

CORPORATE GOVERNANCE AND ENVIRONMENTAL PERFORMANCE: IS THERE REALLY A LINK?

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Corporate governance scholars are increasingly interested in firms' social and environmental performance. Empirical research in this area, however, has moved forward in an uncoordinated fashion, producing fragmented and contradictory results. Our paper seeks to address this situation by adopting a fact-based research approach that comprehensively explores the link between corporate governance and environmental performance. Specifically, we aim to understand how the relationships between and among the firms' owners, managers, and boards of directors influence environmental performance. We are particularly interested in understanding the interactions among these three key sets of actors. In the end, we offer some observations about governance practices and discuss the implications for theory. Copyright © 2012 John Wiley & Sons, Ltd.

INTRODUCTION

Corporate governance has become one of the most researched topics in the organizational field and a perennial *cause célèbre* among business journalists, scholars, and public policy makers (Daily, Dalton, and Rajagopalan, 2003; Dalton *et al.*, 2007; Hambrick, Werder, and Zajac, 2008). The field of corporate governance addresses a wide variety of topics with financial performance as the focus (for meta-analyses see Dalton *et al.*, 2003; Dalton *et al.*, 1998; Tosi *et al.*, 2000). However, corporate scandals such as the now 'classic' cases of Enron, WorldCom, and Arthur Andersen, and more recent ones involving Wall Street financial institutions like AIG, continue to fuel the debate

over whether firms should include social elements as part of their corporate goals or focus exclusively on maximizing shareholder returns (Margolis and Walsh, 2003). This, in turn, has increased ongoing concerns over how corporations are governed and what governance structures can effectively influence social business behavior. Since the turn of the twenty-first century, corporate governance discussions have shifted progressively toward contemporary social issues (e.g., climate change, labor rights, and corruption) that matter to lawmakers, consumers, shareholders, and corporate managers in the marketplace. Sometimes this has resulted in regulatory changes, increased media attention, and even shifts in customer choices. For instance, while the conversation around this issue tends to ebb and flow with the health of the economy, most agree that the adoption of the Sarbanes-Oxley Act of 2001 signaled a sea change in the public consciousness of corporate governance. The business press echoes this sentiment by reporting, for example, that about 25 percent of Fortune 500 companies have a board committee overseeing the natural

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environment and that the number of investor proposals related to the environment nearly doubled between 2004 and 2008 (Kell and Lacy, 2010). Many corporations on both sides of the Atlantic have also begun to include social responsibility criteria in executive compensation (Lublin, 2008; McNulty, 2010; Williams, 2010).

In the wake of the recent global financial crisis, various not-for-profit organizations have emerged to heighten the crucial importance of identifying governance structures that can accommodate social objectives as part of regular corporate life. For instance, voluntary initiatives such as the OECD Principles, the UN Global Compact, the IFC (World Bank Group), the International Corporate Governance Network, and others encourage firms to integrate social aspects in their governance agenda and recognize that a company's environmental, social, and governance responsibilities are integral to its performance and long-term sustainability (Blesener *et al.*, 2009; Escudero *et al.*, 2010; Mackenzie and Hodgson, 2005; Tonello, 2010; White, 2006). While the common denominator across these initiatives is the call for new approaches to governance, at best they offer little more than a handful of broad guidelines regarding the optimal design of a socially accountable governance structure.

A plausible reason for the lack of clear prescription is that it was not until recently that the academic community began to study the corporate governance-corporate social responsibility dynamic. We summarize selected studies analyzing this link in Table 1.

Despite the progress that has been made in understanding how social issues might influence the governance of corporations (and vice versa), the opportunity exists to explore this dynamic more fully. First, notice that no dominant paradigm exists to inform the research. Rather, various theoretical frameworks have been applied that often differ in their assumptions. Moreover, dominant paradigms in corporate governance research such as agency theory fall short in explaining why and/or how social targets should be included in corporate strategic goals. Second, most studies explore a subset of known corporate governance variables. Yet we know that individual governance mechanisms do not work in isolation but are often interrelated at different levels of analyses (e.g., ownership, board of directors, and managers).

Moreover, fragmented and contradictory empirical evidence makes theory building and advancing the conversation difficult. For instance, Graves and Waddock (1994) find no relationship between institutional ownership and corporate social responsibility (CSR), while other researchers (Johnson and Greening, 1999; Neubaum and Zahra, 2006) identify a strong, positive link. In reviewing several studies on the link between social issues and managerial pay, Berrone and Gomez-Mejia (2008) comment that, although these works demonstrate exemplary effort, much remains to be done. Third, the research makes no distinction between types of CSR even though CSR is a multidimensional construct and companies treat social and environmental issues differently in practice (Bansal and Gao, 2008).

The increasing importance of CSR in corporate governance, the lack of an established theoretical foundation, the equivocality of findings, the need for multilevel analysis, and CSR's multidimensionality indicate that the time is right for us to reexamine this complex and rich organizational phenomenon by returning to its facts (Daft and Lewin, 1990).

Fact-based inquiry is particularly useful when researchers are confronted with an interesting phenomenon that no theory can explain fully or appropriately (Hambrick, 2007). Since empirical inquiry has not yielded significant progress in building theories around corporate governance and CSR, we believe this question deserves clearer and more compelling evidence from a 'facts' perspective before more theory-driven empirical work is done. Hence, we explore the intersection between corporate governance and CSR in a tightly focused manner by considering only the environmental performance dimension within it, so that we can extract new insights from our observation of the patterns in the data. Reporting on the results of the 'stylized facts' will allow future researchers to explain how and why this phenomenon exists (Helfat, 2007; Miller, 2007). In short, we are taking that first step to identify patterns in the data for subsequent theorizing (Hambrick, 2007; Miller 2007) and we do so by adopting the format of a 'just-the-facts' approach. We follow this introduction with a methods section, present our results, and discuss the relevance of our findings to extant theory and empirical facts (Oxley, Rivkin and Ryall, 2010).

Our study contributes to the current literature in several ways. Unlike prior work, our study

Table 1. Overview of corporate governance and CSR studies

Level	Study	Theory	Sample	Independent variables	Dependent variable(s)	CSR measure	Relationship
Ownership	Aguilera <i>et al.</i> (2006)	Corporate governance perspective	4 major newspapers in the United Kingdom and the United States	N/A	N/A	<i>Financial Times</i> , <i>London Times</i> , <i>WSJ</i> and <i>NYT</i>	+/-0
Ownership	Coffey and Fryxell (1991)	CSR perspective	89 Fortune 500 firms	Social issues in management, CSR and corporate social responsiveness	Institutional ownership	CEP Guide	+/-0
Ownership	Graves and Waddock (1994)	Efficient market theory	430 firms from S&P 500	Corporate social performance	Institutional ownership	KLD	+/-0
Ownership	Neubaum and Zahra (2006)	Stakeholder management approach	357 (1995) and 383 (2000) firms from Fortune 500	Investment horizon, investor activism, coordination of activism	Corporate social performance	KLD	+
Ownership, board	David, Bloom, and Hillman (2007)	Disciplining and signaling perspectives	218 publicly traded firms	Institutional ownership, shareholder concentration, board independence, shareholder activism, proponent ownership, shareholder group affiliation, stakeholder issue, shareholder activism	Corporate social performance	KLD	-
Ownership, board, management	Johnson and Greening (1999)	CSR perspective and corporate governance literature (developed their own model)	252 firms listed in KLD and Compustat	Institutional investor type, board independence, and managerial control	People and product quality as dimensions of corporate social performance	KLD	+/-
Ownership, board, management	Schnatterly (2003)	Operational governance	57 firms that committed a crime and their corresponding match-pair sample	CEO duality, board independence, committees, board compensation, director and CEO stock ownership, CEO compensation (all as controls)	White-collar crime	<i>Wall Street Journal</i>	0

Table 1. (Continued)

Level	Study	Theory	Sample	Independent variables	Dependent variable(s)	CSR measure	Relationship
Ownership, management	Berrone <i>et al.</i> (2010)	Socio-emotional wealth perspective	194 U.S. firms required to report their emissions	Family firm, local roots, CEO stock ownership, family CEO, CEO duality, and family ownership	Environmental performance	EPA-TRI	+/-
Board	Brown, Helland, and Smith (2006)	Agency cost approach	207 firms from Fortune 500	Board size, board independence, debt, institutional ownership, and shareholder concentration	Corporate philanthropy	Corporate Giving Directory	+/0
Board	Greening and Gray (1994)	Institutional and resource dependence theories	103 firms from Dun's Business Rankings and from S&P Annual Industry Survey	Media exposure, interest group pressure, crisis severity, size, and top management commitment	Survey	Survey	+
Board	Hillman, Keim, and Luce (2001)	Corporate governance and stakeholder perspectives	3,268 board members representing 250 firms randomly chosen from S&P 500	Stakeholder directors	Board committee as one dimension of issues management structure	KLD	+/-/0
Board	Ibrahim, Howard, and Angelidis (2003)	Atheoretical	307 directors from S&P's Register of Directors, and Executives	Economic, legal, ethical, and discretionary responsibilities as dimensions of CSR	Board independence	Survey	+/0
Board	Kassinis and Vaifeas (2002)	Stakeholder theory and corporate governance literature	362 firms out of which 209 were environmental lawsuit defendant	Board size, director affiliation, director reputation, managerial control, and outside stakeholder pressures	Environmental litigations	EPA	+/-
Board	Luoma and Goodstein (1999)	Stakeholder and institutional theories	224 NYSE-listed firms	Legal environment, industry regulatory environment, and company size	Stakeholder directors as proportion of board and on committees	Proxy statements and annual reports	+/0

Board	Wang and Dewhurst (1992)	Stakeholder theory	2,361 directors in 291 of the largest companies of the Southeast States 469 firms required to report their emissions to the EPA	Director type, director occupation Pollution prevention and end-of-pipe pollution control	Stakeholder orientation CEO pay EPA-TRI	Survey +/-
Board, management	Berrone and Gomez-Mejia (2009a)	Agency and institutional theories	98 Fortune 500 companies	Board composition, board diversity, managerial control	Corporate philanthropy Fraudulent financial reporting	Council on Economic Priorities Pro-Quest Newspapers database +/-
Board, management	Coffey and Wang (1998)	Board diversity and managerial control theses	65 matched pairs of public U.S. firms that either had or had not been discovered misreporting financial results	CEO stock options, board of director stock options, and CEO duality		
Board, management	O'Connor <i>et al.</i> (2006)	Agency theory	394 firms listed on the Domini 400 Index of Socially Responsible (SR) firms in the year 2000–2001 and 394 firms matched on industry and size with non-SR firms	16 structural characteristics of the board of directors including independence, diversity, and CEO duality	SR firms N/A	Domini 400 Index and KLD +/-/0
Board, management	Webb (2004)	Agency theory	Top tier journals	N/A	Literature review	+/-/0
Management	Berrone and Gomez-Mejia (2009b)	N/A				
Management	Coombs and Gilley (2005)	Stakeholder-agency	406 Fortune 1000 firms	Stakeholder management	CEO salary, bonus, long-term and total compensation	-/0

Table 1. (Continued)

Level	Study	Theory	Sample	Independent variables	Dependent variable(s)	CSR measure	Relationship
Management	Deckop, Merriman, and Gupta (2006)	Agency and CSR	313 firms from S&P 500	CEO short-term and long-term pay mix	Corporate social performance	KLD	+/-
Management	Mahoney and Thorne (2005)	Agency theory	77 Canadian firms from the TSE market	Pay mix of stock options in CSR	Strengths and weaknesses in CSR	Canadian Social Investment Database	+/-
Management	McGuire, Dow, and Argneyd (2003)	Stakeholder theory	374 firms from S&P Execucomp database	CEO salary, bonus and long-term compensation	Strengths and weaknesses in CSR	KLD	-/0
Management	Stanwick and Stanwick (2001)	Stakeholder mismatch	186 firms from the Fortune corporate reputation index	Environmental reputation	CEO total compensation and salary	<i>Fortune Magazine</i>	—
Management	Zhang <i>et al.</i> (2008)	Agency and prospect theories	Public companies listed in Compustat's Executive Compensation Database and a U.S. General Accounting Office restatements database	Out-of-the-money options, in-the-money options, CEO stock ownership, firm performance, CEO tenure	Earnings manipulation behavior	Financial Statement Restatement Database released by the U.S. General Accounting Office	—

employs a coherent, theory building approach that examines the three key sets of governance actors—the firm's owners, managers, and directors. In addition, we contribute to the field by analyzing the possible interactions among these actors to explore how they might matter to environmental performance. The latter represents an area of literature that has been largely unexplored in a systematic way. Our work contributes to the literature on corporate governance and nonfinancial outcomes and that of studies on the antecedents of environmental management.

METHODS

'Environmental performance' is the outcome of a firm's strategic activities that manage (or not) its impact on the natural environment (Walls, Phan, and Berrone, 2011). These activities can vary substantially from beyond-compliance proactive approaches that require firms to build specific capabilities and resources to reactive solutions that minimally meet (or fail to meet) regulatory standards (e.g., Hart, 1995). There are several reasons to believe that corporate governance plays a role in environmental performance. First, environmental initiatives require substantial investment and have long-term strategic implications (Hart and Ahuja, 1996). Hence, they can be risky and can have an important impact on the capital structure of the firm and its viability. Second, addressing the natural environment requires extensive coordination at multiple levels of analysis (Roome, 1992) that extends the influence of the firm beyond its organizational boundaries to its supply chain and across stakeholder groups (Hart, 1995; Marcus and Geffen, 1998). Thus, in exploring the corporate governance-environmental performance (CG-EP) link, we investigate four broad research questions:

- (i) *What is the relationship between ownership and corporate environmental performance?*
- (ii) *How does the board of directors affect environmental performance?*
- (iii) *What is the role of managerial incentives for environmental performance?*
- (iv) *How do investor, director, and managerial aspects interact to achieve environmental performance outcomes?*

As our research is exploratory, we rely on Hambrick's (2007) recommendations for the

appropriate fact-based research design. Unlike the qualitative approach to extract insights from narrative data, fact-based analyses employ statistical methods to extract patterns from empirical data to yield insights into the nature of the phenomenon in question. In this study, we aim specifically to conduct a broad appraisal of how corporate governance correlates to environmental performance. We begin by demarcating the scope of this body of research as a critical first step to developing theory. We report on previously undocumented associative patterns with an important outcome variable, using a large and carefully constructed sample that controls for obvious relationships and ultimately reveals an effect that warrants continued theoretical investigation (Hambrick, 2007: 1349). We restricted our study sample to companies for which environmental issues are particularly salient: those that are large and operate in industries with large amounts of effluent (Hart and Ahuja, 1996; Walls *et al.*, 2011). Environmental issues are important to these companies because of the value; such practices can create cost savings (Hart, 1995) and reduce systematic risk through conformance with institutional expectations that gives firms access to resources and insulates them from scrutiny (Bansal and Clelland, 2004).

We selected the study's variables in several ways. First, we restricted our dependent variable to environmental performance. Since CSR is multidimensional, it can be difficult to measure and draw insightful conclusions about associative patterns (Mattingly and Berman, 2006). Therefore, we picked one aspect of CSR, environmental performance, for our study. Environmental practices tend to differ from other social practices since they are technical, require specific firm capabilities and significant capital investment, are guided by regulation, and have their own reporting criteria (Bansal and Gao, 2008). Importantly, proactive beyond-compliance environmental activities (strengths)—such as the development and marketing of green products and services, the use of pollution prevention approaches in production, recycling and the use of alternative fuels—and reactive detrimental environmental practices (concerns)—such as hazardous waste, regulatory problems, chemical and other emissions—are not anchors on a continuum of the same construct. Since these environmental activities represent entirely different constructs (Chatterji, Levine, and Toffel, 2009; Mattingly and Berman, 2006; Strike,

Gao, and Bansal, 2006; Walls *et al.*, 2011), their associative patterns are likely to differ.

Second, we selected independent variables relevant to corporate governance aspects for environmental performance. We relied on prior work in this area to select variables related to ownership, board, and management, as shown in Table 1. In the interest of model parsimony, we focused our choice of governance variables on those studied previously as variables of interest.

Our comprehensive and exploratory approach meant that it was necessary to test the associative relationships in stages. We tested the direct effects for each set of ownership, board, and management governance variables against both types of environmental performance (strengths and concerns). We then tested all (56) possible interaction effects between ownership-board, board-management variables and ownership-management variables against both environmental strengths and environmental concerns.

Sample

Our sample consisted of Standard & Poor's (S&P) 500 firms in the primary and manufacturing industries (two-digit Standard Industrial Classification code below 50). We constructed an unbalanced panel dataset from 1997–2005, collected from multiple sources described below. Observations were deleted if information was missing. Our final sample contained 313 firms (2,002 firm years) in 29 industries.

Environmental performance

The environmental performance measure was constructed using Kinder, Lydenberg, and Domini's (KLD) dataset. Since 1991, KLD has evaluated firms along several categories of environmental strengths or concerns (Chatterji *et al.*, 2009). We summed the values of the items of strengths and concerns to construct two measures of environmental performance, respectively.¹ Typically, prior

¹ While KLD has some limitations, it is appropriate for use in our study since it is specifically gathered for and used by investors, and is, therefore, relevant to a study on corporate governance. KLD data has been used extensively in prior studies on the corporate governance–social performance nexus (see Table 1). The data are relatively objective, are not based solely on firms' self-reported measures and, therefore, are less likely to suffer from social desirability biases. And, of course, our publicly available data can be easily used by others in the years ahead.

studies have combined KLD environmental scores into a single measure (Berman *et al.*, 1999; Waddock and Graves, 1997). However, this is problematic since the combined measure offsets strengths against concerns, which may lead to nonsignificant or spurious results. More importantly, recent research shows that the KLD strengths and concerns measures are theoretically and empirically distinct and represent two independent constructs even though they may correlate with each other (Mattingly and Berman, 2006; Strike *et al.*, 2006). Environmental concerns capture pollution levels fairly well, but environmental strengths do not accurately predict future pollution or compliance violations (Chatterji *et al.*, 2009). Instead, environmental strengths capture underlying strategic capabilities that firms develop to improve their environmental performance (Walls *et al.*, 2011). Therefore, we used the two measures separately to maintain the integrity of both components of environmental performance.

Ownership

We selected ownership variables based on prior studies of corporate governance and CSR: institutional ownership, investment turnover, shareholder activism, and shareholder concentration. The majority of these studies focus on the role of institutional investors. Two studies look at the level of institutional ownership of firms as a dependent variable that is positively associated with CSR strategies (Coffey and Fryxell, 1991; Graves and Waddock, 1994) and another finds no relation to corporate philanthropy (Brown, Helland, and Smith, 2006). We included *institutional ownership* in our work as the percentage of shares held by institutional investors using data from Thomson/Reuters, which collects information from 13-F filings with the U.S. Security and Exchange Commission.

Other studies look at specific types of institutional investors. For example, Neubaum and Zahra (2006) consider institutions' investment horizon in relation to corporate social performance. Several studies capture investment horizon by breaking down the types of investors such as pension funds and insurance funds (Aguilera *et al.*, 2006; Johnson and Greening, 1999). Results suggest that a firm's exposure to investors with long-term horizons is positively associated with CSR. We therefore included *investment turnover* as an inverse

measure of investment horizon, calculated as the annual portfolio turnover of each investment institution, weighted by the shares the institution held in a firm (Gaspar, Massa, and Matos, 2005). These data are from the Thomson/Reuters database.

Several studies consider shareholder activism. For instance, the frequency and the level of coordination of activism positively affect corporate social performance (Neubaum and Zahra, 2006). Yet, another study finds that shareholder proposal activism drives managerial attention away from corporate social performance (David, Bloom, and Hillman, 2007). We included *shareholder activism* in our work, captured by the number of shareholder proxy filings related to environmental issues (David *et al.*, 2007). Data are from RiskMetrics on proxy voting behavior for all types of shareholders including institutional, individual, religious groups, unions, and others. We summed up the total number of resolutions that fell under the topics of 'environment' and 'sustainability reporting.' We counted proxies only if they were brought to an actual vote. Cancelled, withdrawn, or omitted proxies were dropped from our data.

One study considers the relationship between institutional shareholder concentration and corporate philanthropy (Brown *et al.*, 2006). Although this research did not find a relationship, we include concentrated ownership in our study since it was previously studied as a variable of interest. Using data from Thomson/Reuters, we included *shareholder concentration* as the percentages of shares held by a firm's top five institutional investors (Demsetz and Lehn, 1985).

Board of directors

Many studies on corporate governance and CSR have considered the role of the board in the form of independence, orientation, diversity, and size. Studies on board independence show mixed results. For instance, outside directors are positively associated with the people and product aspects of corporate social performance (Johnson and Greening, 1999), socially responsible behavior of firms (Webb, 2004), and discretionary dimensions of CSR (Ibrahim, Howard and Angelidis, 2003), and negatively related to environmental litigations (Kassinis and Vafeas, 2002). However, other studies find no relationship between outside directors and corporate philanthropy (Brown *et al.*,

2006; Coffey and Wang, 1998), legal and ethical dimensions of CSR (Ibrahim *et al.*, 2003), and environmental violations (McKendall, Sánchez, and Sicilian, 1999). In addition, Wang and Dewhurst (1992) find that outside directors view some stakeholder groups differently than do inside directors. We included *board independence* as the number of outside directors over total directors (Daily and Dalton, 1994), using data from RiskMetrics.

The use of board orientation toward CSR issues has also been investigated with mixed results. For instance, no association exists between the use of environmental committees and environmental violations (McKendall *et al.*, 1999) although some work suggests committees can encourage extra vigilance (Kassinis and Vafeas, 2002). Berrone and Gomez-Mejia (2009a) find that environmental governance, captured in part through environmental committees, does not influence the relationship between environmental performance and chief executive officer (CEO) pay. In other work, no overall association is present between directors with a stakeholder orientation and corporate social performance (Hillman, Keim, and Luce, 2001). A number of studies find positive associations between interest group pressure and an issue management oriented board committee (Greening and Gray, 1994), or legal pressure and a stakeholder oriented board committee (Luoma and Goodstein, 1999). We included board orientation toward environmental performance in our model captured by dedicated board committees for environmental and social issues. Our measure of *environmental committee* is a dummy variable created via a content analysis of DEF 14-A proxy statements (Berrone and Gomez-Mejia, 2009a).

Another aspect of board structure often investigated for corporate social performance is diversity. Specifically, many studies have considered the impact of the proportion of female directors on boards. Most of these studies identify a positive association between proportion of women directors and socially responsible firms (Webb, 2004) and corporate social performance (Coffey and Fryxell, 1991; Stanwick and Stanwick, 1998). Female directors additionally have a positive impact on firm reputation, after being mediated by CSR (Bear, Rahman, and Post, 2010). On the other hand, no association between women directors and corporate philanthropy has been found (Coffey and Wang, 1998). Other measures of board diversity

have not been extensively investigated, with the exception of directors' diversity in experience, expertise, and demography (Bear *et al.*, 2010). Following this prior work, we included *board diversity* as measured by the proportion of women on the board. These data are derived from the RiskMetrics database.

Two studies have considered the effect of board size and found contradictory results: board size is positively associated with environmental litigation (Kassinis and Vafeas, 2002) but also positively associated with corporate philanthropy (Brown *et al.*, 2006). We included *board size* in our model as the total number of board directors using RiskMetrics data.

Management

Studies on management and CSR have looked at CEO duality, managerial control, and CEO pay. CEO duality, that is, when the CEO is also the chairperson of the board, is a common governance structure studied in the context of CSR, but findings in this area have been mixed. Wang and Dewhurst (1992) find that CEO/chairpersons view stakeholders differently from their non-director peers. Webb (2004) finds that CEO duality is negatively associated with socially responsible firms, while McKendall *et al.* (1999) report no relationship between CEO duality and environmental violations. Likewise, Berrone *et al.* (2010) discern no association between CEO duality and environmental performance. Another case reports CEO duality as a weak and positive moderator in the relationship between CEO stock option plans and fraudulent reporting (O'Connor *et al.*, 2006). We included *CEO duality* in our study measured as a dummy variable when the CEO was also the chairperson of the board using ExecuComp data.

Managerial control is a second aspect often researched for CSR. Mostly, studies find positive associations between the level of managerial control and CSR. For example, the percentage of shares held by the top management team is positively associated with product quality management (Johnson and Greening, 1999). Similarly, the percent of shares held by inside directors is positively associated with corporate philanthropy, although the ratio of managerial control (i.e., shares held by outside directors over shares held by inside directors) is insignificant

(Coffey and Wang, 1998). In studies on CEO stock ownership, results vary from a negative relationship with environmental performance in non-family firms (Berrone *et al.*, 2010), to a negative relationship with manipulation of earnings results (Zhang *et al.*, 2008), or no association with CSR (McGuire, Dow, and Argheyd, 2003). We included *managerial control* in our model as the percentage of shares held by inside directors using data from ExecuComp.

Another management aspect of governance often considered for CSR is that of CEO compensation. In some studies, reputation (Stanwick and Stanwick, 2001) and stakeholder management performance (Coombs and Gilley, 2005) are not associated with total compensation. However, when CEO compensation is broken down into its components, studies find meaningful relationships. Salary, for example, is negatively associated with reputation (Stanwick and Stanwick, 2001), as well as community, diversity, environmental, and product performance (Coombs and Gilley, 2005). Another study demonstrates a positive relationship between salary and poor social performance, but shows no effect on good social performance (McGuire *et al.*, 2003). Short-term pay incentives in the form of bonuses show mixed results. The proportion of bonus over all compensation is negatively associated with corporate social performance (Deckop, Merriman and Gupta, 2006). Bonuses are also negatively associated with employee dimensions of CSR (Coombs and Gilley, 2005), but they do not seem to affect either poor or good social performance (McGuire *et al.*, 2003).

Finally, long-term CEO compensation incentives show a range of results. Long-term pay incentives such as stock options are positively associated with poor social performance but have no relationship to good social performance (McGuire *et al.*, 2003). Another study finds no association between stock options and any CSR dimensions (Coombs and Gilley, 2005). Yet other studies report that long-term CEO pay is positively associated with corporate social performance (Deckop *et al.*, 2006; Mahoney and Thorne, 2005) and negatively with fraudulent reporting (O'Connor *et al.*, 2006). One study, which separates stock options into those with non-positive values and those 'in-the-money,' shows a positive association between 'out-of-the-money' CEO stock options and earnings manipulation behaviors (Zhang *et al.*, 2008). Based on

this prior body of research, we included three aspects of CEO compensation in our model using ExecuComp data: *CEO salary*, *CEO bonus* as a measure of short-term pay incentives, and *CEO stock options* (using Black-Scholes valuation) to capture long-term pay incentives.

Control variables

We included a number of control variables based on prior research conducted on environmental performance using Compustat data (King and Lenox 2002; McWilliams and Siegel, 2000). We measured *firm performance* as the firm's return on assets, *firm size* as a log of total assets, *sales growth* as the change in sales over the previous year, *leverage* as total debt over total assets, *capital intensity* as capital expenditure over sales, *R&D intensity* as research and development (R&D) expenditure over sales, and *advertising intensity* as advertising expenditure over sales.² In addition, we included year dummies and industry dummies to account for these effects.

Estimation techniques

Since our two dependent variables were count data without overdispersion, Poisson regression would normally be used (Cameron and Trivedi, 1998). However, part of our goal was to explore interaction effects between the different governance variables. Since interaction effects are complicated to compute and interpret in nonlinear models because both the sign and significance of the effect can differ across individual observations (Hoetker, 2007; Huang and Shields, 2000), we opted to transform our dependent variable by taking a square root (Cameron and Trivedi, 1998) so that we could use random effects least square regression techniques for panel data. We plotted and interpreted interaction effects at one standard deviation from the mean (Aiken and West, 1991). We conducted several robustness checks with different transformations of the dependent variable; results were consistent across all models.

² Due to missing data in R&D expenditure and advertising expenditure, we imputed zero values if data were missing, since these expenditures are typically only reported if they are substantial. We conducted a robustness check by including a dummy for imputed values to ensure that these did not affect the results.

RESULTS

Descriptive statistics

The number of firms captured in each of the eight years of our study ranged from 119 (in 1997) to 298 (in 2003). On average, a firm's panel lasted 6.4 years. Some 64.3 percent of firms were captured in five industries: food, chemicals, machinery, electronics and instruments, and electric/gas/sanitary services. Environmental strengths outcomes ranged from zero to four, evenly distributed across all years with the exception that performance was generally higher in 2004 and 2005. Firms reporting at least one environmental strength constituted 25.7 percent of the sample, while firms in 12 out of 29 industries had no environmental strengths at all. The highest count of environmental strengths occurred in the chemical industry. Other industries in which environmental strengths scored higher included furniture, paper/pulp, transportation equipment, and instruments manufacturing.

Environmental concerns outcomes ranged from zero to six, evenly distributed across all years with 36.8 percent of firms having at least one environmental concern. Some industries had no firms with environmental concerns at all: non-metallic mining, tobacco products, leather products, stone/clay/glass products, motor freight transportation/warehousing, and air transportation. While this may seem surprising, the number of S&P 500 firms captured by these industries was very low. The highest proportion of environmental concerns was in the petroleum refining industry. Other industries with relatively high levels of environment concerns included chemicals, oil and gas extraction, paper/pulp, primary metals, transportation equipment manufacturers, and gas/electric/sanitary services.

Correlations are shown in Table 2. Firm size and environmental board committees correlated moderately with environmental concerns; board size and CEO salary correlated moderately with firm size; and finally, shareholder concentration correlated moderately with institutional ownership.

Direct effects

We ran the models testing the direct effects of the governance variables on environmental strengths and environmental concerns, separately, in stages.

Table 2. Correlations

	mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Env't strengths	0.27	0.48																					
2. Env't concerns	0.50	0.69	0.28																				
3. Firm perf	0.05	0.13	0.02	-0.03																			
4. Firm size	8.76	1.17	0.33	0.53	-0.01																		
5. Sales growth	0.11	0.33	0.03	0.15	-0.01																		
6. Leverage	0.44	0.16	0.11	0.21	-0.05																		
7. Cap intensity	0.88	0.12	0.05	0.10	-0.07																		
8. R&D intensity	0.05	0.12	0.08	-0.21	-0.34	-0.17	-0.01																
9. Advg. SH concentr	0.24	0.08	-0.09	-0.05	-0.17	0.15	0.04	-0.25	-0.05														
10. Instl. owner	0.66	0.15	-0.01	-0.09	0.11	-0.19	0.06	-0.03	-0.02														
14. Independence	0.70	0.16	0.13	0.04	-0.05	-0.12	0.11	0.23	0.11	-0.03	-0.03	-0.02											
15. Env't com'tee	0.21	0.40	0.25	0.43	-0.03	0.25	-0.04	0.11	0.12	0.11	0.11	0.12	-0.08										
16. Diversity	0.12	0.69	0.08	0.03	0.11	0.10	0.11	0.12	0.11	0.11	0.12	0.12	0.12	-0.53									
17. Board size	10.55	2.48	0.18	0.31	0.11	0.11	0.11	0.12	0.11	0.11	0.12	0.12	0.12	-0.02									
18. CEO duality	0.17	0.38	-0.08	0.04	0.06	0.08	0.03	0.03	0.02	0.02	0.02	0.02	0.02	-0.07									
19. Mar. control	0.01	0.07	0.04	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-0.07									
20. CEO bonus	0.01	0.17	0.06	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-0.07									
21. CEO salary	0.89	0.38	0.14	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	-0.07									
22. CEO options	0.05	0.15	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	-0.05									

We began by including only the control variables, followed by a model for each set of governance variables (shareholder, board, manager), and finally a full model including all the variables.

In the regressions for environmental strengths (Table 3), firm size, leverage, and capital intensity

were positively associated with the outcome. In addition, all year dummies and the food, printing/publishing, railroad transport, air transport, and communications industries were statistically significant. Regressions for environmental concerns (Table 4) showed a positive association with firm

Table 3. Environmental strengths—main effects models

	Controls	Ownership	Board	Manager	All
Firm performance (s.e.)	-0.015 (0.064)	-0.018 (0.064)	-0.011 (0.064)	-0.012 (0.064)	-0.010 (0.064)
Firm size	0.101** (0.017)	0.098** (0.017)	0.094** (0.018)	0.102** (0.018)	0.093** (0.019)
Sales growth	-0.004 (0.021)	-0.008 (0.021)	-0.001 (0.021)	-0.001 (0.021)	-0.004 (0.021)
Leverage	0.167* (0.077)	0.185* (0.078)	0.165* (0.077)	0.156* (0.077)	0.178* (0.078)
Cap intensity	0.281* (0.140)	0.269† (0.140)	0.308* (0.140)	0.289* (0.140)	0.301* (0.141)
R&D intensity	-0.097 (0.097)	-0.103 (0.098)	-0.091 (0.097)	-0.096 (0.097)	-0.096 (0.098)
Advg intensity	0.784 (0.564)	0.782 (0.565)	0.854 (0.560)	0.794 (0.566)	0.852 (0.563)
Industry dummies	incl	incl	incl	incl	incl
Year dummies	incl	incl	incl	incl	incl
Instl ownership		0.104 (0.119)			0.107 (0.119)
Inv turnover		-0.083 (0.164)			-0.078 (0.165)
SH activism		-0.031† (0.018)			-0.030 (0.018)
SH concentration		-0.291† (0.161)			-0.315† (0.162)
Independence			0.082 (0.069)		0.058 (0.071)
Envntal committee			0.067** (0.025)		0.068** (0.025)
Diversity			-0.029 (0.136)		-0.017 (0.136)
Board size			0.003 (0.005)		0.003 (0.005)
CEO duality				0.022 (0.024)	0.022 (0.024)
Mgr control				0.023 (0.268)	0.061 (0.271)
CEO bonus				-0.691 (0.456)	-0.623 (0.458)
CEO salary				0.012 (0.034)	0.009 (0.034)
CEO options				-0.056 (0.043)	-0.055 (0.043)
Constant	-0.456* (0.183)	-0.411* (0.196)	-0.517** (0.186)	-0.476* (0.185)	-0.475* (0.202)
Overall R-square	21.9%	21.8%	23.4%	21.6%	23.3%

n = 2,002 p-values: † p<0.10, * p<0.05, ** p<0.01.

Table 4. Environmental concerns—main effects models

	Controls	Owners	Board	Managers	All
Firm performance	-0.064	-0.069	-0.058	-0.071	-0.069
(s.e.)	(0.071)	(0.071)	(0.071)	(0.071)	(0.071)
Firm size	0.177**	0.170**	0.159**	0.162**	0.139**
(0.020)	(0.020)	(0.020)	(0.020)	(0.021)	(0.021)
Sales growth	-0.039†	-0.039†	-0.035	-0.036	-0.031
(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
Leverage	0.202*	0.226**	0.212*	0.194*	0.227**
(0.086)	(0.087)	(0.086)	(0.086)	(0.086)	(0.087)
Cap intensity	-0.436**	-0.448**	-0.403**	-0.418**	-0.396*
(0.157)	(0.158)	(0.156)	(0.158)	(0.158)	(0.156)
R&D intensity	-0.064	-0.065	-0.052	-0.055	-0.042
(0.109)	(0.109)	(0.108)	(0.109)	(0.109)	(0.108)
Advg intensity	-0.655	-0.699	-0.653	-0.637	-0.677
(0.646)	(0.644)	(0.628)	(0.649)	(0.630)	
Industry dummies	incl	incl	incl	incl	incl
Year dummies	incl	incl	incl	incl	incl
Instl ownership		0.012			0.007
		(0.133)			(0.133)
Invt turnover		0.027			0.019
		(0.182)			(0.183)
SH activism		0.037†			0.037†
		(0.021)			(0.020)
SH concentration		-0.184			-0.142
		(0.180)			(0.180)
Independence			0.154*		0.148†
			(0.077)		(0.079)
Envtal committee			0.143**		0.144**
			(0.028)		(0.028)
Diversity			-0.264†		-0.276†
			(0.151)		(0.152)
Board size			0.013*		0.012*
			(0.005)		(0.005)
CEO duality				-0.022	-0.024
				(0.027)	(0.027)
Mgr control				-0.156	-0.082
				(0.303)	(0.302)
CEO bonus				-0.120	-0.017
				(0.504)	(0.507)
CEO salary				0.096*	0.091*
				(0.038)	(0.038)
CEO options				-0.008	-0.003
				(0.048)	(0.048)
Constant	-0.520*	-0.436†	-0.635**	-0.459*	-0.496*
	(0.213)	(0.225)	(0.210)	(0.216)	(0.226)
Overall R-square	49.5%	49.6%	53.1%	49.7%	53.4%

n = 2,002 p-values: † p<0.10, * p<0.05, ** p<0.01.

size and leverage and a negative association with capital intensity. In the environmental concerns models, only four of the year dummies were statistically significant. However, the majority of industries were significantly associated with environmental concerns, indicating the importance of

industry effects on this kind of environmental performance.

Shareholder activism and shareholder concentration were weakly and negatively associated with environmental strengths, whereas environmental committee was positively associated. No

significant direct effects were present for managerial governance variables. The biggest contribution to environmental strengths came from the board-related variables, which increased overall variance explained (R^2) from 21.9 percent for the controls model to 23.4 percent.

In the environmental concerns models, shareholder activism was weakly and positively associated. All board variables were statistically significant: board independence, environmental committee, and board size were positively associated with environmental concerns, while board diversity was weakly and negatively associated. Of the managerial governance variables, only CEO salary was positively associated with environmental concerns. Variance explained increased the most for the model containing board variables from a base of 49.5 percent to 53.1 percent.

Interaction effects

We next ran 112 different models to test the interaction effects between the three sets of governance variables against the environmental strengths and environmental concerns outcomes. We tested the interactions of each ownership variable with each of the board variable, and similarly tested ownership-management and board-management interactions (Appendix 1).³ We tested interactions in the partial and full models and results were robust across all models.

Ownership-board interactions. There were two significant ownership-board interactions for the environmental strengths models. Environmental performance was best when investors were patient (low turnover) and the board seated more outsiders. In general, environmental performance was also better when investor activism was low. When investor activism was high and boards were small, firms performed less well environmentally.

The environmental concerns models reported four significant ownership-board interactions. In general, environmental performance was worse when fewer women sat on boards. When more women sat on boards there were fewer environmental concerns, especially when the level of shareholder concentration and institutional ownership were high. Similarly, a more independent

board was generally worse for environmental performance. When boards were less independent, in combination with longer investment horizons (low turnover) of shareholders, there were fewer environmental concerns. Likewise, less board independence and highly active shareholders were related to fewer environmental concerns.

Ownership-management interactions. There were five significant ownership-management interactions for the environmental strengths models. Environmental performance was best when institutional ownership was high with high CEO salary or with low CEO stock options. Environmental performance was also better when shareholder activism was high and CEO duality was present. In contrast, environmental performance was least strong when activism was high and CEO bonus was high. Lastly, environmental performance was better when the concentration of investors was low, but least strong when both investor concentration and managerial control were high.

Two significant interactions were found for the environmental concerns models. Environmental performance suffered when CEO duality was combined with high levels of institutional ownership. The interaction of CEO duality with low shareholder concentration had the fewest environmental concerns.

Board-management interactions. There were six significant interaction effects between board and management governance variables for the environmental strengths model. The interaction plots indicated that environmental performance was strongest when boards were less independent and the CEO was also the chairperson of the board. In contrast, high board independence resulted in strong environmental performance when combined with high bonus or high salary. High bonus also resulted in the best environmental performance in the presence of a more diverse board and a larger board. Equally, a larger board in combination with high salary showed stronger environmental performance.

In addition, three significant interaction effects between board and managerial variables were found in the environmental concerns model. Environmental performance had the most concerns when CEO salary was high, particularly if the board was large. Environmental performance also had the most concerns when CEOs duality was absent and the board was highly independent or very large. Moreover, environmental performance

³ In the interest of space and readability, only significant interaction results are displayed in Appendix 1 (Tables A-C for environmental strengths and Tables D-F for environmental concerns).

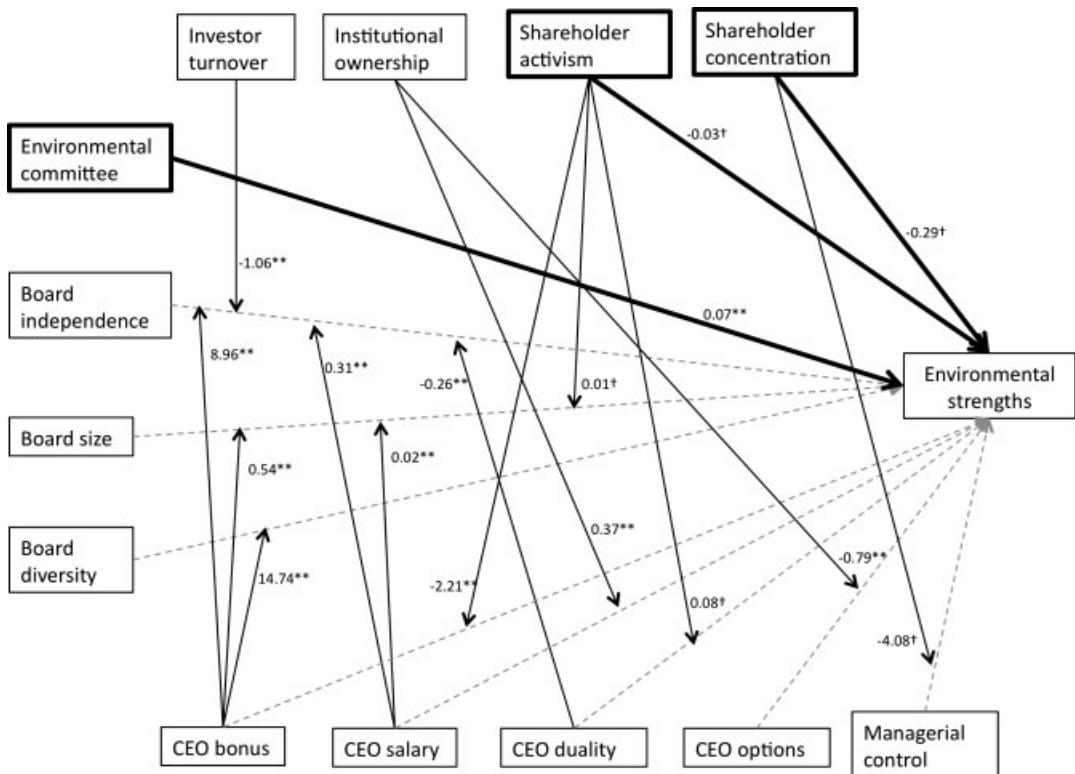


Figure 1. Diagram of direct and interaction effects between corporate governance and environmental strengths

suffered when CEO duality existed in combination with low board independence or small boards.

Result summary

In sum, this fact-based research uncovered many significant associations between corporate governance and environmental performance, but many in directions not predicted by extant theories used in past research. We also found interactions among the corporate governance variables that characterize the phenomenon in finer grained ways not detected in past studies. Figures 1 and 2 provide an overview of the results and show that all three aspects of governance play a role in environmental performance. In general, ownership aspects of governance are very relevant for environmental strengths, whereas board aspects are important for environmental concerns. In addition, interactions between ownership-board are pertinent for environment concerns, while ownership-management and board-management interactions are critical for environmental strengths. In sum, our fact-based approach to these research questions reveals a

plethora of results as seen in Figures 1 and 2. In order to make better sense of them, we now step back from the specific findings to discuss them in relation to each other and more generally, what they say about the extant theory in the literature.

DISCUSSION

Our work explored the relationship between three domains of corporate governance—ownership, boards, and management—and their respective interactions to environmental performance. We adopted a fact-based research perspective (Hambrick, 2007) in order to resolve contradictory findings and seemingly incompatible theoretical positions proffered in prior work. In essence, our work is a first step toward building a theory of the CG-EP link that takes a holistic view of corporate governance and considers the interactions among the different governance actors. We hope that our results will stimulate others to examine the governance of firms' social and environmental practices more closely.

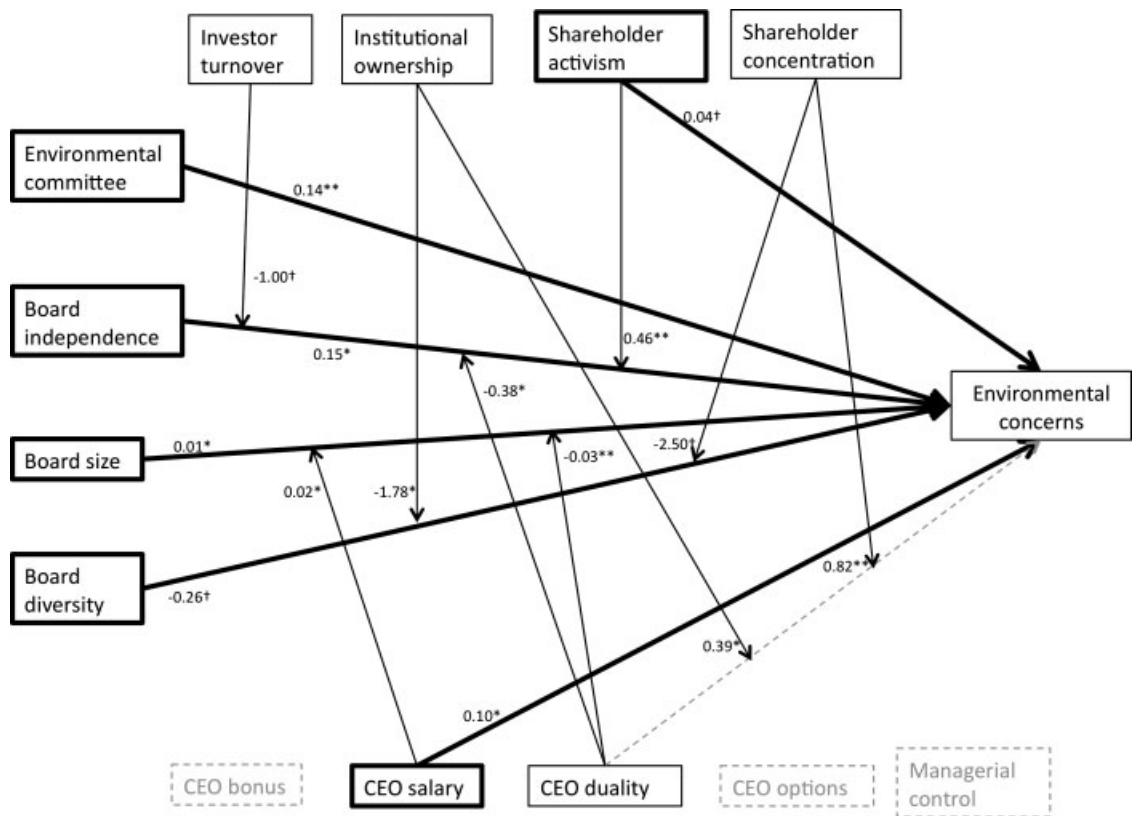


Figure 2. Diagram of direct and interaction effects between corporate governance and environmental concern

At the outset of this paper, we posed four research questions that can be analyzed now in light of our evidence. Our broad query was: what is the relationship between ownership and corporate environmental performance? In line with previous research, all three aspects of corporate governance were relevant to both environmental strengths and environmental concerns outcomes. However, because our holistic approach explored direct and interaction effects, we have made some new discoveries. For instance, among ownership dynamics, we found that only shareholder activism and concentration have a direct impact on environmental performance. When environmental performance is poor, firms can expect investor activism to be rife, possibly because poor environmental performance can be detrimental to firms in the form of violations, fines, remediation costs, and exposure to risk. At the same time, firms with concentrated ownership have less freedom to pursue above and beyond compliance environmental activities, possibly because they may be seen to incur unnecessary costs.

We also found that all previously studied board constructs are relevant for environmental performance and these added the most explanatory power to our models (research question ii). The role of the board seems largely relevant to environmental concerns. When boards were more independent, larger, and less diverse, environmental performance suffered. A board's ability to monitor environmental performance seems to deteriorate under these conditions, and smaller and more diverse boards can mitigate detrimental environmental performance more effectively. While independent boards are typically favorable for financial performance, this is not the case for environmental performance. This finding hints at the orthogonal role of boards when it comes to monitoring financial versus environmental performance. It shows that there is no magical set of governance arrangements for firm management. For instance, while the Sarbanes Oxley Act has pushed for a reduction of insider directors in an effort to increase governance independence to improve financial performance, it has simultaneously led to the decimation

of expertise, experience and reputation insiders provide (Dalton *et al.*, 2007)—a critical element to firm environmental performance outcomes.

Curiously, environmental board committees were positively associated with both environmental strengths and environmental concerns. A *post hoc* test confirmed that environmental committees were only likely to be present when firms had either environmental strengths or concerns, but not when these outcomes were absent. Environmental committees seem to have a dual purpose: while they can support firms' environmental strengths by providing expertise and resources via board members, they can also help a firm to mitigate environmental problems such as litigation by placing emphasis on environmental issues at the board level.

In contrast to prior work, we find only one direct association between managerial incentives and environmental performance (research question iii). Firms with higher CEO salaries generally do less well environmentally. Perhaps CEOs emphasize shorter-term goals such as financial performance to the detriment of environmental ones, hinting at tensions that may be experienced by CEOs who have to make trade-offs between these two organizational outcomes. This is consistent with a large number of studies that suggest that when the fixed component of compensation (i.e., salary) is large, managerial behaviors tend to be conservative and CEOs avoid risky decisions, favoring the *status quo*.

Many of our findings pertain to our fourth research question: the interactions between the three domains of governance for environmental performance. Our results suggest that much of the CG-EP interface rests on the interplay of various governance structures as we find evidence of interaction effects among all three combinations of governance mechanisms. Many of these interactions have not been studied in-depth and while we draw some overarching interpretations of our findings here, they deserve closer attention in future research. The one construct not significant in any interactions is the environmental board committee, which seems to affect environmental performance only directly.

Some interactions are the same for both environmental strengths and environmental concerns: investment turnover and board independence (negative), CEO duality and board independence (negative), and board size and CEO salary (positive). Interpreting the first interaction presents challenges

because it suggests that the combination of long-term investors with an independent board is both good and bad for environmental performance. The second interaction appears similarly problematic, but when plotted, these effects look differently for environmental strengths versus environmental concerns. The level of environmental strengths is highest when CEO duality is combined with more insider directors. In contrast, when CEO duality is absent and the board has more outsiders, environmental performance suffers. It seems that a more powerful CEO (in the form of duality) is able to emphasize environmental goals when the board consists of insiders, but not when a board is independent. This interesting finding suggests that powerful CEOs may be important for environmental outcomes, and that the vision of such CEOs can be fostered by boards consisting of supportive inside directors. Indeed, since environmental activities can be highly technical and industry-specific, insider board members may possess relevant expertise to support the CEO in this context.

The third interaction effect yields similarly nuanced relationships. In the case of environmental strengths, board size and CEO salary show that better environmental performance is due to a small board-low salary or a large board-high salary combination. Whereas for environmental concerns, a high salary is much more detrimental to environmental performance than a low salary; the effect is simply more pronounced when combined with larger boards.

The remaining 16 significant interaction effects involved different combinations of governance constructs for environmental strengths versus environmental concerns. This highlights the importance of modeling the two types of environmental outcomes separately since only four out of 31 significant effects (and 138 total effects evaluated) are similar for both outcomes. In short, corporate governance mechanisms work differently for firms that aim to outperform environmentally by engaging in activities that are above and beyond basic environmental regulatory requirements than for those who fail to meet such standards or only aim to minimally satisfy regulatory demands.

Limitations

We recognize that our work has some limitations. Since we limited our analyses to environmental performance, we cannot extrapolate these findings

to CSR more broadly. Similarly, our sample is restricted to 'large' and 'dirty' industry firms publicly listed in the United States. Having said this, we acknowledge that larger firms are more visible and may, therefore, be more likely to score higher on both 'good' and 'bad' environmental performance outcomes and have their governance structures scrutinized. The CG-EP link may be different for small and medium sized enterprises, firms in service industries, or those operating in other nations under different governance and environmental regimes. Additionally, we relied on archival measures to conduct this exploratory research. To investigate deeper questions about the governance relationships to environmental performance, it will be necessary to identify and measure the underlying mechanisms in the form of socio-logical and behavioral measures through surveys, case studies, and other means of investigation. Finally, since our analysis was run contemporaneously, we did not use lagged effects because some governance aspects, such as investor activism, are relevant only to environmental performance in the concurrent year.⁴ Thus, while our fact-based research methodology employed rigorous estimation techniques to identify interesting patterns, it could not clearly delineate the temporal order of the variables (Hambrick, 2007). Testing temporal order is an aspect that remains open to future researchers.

Future research needs

Some general conclusions from our study lay the path for future empirical work. First, the literature generally assumes that long-term investors will push firms to behave better environmentally (e.g. Berrone *et al.*, 2010). We find that a long-term horizon may be necessary but is not sufficient. Patient capital seems to work better when coupled with outside board members, suggesting that

investors who are willing to wait for the benefits of good environmental performance need an independent monitoring mechanism. In addition, the presence of institutional ownership does not generally drive 'good' environmental outputs. Only in the presence of specific types of CEO pay did institutional ownership prove to be important. Our results suggest institutional ownership is related to poor environmental performance, which may be explained by the different objectives of different types of investment institutions. While investors can be vocal through activism, such activity seems to be present more when firms perform poorly and appears most efficient when boards are dominated by insiders. Thus, our work suggests that the roles of investment horizon and investor activism are more complex than previously thought.

A second area of future research relates to the vital role boards play in a firm's environmental performance. But again, the mechanisms seem complex. The generalized idea of independent boards as a 'best practice' to help performance might not hold for environmental outcomes, especially when activism is present. And, while diversity within boards may not be useful to build environmental strengths, it seems to alleviate environmental concerns when institutional ownership is high or concentrated in a few hands. Diversity can be an important factor to enhance non-financial outcomes such as innovation, but only if women can achieve critical mass on the board rather than having one (token) woman (Torchia, Calabro, and Huse, 2011). In our study, the mean number of women on the board was one. Future research could determine whether having at least three women on the board matters for building environmental strengths. Finally, environmental board committees appear to operate in isolation for environmental outcomes, but do not seem to interact with other governance mechanisms. This result invites reflection on the usefulness of such committees.

Similarly, incentive alignments and reward schemes interact with other governance factors, amplifying or muting environmental performance, which could explain why prior research has reported inconsistent results (Berrone and Gomez-Mejia, 2009b). One question still unanswered is what powerful CEOs do about environmental issues. Our work suggests powerful CEOs are needed to build environmental strengths, and that powerful CEOs are particularly relevant in the

⁴ We confirmed this in *post hoc* analyses using a one year time lag. Results were the same for direct effects models, except that shareholder constructs were not statistically significant. Many of the interaction effects were also similar; some differences were that board committees interacted significantly with managerial constructs for environmental strengths, and shareholder activism did not show any significant interaction effects. Thus, temporal effects, such as the positive association of *environmental committees* with both strengths and concerns when lags are included, need deeper investigation. It could be that firms have different reasons for implementing such committees: on the one hand to mitigate litigation, and on the other to build resources.

presence of investor activism and insider boards. This contradicts the idea that the function of CEO and chairperson should be separated. However, in some cases CEO duality was detrimental for environmental performance, such as in the presence of institutional ownership. The role of the CEO appears integral to understanding the CG-EP link and is an important future avenue of research.

Although our work is still several steps removed from developing a *theory* of corporate governance for environmental performance, the findings in this study nevertheless can serve to stimulate future theoretical development. Not surprisingly, we found that the board of directors plays an important part in environmental outcomes. Traditional agency perspectives consider the board a mechanism to protect shareholders' interests. However, our work also provides some evidence that the shareholder-primacy model of corporate governance could be challenged, especially in the context of the natural environment where the board acts as a mediating body that balances and manages conflicting stakeholder interests (Lan and Heracleous, 2010). For example, the board, even at the expense of the shareholders, may sometimes have to accord priority to the public interests represented by legislators and community pressure groups.

A stakeholder theory lens may be useful in that respect (Freeman, 1984). In particular, the relationship of the firm with its stakeholders, society, and the natural environment is a responsibility that lies with top executives and is facilitated via access to resources (Freeman, 1984; Walsh, 2005), often bestowed by the board of directors. As a theory of accountability and a relational view of the firm, stakeholder theory can help firms to prioritize corporate governance issues related to the natural environment by determining how much of the firm's resources should be allocated and to whom it has obligations (Parmar *et al.*, 2010). In addition, such a view could determine how and when firms aim to avoid environmental violations and fines or invest in clean technologies or green product design. In this way, a stakeholder view of corporate governance could investigate the very real and inseparable tensions between a firm's financial and social demands (Parmar *et al.*, 2010) hinted at in our findings.

Other theoretical frameworks may be needed to fully explain the CG-EP link; theories of social psychology and coalitions, institutional theory and

network analysis, and stewardship theories can supplement stakeholder views of corporate governance. Calls already exist for such 'new directions' in studies of corporate governance and financial performance outcomes (e.g., Hambrick *et al.*, 2008). Our study adds a finer point that such approaches are even more relevant for environmental performance. Here, issues such as the behavior and motivation of directors, social norms and influences, power and competing interests of stakeholders, and moral obligation become all the more critical. Studying the CG-EP link can draw on and extend research that has made moves in these directions—some examples include Bebchuk and Fried (2005) and Westphal, Gulati, and Shortell, (1997)—but with an eye on teasing out the underlying mechanisms that explain the CG-EP link.

Finally, challenges to traditional agency theory and the role of governance in the responsibility of organizations toward society are not new (e.g., Dodd, 1932). Other researchers have made calls for noneconomic perspectives to be brought into corporate governance research. Hill and Jones (1992), for example, proposed a stakeholder-agency model that emphasizes managers as the only group within the organization that engages with all other stakeholders. Our work indicates that CEOs seem to play a critical role in environmental stakeholder issues. This reflects the importance of studying the firms' relationships with stakeholders in corporate 'greening,' social obligations, and accountability (Parmar *et al.*, 2010). Other authors (Hambrick *et al.*, 2008) suggest that the field move toward informal behavioral structure theories of power and social networks, and behavioral process theories in social psychology and symbolic management. They emphasize the importance of considering the impact that heterogeneous stakeholders have on short- versus long-term governance conflicts and principal-principal problems, as well as the motivations of directors and their exposure to liability, and changes in societal values. Finally, multilevel approaches allow scholars to link micro- and macro-level issues of governance (e.g., Aguilera *et al.*, 2008; Minichilli *et al.*, 2011). Sociological topics such as goal conflict, opportunism, self-regulation, risk and 'acting-for' relationships that are collective and bridge physical, social, and temporal distances are central themes in corporate governance and pertinent for firm environmental performance (Roome, 1992; Shapiro, 2005).

This type of approach extends the research beyond traditional agency theory perspectives and attempts to capture the complexity of governance in real-world organizations (Lubatkin, 2007).

Our fact-based exploratory study is a first step in understanding the relationship between corporate governance and environmental performance. While this approach to building theory now calls for sensemaking and theoretical creativity, we can do so with some real idea of how this world works. The facts are now in. Let the theorizing begin.

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APPENDIX 1—REGRESSION RESULTS OF INTERACTION EFFECTS

Table A. Environmental strengths—interactions between ownership and board

	Base	Model 1	Model 2
Firm performance (s.e.)	-0.013 (0.064)	-0.013 (0.064)	-0.014 (0.064)
Firm size	0.091** (0.018)	0.092** (0.018)	0.093** (0.018)
Sales growth	-0.006 (0.021)	-0.008 (0.021)	-0.006 (0.021)
Leverage	0.185* (0.078)	0.184* (0.078)	0.181* (0.078)
Cap intensity	0.296* (0.140)	0.295* (0.140)	0.304* (0.140)
R&D intensity	-0.097 (0.097)	-0.092 (0.097)	-0.099 (0.097)
Advg intensity	0.853 (0.561)	0.860 (0.561)	0.887 (0.561)
Industry dummies	incl	incl	incl
Year dummies	incl	incl	incl
Instl ownership	0.102 (0.119)	0.113 (0.119)	0.093 (0.119)
Invt turnover	-0.081 (0.165)	0.645† (0.370)	-0.081 (0.165)
SH activism	-0.031† (0.018)	-0.030 (0.018)	-0.168* (0.078)
SH concentration	-0.295† (0.161)	-0.296† (0.161)	-0.288† (0.161)
Independence	0.074 (0.069)	0.329* (0.135)	0.078 (0.069)
Envtnl committee	0.069** (0.025)	0.068** (0.025)	0.068** (0.025)
Diversity	-0.023 (0.136)	-0.034 (0.136)	-0.021 (0.136)
Board size	0.003 (0.005)	0.004 (0.005)	0.000 (0.005)
Turnover* independence		-1.058* (0.483)	
Activism* board size			0.011† (0.006)
Constant	-0.466* (0.199)	-0.667** (0.219)	-0.453* (0.199)
Overall R-square	23.5%	23.6%	23.4%

n = 2,002 p-values: † p<0.10, * p<0.05, ** p<0.01.

Table B. Environmental strengths—interactions between ownership and management

	Base	Model 1	Model 2	Model 3	Model 4	Model 5
Firm performance	-0.015 (0.064)	-0.007 (0.064)	-0.015 (0.064)	-0.015 (0.064)	-0.020 (0.064)	-0.016 (0.064)
Firm size	0.099** (0.018)	0.098** (0.018)	0.101** (0.018)	0.101** (0.018)	0.098** (0.018)	0.100** (0.018)
Sales growth	-0.006 (0.021)	-0.005 (0.021)	-0.003 (0.021)	-0.005 (0.021)	-0.002 (0.021)	-0.005 (0.021)
Leverage	0.177* (0.078)	0.182* (0.078)	0.170* (0.078)	0.176* (0.078)	0.176* (0.078)	0.177* (0.078)
Cap intensity	0.276* (0.140)	0.291* (0.140)	0.285* (0.141)	0.274† (0.140)	0.300* (0.141)	0.284* (0.140)
R&D intensity	-0.102 (0.098)	-0.098 (0.098)	-0.097 (0.098)	-0.101 (0.098)	-0.100 (0.097)	-0.101 (0.098)
Advg intensity	0.790 (0.566)	0.697 (0.567)	0.806 (0.566)	0.786 (0.566)	0.763 (0.566)	0.802 (0.566)
Industry dummies	incl	incl	incl	incl	incl	incl
Year dummies	incl	incl	incl	incl	incl	incl
Instl ownership	0.109 (0.119)	-0.236 (0.194)	0.153 (0.122)	0.113 (0.119)	0.113 (0.119)	0.107 (0.119)
Inv turnover	-0.078 (0.165)	-0.028 (0.166)	-0.074 (0.165)	-0.074 (0.165)	-0.075 (0.165)	-0.064 (0.165)
SH activism	-0.030 (0.018)	-0.030 (0.018)	-0.028 (0.018)	-0.042* (0.020)	0.011 (0.024)	-0.029 (0.018)
SH concentration	-0.310† (0.162)	-0.320* (0.161)	-0.324* (0.162)	-0.316† (0.161)	-0.323* (0.161)	-0.250 (0.165)
CEO duality	0.024 (0.024)	0.024 (0.024)	0.025 (0.024)	0.011 (0.025)	0.023 (0.024)	0.023 (0.024)
Mgr control	0.027 (0.268)	-0.039 (0.270)	0.021 (0.268)	0.034 (0.268)	0.028 (0.268)	0.825 (0.549)
CEO bonus	-0.692 (0.456)	-0.772† (0.457)	-0.658 (0.456)	-0.693 (0.456)	-0.150 (0.499)	-0.700 (0.456)
CEO salary	0.011 (0.034)	-0.220* (0.109)	0.011 (0.034)	0.010 (0.034)	0.014 (0.034)	0.012 (0.034)
CEO options	-0.058 (0.043)	-0.067 (0.043)	0.285 (0.208)	-0.058 (0.043)	-0.051 (0.043)	-0.057 (0.043)
Ownership* salary		0.367* (0.164)				
Ownership* options			-0.786† (0.466)			
Activism* duality				0.083† (0.047)		
Activism* bonus					-2.207** (0.836)	
Concentration* mgr control						-4.075† (2.447)
Constant	-0.429* (0.198)	-0.211 (0.220)	-0.468* (0.199)	-0.442* (0.198)	-0.435* (0.198)	-0.450* (0.198)
Overall R-square	21.6%	21.5%	21.8%	21.6%	21.5%	21.4%

n = 2,002 p-values: † p<0.10, * p<0.05, ** p<0.01.

Table C. Environmental strengths—interactions between board and management

	Base	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Firm performance	-0.008 (0.064)	-0.011 (0.064)	-0.011 (0.064)	-0.002 (0.064)	-0.012 (0.064)	-0.011 (0.064)	-0.007 (0.064)
Firm size	0.096** (0.018)	0.096** (0.018)	0.092** (0.018)	0.094** (0.018)	0.094** (0.018)	0.095** (0.018)	0.097** (0.018)
Sales growth	0.001 (0.021)	0.003 (0.021)	-0.002 (0.021)	0.003 (0.021)	0.001 (0.021)	-0.001 (0.021)	0.002 (0.021)
Leverage	0.157* (0.077)	0.157* (0.077)	0.166* (0.077)	0.167* (0.077)	0.159* (0.077)	0.156* (0.077)	0.164* (0.077)
Cap intensity	0.314* (0.140)	0.319* (0.140)	0.342* (0.140)	0.322* (0.140)	0.336* (0.140)	0.338* (0.140)	0.313* (0.140)
R&D intensity	-0.090 (0.097)	-0.085 (0.097)	-0.090 (0.097)	-0.091 (0.097)	-0.093 (0.097)	-0.096 (0.097)	-0.098 (0.097)
Advg intensity	0.855 (0.562)	0.793 (0.563)	0.927† (0.562)	0.871 (0.562)	0.928† (0.563)	0.881 (0.562)	0.799 (0.563)
Industry dummies	incl	incl	incl	incl	incl	incl	incl
Year dummies	incl	incl	incl	incl	incl	incl	incl
Independence	0.067 (0.071)	0.115 (0.075)	-0.045 (0.078)	-0.204 (0.140)	0.065 (0.071)	0.069 (0.070)	0.078 (0.071)
Envtal committee	0.066** (0.025)	0.065** (0.025)	0.070** (0.025)	0.065** (0.025)	0.068** (0.025)	0.068** (0.025)	0.065** (0.025)
Diversity	-0.024 (0.136)	-0.030 (0.136)	-0.027 (0.136)	-0.028 (0.136)	-0.196 (0.151)	-0.013 (0.136)	-0.010 (0.136)
Board size	0.003 (0.005)	0.003 (0.005)	0.004 (0.005)	0.004 (0.005)	0.004 (0.005)	-0.003 (0.005)	-0.017† (0.010)
CEO duality	0.019 (0.024)	0.211† (0.108)	0.021 (0.024)	0.018 (0.024)	0.021 (0.024)	0.020 (0.024)	0.021 (0.024)
Mgr control	0.063 (0.270)	0.064 (0.270)	0.005 (0.270)	0.033 (0.270)	0.026 (0.270)	0.036 (0.270)	0.004 (0.271)
CEO bonus	-0.618 (0.458)	-0.609 (0.457)	-5.221** (1.472)	-0.702 (0.459)	-1.233* (0.512)	-5.083** (1.580)	-0.639 (0.457)
CEO salary	0.010 (0.034)	0.012 (0.034)	-0.004 (0.035)	-0.199* (0.100)	-0.004 (0.035)	-0.008 (0.035)	-0.228* (0.103)
CEO options	-0.053 (0.043)	-0.051 (0.043)	-0.064 (0.043)	-0.062 (0.043)	-0.060 (0.043)	-0.061 (0.043)	-0.056 (0.043)
Independence* duality		-0.264† (0.146)					
Independence* bonus			8.955** (2.723)				
Independence* salary				0.313* (0.140)			
Diversity* bonus					14.744** (5.538)		
Board size* bonus						0.541** (0.183)	
Board size* salary							0.022* (0.009)
Constant	-0.530** (0.189)	-0.571** (0.191)	-0.438* (0.191)	-0.344† (0.206)	-0.499** (0.190)	-0.453* (0.191)	-0.334 (0.205)
Overall R-square	23.2%	23.2%	23.6%	23.2%	23.3%	23.6%	23.3%

n = 2,002 p-values: † p<0.10, * p<0.05, ** p<0.01.

Table D. Environmental concerns—interactions between ownership and board

	Base	Model 1	Model 2	Model 3	Model 4
Firm performance	-0.062 (0.071)	-0.066 (0.071)	-0.063 (0.071)	-0.065 (0.071)	-0.065 (0.071)
Firm size	0.152** (0.020)	0.152** (0.020)	0.153** (0.020)	0.153** (0.020)	0.151** (0.020)
Sales growth	-0.034 (0.023)	-0.035 (0.023)	-0.036 (0.023)	-0.030 (0.023)	-0.033 (0.023)
Leverage	0.233** (0.087)	0.239** (0.087)	0.233** (0.087)	0.238** (0.087)	0.237** (0.087)
Cap intensity	-0.412** (0.156)	-0.403** (0.156)	-0.413** (0.156)	-0.396* (0.156)	-0.401* (0.156)
R&D intensity	-0.051 (0.108)	-0.047 (0.108)	-0.047 (0.108)	-0.051 (0.108)	-0.054 (0.108)
Advg intensity	-0.676 (0.628)	-0.617 (0.628)	-0.670 (0.627)	-0.688 (0.627)	-0.649 (0.627)
Industry dummies	incl	incl	incl	incl	incl
Year dummies	incl	incl	incl	incl	incl
Instl ownership	0.010 (0.133)	0.196 (0.157)	0.021 (0.133)	0.006 (0.132)	0.003 (0.132)
Inv turnover	0.028 (0.182)	0.036 (0.182)	0.717† (0.411)	0.031 (0.182)	0.032 (0.182)
SH activism	0.038† (0.020)	0.037† (0.020)	0.038† (0.020)	-0.299** (0.111)	0.037† (0.020)
SH concentration	-0.165 (0.179)	-0.146 (0.179)	-0.165 (0.179)	-0.153 (0.179)	0.148 (0.240)
Independence	0.155* (0.077)	0.153* (0.077)	0.397** (0.150)	0.103 (0.079)	0.152* (0.077)
Envta committee	0.144** (0.028)	0.146** (0.028)	0.145** (0.028)	0.147** (0.028)	0.147** (0.028)
Diversity	-0.260† (0.151)	0.929† (0.559)	-0.270† (0.151)	-0.273† (0.151)	0.342 (0.344)
Board size	0.012* (0.005)	0.012* (0.005)	0.013* (0.005)	0.013* (0.005)	0.013* (0.005)
Ownership* diversity		-1.784* (0.808)			
Turnover* independence			-1.004† (0.536)		
Activism* independence				0.464** (0.151)	
Concentration* diversity					-2.496† (1.281)
Constant	-0.553* (0.223)	-0.686** (0.231)	-0.747** (0.246)	-0.535* (0.223)	-0.628** (0.226)
Overall R-square	53.2%	53.2%	53.3%	53.4%	53.4%

n = 2,002 p-values: † p<0.10, * p<0.05, ** p<0.01.

Table E. Environmental concerns—interactions between ownership and management

	Base	Model 1	Model 2
Firm performance	-0.076 (0.071)	-0.072 (0.071)	-0.079 (0.071)
Firm size	0.156** (0.021)	0.154** (0.021)	0.155** (0.021)
Sales growth	-0.036 (0.023)	-0.037 (0.023)	-0.036 (0.023)
Leverage	0.216* (0.088)	0.212* (0.088)	0.201* (0.088)
Cap intensity	-0.429** (0.158)	-0.428** (0.158)	-0.429** (0.157)
R&D intensity	-0.056 (0.109)	-0.054 (0.109)	-0.056 (0.109)
Advg intensity	-0.680 (0.646)	-0.597 (0.647)	-0.678 (0.646)
Industry dummies	incl	incl	incl
Year dummies	incl	incl	incl
Instl ownership	0.009 (0.133)	-0.052 (0.135)	0.023 (0.133)
Invt turnover	0.019 (0.183)	-0.002 (0.183)	-0.004 (0.182)
SH activism	0.036† (0.021)	0.039† (0.020)	0.035† (0.020)
SH concentration	-0.164 (0.180)	-0.175 (0.180)	-0.334† (0.188)
CEO duality	-0.020 (0.027)	-0.278* (0.111)	-0.220** (0.069)
Mgr control	-0.155 (0.303)	-0.160 (0.303)	-0.135 (0.302)
CEO bonus	-0.166 (0.506)	-0.158 (0.505)	-0.179 (0.504)
CEO salary	0.093* (0.038)	0.092* (0.038)	0.096* (0.038)
CEO options	-0.009 (0.048)	-0.011 (0.048)	-0.009 (0.048)
Ownership* duality		0.391* (0.163)	
Concentration* duality			0.815** (0.262)
Constant	-0.383† (0.228)	-0.311 (0.229)	-0.327 (0.228)
Overall R-square	49.8%	49.9%	49.8%

n = 2,002 p-values: † p<0.10, * p<0.05, ** p<0.01.

Table F. Environmental concerns—interactions between board and management

	Base	Model 1	Model 2	Model 3
Firm performance	-0.065 (0.071)	-0.070 (0.071)	-0.068 (0.071)	-0.065 (0.071)
Firm size	0.144** (0.021)	0.145** (0.021)	0.142** (0.021)	0.146** (0.021)
Sales growth	-0.032 (0.023)	-0.029 (0.023)	-0.036 (0.023)	-0.031 (0.023)
Leverage	0.208* (0.086)	0.208* (0.086)	0.215* (0.086)	0.215* (0.086)
Cap intensity	-0.388* (0.156)	-0.381* (0.156)	-0.357* (0.156)	-0.391* (0.156)
R&D intensity	-0.043 (0.108)	-0.035 (0.108)	-0.033 (0.108)	-0.052 (0.108)
Advg intensity	-0.655 (0.631)	-0.739 (0.632)	-0.651 (0.630)	-0.721 (0.630)
Industry dummies	incl	incl	incl	incl
Year dummies	incl	incl	incl	incl
Independence	0.148† (0.078)	0.218** (0.084)	0.157* (0.078)	0.160* (0.078)
Envta committee	0.143** (0.028)	0.141** (0.028)	0.144** (0.028)	0.143** (0.028)
Diversity	-0.280† (0.152)	-0.288† (0.151)	-0.268† (0.151)	-0.265† (0.152)
Board size	0.012* (0.005)	0.013* (0.005)	0.018** (0.006)	-0.009 (0.011)
CEO duality	-0.026 (0.027)	0.254* (0.120)	0.347** (0.117)	-0.024 (0.027)
Mgr control	-0.080 (0.301)	-0.079 (0.301)	-0.072 (0.301)	-0.143 (0.302)
CEO bonus	0.026 (0.506)	0.039 (0.505)	0.021 (0.504)	0.005 (0.506)
CEO salary	0.093* (0.038)	0.095* (0.038)	0.092* (0.038)	-0.160 (0.115)
CEO options	-0.002 (0.048)	0.001 (0.048)	-0.002 (0.048)	-0.005 (0.048)
Independence* duality		-0.387* (0.161)		
Board size* duality			-0.034** (0.010)	
Board size* salary				0.023* (0.010)
Constant	-0.570** (0.214)	-0.629** (0.215)	-0.619** (0.214)	-0.367 (0.230)
Overall R-square	53.3%	53.3%	53.4%	53.5%

n = 2,002 p-values: † p<0.10, * p<0.05, ** p<0.01.