeLong, E. R., Jollis, J. G., Muhlbaier, L. H., & Mark, D. B. 1998. The Effects of New York's Bypass Surgery Provider Profiling on Access to Care and Patient Outcomes in the Elderly. Journal of the American College of Cardiology, 32(4): 993-999.

Ramus, C. A. & Steger, U. 2000. The Roles of Supervisory Support Behaviors and Environmental Policy in Employee "Ecoinitiatives" at Leading-Edge European Companies. Academy of Management Journal 43(4): 605-626.

Ramus, C. A. & Killmer, A. B. C. 2007. Corporate Greening Through Prosocial Extrarole Behaviours – a Conceptual Framework for Employee Motivation. Business Strategy & the Environment, 16(8): 554-570.

Rao, H. 1994. The Social Construction of Reputation: Certification Contests, Legitimation, and the Survival of Organizations in the American Automobile Industry: 1895--1912. Strategic Management Journal, 15(8): 29-44.

Reinhardt, F. L. 1998. Environmental Product Differentiation: Implications for Corporate Strategy. California Management Review, 40(4): 43-74.

Rock, M. T. 2003. Public Disclosure of the Sweatshop Practices of American Multinational Garment/Shoe Makers/ Retailers: Impacts on Their Stock Prices. Competition & Change, 7(1): 23-38.

Russo, M. V. & Fouts, P. A. 1997. A Resource-Based Perspective on Corporate Environmental Performance and Profitability. Academy of Management Journal, 40: 534-559.

Russo, M. V. & Harrison, N. S. 2005. Organizational Design and Environmental Performance: Clues from the Electronics Industry. Academy of Management Journal, 48(4): 582-593.

Savitz, A. W. & Weber, K. 2007. The Sustainability Sweet Spot. Environmental Quality Management, 17(2): 17-28.

Scorse, J. 2007. Does Being a "Top 10" Worst Polluter Affect Facility Environmental Releases?: Evidence from the U.S. Toxic Release Inventory.: Monterey Institute of International Studies Working Paper.

Scott, W. R. 1987. The Adolescence of Institutional Theory. Administrative Science Quarterly, 32(4): 493-511.

Sen, S. & Bhattacharya, C. 2001. Does Doing Good Always Lead to Doing Better? Consumer Reactions to Corporate Social Responsibility. Journal of Marketing Research, 38(2): 225-243.

Sharfman, M. 1996. The Construct Validity of the Kinder, Lydenberg & Domini Social Performance Ratings Data. Journal of Business Ethics, 15: 287-296.

Sharma, S. & Vredenburg, H. 1998. Proactive Corporate Environmental Strategy and the Development of Competitively Valuable Organizational Capabilities. Strategic Management Journal, 19(8): 729-753.

Sharma, S. 2000. Managerial Interpretations and Organizational Context as Predictors of Corporate Choice of Environmental Strategy. Academy of Management Journal, 43(4): 681-694.

Short, J. L. & Toffel, M. W. 2008. Coerced Confessions: Self-Policing in the Shadow of the Regulator. Journal of Law, Economics and Organization 24(1): 45-71.

Starik, M. & Marcus, A. A. 2000. Introduction to the Special Research Forum on the Management of Organizations in the Natural Environment: A Field Emerging from Multiple Paths, with Many Challenges Ahead. Academy of Management Journal, 43(4): 539-546.

Stephan, M. 2002. Environmental Information Disclosure Programs: They Work but Why? Social Science Quarterly, 83(1): 281-298.

Takeda, F. & Tomozawa, T. 2007. A Change in Market Responses to the Environmental Management Ranking in Japan, Unpublished Manuscript.

Terlaak, A. 2007. Order Without Law? The Role of Certified Management Standards in Shaping Socially Desired Firm Behaviors. Academy of Management Review, 32(3): 968-985.

TIAA-CREF; Institutional Class Mutual Funds: Social Choice Equity; http://www.tiaa-cref.org/performance/institutional/profiles/1834.html; May 8, 2008.

Toffel, M. W. & Marshall, J. D. 2004. Improving Environmental Performance Assessment: Comparative Analysis of Weighting Methods used to Evaluate Chemical Release Inventories. Journal of Industrial Ecology, 8(1-2): 143-172.

Tomkins, R. 2001. When Caring is a Good Investment, The Financial Times. London. October 5

Vogel, D. 2005. The Market for Virtue: The Potential and Limits of Corporate Social Responsibility. Washington D.C.: Brookings Institution Press.

von Hippel, E. 1988. The Sources of Innovation. New York: Oxford University Press.

Waddock, S. 2003. Myths and Realities of Social Investing. Organization and Environment, 16: 369-380.

Waddock, S. A. & Graves, S. 1997. The Corporate Social Performance–Financial Performance Link. Strategic Management Journal, 18: 303-317.

Walker, P.; Mapping Out the Environment; http://www.cnn.com/2007/BUSINESS/12/11/exceed.mapecos/; March 12, 2008.

Weil, D., Fung, A., Graham, M., & Fagotto, E. 2006. The Effectiveness of Regulatory Disclosure Policies. Journal of Policy Analysis and Management, 25(1): 155-181.

Wilbert, C. July 19th, 2006. Social Responsibility of Coke Questioned, Atlanta Journal Constitution. Atlanta. July 19, 2006

Williams, A. D. 2007. Gov 2.0: The Power of Collaborative Communities Connecting Communities: Using Information to Drive Change. Washington D.C.: The Brookings Institution.

TABLE 1
Sample statistics

Panel A: Number of firms in sample

	(1) Total [a]	(2) Less environmentally efficient	(3) More environmentally efficient
Firms never rated	240	59	79
Firms initially rated mixed or good	297	127	105
Firms initially rated poor	61	43	14
Total number of firms	598	229	198

[a] The sample of firms used to test H1 (results in Table 2) is depicted in column (1). The sample of firms used to test H3 (results in Table 4) is depicted in columns (2) and (3). The former exceeds the latter because classifying firms as more or less environmentally efficient is based on emissions and revenue data from 1999-2000, which not all firms in column (1) reported.

Panel B: Summary statistics

Variable	Mean	SD	Min	Max
1. Log pounds of emissions	12.23	4.18	0	20.71
2. KLD rated × Initial rating poor	0.06	0.24	0	1
3 KLD rated × Initial rating mixed or good	0.26	0.44	0	1
4. Log employees	8.63	1.46	1.95	13.09
5. Log sales	20.97	1.55	15.13	26.38
6. Log assets	21.04	1.63	16.93	27.74
7. Log number of TRI-reporting facilities	1.65	0.87	0.69	4.76

Note: 2,412 firm-year observations.

Panel C: Correlations

	1	2	3	4	5	6
1. Log pounds of emissions	1.00					
2. KLD rated × Initial rating poor	0.09	1.00				
3 KLD rated × Initial rating mixed or good	-0.09	-0.15	1.00			
4. Log employees	0.24	-0.01	-0.06	1.00		
5. Log sales	0.31	0.07	-0.07	0.89	1.00	
6. Log assets	0.30	0.09	-0.06	0.83	0.94	1.00
7. Log number of TRI-reporting facilities	0.52	0.07	-0.04	0.45	0.46	0.40

Note: 2,412 firm-year observations.

TABLE 2
Performance improved most among firms initially rated poor

Dependent variable: Log toxic emissions

		OLS coefficients
(A)	KLD rated × Initial rating poor	-0.656***
		[0.254]
(B)	KLD rated × Initial rating mixed or good	0.315*
		[0.170]
	Log employees	-0.313
		[0.241]
	Log sales	0.718***
		[0.234]
	Log assets	-0.181
		[0.265]
	Log number of TRI-reporting facilities	1.778***
		[0.142]
	Year dummies (2000-2004)	Included
	Facility fixed effects	Included
	Observations (firm-years)	2412
	Firms	598
	R-squared (within)	0.16
	Wald test: coefficient on (A) = (B)?	15.63***

OLS regression coefficients, with standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.10. Wald test displays F test statistic, where null hypothesis is that the coefficients are statistically indistinguishable. The sample includes newly-rated firms and never-rated firms.

TABLE 3
Rating effects moderated by regulatory stringency

Dependent variable: Log toxic emissions

		OLS coefficients
(A)	Highly environmentally regulated × KLD rated × Initial rating poor	-1.027***
		[0.348]
(B)	Highly environmentally regulated × KLD rated × Initial rating mixed or good	0.717**
		[0.313]
	Highly environmentally regulated × Log employees	-0.962*
		[0.548]
	Highly environmentally regulated × Log sales	0.750**
		[0.369]
	Highly environmentally regulated × Log assets	0.328
		[0.524]
	Highly environmentally regulated × Log number of TRI-reporting facilities	1.725***
		[0.257]
(C)	Low environmentally regulated × KLD rated × Initial rating poor	-0.211
		[0.397]
(D)	Low environmentally regulated × KLD rated × Initial rating mixed or good	0.238
		[0.205]
	Low environmentally regulated × Log employees	-0.149
		[0.272]
	Low environmentally regulated × Log sales	0.651**
		[0.308]
	Low environmentally regulated × Log assets	-0.241
		[0.319]
	Low environmentally regulated × Log number of TRI-reporting facilities	1.826***
		[0.172]
	Year dummies (2000-2004) interacted with highly/less environmentally regulated	Included
	Facility fixed effects	Included
	Observations (firm-years)	2412
	Firms	598
	R-squared (within)	0.17
	Wald test: coefficient on (A) = (B)?	24.43***
	Wald test: coefficient on (C) = (D)?	1.36
	Wald test: coefficient on (A) = (C)?	2.39
	Wald test: coefficients on (A) - (B) = (C) -(D)?	6.13**

OLS regression coefficients, with standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.10. Wald test displays F test statistic, where null hypothesis is that the coefficients are statistically indistinguishable. The sample includes newly-rated firms and never-rated firms.

TABLE 4
Rating effects moderated by environmental efficiency

Dependent variable: Log toxic emissions

		OLS coefficients
(A)	Less environmentally efficient × KLD rated × Initial rating poor	-0.772***
		[0.296]
(B)	Less environmentally efficient × KLD rated × Initial rating mixed or good	0.360
		[0.233]
	Less environmentally efficient × Log employees	0.087
		[0.312]
	Less environmentally efficient × Log sales	0.475
		[0.303]
	Less environmentally efficient × Log assets	-0.623*
		[0.339]
	Less environmentally efficient × Log number of TRI-reporting facilities	1.208***
		[0.205]
(C)	More environmentally efficient × KLD rated × Initial rating poor	0.100
		[0.460]
(D)	More environmentally efficient × KLD rated × Initial rating mixed or good	0.541**
		[0.247]
	More environmentally efficient × Log employees	-0.549
		[0.376]
	More environmentally efficient × Log sales	0.980***
		[0.344]
	More environmentally efficient × Log assets	0.771*
		[0.425]
	More environmentally efficient × Log number of TRI-reporting facilities	1.836***
		[0.199]
	Year dummies (2000-2004) interacted with more/less environmentally efficient status	Included
	Facility fixed effects	Included
	Observations (firm-years)	2068
	Firms	427
	R-squared (within)	0.18
	Wald test: coefficient on (A) = (B)?	16.596***
	Wald test: coefficient on (C) = (D)?	0.939
	Wald test: coefficient on (A) = (C)?	2.539†
	Wald test: coefficients on (A) - (B) = (C) -(D)?	1.675

OLS regression coefficients, with standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.10. Wald test displays F test statistic, where null hypothesis is that the coefficients are statistically indistinguishable. The sample includes newly-rated firms and never-rated firms.

ONLINE APPENDIX

EXHIBIT A1
Robustness tests regarding mean reversion

In contrast to our main analysis, which compares newly-rated firms to never-rated firms, we now compare newly-rated firms to S&P 500 member firms, which had KLD ratings throughout our sample period. We categorize these always-rated firms into two groups based on whether their KLD ratings during 1999-2000 (the pre-period of our main analysis), (1) consisted only of KLD concerns, or (2) included no KLD concerns or also included KLD strengths. This categorization mirrors our classification of the newly-rated firms (based on their initial KLD ratings). We refer to the group of newly-rated firms with poor initial ratings and always-rated firms rated poor during the pre-period as the *concerns ex ante comparison group* (and create a dummy variable denoting membership in this group). We refer to the newly-rated firms with mixed or good initial ratings to the always-rated firms rated mixed or good during the pre-period as the *mixed/good ex ante comparison group*. We compare the performance of the newly-rated firms to that of the always-rated firms within each of these two comparison groups. Because all members of each of these two comparison groups received similar initial ratings, subsequent performance differences between the newly-rated and the always-rated firms within these comparison groups cannot be due to mean reversion. To estimate these, we modify our three main models by adding interaction terms between the concerns *ex ante* comparison group dummy and all other variables.[7] The results indicate that the newly-rated firms with poor initial KLD ratings subsequently improved compared to always-rated firms that had poor ratings during the pre-period. We found no evidence that newly-rated firms with mixed or good initial KLD ratings subsequently outperformed the always-rated firms that had mixed or good ratings during the pre-period. These results, which refute concerns that our main results are a function of mean reversion, are displayed in Column 1 of Tables A4, A5, and A6.

[7] Alternatively, including interaction terms between a mixed/good comparison group dummy and all other variables would yield the same result because the two comparison group dummies are coded exactly oppositely.

TABLE A1
Description of KLD environmental ratings (as of 2006)

KLD environmental strengths

1. **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.)
2. **Pollution prevention**. The company has notably strong pollution prevention programs including both emissions reductions and toxic-use reduction programs.
3. **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.
4. **Clean energy** (previously called alternative fuels). 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.
5. **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 began assigning strengths for this issue in 1996.[a]
6. **Property, plant, and equipment**. The company maintains its property, plant, and equipment with above-average environmental performance for its industry. KLD has not assigned strengths for this issue since 1995.
7. **Other strength**. The company has demonstrated a superior commitment to management systems, voluntary programs, or other environmentally proactive activities.

KLD environmental concerns

1. **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.
2. **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.
3. **Ozone-depleting chemicals**. The company is among the top manufacturers of ozone-depleting chemicals such as HCFCs, methyl chloroform, methylene chloride, or bromines.
4. **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.
5. **Agricultural chemicals**. The company is a substantial producer of agricultural chemicals (i.e., pesticides or chemical fertilizers).
6. **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.
7. **Other concern**. The company has been involved in an environmental controversy that is not covered by other KLD ratings.

Source: KLD Ratings Methodology: http://www.kld.com/research/data/KLD_Ratings_Methodology.pdf.
[a] In 2005, after the period analyzed in this article, this issue was incorporated into the Corporate Governance Transparency rating.

TABLE A2
Industry composition of sample

NAICS Code (3-digit)	Description	Number of firms
334	Computer and Electronic Product Manufacturing	98
325	Chemical Manufacturing	60
336	Transportation Equipment Manufacturing	49
333	Machinery Manufacturing	43
331	Primary Metal Manufacturing	32
221	Utilities	31
332	Fabricated Metal Product Manufacturing	29
339	Miscellaneous Manufacturing	25
311	Food Manufacturing	24
335	Electrical Equipment, Appliance, and Component Manufacturing	21
322	Paper Manufacturing	19
212	Mining (except Oil and Gas)	13
324	Petroleum and Coal Products Manufacturing	12
327	Nonmetallic Mineral Product Manufacturing	12
326	Plastics and Rubber Products Manufacturing	11
541	Professional, Scientific, and Technical Services	11
423	Merchant Wholesalers, Durable Goods	10
Various	Other Industries	98
	Total	598

TABLE A3
Performance improved most among firms whose initial rating was poor: Robustness tests

	Dependent variable:	(1) Log emissions	(2) Number of regulatory penalties
	Sample:	Newly rated and *always* rated firms OLS Coefficients	Newly rated and *never* rated firms Incident rate ratios
(A)	KLD rated × Initial rating poor	-0.934***	0.564***
		[0.272]	[0.122]
(B)	KLD rated × Initial rating mixed or good	0.117	1.217
		[0.133]	[0.214]
	Log employees	-1.322**	1.541***
		[0.607]	[0.254]
	Log sales	1.251***	1.006
		[0.463]	[0.178]
	Log assets	0.526	0.725
		[0.665]	[0.150]
	Log number of TRI-reporting facilities	1.063***	0.934
		[0.275]	[0.079]
	Year dummies (2000-2004)	Included	Included
	Firm-level conditional fixed effects	Included	Included
	Interactions between each control variable and the *ex ante* concerns comparison group dummy [a]	Included	
	Observations (firm-years)	3150	1089
	Firms	663	221
	R-squared (within)	0.17	
	Wald test: coefficient on (A) = (B)?	12.04***	11.29**

Column 1 displays OLS regression coefficients. Column 2 displays incident rate ratios from conditional fixed effects negative binomial regression models. Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.10. Test statistic for Wald test is F test in Column 1 and Chi-squared test in Column 2; for both, null hypothesis is that the coefficients are statistically indistinguishable. These models are robustness tests for the results presented in Table 2.

[a] The *ex ante* concerns comparison group includes (a) always-rated firms the KLD ratings of which in 1999-2000 included only KLD concerns (no KLD strengths), and (b) newly-rated firms the initial KLD ratings of which included only KLD concerns.

TABLE A4
Rating effects moderated by regulatory stringency: Robustness tests

	(1)	(2)
Dependent variable:	Log emissions	Number of regulatory penalties
Sample:	Newly rated and *always* rated firms	Newly rated and *never* rated firms
	OLS Coefficients	Incident rate ratios
(A) Highly environmentally regulated × KLD rated × Initial rating poor	-1.072***	0.593*
	[0.343]	[0.184]
(B) Highly environmentally regulated × KLD rated × Initial rating mixed or good	0.783***	1.426
	[0.255]	[0.386]
Highly environmentally regulated × Log employees	-1.565**	1.584**
	[0.680]	[0.369]
Highly environmentally regulated × Log sales	1.096**	0.852
	[0.556]	[0.216]
Highly environmentally regulated × Log assets	0.972	0.888
	[0.815]	[0.262]
Highly environmentally regulated × Log number of TRI-reporting facilities	0.780*	1.075
	[0.401]	[0.166]
(C) Low environmentally regulated × KLD rated × Initial rating poor	-0.728	0.537**
	[0.479]	[0.163]
(D) Low environmentally regulated × KLD rated × Initial rating mixed or good	-0.147	1.092
	[0.159]	[0.258]
Low environmentally regulated × Log employees	-1.054	1.207
	[1.465]	[0.295]
Low environmentally regulated × Log sales	1.260	1.237
	[1.019]	[0.351]
Low environmentally regulated × Log assets	-0.048	0.703
	[1.236]	[0.197]
Low environmentally regulated × Log number of TRI-reporting facilities	1.320***	0.892
	[0.389]	[0.093]
Year dummies (2000-2004) interacted with highly/less environmentally regulated	Included	Included
Firm-level conditional fixed effects	Included	Included
Interactions between each control variable and the *ex ante* concerns comparison group dummy[a]	Included	
Observations (firm-years)	3139	1089
Firms	660	221
R-squared (within)	0.18	
Wald test: coefficient on (A) = (B)?	18.89***	7.06***
Wald test: coefficient on (C) = (D)?	1.33	4.81**
Wald test: coefficient on (A) = (C)?	0.34	0.05
Wald test: coefficients on (A) - (B) = (C) -(D)?	3.72*	0.13

Column 1 displays OLS regression coefficients. Column 2 displays incident rate ratios from conditional fixed effects negative binomial regression models. Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.10. Test statistic for Wald test is F test in Column 1 and Chi-squared test in Column 2; for both, null hypothesis is that the coefficients are statistically indistinguishable. These models are robustness tests for the results presented in Table 3.

[a] The *ex ante* concerns comparison group includes (a) always-rated firms the KLD ratings of which in 1999-2000 included only KLD concerns (no KLD strengths), and (b) newly-rated firms the initial KLD ratings of which included only KLD concerns.

TABLE A5
Rating effects moderated by environmental efficiency: Robustness tests

	(1)	(2)
Dependent variable:	Log emissions	Number of regulatory penalties
Sample:	Newly rated and *always* rated firms	Newly rated and *never* rated firms
	OLS Coefficients	Incident rate ratios
(A) Less environmentally efficient × KLD rated × Initial rating poor	-1.183***	0.530**
	[0.306]	[0.135]
(B) Less environmentally efficient × KLD rated × Initial rating mixed or good	-0.062	1.019
	[0.182]	[0.267]
Less environmentally efficient × Log employees	-1.231*	1.944**
	[0.634]	[0.577]
Less environmentally efficient × Log sales	1.271***	0.771
	[0.475]	[0.203]
Less environmentally efficient × Log assets	0.278	0.923
	[0.712]	[0.276]
Less environmentally efficient × Log number of TRI-reporting facilities	1.194***	0.866
	[0.295]	[0.132]
(C) More environmentally efficient × KLD rated × Initial rating poor	-0.094	0.64
	[0.577]	[0.304]
(D) More environmentally efficient × KLD rated × Initial rating mixed or good	0.307	1.061
	[0.199]	[0.275]
More environmentally efficient × Log employees	-2.095	1.624**
	[1.790]	[0.367]
More environmentally efficient × Log sales	1.191	1.03
	[1.454]	[0.258]
More environmentally efficient × Log assets	1.842	0.695
	[1.619]	[0.202]
More environmentally efficient × Log number of TRI-reporting facilities	0.551	0.838
	[0.670]	[0.113]
Year dummies (2000-2004) interacted with more/less environmentally efficient status	Included	Included
Firm-level conditional fixed effects	Included	Included
Interactions between each control variable and the *ex ante* concerns comparison group dummy[a]	Included	
Observations (firm-years)	2952	1026
Firms	571	198
R-squared (within)	0.178	
Wald test: coefficient on (A) = (B)?	7.511***	5.13**
Wald test: coefficient on (C) = (D)?	1.194	1.06
Wald test: coefficient on (A) = (C)?	2.783*	0.12
Wald test: coefficients on (A) - (B) = (C) -(D)?	1.041	0.07

Column 1 displays OLS regression coefficients. Column 2 displays incident rate ratios (IRR) from a conditional fixed effects negative binomial regression model. Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.10. Test statistic for Wald test is F test in Column 1 and Chi-squared test in Column 2; for both, null hypothesis is that the coefficients are statistically indistinguishable. These models are robustness tests for the results presented in Table 4.

[a] The *ex ante* concerns comparison group includes (a) always-rated firms the KLD ratings of which in 1999-2000 included only KLD concerns (no KLD strengths), and (b) newly-rated firms the initial KLD ratings of which included only KLD concerns.