

Does Greenwashing Pay Off? Understanding the Relationship Between Environmental Actions and Environmental Legitimacy

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Abstract Do firms gain environmental legitimacy when they conform to external expectations regarding the natural environment? Drawing on institutional logic and signaling theory, we investigate sources of heterogeneity in the impacts of environmental actions on environmental legitimacy. Longitudinal data (1997–2001) about 325 publicly traded U.S. firms in polluting industries support the notion that environmental actions help firms gain environmental legitimacy. However, some actions instead can harm this legitimacy if environmental performance deteriorates and the firm is subject to intense scrutiny from nongovernmental organizations. Thus, an important contribution of this research is to identify conditions under which greenwashing can backfire.

Keywords Environmental management · Institutional theory · Greenwashing · Signaling theory · Nongovernmental organizations

Introduction

Increasing concerns about the natural ecosystem and pressures to engage in environmentally responsible conduct have moved environmental management to the top of many corporate agendas (Hart 1995; King and Lenox 2002). In response, companies have embarked on a wide array of environmental endeavors, including participation in voluntary governmental programs (Delmas and Montes-Sancho 2010), environmental innovations (Berrone et al. 2013), environmental pay policies (Berrone and Gomez-Mejia 2009), the use of green labels and trademarks (Leonidou et al. 2011), and the adoption of other environmental management systems (Delmas and Toffel 2008a; King et al. 2005). A widespread ethical concern is about firms simply engaging in “greenwashing,” which refers to the practice of making unsubstantiated or misleading claims about a firm’s environmental impact (Huang and Chen 2015; Laufer 2003; Ramus and Montiel 2005). Despite great progress in understanding the sources of heterogeneity that cause some firms to adopt particular environmental practices, we know little about how the distinct practices ultimately affect people’s perceptions that the firm’s behavior conforms to external expectations related to the natural environment—that is, the firm’s environmental legitimacy (Bansal and Clelland 2004). Yet this factor is a key imperative for ethics and management research, because companies that gain environmental legitimacy likely compete more effectively and thrive (Dowling and Pfeffer 1975; Lamin and Zaheer 2012). In response, we investigate which environmental actions, and in what conditions, are likely to shape public opinion and enhance environmental legitimacy.

Stakeholders often lack sufficient information to evaluate the environmental footprints of different firms (Busch

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and Hoffmann 2009; Lyon and Maxwell 2011). This information asymmetry affects not only companies' current environmental quality but also their plans to curb pollution in the future. It also requires stakeholders to seek signals of the firm's current and future commitments to the natural environment.

With these central notions, our theoretical framework blends elements of institutional theory (Scott 1995) and signaling theory (Connelly et al. 2011). The former provides a means to analyze companies' strategic choices and actions in their efforts to match their corporate values with societal values, which grants them external validation or legitimacy. The latter investigates how agents use different signals to overcome problems and inefficiencies associated with information asymmetry. Following an institutional logic, we argue that environmental actions can convey a firm's environmental stance, and to the extent that stance conforms with the general public's expectations, it should boost the firm's environmental legitimacy. However, not all environmental actions produce the same outcome, because they have varying signaling power. Endeavors that are observable and costly to imitate should secure environmental legitimacy (Certo 2003), because they constitute a strong signal. To explore explanations for heterogeneity across firms, in terms of the effectiveness of their signaling processes, we focus on whether the firm is a credible signaler, according to whether its environmental performance has changed recently (improvement vs. deterioration) (Connelly et al. 2011). Nongovernmental organizations (NGOs) that monitor companies and broadcast environmental information to stakeholders may influence the effectiveness of signals too (Guay et al. 2004).

To test these theoretical arguments, we use longitudinal data (1997–2001) about 325 publicly traded U.S. firms in polluting industries, defined as those sectors that tend to produce problematic levels of waste or emissions in their regular business activities. Our results show that environmental actions can enhance the social acceptance of firms, as long as they “walk the talk.” However, they also can be detrimental, especially if firms issue weak signals and display poor environmental footprints or are subject to intense scrutiny by environmental NGOs.

We thus derive several contributions to extant literature. First, we combine institutional logic and signaling theory to investigate the heterogeneous effectiveness of environmental actions as a means to comply with society's expectations about the ecosystem. Using just institutional theory (DiMaggio and Powell 1983; Meyer and Rowan 1977; Scott 1995), we could not capture this variation fully. For example, firms are able to decouple their pursuit of legitimacy from the actual implementation of relevant actions and their related costs (Bromley and Powell 2012). By introducing signaling theory, we add a new layer to

institutional theory and distinguish environmental actions according to the quality of the signal they convey.

Second, most extant research investigates how firms respond to institutional pressures with an array of environmental actions and policies (see Etzion 2007 for a review), but we focus on the determinants of environmental legitimacy. Exploring the impact of environmental actions on legitimacy is worthy of scholarly and practical attention, because a lack of legitimacy clearly jeopardizes the chances of organizational performance (Attig et al. 2014) and ultimately survival (Dowling and Pfeffer 1975; Lamin and Zaheer 2012). Yet prior literature is almost silent regarding whether different environmental actions lead to legitimacy and the contingencies that might affect this relationship, so we clearly need an empirical exploration (Mueller et al. 2009).

Third, management research frequently relies on signaling theory (Connelly et al. 2011), but its application to environmental management is more limited. King et al. (2005) investigate the conditions that make certain facilities more likely to adopt ISO 14001 certifications (a standard that maps out effective environmental management systems). Surprisingly, they find that firms with lower environmental performance are more likely to use ISO 14001 certifications, which casts some doubt on its effectiveness as a signal. Continuing this line of research, we investigate which environmental actions work better as signals to boost environmental legitimacy, and when. In this sense, we contribute to incipient literature on “greenwashing” (Huang and Chen 2015; Laufer 2003; Ramus and Montiel 2005), by exploring what happens when positive signals about the firm's environmental stance intersect with poor actual environmental performance (Delmas and Cuerel-Burbano 2011). An important message for business ethics scholars is that firms that “don't walk the talk” are penalized in terms of environmental legitimacy. In this sense, our results suggest that greenwashing might not pay off, especially in the presence of vigilant environmental NGOs.

Fourth, this study adds to research into NGOs and suggests they might have an uneven role. That is, they seem to be more effective for amplifying the environmental misdeeds of companies (i.e., when environmental actions do not match environmental claims) than for communicating positive assessments of firms' well-aligned environmental actions and claims.

Theoretical Framework and Hypotheses

In this section, we first review the main insights of institutional theory and how it has been employed in the context of environmental management. Then we provide a quick overview of signaling theory and discuss how we leverage it in the current study.

Institutional theory predicts how social stimuli shape organizational actions (DiMaggio and Powell 1983; Meyer and Rowan 1977; Scott 1995). According to this perspective, when companies adopt strategies that adhere to institutional prescriptions, their corporate values align with societal values (Meyer and Rowan 1977), so they obtain external validation or legitimacy (Scott 1995). Legitimacy thus refers to the degree to which the broader public or various stakeholders regard an organization's actions as both appropriate and useful (Scott 1995; Suchman 1995). It arises when stakeholders—that is, actors who affect and are affected by the firm's actions (Freeman 1984)—endorse and support organizational actions. With legitimacy, the firm can compete more effectively, because it gains better access to resources, can attract better employees, and enjoys improved exchange conditions with partners (Oliver 1991; Pfeffer and Salancik 1978). Consequently, acquiring legitimacy is a strategic concern for organizations.

In a corporate environmentalism setting, which arises from “the recognition and integration of environmental concerns into a firm's decision-making process” (Banerjee 2002, p. 177), environmental legitimacy implies a “generalized perception or assumption that a firm's corporate environmental performance is desirable, proper, or appropriate” (Bansal and Clelland 2004, p. 94). Firms that match stakeholders' environmental norms gain environmental legitimacy (Bansal and Clelland 2004; Hart 1995), but poor environmental behavior likely substantially lessens corporate environmental legitimacy.

In the past three decades, firms have increasingly claimed that they are environmentally responsible, and environmental legitimacy has become a central concern, especially for companies operating in environmentally sensitive sectors, where well-identified external actors often scrutinize the firms' behavior and can grant or revoke legitimacy (Barnett and King 2008; Berrone and Gomez-Mejia 2009). Assessing a firm's environmental footprint is more challenging for the general public though, because most people lack direct knowledge of the real environmental quality of the firm's production processes or the extent to which it is committed to improving its environmental performance by incorporating clean technologies or implementing effective environmental management practices (Lyon and Maxwell 2011). That is, even though stakeholders are increasingly concerned about environmental matters and benefit from wider diffusion of pollution rankings and reports, substantial information asymmetry persists in their assessments of firms' current environmental quality and behavioral intentions (King et al. 2005).

In combination, greater environmental pressures and information asymmetry create strong incentives for firms to adopt policies and programs that might improve their environmental performance (Borial 2007). They also want to release signals to the general public that they are moving

toward a sustained environmental commitment. However, across various studies that consider which types of actions firms implement (Berrone et al. 2013; Berrone and Gomez-Mejia 2009; Delmas and Montes-Sancho 2010; Delmas and Toffel 2008b), we find little evidence that demonstrates which actions are most effective for securing environmental legitimacy. To fill this gap, we turn to signaling theory.

Certain corporate actions and policies might reduce information asymmetry (Connelly et al. 2011). Corporate environmentalism is an appropriate setting for signaling theory too, because (1) objective measures of environmental performance are usually available, though with some delay, such that they reflect past behavior but not future intentions, and (2) environmental initiatives, such as changes in current production systems, the implementation of intricate programs, new equipment, or cross-functional employee coordination, take time to exert influences and are not easily observable by the general public. Signaling theory defines the efficacy of signals as the extent to which they are observable to outsiders and costly to imitate (Banerjee 2002). The former feature is straightforward: No receiver is affected if the signal is not observable. The latter condition requires that the costs of emitting the signal differ across actors, because otherwise all actors would emit that signal, and it would not be credible. For simplicity of exposition, we refer to signals that are highly visible and costly to imitate as *strong signals* and differentiate them from *weak signals*. With this logic, we posit that all environmental actions might help a firm conform to societal expectations about the natural ecosystem and secure environmental legitimacy, but some actions work better than others to signal underlying environmental quality and behavioral intentions.

Some environmental endeavors are both highly visible and impose differentiated costs. For example, environmental patents require firms to invest significant time, effort, and money to conduct the underlying research, and the impacts on the firm's environmental performance take considerable time to materialize (Berrone et al. 2013). Patent information also is publicly available and often appears in companies' annual reports. Furthermore, patents are granted only after a careful examination to ensure the novelty, nonobviousness, and usefulness of the patented product or process. Thus, innovators bear considerable costs to conduct the underlying research, and these costs are sunk (i.e., nonrecoverable) for firms that do not intend to implement the patented innovations. Such environmental actions are strong signals.¹ In contrast, firms can participate

¹ Hsu and Ziedonis (2013) and Hoenen et al. (2014) show that patents have signaling value in early rounds of venture capital financing. However, their signaling value diminishes as information asymmetries between investors and funded firms lessen.

in environmental programs sponsored by government agencies (see Darnall and Sides 2008 for a recent meta-analysis on the issue), with negligible costs (Delmas and Keller 2005). No fines punish firms that fail to achieve environmental improvements, and participants can publicize their membership, regardless of their environmental record. Therefore, these environmental endeavors are weak signals. In summary,

Hypothesis 1a In environmentally sensitive organizational fields, environmental actions are associated with gains in environmental legitimacy.

Hypothesis 1b Environmental actions that constitute strong signals are associated with greater gains in environmental legitimacy than actions that constitute weak signals.

Signaling theory also suggests that some signaler characteristics are more likely to enhance the effectiveness of a signal. Some management scholars use the term *credibility* to reflect the extent to which a signaler is honest, such that the signal corresponds with actual quality (Davila et al. 2003). This credibility depends on the signaler's past behavior and reputation (Connelly et al. 2011). In our study context, past environmental performance provides an objective measure of environmental conduct.² Firms competing in organizational fields characterized by strong environmental pressures are subject to public, "objective" measures of environmental performance [e.g., those by the Environmental Protection Agency (EPA)], which often are echoed and amplified by watchdog institutions (Berrone and Gomez-Mejia 2009). Tangible environmental improvements increase the firm's credibility, as a signaler, as well as the effectiveness of its environmental actions as signals of its environmental quality. If stakeholders believe that these actions and policies are good for the environment, they can find positive evidence in observations that the firm has improved its environmental imprint. In contrast, if the focal firm's environmental performance has deteriorated, its credibility shrinks, and environmental actions likely invoke skepticism among the general public (Delmas and Cuerel-Burbano 2011). We expect the following:

Hypothesis 2 In environmentally sensitive organizational fields, the credibility of the focal company (i.e.,

improvements in its environmental performance) positively moderates the impact of environmental actions on environmental legitimacy.

Existing research indicates that signaling effectiveness also depends on the characteristics of the receiver (Connelly et al. 2011). Signaling tends to be ineffective if the receiver is not looking for signals or does not know where to look for them. In these cases, *receiver attention* is limited (Ilmola and Kuusi 2006). Environmental misconduct can lead to human health concerns (e.g., respiratory problems, degenerative diseases), so various constituencies closely scrutinize firms' environmental behavior. But even in a single organizational field, some variation exists in the degree of monitoring (Berrone et al. 2013), perhaps due to the presence of environmental NGOs (Lenox and Eesley 2009). As external stakeholders that often function beyond formal channels, NGOs still can influence organizational processes and public sentiment (King and Pearce 2010; King and Soule 2007; Lounsbury et al. 2003). When the number of environmental NGOs monitoring a firm increases, available information about its environmental conduct increases, so more receivers obtain and process it and might broadcast it to other stakeholders.

The effect of this surveillance also may depend on the firm's credibility as a signaler. When a company increases its polluting emissions, it attracts the attention of environmental NGOs, which intensify their surveillance and draw more attention to its lack of credibility as a signaler. The signaling power of its environmental actions then should decline. Weak signals even might be perceived as opportunistic (King and Lenox 2000) and subject to moral evaluation (Lange and Washburn 2012), leading to perceptions of the companies as untruthful, unreliable, calculating, or manipulative. In many cases, "activists react more angrily to firms that lay claim to being virtuous, and then are discovered to have feet of clay" (Lyon and Maxwell 2011, p. 4). When a company increases emissions but still has official environmental policies, environmental NGOs likely accuse it of greenwashing, and this outcome is particularly likely when more environmental NGOs are monitoring that company.

If instead the firms walk the talk (i.e., have high credibility), they might not come as readily to the attention of environmental NGOs. As Lange and Washburn (2012, p. 301) suggest, "there is significant asymmetry between the cognitive processing that observers do in response to negative (adverse or threatening) events and the cognitive processing they do in response to positive events." Environmental NGOs usually do not focus on good examples, nor are they likely to be mobilized by firms that perform the actions they claim (Lyon and Maxwell 2011). Therefore, when firms improve their environmental impacts, it

² The arguments we develop apply to the level of environmental performance too, but we assert that it is easier for stakeholders to react to changes (positive or negative) in environmental performance rather than to assess the level in absolute terms. Thus, our underlying assumption is that environmental legitimacy depends more on the slope than on the level of environmental performance. Nevertheless, we include the levels as a control measure in the econometric specification.

may mitigate the relationship between the number of environmental NGOs and the impact of environmental actions on environmental legitimacy. That is, we predict that the influence of environmental NGOs on the effectiveness of the signaling process is weaker for firms that exhibit improving environmental performance (high credibility signalers) than for firms that exhibit declining environmental performance (low credibility signalers).

Hypothesis 3 In environmentally sensitive organizational fields, the number of environmental NGOs around the focal firm (a) negatively moderates the impact of environmental actions on environmental legitimacy for firms with low levels of credibility but (b) positively moderates the impact of environmental actions on environmental legitimacy for firms with high level of credibility, with a weaker effect.

Methods

Sample and Data Collection

To test our hypotheses, we needed information about firms in environmentally sensitive organizational fields. In line with previous research (Berrone and Gomez-Mejia 2009; Russo and Harrison 2005), we focused on firms operating in the 20 most polluting sectors [at the two-digit standard industrial classification (SIC) code level], according to the Toxic Release Inventory (TRI) program of the U.S. EPA, which requires facilities exceeding a threshold level to report their emissions.³ These sectors draw close public scrutiny, because they account for a large share of overall emissions and pollution. They thus provide a good approximation of an environmentally sensitive organizational field that is characterized by strong environmental pressures; it would make little sense to investigate environmental legitimacy in contexts in which environmental issues are not a major concern. This selection procedure produced an initial set of 876 firms.

We then cross-referenced this initial sample with the COMPUSTAT database and searched other data sources [e.g., U.S. Patent and Trademark Office (USPTO), CHI's Patent Citation Indicators database, proxy statements] to gather information about the independent variables (as we describe in the next section). We used multiple sources to aggregate the data by parent companies, including Mergent Manuals, which compile data regarding subsidiaries; the COMPUSTAT database; and companies' websites (for fewer than 10 percent of all firms). The final sample, after we dropped firms with missing values, was an unbalanced

panel of 325 firms, with data available between 1997 and 2001. These companies are all public and rather large, so our findings cannot be extended automatically to all firms (e.g., small and private ones).

Measures

Dependent Variable: Environmental Legitimacy

Legitimacy is not an easy construct to measure. Empirical research has employed three different approaches: code adoption, organizational linkages, and media perception (see Vergne 2011 for a review). Code adoption measures a response to institutional pressures but does not necessarily signal firm legitimacy. Organizational linkages refer to external certifications and evaluations, which tend to reflect quality assessments and are unlikely to represent the broad public's perception. Media accounts partially overcome these problems and offer two advantages (Vergne 2011): First, media evaluations of firms are often distributed to a broader audience than opinions of alternative evaluators. Second, the media typically are primary sources of information for the broader public (Ader 1995). Thus, following Bansal and Clelland (2004), Hamilton (1995), and Konar and Cohen (1997), we drew on media accounts to assess environmental legitimacy.

We used *The Wall Street Journal*, considering its national coverage and large circulation. We followed several steps to compute a measure of environmental legitimacy. First, we extracted full-text electronic articles published between 1996 and 2002 by searching for the company name (for each of our 325 firms) and at least one keyword from an environmental word list. The keywords included were those used by Bansal and Clelland (2004); e.g., sustainable development, environment, pollution, toxic, plus others added to reflect the content of papers cited in that article (e.g., hazardous, waste, disposal, alternative energy, ecology, contamination). We obtained more than 1500 articles for the analysis period. Second, we read each article and coded it as -1 or 1 , depending on whether it reflected a legitimacy-challenging or legitimating view of the firm's environmental stance. The coder rated the overall tone of the article (i.e., the extent to which it was legitimating or legitimacy challenging) independently of its specific facts. An article might, for instance, cover a company that has been granted several patents but speak negatively about its environmental conduct. Coders were trained to identify criteria that supported this classification, including semantics and linguistics that indicated either endorsement or criticism (Hart and Jarvis 1997). For a limited number of articles (fewer than 7 percent), the coders (two authors) were unable to assign a category, so they were coded "unsure." An intercoder reliability check for 100 randomly selected articles indicated

³ Namely, SIC codes 10, 50, 33, 49, 28, 36, 12, 13, 20, 32, 30, 51, 26, 34, 29, 31, 35, 37, 24, and 27.

agreement on 91 percent of the articles. The disagreements mostly involved the application of the unsure category, so we dropped articles classified as unsure to reduce the risk of unreliable coding. If we treated all unsure articles as either legitimating or legitimacy challenging, it did not alter our findings (these results are available on request). Third, following Deephouse (1996) and Bansal and Clelland (2004), we used the Janis-Fadner coefficient (see the Appendix) to construct our measure of environmental legitimacy. This measure ranges from 1 (only legitimating articles about the company) to -1 (only legitimacy-challenging articles). For example, Chevron was the subject of ten articles in 1999, of which five were classified as legitimacy challenging, three as legitimating, and two as unsure (dropped). Therefore, the coefficient was $(3 \times 5 - 5 \times 5) / (8 \times 8) = -0.15625$. This measure accordingly increases with the publication of positive articles and decreases with the publication of negative articles about a firm's environmental conduct.

Corporate Environmental Actions

We considered five environmental actions: (1) environmental patents, (2) board committees dedicated to environmental issues, (3) environmental pay policies, (4) voluntary government programs, and (5) environmental trademarks. These actions vary in their visibility and implementation costs and therefore in their potential effectiveness for signaling environmental quality.

Environmental Patents Extensive literature affirms the role of patents as signaling devices to attract external financing (e.g., Levitas and McFadyen 2009; Hsu and Ziedonis 2013), to competitors (e.g., Anton and Yao 2004; Horstmann et al. 1985), and to technology end-users (Gick 2008). Patents are visible because they are publicly available and firms often disclose them, such as in their annual reports. In addition, patents are subject to a careful examination process, which filters them according to novelty, nonobviousness, and usefulness criteria. Innovators face substantial costs to develop a patent, and that cost becomes sunk if the firm never implements or commercializes the underlying knowledge. Therefore, the quantity and quality of the patents that a firm owns convey information about not only the inventions *per se* but also the type of research the firm conducts and how quickly its research efforts have unfolded (Long 2002). As a result, patents can influence the observer's perception about a given company.⁴ For these reasons, we treat environmental patents as strong

signals of environmental quality. To identify environmental patents, we relied on Nameroff et al. (2004), who used the CHI's Patent Citation Indicators database to identify firm-assignees of more than 3200 environment-related patents during 1983–2001. Because higher quality patents usually involve higher development costs, we account for patent quality by weighting them by their corresponding citations (e.g., Hall et al. 2005; Lanjouw and Schankerman 2004; see Appendix).

Environmental Board Committees Companies sometimes explicitly and formally delegate environmental oversight to a subgroup of the board (i.e., an environmental committee), which requires changes to the structure of the board, new roles and functions, and even new board members (Walls et al. 2012). These changes are observable and reported in companies' annual reports. Board members likely are unwilling to ruin their reputation, status, or prestige by taking direct responsibilities for the environmental actions of companies that fail to meet stakeholders' environmental expectations. Therefore, this policy is more costly to implement for companies that are less committed to the preservation of the environment. Existing research grounded in signaling theory demonstrates that both the characteristics of board members and the composition of the board can be valid instruments to communicate credible information that is not related with environmental management (Certo 2003; Filatotchev and Bishop 2002). Thus, environmental committees should offer strong signals of environmental quality.

To identify firms with environmental committees on their boards, we used a measure constructed by Berrone and Gomez-Mejia (2009). They searched annual proxy statements for dyadic relationships between the items in an environmental word list (the same list we used to compute our measure of environmental legitimacy) and the term "board."⁵ The extracted paragraphs then were individually inspected, to determine whether the company had a board-level committee responsible for environmental issues.⁶ The variable took a value of 1 if it did and 0 otherwise.

Environmental Pay Policies Some firms formulate executive pay policies that include environmental criteria,

Footnote 4 continued

The company used its environmental innovation to regain some of its environmental legitimacy.

⁵ We also searched for the presence of an environmental Vice President (VP) and found very few companies with this position during our period of analysis (less than 10 %). The inclusion of these additional firms did not change the results as described in footnote v.

⁶ The name of the dedicated board committee varies across firms, as Klettner et al. (2014) note. Some firms refer to "safety, health and environmental affairs" or "environmental compliance" committees. For simplicity, we use "environmental committees," which all refer to committees within boards of directors.

⁴ In a recent paper, Matejek and Goossling (2014) describe processes of building, losing, and repairing environmental legitimacy in the context of the Deepwater Horizon case. They show that "technological development and unlimited progress" was at the heart of BP's communications as it sought to influence its green corporate image.

to recognize the value of good environmental performance and commit to rewarding it (Berrone and Gomez-Mejia 2009; Russo and Harrison 2005). A formal link between environmental performance and pay may help motivate executives' efforts in environment-related activities (Lothe et al. 1999). Information about such environmental pay policies usually would be included in a firm's annual reports. Furthermore, incentive theory suggests that when agents are risk averse, the costs of implementing incentive contracts increase if the link between effort and performance is more uncertain (Bloom and Milkovich 1998). Therefore, for firms with strong environmental quality, the relationship between efforts and outcomes (i.e., improved environmental performance) is clear. In contrast, there is greater noise and more uncertainty among companies with poor environmental quality, such that top management might make huge efforts, but the outcome remains uncertain and outside its span of control. Therefore, we expect environmental pay policies to be strong signals of environmental quality.

To identify firms with an environmental pay policy directed to the executive management team, we used a measure constructed by Berrone and Gomez-Mejia (2009). We analyzed annual proxy statements, searching for paragraphs that contained any word(s) from our environmental word list, plus any of the following terms: "pay," "compensation," "salary," "wage," "reward," "remuneration," "incentives," "bonus," "stock," and "income." Finally, we visually inspected the texts and created a dummy variable, equal to 1 if there was at least one explicit relationship between executive pay and environmental performance in the firm's annual proxy statement, and 0 otherwise.

WasteWise Program Some firms participate in environmental programs sponsored by government agencies (see Darnall and Sides 2008 for a recent meta-analysis on the issue). These programs are intended to provide specialized information and technical assistance that ultimately might reduce pollution, though they vary substantially. Some are oriented exclusively toward specific sectors or topics, and they might be limited in time or restrict participation. There is also variation in the participation costs. Following Delmas and Keller (2005), we explore the impact of participation in the U.S. EPA's WasteWise program. This program originally was established to reduce municipal solid waste; it covers the period under analysis and is open to a broad set of industries. In addition, it sets few restrictions for participation, and there are no penalties for firms that fail to achieve environmental improvements (Delmas and Keller 2005). Rather, participants can publicize their membership, regardless of their environmental record. Because membership costs are low and undifferentiated across firms, we expect this government program

to offer a weak signal of environmental quality. The variable takes the value of 1 if the firm participates in the WasteWise program and 0 otherwise.⁷

Environmental Trademarks Trademarks combine "words, phrases, symbols, or designs that identify and distinguish the source of the goods or services" (<http://tess.uspto.gov>). Firms can trademark a new name, jingle, slogan, image, or logo, as long as they pay fees and prove periodically that they continue to use the trademark in the relevant market. To inform consumers about the environmental footprint of the products they consume (Polonsky 1995), firms may adopt green brands, protected with trademarks, that offer visible signs, such as on packaging, to profess an environmental stance every time consumers see the products. The number of green trademarks has increased significantly in the past decade (see, for instance, Gruère 2013). Because trademarks do not require any underlying innovations, filing for a green trademark incurs similar costs for firms with different levels of environmental quality, so according to our criterion, green trademarks are weak signals.⁸

We obtained trademarks registered with the USPTO for each firm in the sample, during our study period. We then extracted trademarks that included at least one of the following terms in their descriptions: "alternative energy," "clean," "Earth," "eco," "ecology," "environment," "friendly," "green," "natural," "organic," "planet," and "sustainable." To expand the search, we also included words with relevant suffixes and prefixes (e.g., ecology, ecologic, ecological). Our measure counted the total number of environmental trademarks registered in a particular year. No sample firms registered for more than one environmental trademark in a given year, so the variable took a value of 0 or 1.

Moderators

(Change in) Environmental Performance We measured the firm's credibility as a signaler as the extent to which its environmental performance improved or deteriorated, in terms of changes in its pollution emissions. These data came from the EPA's TRI program. Following previous

⁷ This information was generously provided by a representative of the EPA's WasteWise Program. In the United States alone, there are more than 200 such programs (Delmas and Keller 2005), most of which focus on specific sectors or topics for a limited time and select participants.

⁸ In recent years (after our sample period), the USPTO grew more stringent, denying applications that used the term "green" too generically or descriptively (LegalZoom, 2011, <http://www.legalzoom.com/intellectual-property-rights/patents/registering-green-trade-marks>. Accessed March 22, 2014).

environmental literature (King and Lenox 2000, 2002), we computed changes in pollution emissions as the difference between a predicted value and some actual pollution level; precisely, we used the measure computed by Berrone and Gomez-Mejia (2009). Facilities must report their production ratios for the current reporting year compared against the previous reporting year (i.e., ratio of production volume in $t + 1$ to production volume in t), so we used these values to estimate total waste generation, which we compared with real values. With regard to waste generation, first, we weighted each chemical by its Human Toxicity Potential Factor ((Hertwich et al. 2001), which measures toxicity in terms of benzene equivalence (for carcinogens) or toluene equivalence (for noncarcinogens). Second, we aggregated the results across chemicals at the facility level. Third, we multiplied these results by their corresponding production ratio values. Fourth, we aggregated the results by parent company. Fifth, we compared these results against real values (see the Appendix). Changes in pollution emissions for carcinogens and noncarcinogens were log-transformed to approach normality, then standardized and averaged ($\alpha = 0.96$) to create our final measure of (changes in) environmental performance. The higher the value of this variable, the more the firm improved its environmental performance.

Nongovernmental Organizations We gathered information about the number of environmental NGOs per year and state from the National Center for Charitable Statistics, which is a national repository of data about the U.S. non-profit sector. Previous research also has used this database to operationalize normative pressures (Berrone et al. 2013; Kassinis and Vafeas 2006). First, we obtained information from a report summarized by Brown and Green (2001) regarding the total number of regulated entities, including sites, facilities, or incidences. Second, we computed the ratio of the total number of environmental NGOs to the total number of regulated entities (divided by 1000) to obtain a state-level measure of the presence of environmental NGOs. Third, we used information about the location and number of a firm's subsidiaries, from the Orbis database, to compute a weighted average of the state-level measure of environmental NGO presence, which served to weight the proportion of subsidiaries the firm had in each state. Noting the nonnormal distribution of this variable, we applied a logarithmic transformation before including it in the model.

Controls

We included a set of variables that might correlate with the firm's (environmental) legitimacy and whose omission might bias our estimated coefficients. Our measure of

environmental legitimacy refers to the number of legitimating and legitimacy-challenging press articles available for any given firm in a specific year, but it is also important to control for overall media visibility.⁹ Therefore, we counted the total number of articles, independent of their content (i.e., not only just those related to the environment), that referred to the focal company in a given year.

Another important determinant of a company's environmental legitimacy is the extent to which it is involved in environmental lawsuits. We gathered information from the Enforcement and Compliance Assurance Accomplishment Report, issued annually by the Office of Enforcement and Compliance Assurance of the U.S. EPA. These reports detail "significant criminal, civil, and administrative enforcement actions and the results achieved on behalf of the American public and the environment" (EPA 1996, pp. 1–1). Thus, we could identify cases in which the companies in our sample were defendants in environmental lawsuits. We used the number of cases per firm per year as an additional control variable.

Following Deephouse (1996), we controlled for firm size, age, and financial performance. Larger firms may have more contractual and social ties than smaller ones, as well as also more endorsements from external actors in their environments (Pfeffer and Salancik 1978; Singh 1986). Older organizations are more likely than younger ones to develop strong exchange relationships and be endorsed by powerful social actors (Singh 1986). Firms with better financial performance are more efficient than poorer performers at producing goods and services, and society values such efficiency (Dowling and Pfeffer 1975; Meyer and Rowan 1977). We measured size by the logarithm of the total number of employees, obtained the foundation year to compute the firm's age, and proxied for financial performance using the annual return on assets. All three measures came from the COMPUSTAT database. We also included the firm's level of emissions (over sales) as a control variable. *Ceteris paribus*, firms with higher emissions should have lower environmental legitimacy. Finally, all the specifications included sector dummies at the two-digit SIC level and annual dummies.

Empirical Analysis

We ran a linear model and a Tobit model with random effects. The Tobit model is appropriate because the dependent variable is bounded between -1 and 1 and has

⁹ Variation of press coverage is difficult to interpret. Perfectly legitimate organizations might be so taken for granted that they are no longer scrutinized. Alternatively, notably stigmatized organizations may wish to remain invisible in the news to avoid public attacks, even if, in some circumstances, visibility is a valuable asset (Deephouse and Suchman 2008).

observations at the boundaries (about 15 percent). However, interpreting the marginal effects of the explanatory variables is simpler for the linear model, so we provide both results. The coefficients and significance levels were very consistent across models, suggesting that the estimation bias from using the linear model was not severe. In addition, we estimated a linear model with firm fixed effects, to help control for unobservable factors that are constant over time and reduce possible endogeneity concerns. This model confirmed the main results (details available on request), though some coefficients became less significant. We chose to report the results with random effects, because our data indicated reduced variability across years, and using fixed effects would require that we drop half of the firms of our sample.

Results

Table 1 contains some descriptive statistics and correlations of the variables in the analysis. The total number of firm-year observations is 1478. The average number of employees is 41,652, indicating that our sample consists of very large firms, and their overall environmental impact is likely to be substantial.

In Table 2, we include our baseline regression with only control variables, then add all environmental actions as explanatory variables to test H1a and H1b. The coefficients of environmental patents, environmental pay policies, and environmental trademarks were positive and significant, but environmental board committees and WasteWise participation had no significant effects, in partial support of H1a. Table 2 also shows that strong signals exerted greater effects on legitimacy than the weak signal of WasteWise participation. Unexpectedly, environmental trademarks had a significant, strong impact on environmental legitimacy (though this finding did not persist in the fixed effects model), whereas environmental board committees had no significant effect, indicating mixed support for H1b.

Table 3 provides the results of the estimation of the previous models, augmented by the interaction terms between environmental performance (our credibility measure) and each environmental action. Introducing each interaction term separately produced qualitatively similar results. The estimated effects supported our contention that the effect of corporate environmental actions was positively moderated by a firm's environmental credibility, captured by changes in environmental performance (H2). Environmental actions exerted a stronger positive effect on environmental legitimacy with greater improvements in the firm's environmental performance (environmental trademarks were significant at 13 percent in the Tobit estimation). These findings were qualitatively unchanged in the

fixed effect model. Figure 1 graphically represents the marginal effects of each environmental action, using the results of the OLS model with random effects.¹⁰ These results indicated that for the 10th (90th) percentile of environmental performance (i.e., firms that improved most [did the least] in terms of emissions), one more environmental patent was associated with a change of 0.04 (0.07) in environmental legitimacy; an environmental committee linked to a change of -0.04 (0.04); the adoption of environmental pay policies was associated with a change of -0.02 (0.14); participation in WasteWise indicated a change of -0.12 (0.04); and one more environmental trademark was associated with a change of -0.14 (0.14). All the estimated marginal effects were significant with a confidence level higher than 90 percent. Incorporating the interaction terms significantly increased the explanatory power of the models in Table 3, compared with Table 2.

These results suggested that firms that curbed emissions benefited more from environmental actions than those that did not. The estimated marginal effects in Fig. 1 further indicated that for the bottom 18 percent of firms, in terms of changes in environmental performance, having an environmental board committee, environmental pay policies, or environmental trademark and participating in the WasteWise program actually decreased their environmental legitimacy.

Finally, to test H3a and H3b, we divided the sample into two subsamples (low and high credibility), according to whether a firm's change in environmental performance was lower or higher than the median. Then we reestimated the models in Table 2 after including the interactions of each environmental action with the environmental NGO variable. The results appear in Table 4, and introducing each interaction term separately produced qualitatively similar results. As we predicted in H3a, the number of environmental NGOs negatively moderated the impact of environmental actions on environmental legitimacy for firms with low credibility as signalers. The interaction terms with environmental NGOs were negative and significant for all environmental actions, except for the environmental board committee. In contrast, for the subsample of firms with high levels of signaler credibility, none of the interaction terms was significant. Although we found no evidence of a positive moderating effect of the number of environment NGOs for firms with high credibility, the results from Table 4 generally indicate a dual role of environmental NGOs. When changes in emissions do not match firms'

¹⁰ The average marginal effects computed with the Tobit model (Model 2), evaluated at different percentiles of environmental impact as the moderator variable (Hoetker 2007; Huang and Shields 2000), were consistent with those from the OLS model with random effects (Model 1) in sign and significance. This consistency held for all other moderators.

Table 1 Descriptive statistics and correlations

	Mean	SD	Min.	Max.	1	2	3	4	5	6	
1. Env. legitimacy	0.05	0.39	−1	1	1						
2. Env. performance	−0.05	0.24	−2.35	0.49	0.23	1					
3. Env. patents	0.34	1.43	0	22	0.27	−0.03	1				
4. Env. committee	0.08	0.26	0	1	0.04	−0.13	0.05	1			
5. Env. pay policies	0.04	0.17	0	1	0.03	−0.07	0.09	0.27	1		
6. WasteWise program	0.15	0.17	0	1	−0.03	−0.28	0.04	0.10	0.13	1	
7. Env. trademarks	0.02	0.12	0	1	0.11	0.10	0.14	−0.02	0.09	0.02	
8. Return on assets	1.80	23.6	−0.33	25.01	−0.06	−0.11	−0.01	0.07	0.05	0.09	
9. Firm size	2.89	1.29	0.69	6.47	0.07	−0.12	0.05	0.12	0.11	0.23	
10. Firm age	43.7	25.1	12	89	0.01	0.00	0.03	0.09	−0.05	0.03	
11. Emissions/sales	2.04	2.57	0	9.80	−0.01	−0.32	0.06	0.31	0.23	0.17	
12. Env. NGOs	3.37	1.16	−3.14	5.47	−0.01	0.07	0.07	−0.03	−0.14	−0.11	
13. Media visibility	1.85	1.28	0	6	0.20	−0.01	0.23	0.13	0.09	0.10	
14. Enforcement actions	0.08	0.22	0	3	−0.07	0.04	0.02	−0.02	0.06	0.01	
	Mean	SD	Min.	Max.	7	8	9	10	11	12	13
1. Env. legitimacy	0.05	0.39	−1	1							
2. Env. performance	−0.05	0.24	−2.35	0.49							
3. Env. patents	0.34	1.43	0	22							
4. Env. committee	0.08	0.26	0	1							
5. Env. pay policies	0.04	0.17	0	1							
6. WasteWise program	0.15	0.17	0	1							
7. Env. trademarks	0.02	0.12	0	1	1						
8. Return on assets	1.80	23.6	−0.33	25.01	0.06	1					
9. Firm size	2.89	1.29	0.69	6.47	0.07	0.35	1				
10. Firm age	43.7	25.1	12	89	−0.16	−0.10	0.15	1			
11. Emissions/sales	2.04	2.57	0	9.80	0.04	0.20	0.13	0.02	1		
12. Env. NGOs	3.37	1.16	−3.14	5.47	0.02	−0.22	−0.23	−0.14	−0.26	1	
13. Media visibility	1.85	1.28	0	6	0.21	0.05	0.21	−0.35	0.15	−0.08	1
14. Enforcement actions	0.08	0.22	0	3	0.03	0.05	0.08	−0.05	0.06	0.06	0.05

environmental claims, NGOs point it out and amplify this inconsistency, thereby weakening the effect of environmental actions on environmental legitimacy. However, NGOs are less likely to engage in spreading positive news or offering “good examples,” so no reinforcing (positive moderator) effect arose for firms with high levels of signaler credibility. Figure 2 graphically represents the marginal effects of each environmental action for signalers with low credibility, using the results of the OLS model with random effects.

Robustness Tests

To assess the robustness of our findings, we ran several other estimations (full results are available on request). The reported effects were robust to the use of an alternative

measure of the dependent variable: the Janis-Fadner index computed with data on environmental strengths and environmental concerns from the Kinder, Lydenberg Domini & Co. (KLD) database. The results using this alternative measure were qualitatively similar, though we still considered our measure using media counts significantly stronger, for several reasons. First, the strengths and concerns in the KLD database are assessed by experts, such that the measure is less likely to reflect the opinion of the general public. Second, news media have been validated as suitable sources of information for assessing environmental legitimacy (e.g., Bansal and Clelland 2004; Barnett and King 2008), whereas the KLD database has not. Third, for our period of analysis, the KLD database provided information only about firms included in the Domini 400 Social Index or the S&P 500; thus, the number of observations

Table 2 Determinants of environmental legitimacy

	OLS (random effects) (1a)	Tobit (random effects) (2a)	OLS (random effects) (1b)	Tobit (Random effects) (2b)
Environmental performance _{<i>t</i>}	0.05 (0.01)	0.06 (0.01)***	0.05 (0.01)***	0.06 (0.01)***
Environmental patents _{<i>t</i>}			0.05 (0.01)**	0.06 (0.01)***
Environmental committee _{<i>t</i>}			0.03 (0.04)	0.02 (0.05)
Environmental pay policies _{<i>t</i>}			0.09 (0.05)*	0.10 (0.05)*
WasteWise program _{<i>t</i>}			0.01 (0.03)	0.01 (0.04)
Environmental trademarks _{<i>t</i>}			0.10 (0.05)*	0.08 (0.04)**
ROA _{<i>t</i>}	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
Firm size _{<i>t</i>}	0.01 (0.01)	0.03 (0.01)	0.01 (0.01)	0.01 (0.01)
Firm age _{<i>t</i>}	0.01 (0.00)*	0.01 (0.00)**	0.01 (0.00)*	0.01 (0.00)*
Emissions per sales _{<i>t</i>}	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
Media visibility _{<i>t</i>}	0.05 (0.01)***	0.05 (0.01)***	0.04 (0.02)*	0.04 (0.02)*
Enforcement actions _{<i>t</i>}	−0.04 (0.02)**	−0.04 (0.02)**	−0.02 (0.01)*	−0.02 (0.01)*
Observations	1478	1478	1478	1478
Left censored		78		78
Right censored		121		121
Chi ²	182.1	187.14	361.3	344.11
R ²	0.13		0.15	

All models include industry (two-digit SIC code), state (by firm's headquarter location), and year fixed effects. Models 1 and 2 include a constant term. Standard errors reported in parentheses for the linear models are clustered by firm. *OLS* ordinary least squares, *ROA* return on assets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

would drop to 385 firm-year observations, leaving the estimated coefficients less precise.

Another possible concern is a potential location bias. *The Wall Street Journal* provides national coverage, but it might cover companies located near its offices more readily. To address this issue, we contacted its publisher, Dow Jones, to obtain information about its global offices and identify the states in which the newspaper maintains news bureaus. Then we created a dummy variable equal to 1 for firms headquartered in those states and 0 otherwise. The results were robust to the inclusion of this control variable.

Our results remained unchanged when we used environmental patent counts instead of citation counts. With simple patent counts (instead of a value-weighted measure), the coefficient of environmental patents lost significance. Thus, not every environmental patent was considered an environmental contribution; only the most influential ones “counted.”

Finally, when we reestimated all the models after lagging all the predictors one year, some coefficients were less precisely estimated, but the results were still consistent with those reported herein and provided significant support for our hypotheses.

Discussion

Implications for Research

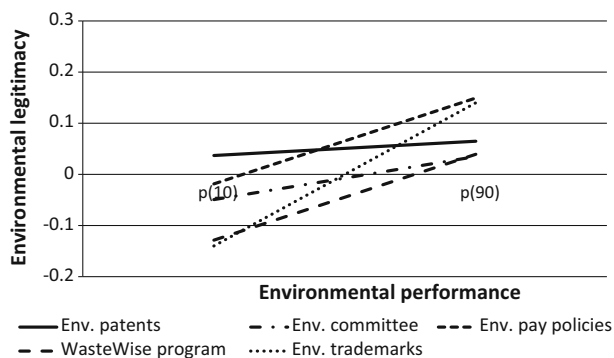
A key assumption in institutional theory is that firms gain legitimacy by complying with stakeholders' requirements. However, it is silent about which environmental actions and policies are more effective for doing so. By combining institutional theory with signaling theory, we undertook a systematic analysis of the heterogeneity across environmental actions and showed that different environmental actions are not equally effective in producing environmental legitimacy. We emphasize two key features of environmental actions that make them stronger signals of environmental quality: visibility and differentiated costs. Environmental patents constitute the strongest signal among the environmental actions we studied; they help firms gain legitimacy, regardless of signaler credibility or the intensity of the normative scrutiny that companies experience. Other environmental actions increase environmental legitimacy when the focal company has strong credibility, but they might harm it in other circumstances. These findings are consistent with recent research that indicates that firms respond to both regulatory and

Table 3 Determinants of environmental legitimacy (moderator: environmental performance)

	OLS (random effects) (1)	Tobit (random effects) (2)
Environmental performance _t	0.03 (0.01)***	0.03 (0.01)***
Environmental patents _t	0.06 (0.02)***	0.08 (0.02)***
Environmental committee _t	0.03 (0.01)	0.05 (0.05)
Environmental pay policies _t	0.12 (0.05)**	0.16 (0.07)**
WasteWise program _t	0.02 (0.03)	0.03 (0.04)
Environmental trademarks _t	0.10 (0.07)	0.05 (0.02)*
Env. patents _t × Env. performance _t	0.01 (0.00)**	0.03 (0.01)**
Env. committee _t × Env. performance _t	0.03 (0.02)*	0.03 (0.01)*
Env. pay policies _t × Env. performance _t	0.06 (0.03)**	0.08 (0.0)**
WasteWise program _t × Env. performance _t	0.06 (0.02)**	0.03 (0.02)*
Env. trademarks _t × Env. performance _t	0.09 (0.04)*	0.07 (0.04)
ROA _t	0.01 (0.01)	0.01 (0.01)
Firm size _t	0.01 (0.01)	0.04 (0.08)
Firm age _t	0.01 (0.01)	0.02 (0.01)**
Emissions per sales _t	0.01 (0.01)	−0.01 (0.01)
Media visibility _t	0.04 (0.02)*	0.04 (0.02)*
Enforcement actions _t	−0.03 (0.01)*	−0.03 (0.01)*
Observations	1478	1478
Left censored		78
Right censored		121
Chi ²	377.14	355.11
R ²	0.22	

All models include industry (two-digit SIC code), state (by firm's headquarter location), and year fixed effects. Models 1 and 2 include a constant term. Standard errors reported in parentheses for the linear models are clustered by firm. *OLS* ordinary least squares, *ROA* return on assets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

**Fig. 1** Marginal effects, ordinary least squares with random effects (moderator: environmental performance)

normative pressures by engaging in more aggressive eco-patenting (Berrone et al. 2013).

This article also contributes to environmental management studies that analyze the phenomenon of greenwashing (Laufer 2003; Ramus and Montiel 2005). Interpreting our results through this lens, we conclude in general that actions that require greater commitment (visibility and

differentiated costs) are more likely to be considered authentic by a broader public. However, we found a positive effect of environmental trademarks (a weak action, by our definition), which might be an artifact of the time span of our analysis. In the late 1990s, the notion of adding green labels and using eco-brands was still relatively new, and few companies had filed environmental trademarks. Thus, environmental trademarks might have provided more visibility to environmentally responsible companies. Additional research could explore whether this effect has completely vanished in recent years, as a consequence of the upsurge of filings of green trademarks, or if that increase has been compensated for by more stringent standards set by the USPTO.

Our research also has important implications for literature on NGOs and social movements in general. Our findings suggest that environmental NGOs help point out and amplify the inconsistency between a firm's environmental claims and its emissions. Stretching further the interpretation, this implies that, in the presence of NGOs, an environmental stance might be difficult to fake, and only genuinely green credentials would lead to the acquisition of environmental legitimacy. This reasoning suggests that the

Table 4 Determinants of environmental legitimacy by level of environmental impact (moderator: environmental NGO)

	Higher environmental performance (high credibility)		Lower environmental performance (low credibility)	
	OLS (random effects) (1.a)	Tobit (random effects) (2.a)	OLS (random effects) (1.b)	Tobit (random effects) (2.b)
Environmental performance _t	0.06 (0.01)***	0.08 (0.02)***	0.05 (0.01)***	0.06 (0.01)***
Environmental NGOs _t	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
Environmental patents _t	0.20 (0.03)***	0.30 (0.04)***	0.18 (0.03)***	0.25 (0.05)***
Environmental committee _t	0.03 (0.17)	0.07 (0.21)	0.03 (0.19)	0.07 (0.22)
Environmental pay policies _t	0.30 (0.14)*	0.25 (0.12)*	0.15 (0.24)	0.16 (0.28)
WasteWise program _t	0.02 (0.10)	0.05 (0.13)	0.07 (0.12)	0.08 (0.13)
Environmental trademarks _t	0.08 (0.23)	1.11 (0.53)*	0.34 (0.23)	0.35 (0.30)
Env. patents _t × Env. NGO _t	−0.04 (0.03)	−0.06 (0.04)	−0.03 (0.01)***	−0.04 (0.02)***
Env. committee _t × Env. NGO _t	0.02 (0.05)	0.02 (0.06)	−0.05 (0.12)	−0.05 (0.06)
Env. pay policies _t × Env. NGO _t	−0.09 (0.08)	−0.07 (0.09)	−0.07 (0.02)**	−0.12 (0.06)*
WasteWise program _t × Env. NGO _t	−0.02 (0.03)	−0.02 (0.04)	−0.04 (0.02)*	−0.05 (0.03)*
Env. trademarks _t × Env. NGO _t	−0.10 (0.08)	−0.10 (0.22)	−0.12 (0.06)*	−0.19 (0.09)**
ROA _t	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
Firm size _t	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.03 (0.07)
Firm age _t	0.01 (0.01)	0.01 (0.01)	0.01 (0.00)*	0.03 (0.01)***
Emissions per sales _t	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	−0.01 (0.01)
Media visibility _t	0.03 (0.02)*	0.04 (0.02)**	0.06 (0.03)*	0.06 (0.03)*
Enforcement actions _t	−0.02 (0.01)*	−0.02 (0.01)*	−0.04 (0.01)**	−0.04 (0.01)**
Observations	709	709	720	720
Left censored		41		35
Right censored		83		38
Chi ²	322.4	298.3	264.1	244.1
R ²	0.32		0.28	

All models include industry (two-digit SIC code), state (by firm's headquarter location), and year fixed effects. Models 1 and 2 include constant terms. Standard errors reported in parentheses for the linear models are clustered by firm. OLS ordinary least squares, ROA return on assets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

activities of environmental NGOs can reduce the incentives for firms to engage in greenwashing. However, we also find no evidence of a positive moderating effect of the number of environment NGOs for firms with good environmental credentials, suggesting that they might not be able to motivate firms to improve further. In this sense, a broader approach that focuses on not just detecting improper behaviors but also amplifying good examples could increase the influence of environmental NGOs and create better incentives for companies' environmental management. This dual role of environmental NGOs is a new insight, and it requires a better understanding of the underlying theoretical mechanisms, which we hope to uncover in future research.

We also enrich legitimacy literature. Legitimacy is a central concept for many studies (Suchman 1995), but its operationalization and empirical analysis have been rather limited (Bansal and Clelland 2004; Deephouse 1996). We use a previously tested measure of legitimacy based on

media accounts, but this article, to the best of our knowledge, is the first to examine environmental actions systematically as determinants of environmental legitimacy. We thus help fill a research gap regarding what firms must do to acquire legitimacy (Zimmerman and Zeitz 2002).

Implications for Practice

More and more organizations are jumping on the green management bandwagon, though in various ways. Some companies use environmental actions and policies to save face and gain approval from their stakeholders, even if their environmental performance is poor. Perhaps the most important message for practitioners is that only genuinely green credentials are effective for acquiring social legitimacy. An environmental stance is difficult to fake, especially if the company functions in an environmentally sensitive sector, and doing so might backfire. Environmental patents are typically costly and difficult to fake, but

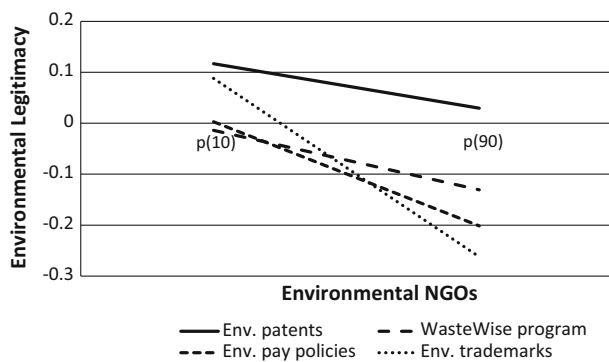


Fig. 2 Marginal effects, ordinary least squares with random effects (moderator: environmental NGO; subsample with low environmental performance). *Notes:* The marginal effect for environmental committee is not reported because the interaction is not statistically significant

the other environmental actions we studied here were not just ineffective for boosting the environmental legitimacy of firms with poor environmental performance but even counterproductive in some cases. If firms have a deteriorated environmental footprint, it may be safer for them to do nothing, rather than pretend to be green.

Companies also should be aware of the role of environmental NGOs, which exert an indirect surveillance on their behaviors and can influence organizational processes and public sentiment. Our results suggest that NGOs are rather effective in confronting and challenging companies for their environmental misdeeds, but they are relatively less capable at praising good environmental actions. Thus, in the presence of stringent NGOs, it may be better to stay quiet and remain outside their radars. This finding might also be of interest to the management of environmental NGOs. By creating policies and devising strategies to support and amplify companies' good environmental conduct, they might increase their role and impact in our society.

Limitations

There are three main limitations in our empirical research, which could be rectified in future work, related to empirical measures, time span, and sample selection.

First, some of the environmental actions we studied can be observed in a direct fashion (e.g., registered trademarks, granted patents), but we measured others indirectly, by using companies' annual proxy statements. In so doing, we followed other scholars and their validated work (e.g., Berrone and Gomez-Mejia 2009). However, proxy statements might not cover environmental endeavors completely or might provide an intentionally distorted account. As a result, for some of the actions, we cannot be fully sure about the extent of decoupling that might take place. Therefore, some of the findings must be taken with due consideration and interpreted as suggestive evidence.

Second, the data availability of some explanatory variables limited our time span (up to 2001). As concerns about the natural environment have increased though, stakeholders in general and environmental NGOs in particular have engaged in closer scrutiny. When the salience of environmental issues changes, some environmental actions might become more or less effective for shaping environmental legitimacy. For instance, one might speculate that greater concerns about the natural environment and the diffusion of more objective measures of companies' environmental footprint might make cosmetic actions, and greenwashing more in general, less effective in shaping environmental legitimacy. In addition, nowadays firms can use a much wider array of environmental actions to signal their environmental quality. In addition to ISO 14001, LEEDs certifications and environmental program training may influence environmental legitimacy. Their effects on environmental legitimacy are likely to depend on the same crucial dimensions we have theorized in our paper. For instance, LEEDs certifications, which are granted by the US Green Building Council, are likely to fall into the category of strong signals. Moreover, having four different levels of certification (standard, silver, gold, platinum), they are a good test-bed for a more granular analysis. More in general, further research should extend the time span and encompass a broader range of environmental actions.

Third, we focused exclusively on large, publicly traded firms, which are more exposed to public scrutiny; smaller companies and private firms may get away with environmental actions that fail to match their environmental claims, even in the presence of monitoring NGOs. New studies should explore the extent to which our conclusions apply to small corporations, private companies, or family firms.

Conclusion

Society's increasing concern regarding the natural ecosystem has pressured companies to make all sorts of efforts in terms of greener practices to "save face" and gain the approval of their stakeholders. Environmental actions, because they help overcome asymmetric information about firms' environmental quality and behavioral intents, can be effective means for firms to achieve social acceptance. However, our results suggest that not all environmental actions are effective to this goal, and some of them might even be detrimental. This is the case for those companies that do not "walk the talk" and resort to greenwashing. Especially in the presence of vigilant environmental NGOs, such cosmetic environmental tactics do not seem to pay off.

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Appendix

Environmental Legitimacy Measure

$$\begin{aligned} \text{Environmental legitimacy}_{it} &= \frac{(p_{it}^2 - p_{it}n_{it})}{T_{it}^2} & \text{if } p_{it} > n_{it} \\ &= \frac{(p_{it}n_{it} - n_{it}^2)}{T_{it}^2} & \text{if } p_{it} < n_{it} \\ &= 0 & \text{if } p_{it} = n_{it} \end{aligned}$$

where p_{it} is the number of legitimating environmental articles about firm i in year t , n_{it} is the number of legitimacy-challenging environmental articles about firm i in year t , and T_{it} is the total number of articles about firm i in year t ($T_t = p_t + n_t$).

Environmental Performance Measure

We obtained a weighted waste score for each facility:

$$ww_{jt} = \sum_k \sum_l E_{klt} \times f_{kl},$$

where E_{klt} is the emissions of chemical l to medium k in year t by facility j , and f_{kl} is the weighting factor corresponding to chemical l emitted to medium k . Next, we predicted waste generation using the reported production ratios:

$$\text{Predicted_waste}_{it+1} = \sum_j ww_{jt} \times PR_{jt+1}.$$

Finally, we computed the difference between actual waste and predicted waste and aggregated the values at the parent firm level to obtain a firm measure of pollution prevention:

$$\begin{aligned} \text{Pollution prevention}_{it+1} &= \sum_j ww_{jt} \times PR_{jt+1} \\ &\quad - \sum_j ww_{jt+1}, \end{aligned}$$

where j are facilities that belong to firm i . If the actual waste level is lower than the predicted level, pollution prevention $_{it+1}$ yields positive values, indicating a reduction of waste generation. Thus, bigger values are associated with better environmental performance.

Environmental Patents Index

$$\begin{aligned} \text{Environmental patents}_{it} &= w_{it} \times \text{Patents}_{it}, \\ \text{with } w_{it} &= \frac{(\text{Citations} \div \text{patents})_{it}}{\sum_{i=1}^{i=N} (\text{Citations} \div \text{patents})_{it}} \times N_t \end{aligned}$$

and where patents_{it} denotes total environmental patents of firm i granted during year t , citations_{it} is all the citations received by the patents granted to firm i during year t , and N_t denotes the total number of firms in the sample for year t .

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