08-025

Shamed and Able: How Firms Respond to Being Rated

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May 15, 2008

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ABSTRACT

We examine how firms respond to third-party ratings of their corporate environmental activities. Using insights from institutional theory, we hypothesize that ratings are particularly likely to spur responses from firms whose legitimacy is threatened—and thus are shamed—by these ratings. We extend existing theory by drawing on the strategic choice perspective to hypothesize that the greatest performance improvements will be exhibited by those shamed firms that face lower-cost opportunities to improve—and thus are particularly able to respond. We take advantage of a natural experiment, when a major social rating agency expanded the scope of its ratings, to empirically test these hypotheses in the context of environmental ratings and environmental performance of more than 650 firms in the United States. We find empirical evidence that supports our hypotheses, and present implications for theory and public policy.

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INTRODUCTION

Company ratings have been an important source of information for over a century. The origins of Dun and Bradstreet's company ratings date back to 1851 (Dun And Bradstreet, 2008), Standard and Poor's has been rating corporate debt since 1916 (Standard and Poors, 2008), and the Michelin Guide's restaurant ratings began in 1926 (Fabricant, 2004). Today, over 183 public lists across 38 countries rate or rank companies based on their reputation for corporate citizenship, employee relations, leadership, innovation, and other characteristics (Fombrun, 2007). The rise of the Internet has spurred new forms of online rating schemes: homeowners rate their contractors on Angie's List; travelers rate hotels and restaurants on TripAdvisor; and online auction buyers and sellers rate each other on eBay. All of these rating schemes are institutions designed to achieve a common objective: to reduce information asymmetry between the entity being rated and its external stakeholders—such as customers, investors, and potential employees—and to do so in a credible way.

Prior research on rating schemes has focused on the question of how these ratings affect the behavior of the rated organizations' stakeholders by investigating how ratings affect sales and stock prices (Becchetti, Ciciretti, & Hasan, 2007; Curran & Moran, 2007; Rock, 2003; Rowe, Harris, Cannella, & Francolini, 2003; Takeda & Tomozawa, 2007) and consumer perceptions (Sen & Bhattacharya, 2001). However, much less research has focused on how the rated organizations themselves respond to these ratings, a question arguably more central to management scholarship. Two related papers (Elsbach & Kramer, 1996; Espeland & Sauder,

2007) have examined how law schools and business schools respond to rankings, but did not study whether rankings were associated with any subsequent changes in the schools' performance.

In this paper, we propose that organizations' responses to ratings are influenced by their need to maintain legitimacy, but also are constrained by economic considerations. In doing so, we propose that strategic choice (Child, 1972; Oliver, 1988) serves as an important moderator of the institutional pressures described in previous theoretical work (Oliver, 1991). We argue that poor ratings shame firms. Their legitimacy threatened, firms rated poorly will be particularly likely to respond in ways that improve their rating. In addition, we use insights from the strategic choice literature to propose that the subset of firms rated poorly that face lower-cost investment opportunities to improve their ratings will be especially likely to do so. Our comprehensive theoretical approach is distinctive from prior studies, in that we propose that organizations' responsiveness to institutional pressures is moderated by strategic choice, and that this moderation differs between firms that face high or low institutional pressure.

We test our hypotheses in the context of one of the world's foremost rating agencies that assesses firms' corporate social performance and discloses its assessments. We examine how hundreds of organizations responded to being involuntarily entered into this annual rating scheme when the rating agency expanded the number of rated firms. This kind of natural experiment has rarely been used in prior research in this domain, and constitutes an important empirical contribution to the extant literature. In contrast to prior work that has investigated how organizations rearrange their internal activities or alter their self-perceptions in response to being rated (Elsbach & Kramer, 1996; Espeland & Sauder, 2007), our study directly examines the effect of ratings on organizational performance.

We find evidence that firms whose legitimacy was threatened by a poor initial rating subsequently improved their performance to restore their legitimacy. Upon closer examination, however, we find that the firms that responded most aggressively to restore their legitimacy were those with less costly opportunities to exercise strategic choice. As such, we find evidence that ability, as measured by cost-efficient opportunities, serves to moderate organizations' willingness to acquiesce to institutional pressures. We describe the relevance of these insights for management scholars as well as policy makers who seek to understand how firms respond to public and private regulatory schemes.

In the following sections, we develop our theoretical propositions by building on institutional theory and the strategic choice literature. We proceed to discuss our data and method, and subsequently present our results. We conclude by discussing our contributions to the theoretical and empirical literature and by describing our results' implications for public policy.

THEORY AND HYPOTHESES

One of the classic arguments of institutional theory is that organizations adopt the structures and symbols common to other organizations in their field to acquire legitimacy, which promotes organizational survival (DiMaggio & Powell, 1983). This process of isomorphism results in "organizations within the same population possessing similar characteristics" (Oliver, 1988:543). Empirical research based in institutional theory has illustrated this isomorphic process in a wide variety of contexts (Scott, 1987). Through the lens of institutional theory, divergent organizational practices among otherwise similar firms is often attributed to heterogeneous organizational responses to differing levels or sources of institutional pressures

(D'Aunno, Succi, & Alexander, 2000; Goodstein, 1994; Lounsbury, 2001; Marquis, Glynn, & Lounsbury, 2007).

However, through the mid-1990s, most institutional theorists had paid little attention to "the internal dynamics of organizational change" (Greenwood & Hinings, 1996:1023) or "the role of organizational self-interests and active agency in organizational responses to institutional pressures and expectations" (Oliver, 1991:146). Several theoretical mechanisms have been offered to explain why heterogeneous organizational practices may persist despite common institutional pressures. For example, even within organizations, different functional managers apply disparate cognitive frames to interpret institutional pressures, which can lead to heterogeneous responses (Delmas & Toffel, 2004; Delmas & Toffel, 2008; Hoffman, 2001; Levy & Rothenberg, 2002). Hoffman (2001:138) argues that organizational responses to institutional pressures are highly dependent on "the form of organizational structure and culture that exist inside the organization."

Several empirical studies have examined heterogeneous organizational responses to common institutional pressures. Factors that have been shown to confound isomorphic pressures include differences in resource dependence (Kostova & Roth, 2002), influential corporate functions (Delmas & Toffel, 2008), ownership structure (Goodrick & Salancik, 1996), as well as differences in board of director interlocks and geographic proximity to peer organizations (Davis & Greve, 1997). In sum, this body of scholarship theorizes several contingencies that circumscribe the power of institutional forces.

In this paper, we bring together institutional theory with another set of contingencies, those outlined by the strategic choice perspective, which posits that "organizations have the capability to exercise considerable discretion over the design and alteration of their own

structures in response to environmental contingencies" (Oliver 1988:545). In particular, we extend existing theory by integrating these two perspectives and theorizing that strategic choice moderates firms' responses to institutional pressures. In doing so, we develop hypotheses deriving from both perspectives rather than presenting competing predictions. Specifically, we propose that organizational responsiveness to institutional pressures is moderated by strategic choice.

Below, we theorize how firms respond to threats to their corporate environmental legitimacy, using the traditional arguments of institutional theory. Next, we integrate insights from the literature on strategic choice to explain why some firms are more responsive to institutional pressures than others.

Corporate Environmental Legitimacy

A central tenet of institutional theory is that an organization's survival depends on its ability to maintain legitimacy by conforming to the rules and norms of its institutional environment (DiMaggio & Powell, 1983; Scott, 1995). Suchman (1995:574) defines legitimacy as "a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions." Scholars are finding firms to be increasingly attentive to acquiring and maintaining legitimacy in the environmental realm. Gunningham, Kagan, and Thornton (2004:308), for example, report that "corporate executives increasingly talk about the importance of…[avoiding] activities that societies (or influential elements within them) deem unacceptable." These authors characterize the institutional pressures exerted by neighborhoods, environmental groups, and community members as being tantamount to a "social license to operate" that organizations are required to

secure. Moreover, with investment in "green funds" accelerating at a rapid rate, interest in firms' environmental performance is increasing among a growing number of investors (Norton, 2007).

In the face of these trends, firms are implementing a variety of environmental management practices in an attempt to maintain their "corporate environmental legitimacy", which has been defined as "the generalized perception or assumption that a firm's corporate environmental performance is desirable, proper, or appropriate" (Bansal & Clelland, 2004:94). Firms that deviate are often sanctioned by actors in their organizational field. For example, activists' may mount boycotts or other negative public relations campaigns (Eesley & Lenox, 2006), which can diminish corporate environmental legitimacy. Others have examined the effects of poor corporate environmental performance. Several studies found that the disclosure of high pollution levels led to greater negative media coverage and market value losses (Hamilton, 1995; Khanna, 1998). Bansal and Clelland (2004) note that poor corporate environmental performance is often targeted by local community and customer activists because of its associated negative externalities. In addition, non-compliance with environmental laws can elicit coercive pressure in the form of penalties imposed by government regulators (Bansal, 2004). Such stakeholder actions can prove costly to firms, as corporate environmental legitimacy is not easily or quickly recovered, and firms assessed fines and penalties are subsequently watched more closely by the state, non-profit organizations, and other interest groups (Bansal, 2004; Short & Toffel, 2008).

As suggested above, losing corporate environmental legitimacy can impair a firm's access to resources; the negative spiral precipitated when exchange partners begin to distance themselves from troubled firms has come to be known as the "retraction cascade" (Suchman,

1995). Firms punished by investors, customers, regulators, and interest groups for loss of environmental legitimacy can find their very survival threatened (Hunter & Bansal, 2007). Bansal and Clelland (2004) argue that firms so penalized will be more attuned to societal expectations of environmental sustainability, and become better educated about methods for improving their environmental performance and regaining their lost legitimacy.

Environmental Ratings as a Social Test

Several firms and non-profit organizations have developed a business around assessing and revealing difficult-to-observe information about firms' operations, products, and services. The goal of these organizations is to make this information more transparent to stakeholders (Chatterji, Levine, & Toffel, 2008). For example, just as Standard and Poor's and Moody's analyze and disclose grades of firms' financial viability, social rating agencies such as KLD Research & Analytics, Inc. analyze firms' social and environmental management and performance to generate and disclose social ratings .

We view these company ratings as "social tests", where favorable ratings "legitimate organizations" and bestow high status; highly rated firms acquire a presumption of superiority compared to other firms on the dimension of interest (Rao, 1994:32). Such ratings and rankings exist in a wide variety of contexts, including Michelin guidebooks, AAA Tour books, Consumer Reports, and J.D. Power and Associates surveys (Rao, 1994). By defining widely accepted standards of behavior and convincingly comparing organizations in their adherence to these standards, these rating organizations help distinguish which organizations are socially legitimate (Dacin, Oliver, & Roy, 2007). Poor ratings, on the other hand, can result in companies suffering "public humiliation" (Graham, 2000). Thus, we argue that these ratings impose institutional pressure on rated firms.

If organizations' environmental misconduct and environmentally beneficial actions were widely reported and readily understood by the general public, environmental rating systems would be less critical. Environmental ratings by credible third-parties reduce information asymmetry between firms and those concerned with their environmental performance, and can provide a window into firms' environmental legitimacy. Indeed, Dacin et al. (2007:176) argue that "the monitoring efforts" of these organizations will provide incentives for "firms to behave as socially responsible entities."

In response to the institutional pressure described above, we argue that some third-party ratings will spur a reaction by the rated firms. Broadly, there are two possible outcomes of environmental ratings. Environmental legitimacy is sustained or improved when ratings reveal a firm's environmental performance to be in accordance with what is considered "desirable, proper, appropriate" (Bansal, 2004). Alternatively, disclosures that imply that a firm's behavior is outside these agreed upon standards of practice threaten its environmental legitimacy (Dacin et al., 2007). Organizations whose legitimacy is threatened tend to adopt procedures to reduce gaps with competitors to gain legitimacy with external stakeholders (Darnall & Edwards, 2006; Zuckerman, 1999). Thus, we expect firms whose legitimacy is threatened by ratings will take actions to bolster their legitimacy. Because environmental ratings are based largely on environmental performance, we expect such actions will lead these firms to more rapidly improve their environmental performance. As a result, we predict:

Hypothesis 1. Firms whose environmental legitimacy is threatened by third-party ratings will subsequently improve their environmental performance more than other firms.

Strategic Choice

As discussed above, other factors beyond institutional pressures may drive some firms to improve their environmental performance more significantly than others. Institutional theory's traditional emphasis on conformance and homogeneity has historically limited its ability to explain enduring differences in structures and strategies among firms that share common institutional environments.

The strategic choice perspective emerged as a response to concerns that institutional theory depicted organizations as being overly constrained (Hrebiniak & Joyce, 1985). Strategic choice scholars assert that organizations maintain "considerable discretion with respect to the design of their own structures" (Oliver, 1988:543) and that organizational responses to institutional pressures are influenced by their desire for efficiency and to maintain a coherent strategy (Bamberger & Sonnenstuhl, 1996). In sum, strategic choice theory argues that organizational adaptation is governed by "the inter-dependence of choice and constraint" (Child, 1997:72), yielding divergent outcomes that cannot be explained by institutional theory alone. In this spirit, Oliver (1991: 146) describes a range of organizational responses to institutional pressures from "passive conformity to active resistance" and theorizes that organizations will respond differently based on their particular levels of "willingness" and "ability" to conform. She ascribes organizations' willingness to conform to their perceived economic gains in doing so, and their ability to conform as being limited by inadequate organizational resources, conflicting institutional pressures, or a lack of awareness of institutional expectations.

The strategic choice perspective argues that the intent of an organization or groups within the organization have an important influence on organizational outcomes, often more important than external forces (Bamberger & Sonnenstuhl, 1996; Child, 1972; Hrebiniak & Joyce, 1985;

Judge & Zeithaml, 1992; Lewin & Volberda, 1999; Oliver, 1988). Organizations, usually through their top managers (Child, 1972; Hitt & Tyler, 1991), exercise strategic choice in the face of institutional pressures in accordance with their "rational interest in maximizing efficiency, coordination, and the overall fit between the market-based needs of the environment and organizational capabilities" (Bamberger & Sonnenstuhl, 1996).

In the spirit of maximizing efficiency, Terlaak (2007) suggests that different responses to environmental policy and voluntary environmental initiatives reflect differences in the costs and benefits of environmental compliance across firms. The costs of environmental improvement might be expected to be lower for poorly performing 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 firms with the poorest environmental records (Hart & Ahuja, 1996). As von Hippel (1988) notes, technological laggards 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 environmental management techniques that can improve environmental performance.

As environmental performance improves however, further improvement increasingly requires the adoption of costly new technology or other dramatic steps (Darnall & Edwards, 2006; Graham & Miller, 2001; Hart & Ahuja, 1996). Thus, while the poorest environmental performers often stand to reap the greatest financial benefits from reducing emissions, top performers face costlier trade-offs in moving towards "zero pollution," and might find further environmental improvement prohibitively costly (Hart & Ahuja, 1996).

We thus extend our earlier prediction—that institutional forces will compel firms whose environmental legitimacy is threatened to improve their performance—by noting that firms' ability to improve their performance will be influenced by their efficiency. As discussed above, strategic choice scholars have long argued that maximizing efficiency would be among one of the strategic choices an organization could make, even in the face of countervailing institutional pressure (Bamberger & Sonnenstuhl, 1996; Spell & Blum, 2005).

We argue that firms that are subject to institutional forces and, in addition, have the strategic opportunity to seize low hanging fruit are especially likely to pursue improvement. The motivation to acquire legitimacy and the presence of low cost improvement opportunities will differentiate these firms from competitors with high legitimacy or less low-hanging fruit (or both). Our expectation that the level of efficiency will moderate the effect of legitimacy-threatening ratings on environmental performance leads us to make the following prediction:

> *Hypothesis 2. Firms whose environmental legitimacy is threatened by third-party ratings and that are less environmentally efficient will subsequently improve their environmental performance more than other firms.*

METHODS

Data and Sample

We use 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 the Domini Social 400 Index since 1991. KLD expanded its

ratings coverage in 2001, when it began including ratings for Russell 1000 Index members in its KLD STATS 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 those firms' behavior or performance, and because these firms had no influence on the decision to be rated, we avoid selection problems common to many program evaluations.

We obtained annual environmental performance data from the Corporate Environmental Profiles Directory (CEPD). Created by the Investor Responsibility Research Center (IRRC), the CEPD 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.

Because we are interested in how firms respond to their initial KLD ratings, we compare firms that were first rated due to KLD's expansion to firms that were never 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 firms, not just 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. Thus, our sample includes 653 companies that meet all of the following criteria: at least one subsidiary regulated by the US EPA; a member of either the S&P SmallCap 600 or S&P MidCap 400 index; and not listed in the Domini Social 400 Index prior to 2001. Our sample includes firms from a wide variety of industries (see Table 1).

Insert Table 1 about here

Variables

  Environmental performance. Because there is no single ideal way to measure corporate environmental performance, we employ two very different measures: pollution and regulatory compliance. To measure pollution, 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. *TRI emissions* 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. Whereas some studies apply various weights to these chemicals to account for differences in their toxicity, simply summing the pounds of emissions was a common method used by the media and prominent non-profit organizations and in government publications during the sample period (Toffel & Marshall, 2004). We obtained toxic chemical emissions data from the CEPD, which aggregates facility-level data from the US EPA's TRI database to the appropriate corporate owner of each facility. To reduce the impact of outliers in our models, 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).

  As an alternative measure of environmental performance, we obtained the *annual number of penalties* each firm accrued for violated regulations associated with all nine major U.S. federal environmental regulations that are included in the CEPD database: 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.

Environmental legitimacy. We base our measure of environmental legitimacy on KLD's environmental ratings of companies. 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 Research & Analytics, 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 of 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 Coca-Cola Company stock (Wilbert, 2006). KLD ratings have been widely used in studies of corporate social responsibility and socially responsible investing (Berman, Wicks, Kotha, & Jones, 1999; Margolis & Walsh, 2003), and have been referred to as "the *de facto* research standard" in those domains (Waddock, 2003:369).

We obtained annual company environmental ratings data on each of KLD's 14 dichotomous environmental "strength" and "concern" variables from KLD STATS. The seven environmental "strength" variables include: Beneficial products and services; Pollution prevention; Recycling; Clean energy; Communications; Property, plant, and equipment; and Other strengths. The seven environmental "concern" variables include: 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 2.

Insert Table 2 about here

We consider a firm's legitimacy to be threatened when its initial KLD rating reveals its behavior to violate taken-for-granted norms (Scott, 1987). We consider those firms whose initial KLD environmental rating consisted of concerns but no strengths to have had their legitimacy threatened. We coded a dummy variable *initial rating poor* "1" for these firms, and "0" otherwise. In contrast, we consider those firms whose initial environmental rating consisted of only strengths (no concerns), both strengths and concerns, or neither strengths nor concerns to not have had their legitimacy threatened. *Initial rating mixed or good* was coded "1" for these firms, and "0" otherwise. In our empirical analysis, we interact these firm-level variables with *KLD rated*, a dummy variable coded "1" in years when firms were rated by KLD (regardless of the actual rating), and "0" otherwise.

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 from Compustat, respectively. We calculate each firm's average ratio during 1999-2000, the two-year period immediately before any firms in our sample were rated by KLD. We compared each firm's average ratio to its industry's median value during that period, and created two firm-level dummy variables. *Less environmentally efficient* was coded "1" when a firm's ratio was above its industry median, and "0" otherwise. In contrast, *more environmentally efficient* was coded "1" when a firm's ratio was below its industry median, and "0" otherwise (see Table 1, Panel B).

Control variables. We control for several other factors that may influence organizational responses to institutional pressures, including geography (Marquis et al., 2007), regulatory

context (Delmas & Toffel, 2008), and organizational size (Goodstein, 1994). We control for geography and regulatory context by including firm fixed effects and year dummies. We control for organization size—which may also affect a firm's emissions and number of violations—with annual *employment, revenues*, and *assets* from Compustat*,* and use the logarithmic transformations of these variables in our regressions (Christmann, 2000; King, Lenox, & Terlaak, 2005; Russo & Fouts, 1997; Sharma, 2000; Waddock & Graves, 1997)*.* Because a firm's acquisitions or divestitures of TRI-reporting facilities can also affect its aggregate TRI emissions, we obtained data on the *number of TRI-reporting facilities* from the CEPD. In addition, by including only publicly owned firms in our sample, we control for the fact that publicly-owned firms have been found to respond differently to institutional pressures than privately-owned firms (Goodrick & Salancik, 1996).

Models

To test our hypotheses, we use 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 never rated. We estimate the following model to test Hypothesis 1:

$$Y_{i,t} = \beta_1 \, KLD \, rated_{i,t} \times Initial \, rating \, poor_i + \beta_2 \, KLD \, rated_{i,t} \times Initial \, rating \, mixed \, or \, good_i$$

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

$Y_{i,t}$ refers to the TRI emissions or annual number of penalties 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 all time-invariant factors at each firm that might affect its emissions or compliance such as corporate culture and geographic location. We include a full set

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

To test the moderating effect described in Hypothesis 2, we estimate a model that is similar to Equation (1), but interacts all variables with the two dummy variables, *less environmentally efficient* and *more environmentally efficient*. As with our specification that tests Hypothesis 1, this specification identifies changes in performance levels between: (1) firms initially rated as poor; (2) firms initially rated as mixed/good; and (3) unrated firms. However, our interaction terms enable us to make these comparisons *within* the less environmentally efficient subset of firms and *within* the more environmentally efficient subset of firms. This empirical specification is similar to running separate regressions on split samples (the less efficient subsample, and then the more efficient subsample), but employing a single fully interacted model facilitates comparing coefficients.

RESULTS

Descriptive statistics are provided in Table 3. We estimated our models using Stata 10. We employ ordinary least-squares (OLS) regression with firm-level fixed effects when estimating annual log emissions, and a conditional fixed effects negative binomial model when estimating the annual number of penalties.

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 bolstered if the performance trends between these three groups were similar during the pre-rating period. To test this, we compared the trends during 1999 to 2000—the period during our sample before any firms were rated—between our three focal groups: (1) facilities eventually rated poorly, (2) facilities eventually rated mixed/good, and (3) facilities never rated in our sample. For emissions, we conducted t-tests to compare the percent change in emissions per sales from 1999 to 2000 and found the pre-period trends were statistically indistinguishable between the three groups. We also compared the percent change in penalties per sales from 1999 to 2000 between these three groups. Here, t-tests indicated that penalties per sales were declining faster among both groups of firms that were about to be rated, compared to the never-rated firms (p<0.01). Our concern that these pre-existing differences might bias our results led us to trim the sample to the common support of the rated and unrated groups' pre-trends. This eliminated just 7 outlier firms, and t-tests indicated that the three groups in the remaining sample had statistically indistinguishable trends during the pre-period.

Insert Table 3 about here

Results of hypothesis tests

Table 4 provides the results of our models that test Hypothesis 1. As depicted in Column 1, firms whose initial ratings were poor (i.e., whose legitimacy was threatened) subsequently reduced their emissions more than never-rated firms ($\beta = -0.64$; p=0.01). The coefficient value, our difference-in-differences estimate, indicates that poorly rated firms reduced their emissions

0.64 log points more than the unrated firms did, a magnitude equal to one-sixth of a standard deviation (calculated as $\beta = -0.64$ divided by SD of log emissions = 4.22). A Wald test that compared the coefficients on the two interaction terms revealed that the firms whose initial ratings were poor also reduced their emissions more than the firms initially rated mixed or good (F=14.88; p<0.01).

Our penalty regressions yielded similar results. Column 2 indicates that firms whose initial ratings were poor subsequently accrued fewer penalties than the never-rated firms ($\beta = -0.56$; p<0.01). The corresponding incident-rate ratio of 0.57 (the exponential of the coefficient) indicates that the penalty rate of the firms whose initial ratings were poor declined nearly twice as much as the control group's penalty rate. A Wald test indicated that firms whose initial ratings were poor also subsequently accrued fewer penalties than the firms initially rated mixed or good (χ^2=12.32; p<0.01). Together, our emissions and penalty results presented in Table 4 support Hypothesis 1.

Insert Table 4 about here

The fully interacted models that test Hypothesis 2 are estimated on slightly smaller samples than our earlier models. These samples omit those firms we could not classify as being more or less environmentally efficient because they lacked emissions and revenues data in 1999 or 2000, and those firms that exhibit no variation in the number of penalties during the sample period. Table 5 presents the results of these models.

The negative statistically significant coefficient on the first interaction term in Column 1 (*KLD rated × Initial rating poor × Less environmentally efficient firms*) indicates that the less efficient firms whose initial ratings were poor subsequently reduced their emissions by 0.74 log

points—just under one-sixth of a standard deviation (calculated as β = –0.74 / sd=4.22)—more than the less efficient firms that were never rated. Column 2 indicates that the former's penalty rate declined nearly twice as much as the latter's (β = –0.66; p<0.01; incident-rate ratio = 0.52). We also compared 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 firms*) using Wald tests, and found that the less efficient firms that were initially rated poorly also reduced their emissions (Wald test F = 16.09; p<0.01) and accrued fewer penalties (Wald test χ^2 = 6.67; p<0.01) more than did the less efficient firms whose initial ratings were mixed or good. The insignificant coefficients on the second interaction term provide no evidence that less efficient firms whose initial ratings were mixed or good subsequently performed any differently from the less efficient firms that were never rated.

For completeness, we also note that the insignificant coefficients on the third and fourth interaction terms in Table 5 indicate a lack of evidence that either newly-rated group of more efficient firms performed any differently from the more efficient firms that were never rated. In addition, insignificant Wald test results comparing these coefficients provided no evidence these two newly-rated groups performed any differently from each other.

Taken as a whole, the results presented in Table 5 support Hypothesis 2 by indicating that ratings are particularly effective in improving performance among less efficient firms that are initially rated as poor—in other words, firms that are both willing *and* more able to improve.

Insert Table 5 about here

Robustness tests

We conducted several robustness tests to assess the extent to which our results were sensitive to plausible alternative measures. We begin by noting that our main results that support our two hypotheses are robust to the two alternative dependent variables we employ (toxic chemical emissions and compliance penalties), which measure environmental performance quite differently.

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 (50th percentile) value. We also tried categorizing firms based on whether they were above or below their industry's 40th percentile. Separately, we used the 60th percentile as a second alternative threshold. Our results using these alternative thresholds were broadly similar to our main results.

We also tested the robustness of our results to several changes to our sample. First, we re-estimated our models testing Hypothesis 1 on the slightly smaller samples that were used to test Hypothesis 2. Specifically, we omitted those firms that we could not classify as being more or less environmentally efficient because they lacked emissions and revenues data in 1999 or 2000. Second, we re-estimated the models on the subsample that excluded firms whose initial ratings contained no environmental strengths and no environmental concerns because such "null ratings" for some firms may be due to KLD's inability to find information, rather then KLD making an informed determination that these firms actually had no strengths and no concerns. Third, we re-estimated the models on the subsample that excluded those 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; 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 two hypotheses. As a whole, these tests indicate that our main results are robust to a variety of plausible alternative dependent and independent measures and to several alternative samples.

DISCUSSION

We find that those firms that are "shamed" by a poor KLD rating and most "able" to seize low hanging fruit show the most improvements in environmental performance. 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. Below, we describe how our work contributes to research in institutional theory, the strategic choice perspective, and the impact of ratings systems and other information disclosure programs on firms and their stakeholders. In addition, we discuss several implications of our results for public policy in the environmental domain and beyond.

Contributions to institutional theory and the strategic choice perspective

The theoretical insights developed in this paper advance institutional theory and our understanding of organizational adaptation more generally. Specifically, we find that firms facing lower cost opportunities to respond to institutional forces are more likely to do so. While much of the theoretical work on institutional theory focuses on deterministic constraints imposed

by institutional forces, our findings suggest that institutional forces can be supported or constrained by the strategic choices of organizations.

To be sure, others have identified a variety of organizational factors that serve as contingencies on how firms respond to common institutional pressures. Examples include differences in employee demographics (Goodstein, 1994), ownership structure (Casile & Davis-Blake, 2002; Goodrick & Salancik, 1996), and board of director interlocks (Davis & Greve, 1997). Others have explained differences in subsidiaries' responsiveness to common institutional pressures by focusing on differences within organizations, including the extent to which subsidiaries rely on corporate headquarters for resources (Kostova & Roth, 2002) and direction (Delmas & Toffel, 2008).

We take a more comprehensive approach, examining the impact of both variation in the degree of institutional pressure (good or bad rating) and variation in organizational characteristics impacting strategic choice (more or less efficient). Specifically, we propose that strategic choice moderates organizations' responsiveness to institutional pressures, and that this moderated effect differs depending on whether firms face high or low pressure from institutional constituents.

Our work supports the view advanced by Child (1997) and Hrebiniak and Joyce (1985) that no single theoretical perspective can explain the full range of organizational adaptation. Whereas others have contrasted the strategic choice perspective to institutional theory (Oliver, 1988), our analysis illustrates how strategic choice considerations moderate organizations' responses to institutional forces. Prior work built on the strategic choice perspective often ignores the important role of institutional forces in co-determining organizational responses. While the prior literature in the strategic choice tradition has emphasized the "proactive" (Oliver,

1988) in contrast to the "reactive" (Child, 1997) behavior predicted by institutional theory, we find support for both proactive and reactive organizational behavior.

Contributions to theory on ratings

Our paper contributes to a nascent literature that examines the impact of ratings on rated organizations. Most prior work has considered how ratings impact the behavior of investors (Becchetti et al., 2007; Curran & Moran, 2007; Rock, 2003; Rowe et al., 2003; Takeda & Tomozawa, 2007) or customers (Sen & Bhattacharya, 2001). Others have considered how the public processes information to develop reputational appraisals of organizations (Fombrun & Shanley, 1990) or how ratings are "social tests" for organizations in the eyes of the public (Rao, 1994). Meanwhile, an emerging literature is investigating how ratings affect the organizations that are rated (Elsbach & Kramer, 1996; Espeland & Sauder, 2007). Focusing on the response of the rated organizations provides opportunities for richer theoretical development, including utilizing theories of organizational adaptation.

In contrast to our predictions, it is quite plausible that in some circumstances, poor ratings will not stimulate improvement but rather will lead to organizational decline. In fact, Espeland and Sauder (2007) found that law schools that received poor rankings subsequently faced lower quality applicants and greater difficulty raising funds, both of which led these schools to decline in what amounted to a self-fulfilling prophesy. Our results indicate the opposite pattern, whereby poorly rated firms subsequently improve their performance. These differences may result from distinctions in the empirical contexts.

Espeland and Sauder (2007) use a case study approach to investigate the internal responses of law schools to being rated (redistributing resources, gaming the ratings system, etc.), whereas Elsbach and Kramer (1996) analyze qualitative data to investigate how business

schools shift their activities in response to rankings, particularly when the ratings do not conform to expectations. However, neither of these studies directly examined whether rankings affect the performance of law schools or business schools. Thus, these two articles and our work offer the potential to facilitate a better understanding about how rated organizations reconfigure internal activities, reassess their own identities, and improve their actual performance in response to being rated.

Implications for understanding information disclosure programs

Our research also has implications for the design and scope of the growing number of government regulatory programs that require organizations to publicly disclose information. A small body of scholarship has examined the extent to which these programs "shock and shame" (Stephan, 2002) organizations to alter their behavior. In their comprehensive analysis of government regulations mandating information disclosure, Fung, Graham, and Weil (2006) describe many of these policies as seeking to bolster transparency by bridging information asymmetries that can impair the quality of services. Their analysis finds that few such programs have actually elicited the behavioral changes they sought.

A few studies highlight noteworthy exceptions. For example, Graham (2000) found that a state regulation requiring companies to warn consumers about toxic materials in their products inspired "a flurry of efforts" by companies to reduce or eliminate toxic materials from their products, providing evidence of "a newly potent political force: regulation by shaming". Others have found that some government mandatory information disclosure programs have spurred organizations to improve their environmental performance (Blackman, Afsah, & Ratunanda, 2004; Konar & Cohen, 1997; Scorse, 2007), food and water safety (Bennear & Olmstead, 2008; Jin & Leslie, 2003), and surgical outcomes (Cutler, Huckman, & Landrum, 2004; Hannan,

Kilburn, Racz, Shields, & Chassin, 1994; Peterson, DeLong, Jollis, Muhlbaier, & Mark, 1998). Our findings are similar to a study that found a government disclosure program in Indonesia prompted the greatest reductions in water pollution among those that had been rated as having the worst environmental performers (Blackman et al., 2004).

Our analysis indicates that not just governmental information disclosure programs, but also private sector disclosure programs, can affect organizational performance. That said, KLD's ratings are based in part on government data (e.g., regulatory compliance records), and much of the ability of KLD environmental ratings to predict environmental outcomes is owed to their aggregating historical environmental data extracted from government databases (Chatterji et al., 2008). This highlights an opportunity for policy makers to partner with other stakeholder groups, where the government uses its coercive power to gather the data while these groups focus on communicating the data to the public.

There are several examples of non-governmental entities already doing this without much involvement from the government. For example, while the US EPA requires tens of thousands of facilities to disclose their toxic emissions of over 600 chemicals every year, the agency's TRI data languishes on two fairly obscure EPA websites (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), a team of academics created a Google Map mashup of this data (www.mapecos.org; see Walker (2007)), and the Investor Responsibility Research Center aggregated this factory-level data to their parent companies to create the CEPD. In this spirit, *Wikinomics* author Anthony Williams foresees a future where 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).

Implications for public policy

The results of our study have policy implications to bolster the effectiveness of government information disclosure programs. Government agencies striving to leverage mandatory information disclosure programs to improve the environmental performance of laggard enterprises can devise incentives that not only "shame" them but also help them to identify opportunities for low cost improvements. Specifically, our results suggest that a stick (shaming) *and* carrot (enabling) approach might yield the most significant improvements by fostering both willingness *and* ability to improve.

In practical terms, policymakers can promote change by lowering costs of investments that elicit environmental performance improvements. Examples include providing technical assistance or subsidies to facilitate knowledge transfer to or between firms. For example, government technical assistance programs (O'Rourke & Lee, 2004) may be ideally suited to help companies identify opportunities for low cost improvements, especially when they have not yet been "shamed" by an external rating. Targeting scarce technical assistance resources to those firms with the "ability" to improve their performance could lead to much more performance improvement than a first-come-first-served approach. Alternatively, governments may promote technical assistance through subsidies, such as the Pakistan and Singapore governments' subsidizing the training associated with companies' adopting international environmental and labor standards, or the US EPA 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 of this study can also be broadly applied in other policy arenas, perhaps most notably 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 this kind of policy could be made more effective if failing schools were provided with increased funding to identify low cost opportunities to raise student achievement.

Caveats and limitations

There are several limitations to our study. First, because our dataset ends in 2004, we are unable to determine whether the firms in which we observed improvements continued to maintain these improvements. Future work could analyze organizational responses over longer periods of time after ratings are bestowed. 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 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 KLD ratings. In that case, our results could suffer omitted variable bias. However, for this to affect the inferences from our analysis, this would have to occur disproportionately among the newly rated (treatment) group or the never-rated (control) group. While we have no

reason to suspect this concern is seriously biasing our results, we nonetheless acknowledge it is a possibility.

While 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 may be related to these ratings. In this spirit, future research could further illuminate how firms respond to ratings by studying firms that initially received positive rating and nonetheless improved, and firms that initially received poor ratings and nonetheless failed to respond by improving. Understanding how and why firms respond differently once they receive negative ratings also represents an important avenue of future research. Finally, while there is no single ideal measure of corporate environmental legitimacy, we believe that KLD ratings are a reasonable choice, especially given that KLD ratings' construct validity (Sharfman, 1996) and predictive validity (Chatterji et al., 2008) have been confirmed. There exist other corporate legitimacy metrics such as the Fortune Corporate Reputation Index that are quite different from KLD ratings. Those alternative measures might yield new insights, although their construct validity remains a challenge (Chatterji & Levine, 2008).

CONCLUSION

Company ratings and rankings have a long history and continue to proliferate. Our paper is among the first to document the impact of third party company ratings on firm performance. Future research should investigate whether other kinds of third party raters and market intermediaries have a similar impact. Third party 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).

Our study has implications for both theory and practice. Our results demonstrate the benefits of integrating multiple theoretical perspectives to obtain a more nuanced understanding of how ratings influence organizations, including divergent organizational responses. For policy makers and other stakeholders seeking to circumscribe externalities created by the market economy, company ratings can be a valuable tool. We hope our work is part of a nascent literature that helps identify the conditions under which company ratings are most likely to achieve their goals.

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TABLE 1
Sample description

Panel A: Industry composition

NAICS Code (3-digit)	Description	Number of firms
334	Computer and Electronic Product Manufacturing	102
325	Chemical Manufacturing	63
336	Transportation Equipment Manufacturing	49
333	Machinery Manufacturing	44
221	Utilities	35
331	Primary Metal Manufacturing	32
332	Fabricated Metal Product Manufacturing	29
339	Miscellaneous Manufacturing	26
311	Food Manufacturing	25
335	Electrical Equipment, Appliance, and Component Manufacturing	21
322	Paper Manufacturing	19
212	Mining (except Oil and Gas)	14
211	Oil and Gas Extraction	13
324	Petroleum and Coal Products Manufacturing	13
327	Nonmetallic Mineral Product Manufacturing	12
326	Plastics and Rubber Products Manufacturing	11
423	Merchant Wholesalers, Durable Goods	11
541	Professional, Scientific, and Technical Services	11
	Other industries	123
	Total	653

Panel B: Number of firms in sample

	(1) Total [a]	(2) Less environmentally efficient	(3) More environmentally efficient
Firms never rated	258	63	89
Firms whose initial rating was mixed or good	329	132	125
Firms whose initial rating was poor	66	47	14
Total number of firms	653	242	228

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

TABLE 2
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 3
Summary statistics

Panel A: Summary statistics

Variable	Mean	SD	Min	Max
1. Log pounds of emissions	12.21	4.22	0	20.71
2. Number of penalties [a]	0.67	2.90	0	47
3. KLD rated × Initial rating poor	0.06	0.24	0	1
4 KLD rated × Initial rating mixed or good	0.26	0.44	0	1
5. Log employees	8.59	1.50	1.95	13.09
6. Log sales	20.97	1.55	15.13	26.38
7. Log assets	21.08	1.62	16.93	27.74
8. Log number of TRI-reporting facilities	1.58	0.92	0	4.76

Note: 2,499 firm-year observations
[a] Median=0

Panel B: Correlations

	1	2	3	4	5	6	7
1. Log pounds of emissions	1.00						
2. Number of penalties	0.07	1.00					
3. KLD rated × Initial rating poor	0.10	0.04	1.00				
4 KLD rated × Initial rating mixed or good	-0.09	-0.06	-0.15	1.00			
5. Log employees	0.24	0.14	-0.01	-0.06	1.00		
6. Log sales	0.31	0.17	0.08	-0.07	0.89	1.00	
7. Log assets	0.29	0.19	0.10	-0.06	0.82	0.94	1.00
8. Log number of TRI-reporting facilities	0.52	0.18	0.07	-0.04	0.45	0.46	0.40

Note: 2,499 firm-year observations

TABLE 4
Performance improved most among firms whose initial rating was poor

Dependent variable	(1) Emissions	(2) Number of penalties
Functional form	OLS	Negative binomial
KLD rated × Initial rating poor	-0.643*	-0.562**
	[0.251]	[0.207]
KLD rated × Initial rating mixed or good	0.295	0.221
	[0.168]	[0.173]
Log employees	-0.230	0.358*
	[0.238]	[0.164]
Log sales	0.693**	0.078
	[0.232]	[0.175]
Log assets	-0.202	-0.350
	[0.263]	[0.208]
Log number of TRI-reporting facilities	1.775**	
	[0.141]	
Year dummies (2000-2003)	Included	Included
Facility fixed effects [a]	Included	Included
Observations (firm-years)	2478	1110
Firms	624	228
Model F test or Wald chi-squared statistic [b]	31.39**	123.81**
R-squared	0.85	
Wald test: *KLD rated* coefficients equal? [b]	14.88**	12.32**

Coefficients, with standard errors in brackets. The negative binomial model is based on a smaller sample because the specification drops those firms that have the identical number of penalties throughout the sample period.
[a] Conditional fixed effects in the negative binomial model.
[b] F test statistic for the OLS model; Chi-squared test statistic for the negative binomial model.
   ** $p<0.01$
    * $p<0.05$

TABLE 5
Performance improved most among less efficient firms whose initial rating was poor

Dependent variable	(1) Emissions	(2) Number of penalties
Functional form	OLS	Negative binomial
KLD rated × Initial rating poor × Less environmentally efficient firms	-0.741*	-0.663**
	[0.292]	[0.246]
KLD rated × Initial rating mixed or good × Less environmentally efficient firms	0.364	0.059
	[0.229]	[0.256]
KLD rated × Initial rating poor × More environmentally efficient firms	0.068	-0.329
	[0.462]	[0.469]
KLD rated × Initial rating mixed or good × More environmentally efficient firms	0.468	0.118
	[0.243]	[0.252]
Log employees × Less environmentally efficient firms	0.149	0.415
	[0.304]	[0.279]
Log employees × More environmentally efficient firms	-0.422	0.394
	[0.376]	[0.215]
Log sales × Less environmentally efficient firms	0.460	-0.069
	[0.297]	[0.247]
Log sales × More environmentally efficient firms	0.933**	0.040
	[0.345]	[0.248]
Log assets × Less environmentally efficient firms	-0.627	-0.179
	[0.333]	[0.295]
Log assets × More environmentally efficient firms	0.694	-0.359
	[0.425]	[0.287]
Log number of TRI-reporting facilities × Less environmentally efficient firms	1.225**	
	[0.205]	
Log number of TRI-reporting facilities × More environmentally efficient firms	1.800**	
	[0.198]	
Year dummies (2000-2003) interacted with more/less environmentally efficient status	Included	Included
Facility fixed effects [a]	Included	Included
Observations (firm-years)	2134	1047
Firms	395	205
R-squared	0.85	
Model F test or Wald chi-squared statistic [b]	16.51**	178.54**
Wald test: *KLD rated × Less environmentally efficient firms* coefficients equal? [b]	16.09**	6.67**
Wald test: *KLD rated × More environmentally efficient firms* coefficients equal? [b]	2.19	0.84

Coefficients, with standard errors in brackets. The negative binomial model is based on a smaller sample because the specification drops those firms that have the identical number of penalties throughout the sample period.

[a] Conditional fixed effects in the negative binomial model.

[b] F test statistic for the OLS model; Chi-squared test statistic for the negative binomial model.

** $p<0.01$

* $p<0.05$