

The Effect of Corporate Governance on Voluntary Risk Disclosures: Evidence from Greenhouse Gas Emission Reporting

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ABSTRACT: This study extends prior literature examining the relationship between corporate governance and voluntary disclosures. Specifically, we investigate whether corporate governance characteristics are related to risk disclosures of the firm, in the form of greenhouse gas (GHG) emissions. GHG disclosures represent proprietary risk information about the firm's operations and future profitability and result in negative impacts to firm value. Using a sample of firms participating in the Carbon Disclosure Project (CDP) from 2002 through 2006, we find that the presence of an environmental committee and a Chief Sustainability Officer (CSO) are positively related to the probability of risk disclosure and disclosure quality. Further analysis of specific committee and executive characteristics reveals that the probability of disclosure is associated with committee size, number of committee meetings, expertise of committee members and CSO, and overlap between the environmental committee and audit committee. Only expertise of the environmental committee members and the CSO are associated with GHG disclosure quality, while larger committees tend to be associated with lower disclosure quality. Our results suggest that firms should also consider the impact of corporate governance mechanisms in responding to the call of regulators and stakeholders for greater transparency of corporate risks.

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I. INTRODUCTION

Prior literature extensively examines the relationship between corporate governance and voluntary disclosure. Much of this research documents a positive relation between higher quality governance mechanisms and voluntary disclosure (e.g. Chen and Jaggi 2000; Ajinkya, et al. 2005; Karamaonou and Vafeas 2005; Cheng and Courtenay 2006; and Laksmana 2008). This is consistent with superior governance attributes serving to enhance transparency and disclosure quality by protecting shareholder interests and monitoring management to prevent opportunism. However, other research finds that outside directorship reduces disclosure (Eng and Mak 2003), suggesting that increased corporate governance, by signaling additional monitoring, may act as a substitute for disclosure.

Research on corporate governance largely examines voluntary disclosure in relation to general corporate governance mechanisms. Primarily, authors investigate these general governance mechanisms in relation to broad financial disclosures (Eng and Mak 2003; Cheng and Courtenay 2006), management forecasts (Ajinkya et al. 2005 and Karamonou and Vafeas 2005), or stock options and compensation disclosures (Chen and Jaggi 2000; Laksmana 2008). One association not directly examined in prior research is the relation between corporate governance and disclosures of risks that are likely to adversely impact the firm. Regulators have recently indicated a growing concern for deficient non-financial disclosures related to firm-specific operational risks. Consequently, public firms have witnessed a significant increase in Securities and Exchange Commission (SEC) comment letters requesting additional detailed information about the risks they face (Johnson 2010). Given this focus, Cohen et al. (2008) and Carcello et al. (2011) suggest it is important to understand how other corporate governance mechanisms impact other operational aspects of the firm, namely risk disclosures.

This paper extends the literature on the relation between governance and disclosure by examining the association between a particular form of corporate governance and voluntary risk disclosures. Specifically, we examine whether the existence of a board of director's sustainability committee and a Chief Sustainability Officer (CSO) are related to the voluntary disclosure of greenhouse gas (GHG)

emission accounting information.¹ A secondary objective is to determine whether specific characteristics of the individual corporate governance structures (committee and officer expertise as well as committee activity, diligence, and spillover with the audit committee) affect the likelihood and quality of risk disclosures.

We examine GHG emissions disclosures because, in its 2010 interpretive guidance, the SEC formally acknowledges the longstanding notion that GHG emissions are a potential risk to a firm's operations and future profitability and calls for increased disclosures of these risks (SEC 2010b). Climate change risks include increasing compliance or input costs from carbon reducing regulation, increasing operating costs and catastrophic losses related to weather and threats to water supplies, altered consumer demand for products or services attributed to fluctuating weather patterns, and reputational and market value penalties from increasing GHG emissions (Coburn et al. 2011). Highlighting and providing disclosures about these risks can create adverse consequences given that they have the potential to: (1) incite government agencies to investigate firms, thereby increasing compliance costs; (2) invoke costly litigation; (3) impose costs based on the firm's accountability of disclosed GHG information in relation to future regulation;² (4) affect the cost of capital;³ (5) provide competitors with information about firm-specific sustainability strategies; and (6) provide ammunition for environmental advocacy groups or NGOs inciting negative attention. Given the possible penalties for disclosure, it is important to understand what factors affect firms' decisions to disclose this firm-specific risk information.

¹ For the purposes of the current study, we adopt the term "GHG emission accounting" from the Carbon Disclosure Project's Greenhouse Gas Emissions Questionnaire. Traditionally, GHG emission accounting includes information about emission and management of numerous items including carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFC), perfluorocarbons (PFC), sulfur hexafluoride (SF₆) and other fluorinated gases (USEPA 2009). These gases are released as a result of manufacturing processes and the burning of fossil fuels. The terms *GHG emissions* and *carbon emissions* are used interchangeably in practice. Additionally, "sustainability" refers to the corporate practice of creating long-term shareholder value by focusing corporate strategy around economic, environmental and social endeavors.

² Examples of future regulatory requirements include the Environmental Protection Agency (EPA) Mandatory GHG Reporting Rule, issued on September 22, 2009, which requires major emitters and suppliers of fossil fuels to report GHG emissions beginning 2010 (USEPA 2009).

³ Prior research has considered the value implications of GHG levels. For example, Griffin et al. (2010) find GHG levels disclosed in CDP responses are negatively associated with firm stock price and that the negative relation is greater for carbon-intensive companies. This association also appears to hold for firms that do not disclose CDP responses. However, their study focuses solely on GHG levels and ignores the vast amount of other qualitative information available in the CDP questionnaire that is not readily available through other channels.

We examine corporate GHG accounting disclosures using U.S. firms from 2002 through 2006.⁴ This timeframe ensures SEC lobbying to increase climate change disclosures and the subsequent interpretive guidance release are not confounding events affecting results. We capture GHG disclosures from the Carbon Disclosure Project's (CDP) GHG Emissions Questionnaire. The CDP is the leading global repository for comparative GHG emission accounting information and provides a setting to explore a truly discretionary climate change disclosure, involving information previously shown to negatively impact firm value (Chapple et al. 2009; Matsumura et al. 2010; Griffen et al. 2010). Results indicate that the existence of an environmental committee and a sustainability officer are associated with the likelihood and quality of GHG disclosures. Pressures officers face to disclose GHG information appears to outweigh fears of its proprietary nature and possible penalties. Further analysis reveals the probability of disclosure is associated with committee size, number of committee meetings, expertise of committee members, overlap between the environmental committee and the audit committee, and CSO expertise. Only expertise of the environmental committee members and CSO are associated with better quality GHG disclosures, while larger committees tend to be associated with lower quality disclosures.

A sustainability officer's background potentially influences the objectives and effectiveness of her position. The educational and experiential background of current CSOs in U.S. firms range from sustainability to public relations and communications. Expertise in sustainability includes a fundamental understanding of GHG emissions and the significance of emissions in relation to operational and profitability risks to the firm. Consequently, sustainability experts are more likely to implement strategies that mitigate these risks, increasing disclosures in order to positively differentiate their firms in the market. CSOs with expertise in public relations are presumably more motivated by the disclosure or non-disclosure of GHG emission data to create the best possible public image for the firm, regardless of actual performance. Given their dual role as monitors for shareholders as well as sustainability advisors to the firm, it is unclear how their expertise will influence their disclosure decision.

⁴ The sample includes all U.S. firms in the FT500, comprised of 500 of the largest companies in the world based on market capitalization from 2002 until 2004, and the S&P 500 companies from 2005 and 2006.

In addition to monitoring, environmental committees are charged with responsibilities to understand sustainability, the significant aspects of sustainability for the firm, and how to incorporate those aspects into the firm's sustainability strategy. Similar to the justification for hiring a CSO, the reasons for voluntary environmental committee adoption are numerous, ranging from assisting management with proactive sustainability strategies to legitimacy building committees void of substantive responsibilities. In all forms, it is unlikely environmental committees will face disclosure pressures alone. "As climate change and sustainability-related regulations become more burdensome, there are a number of ways in which audit committees could provide additional oversight (EY 2010)." In particular, audit committees will be asked to integrate climate change and sustainability into enterprise wide risk assessment, focus on the quality of disclosures, evaluate the reporting systems and consider third party validation of reporting. Therefore, it is particularly important to examine the environmental committee and its characteristics in relation to GHG disclosures, as well as the overlap of the individuals on the environmental and audit committees, as the knowledge these individuals possess is likely complementary between committees.

Our study contributes to the voluntary disclosure literature by providing archival evidence of the impact of corporate governance mechanisms on risk disclosures. Our study also adds to the accounting disclosure literature's long-standing interest in the reporting of corporate environmental actions and strategic initiatives (e.g., Estes 1972; Ramanathan 1976; Spicer 1978; Ingram and Frazier 1980; Berthelot et al. 2003; Simnett et al. 2009a; Simnett et al. 2009b) as well as environmental accounting research's interest in incentives to disclose GHG information (e.g., Peters and Romi 2008; Stanny and Ely 2008; Stanny 2009; Lou et al. 2010; Matsumura et al. 2010; Galbreath 2010).

Given the regulatory attention to firm-specific risk disclosures, this study should also be of particular interest to regulators. Understanding the substitutive and complimentary effects of corporate governance as it relates to climate change disclosures in a stand-alone setting, reveals potential obstacles to and synergies for ensuring the success of future regulation concerning risk disclosures in public filings.

The remainder of this paper is organized as follows. In section II, we discuss the Carbon Disclosure Project's Questionnaire and the nature of GHG emission accounting disclosures. Section III presents the

hypotheses development. In section IV, we describe the sample and methods used. Finally, we present the results in Section V and the conclusion in section VI.

II. THE CARBON DISCLOSURE PROJECT AND GHG INFORMATION

The CDP is an independent not-for-profit organization established in 2002, to facilitate a dialogue between shareholders and corporations concerning a global corporate response to climate change (CDP 2007). The CDP's activities include a questionnaire process focusing directly on corporate GHG measurement and disclosure, as well as GHG reduction strategies, governance associated with GHG responsibilities, GHG initiatives, etc.⁵ The CDP's questionnaire was developed by institutional investors, representing over \$55 trillion in assets, with the goal of creating a repository of GHG information for comparison and trend analysis. As a result of their efforts, the CDP has become the benchmark for GHG disclosure methodology and the largest repository of GHG disclosures in the world. Each year, since 2002, the CDP sends the GHG questionnaire to the largest corporations (based on market capitalization) in every country. Firms then decide whether to participate in providing information to the CDP and whether to disclose firm-specific GHG accounting information to the public. The CDP's website contains each firm's response.⁶

Similar to other forms of voluntary disclosures in stand-alone settings, the CDP's data has potential limitations with regard to reliability. Kolk et al. (2008) address these possible limitations and contend that firms do not consistently offer complete answers to the CDP questions. Secondly, the authors assert specific reliability checks are absent in the CDP's process. Disclosing firms are asked if the information they are providing in their response has been assured, but the CDP itself provides no accuracy checks. In an attempt to mitigate these issues, we not only evaluate a firm's propensity to disclose, but also utilize

⁵ Each CDP questionnaire includes four main areas: management's views on the risks and opportunities that climate change presents to the business; greenhouse gas emissions accounting; management's strategy to reduce emissions/minimize risk and capitalize on opportunity; and corporate governance with regard to climate change.

⁶ The CDP discloses the names of all firms they ask to participate in their project. The number of public corporations and span of global representation has increased over the life of the project, from 2003 through 2007 (CDP1 – CDP5 Reports). The official reporting location for the CDP is their web site on which they have a comprehensive list of all firms asked to participate in the project with the firm's response. For those firms that choose to disclose their responses, the CDP includes a downloadable copy.

the CDPs own methodology to evaluate the quality of those disclosures. In light of the possible limitations, Kolk et al. (2008) contend “From a research perspective, the growing availability of data, even with their limitations, provides opportunities for more in-depth investigations of corporate responses to climate change, both more generally and specifically with regard to carbon accounting and reporting.” Moreover, Rankin et al. (2011) find the extent and credibility of GHG disclosures are greater for firms reporting through the CDP process. Due to the comparability of information, the fact that the CDP has become the benchmark for corporate carbon reporting, and that this setting allows us to investigate disclosure theories in a purely discretionary setting, we rely on the CDP data to draw inferences about the association between environmental corporate governance characteristics and the voluntary disclosure of risk information.

GHG information shares characteristics similar to more traditional accounting information within the firm. For example, similar to the way overhead costs are allocated to specific products, or lines of products, total GHG emissions from operations are measured and then allocated to specific products for decision making. Similar to the demand for financial information, assurance for GHG accounting disclosures is increasingly requested. The International Standards on Assurance Engagements recently developed audit guidance for the assurance of GHG reporting and other related sustainability disclosures.

Given the similarities to other operational accounting information, the CDP setting provides a unique opportunity to examine disclosure practices and decisions in a ‘stand-alone’ setting. A key factor within disclosure theory is a firm’s ability to credibly disclose its private information to the market (Grossman 1981; Milgrom 1981). The CDP’s process affords firms this opportunity by providing firms with the same questionnaire, the same advised methodology for measurement and a credible repository for disclosure to the market. Because the CDP discloses its annual questionnaire and the names of all firms asked to respond, investors are aware of each firm’s potential information set and which firms choose to provide that information, which firms choose to answer the questionnaire but not publicly release their responses, and which firms choose not to respond.

In addition to the increasing demands from regulators and investors for GHG accounting information, current research suggests this information could be used to impose significant costs on the firm.⁷ Firms face not only the direct costs of measurement activities, but also market-imposed costs and the threat of competitive harm (e.g. Chapple et al. 2009; Matsumura et al. 2010; Griffin 2010). The proprietary nature of GHG information also provides a unique setting to examine voluntary risk disclosure decisions. GHG information exhibits an exhaustive list of proprietary costs, similar to those discussed by Li et al. (1997). Disclosure potentially: (1) incites government agencies to investigate firms, thereby increasing compliance costs; (2) invokes costly litigation; (3) imposes costs based on the firm's accountability of disclosed GHG information in relation to future regulation;⁸ (4) affects the cost of capital;⁹ (5) provides competitors with information about firm-specific sustainability strategies; and (6) provides ammunition for environmental advocacy groups or NGOs inciting negative attention. Given GHG emissions result from the company's operations, these disclosures potentially reveal competitive information related to the efficiency of a company's business processes (USEPA 2009). The U.S. EPA motivates their recent disclosure rules by arguing that accounting for GHG will "allow businesses to track their own emissions, compare them to similar facilities, and provide assistance in identifying cost effective ways to reduce emissions in the future" (USEPA 2009). This information may also impact the purchasing decisions of company's business partners and customers, resulting in market share and cash flow implications (Zimmerman 2008; A.T. Kearney 2010; SEC 2010a). Graham and Fagotto (2007) indicate that, once disclosed, emission data could be used by investors to more accurately predict material risks, by

⁷ A vast amount of previous accounting literature has examined the limitations of full disclosure when the associated costs are deemed high (Jovanovic 1982; Verrecchia 1983; Dye 1986; Wagenhofer 1990; Darrough and Stoughton 1990; Feltham and Xie 1992; and Scott 1994 among others).

⁸ Examples of future regulatory requirements include the Environmental Protection Agency (EPA) Mandatory GHG Reporting Rule, issued on September 22, 2009, which requires major emitters and suppliers of fossil fuels to report GHG emissions beginning 2010 (USEPA 2009).

⁹ Prior research has considered the value implications of GHG levels. For example, Griffin et al. (2010) find GHG levels disclosed in CDP responses are negatively associated with firm stock price and that the negative relation is greater for carbon-intensive companies. This association also appears to hold for firms that do not disclose CDP responses. However, their study focuses solely on GHG levels and ignores the vast amount of other qualitative information available in the CDP questionnaire that is not readily available through other channels.

consumers to make more informed choices among products, and by environmental groups and the media to help pinpoint the most inefficient factories, power plants, etc.

Despite all of the costs associated with disclosure, stakeholder pressures on management to disclose GHG emissions continue to intensify. Not only are institutional investors interested in this information as it relates to a firm's operational risks from climate change, but pressures from NGOs and regulatory agencies continue to rise as well. And, in a market where strong corporate sustainability practices may be rewarded, firms with GHG emission strategies and disclosures stand to benefit from positive differentiation. Given the existence of conflicting disclosure incentives, prior accounting research suggests that disclosure of accounting information is impacted by governance mechanisms, including board of director involvement and executive-level support (e.g., Healy and Palepu 2001; Klein 2002a; Eng and Mak 2003; Abbott et al. 2004; Ajinkya et al. 2005; Karamanou and Vafeas 2005; Cheng and Courtenay 2006; Laksmana 2008). Following prior accounting literature, we examine the association between corporate governance (environmental committee and CSO) and voluntary GHG emission accounting disclosures.

III. HYPOTHESIS DEVELOPMENT

Environmental Committees

Prior research extensively investigates the role of governance structures, namely the role of the board of directors, on the financial reporting process.¹⁰ Underlying these studies is the function of the board of directors in mitigating agency cost problems by reducing information asymmetry. In general, it is assumed that directors will ensure greater transparency of the firm's activities when it is in the shareholder's best interest (Ajinkya et al. 2005). In a broader view of governance, resource dependency theory suggests that the board acts less as a monitor of management behavior and more as an influential partner to management, assisting with the firm's strategy to meet its objectives (Pfeffer and Salancik

¹⁰ Examples include: Forker 1992; Beasley 1996; Dechow et al. 1996; Klein 2002a, 2002b; Eng and Mak 2003; Abbott et al. 2007; Ajinkya et al. 2004; Karamanou and Vafeas 2005; Krishnan 2005; Farber 2005; Cheng and Courtenay 2006; Larcker et al. 2007; and Laksmana 2008 among others.

1978; Boyd 1990; Cohen et al. 2008). Agency theory, in conjunction with resource dependency theory, supports the expectation that an environmental committee of the board of directors will monitor and promote management activities while seeking ways to increase the firm's alignment with stakeholders. In a slightly divergent perspective, legitimacy theory predicts firms will partake in activities that create a perception that the firm's actions are in accordance with that of larger societies, regardless of any substantive performance (Suchman 1995). Prior accounting literature establishes a link between management's strategic use of social reporting to create an image that may have little correlation with the firm's actual performance (Deegan and Rankin 1996; Neu et al. 1998). Based on legitimacy theory, firms are likely to establish board committees or hire CSOs to create a perception of a firm sustainability strategy rather than empowering these parties to actually advance firm-specific sustainability initiatives. The signal from the existence of an environmental committee and a CSO acts as a substitution for the actual disclosures of GHG information.

Prior research examining the impact of board committees on environmental accounting is mixed. Examples include Lam and Li (2008) who find that having an environmental committee of the board is associated with a significant increase in environmental performance for high polluting firms. Brown et al. (2010) examine firm characteristics associated with a range of environmental disclosure categories and find no significance between disclosure quality and the existence of a corporate social responsibility committee. Using a Malaysian setting, Haniffa and Cooke (2005) find that corporate social disclosures have a significant association with characteristics of the board of directors, including domination of the board by individuals who would have greater concern for social issues. Cowen et al. (1987) find that firms with a corporate social responsibility committee are more likely to have a greater amount of human resource, but not environmental disclosures. Finally, Rankin et al. (2011) examine the relation between voluntary adoption of environmental committees and the probability of GHG disclosures in Australian firms, as well as the extent and credibility of that disclosure, and find no association.¹¹

¹¹ Rankin et al. (2011) rely on a limited sample of firms to examine the relationship between environmental committees and GHG credibility and extent of disclosure.

The Deloitte Review recently addressed the role of corporate governance in relation to corporate sustainability by indicating the need for climate change activities to be on corporate boards' radar screens (Wagner et al. 2009). They contend that the board has the ability to provide a perspective that may be lacking at the executive level. Ewing (2008) determines that the key to addressing climate risk lies in defining the responsibilities of the board in relation to the executive team. Michals (2009) contends that firms are now designating specific committees of the board to address environmental issues from the perspectives of risks, strategic opportunities, and commitments to stakeholders. Because management is reluctant to provide environmental information representing risk to the firm, board oversight is particularly important in actively monitoring the climate change risks of the company as well as stakeholder information needs and the legitimacy of the firm's environmental reputation (Michals 2009; Gregg 2009; Ewing 2008).

The environmental committee's role with respect to non-financial GHG disclosures is corollary to the role of audit committees in ensuring proper financial accounting disclosures. However, in contrast to audit committees, having an environmental committee is purely voluntary, and its presence is one potential indicator of a corporation's commitment to environmental issues and transparency. Understanding that GHG information is associated with negative market penalties and the release of proprietary information, it is important to determine whether committees will attempt to withhold proprietary information from the market or provide such disclosures. Based on agency and resource dependency theory, we expect that environmental committees will take more proactive interest in corporate sustainability strategies as a part of the firm's overall operational strategy and, therefore will be more likely to respond to stakeholder demands for disclosures related to GHG emission accounting information and will be associated with increased quality of disclosures. This leads to the first set of hypotheses (in the alternative form):

H1a: *Ceteris paribus, firms with an environmental committee will be more likely to disclose GHG emission accounting information.*

H1b: *Ceteris paribus, firms with an environmental committee will have higher quality GHG disclosure.*

Existence of Sustainability Officer

While prior accounting literature focuses primarily on the roles of the board and audit committees, less attention concentrates on the role of executive-level support in the form of new executive officer positions (Cohen et al. 2008). Given the potentially costly nature of GHG disclosures, we argue that disclosure will be positively associated with credible executive-level support. Prior research suggests that the combined participation of top management support and other internal representatives are important factors in the firm's activities to monitor climate risk concerns (Hanna et al. 2000; Ramus and Steger 2000; Zutshi and Sohal 2004; Cordano and Frieze 2000; Egri and Herman 2000; Ewing 2008). An increasingly common manifestation of this executive knowledge and support includes the existence of Chief Sustainability Officers (Rivenburgh 2010; Galbraith 2009; Deutsch 2007).¹² Consistent with executive-level support, CSO responsibilities often include integrating various environmental concerns of external stakeholder demands, firm-wide strategy, and governance practices. Moreover, these positions often report directly to the Chief Executive Officer and the board, thus representing an influential internal stakeholder of the firm's resource commitments.

Because sustainability officer positions are, similar to other executive positions, proactive we expect that the existence of such positions will be associated with greater understanding of sustainability initiatives, advanced involvement in these initiatives, greater effort and confidence in the collection and monitoring of GHG information, and less fear of emulation from competing firms. Consequently, the firm will also have more confidence in its development of a GHG reduction strategy and in its response to the CDP questionnaire, making participation in GHG measurement and disclosure more likely. Similarly, we expect a sustainability position to be associated with higher quality GHG disclosure. Thus, our second set of hypotheses is stated as follows (in the alternative form):

H2a: *Ceteris paribus, firms with a sustainability officer will be more likely to disclose GHG emission accounting information.*

H2b: *Ceteris paribus, firms with a sustainability officer will have higher quality GHG disclosure.*

¹² Although the CSO position is a relatively new position, the strategic influence of this executive position is also analogous with the impact and adoption of other strategically specialized executive positions that have evolved in the past, such as Chief Risk Officers and Chief Information Officers (e.g., Beasley et al. 2010; Pagach and Warr 2010; Feeny et al. 1992; Lubin and Esty 2010).

Committee and Sustainability Officer Characteristics

Environmental Committee Size, Diligence, Expertise, Knowledge Spillover

Resource dependency theory posits that a board's attention to firm strategy will benefit from the attributes of the board members, including expertise (Boyd 1990). As the experience or knowledge possessed by individuals in governance positions increases, it is more likely these individuals will be better equipped to assist the firm in meeting its strategic operating objectives, mitigating GHG risks. In comparison, legitimacy theory posits that establishing committees without meaningful characteristics and concomitant influence are an attempt to merely create a sustainability image, as opposed to committees that will be instrumental in GHG initiatives and reporting. Therefore, we extend our primary hypotheses by investigating the relationship between specific environmental committee qualities and officer characteristics and GHG disclosure. Little is known about the importance of environmental committee characteristics for environmental disclosure. In comparison, investigations of audit committee characteristics have a strong presence in previous accounting literature and therefore guide our examination into firm-specific environmental committee characteristics and risk disclosures.

Analogous to our environmental committee setting, Sommer (1991) suggests that simply having an audit committee as part of a firm's governance structure and actually having an effective audit committee are two distinctly different things. Prior literature reveals certain audit committee characteristics are related to better financial reporting quality due to effective monitoring (e.g., Carcello and Neal 2000, 2003; Klein 2002a; Abbott et al. 2004).¹³ Two common characteristics include committee size and number of meetings. In general these are viewed as a greater extent of authoritative influence and rigor of commitment (e.g., Kalbers and Fogarty 1993; DeZoort et al. 2002). Contrary to these findings, Yermack (1996) finds firms with larger boards perform worse than firms with smaller boards, indicating decreased

¹³ The body of research on audit committee characteristics is relatively vast. We provide selected examples that would have analogous application to the influence of environmental committee activities. Other examples include: Menon and Williams 1994; McMullen and Raghunandan 1996; DeZoort 1998; Conger et al. 1998; Vafeas 1999; DeZoort and Salterio 2001; Klein 2002b; Xie et al. 2003; Bedard et al. 2004; Anderson et al. 2004; Karamanou and Vafeas 2005; Krishnan 2005; Bronson et al. 2006; Zhang et al. 2007; Krishnan and Visvanathan 2008.

efficiencies with size. Assuming the impact of these characteristics also applies to other board committees, we expect similar characteristics to impact the association between a firm's environmental committee and voluntary GHG disclosure. In general, the greater the board importance placed on environmental strategy and innovation, as evidenced by the size and activity of the committee, the greater the likelihood that firms will disclose their GHG responses.

We also expect the environmental committee's performance to be of higher quality when its members have more expertise (Fama 1980; Fama and Jensen 1983). As an example, prior literature documents positive relationships between audit committee expertise and financial reporting quality. In general, these relationships exist due to the ability to interpret and influence issues of interest to the committee (Farber 2005; McDaniel et al. 2002; Abbott et al. 2004; Naiker and Sharma 2009, Cohen et al. 2011). A firm's strategy implementation can also benefit from the expertise of its directors (Boyd 1990). For a sustainability strategy, which includes managing GHG emissions, benefits will likely be stronger if the environmental committee members possess related expertise. Similar to the existence of expertise on the audit committee, having an environmental committee member with appropriate expertise will better equip the committee to effectively evaluate environmentally innovative opportunities and strategies, including the involvement in and disclosure of GHG accounting information.

One final committee characteristic that will potentially affect the probability of disclosure is the membership overlap between the environmental committee and the audit committee. As boards gain size and diversity of sub-committees, the monitoring role is disseminated among a broader set of knowledge/expertise. Moreover, the specific monitoring roles of specialized committees could complement each other when mitigating the complexity of firm problems (Carcello et al. 2011). GHG accounting is a measurement process that requires the accumulation and allocation of carbon emissions to the corporation, different geographical areas, different products, etc. This process requires an understanding of both accounting and GHG strategy. As climate change and sustainability-related regulations increase in complexity, the audit committee insights may prove beneficial, as well as providing additional oversight (EY 2010). In particular, audit committees will be asked to integrate

climate change and sustainability into enterprise wide risk assessment, focus on the quality of disclosures, evaluate the reporting systems and consider third party validation of reporting. The audit committee could potentially possess financial expertise that will spill over into the environmental committee's knowledge of the reporting issues. Specifically, knowledge of disclosure issues and operational risks from the audit committee may spill over to the environmental committee, which could attenuate apprehension concerning the measurement and disclosure of GHG information.¹⁴ Considering the benefits of accounting expertise to the sustainability committee, firms with increased spillover from the audit committee to the sustainability committee will have a greater understanding of the issues, hence increased motivation to signal their carbon initiatives by exhibiting increased GHG disclosure. Given this potential relationship, we also examine whether the overlap between the environmental and audit committee will be associated with greater GHG disclosure and higher disclosure quality.

Sustainability Officer Expertise

With the recent increase in corporate sustainability officer appointments, the question as to the appropriate expertise of these individuals to carry out their duties is of particular importance. Coinciding with the shift from reactive/compliance strategies to more proactive/innovative strategies, the background of sustainability executives is also expected to be distinctly different, with a divergence between officers possessing public relations expertise (reactive) and those with environmental and social expertise (proactive). While many sustainability officers were initially hired to 'spin' negative organizational sustainability behavior, such as large environmental fines (e.g., Exxon Valdez and British Petroleum's oil spills), in order to mitigate negative public impressions and litigation exposure, many firms now desire a more equitable mix of business and scientific knowledge to assist in key strategy decisions. CSOs with public relations expertise (reactive) would also presumably be the type of individuals associated with firms attempting to gain legitimacy in the market. Legitimacy measures are commonly expressed through 'greenwashing', which includes general disclosures of a firm's environmental activities. These firms are

¹⁴ Corporate governance overlap has been examined in relation to audit committee and compensation committee overlap and its effect on reporting quality is mixed (Higgs 2003; Van der Zahn and Tower 2005; Chandar et al. 2008; Zheng and Cullinan 2010).

unlikely to have authentic sustainability initiatives and will assume the signal of the CSO hire will be sufficient to create that perception; therefore GHG emissions disclosure is unlikely.¹⁵ This divergence in expertise is likely to affect the participation in GHG disclosure. Firms attempting to differentiate their activities based on sustainability initiatives are more apt to disclose GHG information in order to signal carbon innovation and risk mitigation to the market. Similarly, these firms are more likely to have strategies in place specific to the CDP's questions; hence they will have higher disclosure quality. Therefore, we also examine whether the officer's expertise will be associated with an increased propensity for and quality of GHG accounting disclosure.

IV. SAMPLE AND METHODS

Sample

To examine the voluntary disclosure of GHG information, we use data available from the CDP's "Greenhouse Gas Emissions Questionnaire" from 2002 until 2006. This sample period is of particular interest because this was also the period of the initial firm adoption of sustainability committees and officers. This timeframe ensures SEC lobbying to increase climate change disclosures and the subsequent interpretive guidance release are not confounding events affecting results. As described in the background section, the CDP sends the questionnaire to the largest corporations in every country. Our sample includes all U.S. firms in the FT500, comprised of 500 of the largest companies in the world based on market capitalization from 2002 until 2004, and the S&P 500 companies from 2005 and 2006. These firms are

¹⁵ Greenwashing is a term used by many to describe the practice by individuals or organizations to mislead outside parties as to an organization's environmental practices or the environmental advantages of a product or service provided. This process takes place in the form of advertising, public disclosures, public relations, event sponsorship and other methods. Greenwashing is found in many forms, but usually entails public emphasis on a corporation's environmental qualities and activities without mention of their wrongdoings. It assists in the creation of a positive environmental public impression. This issue is important because the use of greenwashing tends to muddy the waters of legitimate honorable environmental work. Detection of misleading claims is difficult and therefore opens the door for rampant utilization of the process. Because greenwashing is so prevalent in the corporate world, it is difficult for the public to decipher between deceitful behavior and actual positive environmental performance, which leaves external parties weary of any word of positive environmental acts or products (Romi 2007).

asked to respond at the corporate aggregate level, and then to allocate GHG levels to different countries, products, etc. Table 1 presents the sample attrition. We initially identify a total sample of 1620 firm year observations. We eliminate 47 firm year observations that lack Compustat data, 174 observations in the banking/financing industry, 36 observations that lack the appropriate KLD Analytics data, 26 observations that lack available proxy information, 49 observations that lack governance information in Corporate Library, and 50 observations that lack at least two observations for a given industry in a given year, rendering a final sample of 1238 firm year observations.

Insert Table 1 Here

Methods and Data

We incorporate a probit model to investigate the impact of firm-specific characteristics on the decision to disclose GHG accounting information. We then incorporate a Heckman two-stage sample selection model to control for sample selection bias and investigate corporate governance characteristics on the quality of disclosures. There are a total of 429 unique firms in the sample, rendering an average of 2.89 out of 5 years of participation per firm. In order to control for multiple year inclusion by one firm, we include a variable to account for past disclosure and we cluster by firm, rendering robust standard error estimates.¹⁶ We use the following probit model to test the primary hypotheses concerning the association between the probability of disclosure and the existence of an environmental committee and a sustainability officer:

$$DISC_{i,t} = \beta_0 + \beta_1 COMMITTEE_{i,t-1} + \beta_2 OFFICER_{i,t-1} + \beta_3 ENVST_{i,t-1} + \beta_4 PRIOR_{i,t-1} + \beta_5 CROSSLIST_{i,t-1} + \beta_6 FOR_OP_{i,t-1} + \beta_7 ENVINDEX_{i,t-1} + \beta_8 ESI_{i,t-1} + \beta_9 CAPX_{i,t-1} + \beta_{10} PPE_NEW_{i,t-1} + \beta_{11} LITIGATION_{i,t-1} + \beta_{12} INSTOWN_{i,t-1} + \beta_{13} TOBINSQ_{i,t-1} + \beta_{14} FINANCING_{i,t-1} + \beta_{15} HERF_{i,t-1} + \beta_{16} LIQUIDITY_{i,t-1} + \beta_{17} ROA_{i,t-1} + \beta_{18} SIZE_{i,t-1} + \beta_{19} LEV_{i,t-1} + \beta_{20} YRCONTROLS$$

¹⁶ Although firm-specific GHG disclosure policies might remain constant across years, we do not find this to be the case. Many times firms chose a disclosure strategy, only to change to a non-disclosure strategy the next year. In contrast, governance structures do remain more consistent, but, as indicated in Table 5, out of 429 unique firms, only 89 have CSOs and 75 have a sustainability committee. Because of the timing of our sample, it was extremely rare for firms to have either of these in place in 2002, making it possible to examine the effects of these relationships since their inception.

We then incorporate a Heckman two-stage model to examine the relationship between our corporate governance variables and the quality of disclosures. This allows us to control for systematic firm-specific factors potentially related to firms that choose GHG disclosure versus all other firms.

****Insert Table 2 here****

Dependent Variable

Prior environmental disclosure research exhibits great latitude in determining the type, level, and quality of disclosure.¹⁷ In the present study, much of the prior literature's latitude in disclosure measurement is controlled by examining the GHG disclosures contained in the CDP questionnaire. This also allows us to ascertain the disclosure determinants of a specific environmental risk, one of particular interest to both market participants and regulators. Each year, firms are sent a questionnaire and asked to respond. Each firm's response is then listed on the CDP's website. This ensures the public is aware of firm participation. The level of disclosure is unambiguous as 'answered the questionnaire – disclosed', 'answered the questionnaire- disclosure declined', 'declined to participate' or 'no response' is listed next to each firm name. This process allows stakeholders to compare and contrast firm responses. In this study, we investigate which firm characteristics are associated with the decision to disclose GHG information. We assign a value of 1 to *DISC* when a firm discloses GHG information, 0 otherwise.

We also incorporate the CDP's own disclosure scoring methodology to assign each firm a disclosure quality score (*QUALITY*). Beginning in 2010, the CDP developed a disclosure quality methodology, in conjunction with PriceWaterhouseCoopers, to determine how well corporations respond to the CDP questions.¹⁸ This taxonomy indicates a level of quality based on the congruence between each firm's

¹⁷ Examples include Ingram and Frazier 1980; Freedman and Jaggi 1982; Wiseman 1982; Freedman and Wasley 1990; Li et al. 1997; Al-Tuwaijri et al. 2004; Clarkson et al. 2008; Hughes et al. 2001; Patten 2002; Cho et al. 2006; Cho and Patten 2007; Hughes et al. 2001; among others.

¹⁸ The authors had several discussions with CDP and PriceWaterhouseCoopers representatives involved in grading firm disclosures about the methodology and its application.

answer provided and the CDP's actual question being asked.¹⁹ *QUALITY* is our continuous dependent variable representing disclosure quality as designated by the CDP's 2010 disclosure rating methodology.

Test Variables

The two variables of interest in evaluating the relationship between corporate governance and GHG disclosure and quality are *COMMITTEE* and *OFFICER*. We lag these variables because the request for participation and actual disclosure happen in different time periods. It is appropriate to analyze the influence of these variables during the actual period when managers make the disclosure decision. We code the existence of an environmental committee of the board of each firm (*COMMITTEE*) as a 1; otherwise as a 0. We search each proxy statement, Form DEF 14a, in SEC filings to determine whether the firm has any committee associated with environmental or sustainability related matters. Titles for environmental committees include, but are not limited to: Public Policy Committee, Sustainability Committee, Corporate Social Responsibility Committee, Environmental Concerns Committee, and Social Welfare Committee. Committee responsibility descriptions, no matter the title, must mention responsibilities related to the environment or corporate sustainability practices.²⁰

The choice to hire a corporate sustainability officer is a substantial investment, as that individual is also likely to oversee a department including other employees focused on sustainability. We search each company by year to determine whether it has a CSO or equivalent position. Information about CSOs and their qualifications are collected from companies' Form 10-K, Lexis-Nexis, and broad internet searches. This position is not limited to a chief officer. Because of the extreme variance in the title associated with

¹⁹ The CDP questionnaire builds upon itself every year, asking firms to disclose greater detail about their GHG strategies, emissions, goals, etc. Because the basic questions remain unchanged with additional questions added each year, the scoring possibilities for each question each year were assigned accordingly. There was not, in accordance with the CDP disclosure quality methodology, judgment used to determine how "environmentally well" a firm responded to a question. Instead, the firm was assigned an allotted score dependent upon the extent they answered each part of the question. Several individuals were involved in the scoring to ensure similarities in disclosure quality assignment.

²⁰ Many firms choose not to develop a stand-alone committee to deal with these issues, but instead assign additional responsibilities to other standing committees. In addition to reading proxy statements for environmental committees, we also examined the responsibilities of standing committees to determine whether sustainability responsibilities were assigned to them. We found this on several occasions and the responsibilities were predominately assigned to the audit committee or the governance committee. On these occasions, firms were also assigned a 1 for *COMMITTEE*.

this position, we search using various key words (Rivenburgh 2010). Searches conducted included the following key words: Sustainability Officer, Environmental Officer, Environmental Director, Environmental Health & Safety Officer, Sustainability Vice President, Corporate Responsibility Officer, Responsibility Officer, and other variants of the same. *OFFICER* is measured as a 1 if the organization employs a sustainability officer, 0 otherwise.

Control Variables

We control for the relative environmental performance of the firm by including *ENVST*. We measure *ENVST* similar to Dhaliwal et al. 2011, using the total KLD Analytics environmental strength score.²¹ We then adjust the raw environmental strength score by the industry medians each, resulting in a firm's relative environmental strength (Dhaliwal 2011; Clarkson et al. 2004). We chose the environmental measure in KLD because it most closely reflects similar activities to GHG measurement. Voluntary disclosure theory predicts a positive association between environmental performance and environmental disclosure (Verrecchia 1983, 2001; Dye 1985). Firms with greater environmental performance will attempt to signal their superiority by disclosing environmental information. In the case of GHG information, with a significant stakeholder demand for climate change information, firms performing better environmentally will likely have GHG mitigating strategies in place and will reveal this information through greater amounts and quality of GHG disclosure.

We control for prior CDP disclosure by including a variable measured as the cumulative amount of prior disclosures (*PRIOR*) and expect a positive relationship between previous disclosure and the current choice to disclose GHG emission accounting information. We also expect a positive relationship between the amount of prior disclosure and the quality of a firm's disclosure. Because the questionnaire expands

²¹ KLD Research & Analytics, Inc. provides an independent rating of corporate social responsibility for public firms. The specific environmental performance ratings are a measurement based on a binary system with 1 representing the existence of a specific environmental strength or weakness and 0 representing the absence of a specific strength or weakness. The environmental rating for firm specific strengths includes the following: beneficial products and services, pollution prevention, recycling, alternative fuels, PPE and other environmental strengths. The environmental rating for concerns includes: hazardous waste, regulatory problems, ozone depleting chemicals, substantial emissions, agricultural chemicals, climate change and other environmental concerns.

each year, a firm having already participated and disclosed is likely to have a process in place to accumulate the necessary information in order to respond (Stanny 2009).

Firms cross-listed on foreign stock exchanges face wider visibility and greater scrutiny by a broader set of investors and regulators (Lang et al. 2003; Reese and Weisbach 2003). The CDP process includes a global sample of firms asked to participate, and U.S. firms that are cross-listed may face greater scrutiny and greater pressures to participate and disclose GHG information.²² *CROSSLIST* controls for firms that are cross-listed on international exchanges, and we expect a positive relationship with the level and quality of GHG disclosure. *CROSSLIST* is assigned a value of 1 if the firm is cross-listed on one of the top six stock exchanges in the world, as measured by domestic market capitalization, and 0 otherwise. We also include *FOR_OP* as a variable indicating a firm's operations overseas (Stanny 2008). Because the CDP asks specific questions regarding a firm's strategy as it relates to EU trading schemes and operations in Kyoto Protocol Annex B countries, we control for companies that might have operations in these particular jurisdictions. *FOR_OP* is measured as a 1 if the firm reports income from foreign operations, 0 otherwise. We expect *FOR_OP* to be positively related to disclosure.

Dye (2001) argues that the presence of sophisticated investors increases disclosure quality by firms. *ENVINDEX* is a control variable measuring the level of firm exposure to environmentally informed stakeholders, or sophisticated investors, as proxied by the firm's presence on environmental or sustainability indices. The greater the firm visibility on sustainability indices, the greater the likelihood those firms will be strategically responsive to environmentally informed stakeholders.²³ We assign a 1 for

²² It is also important to note that many other countries already have mandatory carbon disclosures or carbon markets where cross-listed firms would be expected to compete (although participation with CDP disclosure guidelines remains voluntary).

²³ We create an aggregate measure of *ENVINDEX* by searching for each firm on three separate indices: the Dow Jones Sustainability World Index (DJSWI), the Domini 400 Social Index (DSI) and the FTSE 4Good Index (FTSE4). The DJSI was created in 1999 and is the first global index tracking the financial performance of sustainability focused firms. This index encompasses the top ten percent of the world's largest 2,500 companies in the Dow Jones Global Total Stock Market Index in terms of economic, environmental and social criteria. Firm analysis and ranking is updated annually. The DSI began in May of 1990 as an index of U.S. equities that was the first benchmark created to measure the impacts of environmental, social and governance factors on investment portfolios. Finally, the FTSE4 is an index that measures the economic performance of firms that meet specific responsibility standards, while encouraging investment in those companies. Specifically, firms are recognized for their environmentally and socially responsible activities.

each listing on each index, 0 otherwise. The value range a firm receives for *ENVINDEX* is between 0 and 3. The greater the value for *ENVINDEX*, the greater the firm's environmentally responsible intensity and the greater the expectation they will disclose their GHG information with the CDP. Similarly, we expect firms with a greater *ENVINDEX* value to have greater quality disclosures.

A potentially confounding factor in examining the relationship between firm-specific characteristics and GHG disclosures is the political and social pressures facing firms in certain industries. Following prior environmental accounting literature, we include *ESI* to control for firms included in environmentally sensitive industries (ESI). *ESI* is a dichotomous variable with a value of 1 if the firm belongs to any one of the ESIs, 0 otherwise. Similar to Cho and Patten (2007), the ESI firms are defined as firms belonging to industries with two-digit SIC codes: *OIL* = 13 (oil exploration), *PAPER* = 26 (paper), *CHEMICAL* = 28 (chemical and allied products), *PETROLEUM* = 29 (petroleum refining) or *METALS* = 33 (metals). Verrecchia (1983) argues that firms will not disclose information if the proprietary costs are greater than the expected benefits. Inclusion in any one of these industries creates a greater external expectation and tolerance of negative environmental activities, decreasing the tolerance for nondisclosure. This, in turn, decreases the cost of disclosure. We expect each of these control variables to exhibit a positive association with the likelihood that a firm discloses its CDP responses.

Additional confounding characteristics that may motivate firms to disclose GHG information relates to firm investment in innovations that assist in driving down GHG levels. Prior environmental accounting literature has controlled for these innovative investments by examining the age of a firm's property, plant and equipment and the level of capital expenditures (Clarkson et al. 2008). Firms investing in newer and better GHG emitting technologies are more likely to desire differentiation through disclosure of this information to stakeholders. Similarly, firms with greater capital expenditures are more likely to be invested in GHG innovative technologies and would, again, desire to signal this strategy. We control for the age of a firm's equipment by including *PPE_NEW*, measured as the ratio of net PPE divided by gross PPE. We also control for capital intensity of a firm by including *CAPX*, measured as the ratio of a firm's

capital spending divided by their total sales. Each of these variables is adjusted for the industry median per year.

Skinner (1997) posits that firms facing higher levels of litigation risk are more likely to offer voluntary information in an attempt to mitigate potential lawsuits. Similar to Dhaliwal et al. (2011), we include *LITIGATION* to control for a firm's litigation risk. *LITIGATION* equals 1 if a firm operates in any one of the high litigation industries (SIC codes 2833-2836, 3570-3577, 3600-3674, 5200-5961, and 7370), 0 otherwise (Francis et al. 1994; Matsumoto 2002). Because GHG is considered a potential risk to operations from climate change, those firms in industries of high litigation risk are more likely to voluntarily disclose GHG information.

The CDP was formulated in response to institutional shareholder requests for firm-specific GHG information. Because of the substantial investment, institutional shareholders have an incentive to monitor management behavior in response to firm-specific risks from climate change. Extant literature indicates institutional shareholders play a vital role in corporate governance through the monitoring of management (Shleifer and Vishny 1986). We include *INSTOWN* and assign a value of 1 if the firm is majority owned by institutional investors and expect a positive relationship between institutional ownership and disclosure. We obtain institutional ownership data from the Corporate Library.

We control for the growth opportunities of the firm by including *TOBINSQ*. In growth periods, firms have fewer discretionary resources to contribute towards the measurement and reporting of GHG information, decreasing the motivation for disclosure. Similarly, these firms are less likely to have the funds to place towards the development of new committees and appointment of new officers unless it is truly their competitive strategy. However, these same growth firms face a greater amount of information asymmetry, which would increase the motivation for management to disclose GHG information to signal differentiation to potential investors (Clarkson et al. 2008). *TOBINSQ* is measured as the market value of common equity plus book value of preferred stocks, book value of long term debt and current liabilities, divided by book value of total assets. We then adjust the raw score by industry median each year. We do not predict the direction of the growth and disclosure relationship.

Prior research suggests firms needing to raise capital will have a greater incentive to disclose good news (Frankel et al. 1995; Barth et al. 1997). We include *FINANCING* to control for the external financing needs of the firm prior to disclosure. Similar to Richardson et al. (2004) and Dhaliwal et al. (2011), *FINANCING* is measured as the sale of common and preferred shares of stock minus the purchase of common and preferred shares of stock, plus the long-term debt issuance minus the long-term debt issuance, adjusted for the industry median for each year.

From an economic theory perspective, perfectly competitive markets differentiate firms based solely upon price. In contrast, industry concentrations create opportunities for firm differentiation, abnormal profits and competitive advantages (Harris 1998). As such, disclosure choices give managers opportunities to manage their own public image among competitors, regulators, and consumers within the industries. This is also consistent with Narver's (1971) suppositions that environmental disclosure choices signal management's attempts for positive differentiation and market gain to the product markets. Therefore, we expect firms in more concentrated industries to face greater incentives to disclose GHG information. *HERF* represents the measure of industry concentration, where higher values of *HERF* indicate greater industry concentration (Harris 1998). *HERF* is calculated as follows:

$$HERF_j = \left(\sum_{i=1}^n (Sales_{ij} / Sales_j)^2 \right) * -1$$

where $Sales_{ij}$ is company i 's sales in industry j , as defined by four-digit SIC codes. $Sales_j$ is the sum of sales for all companies in industry j and n is the number of companies in industry j . Following the related hypothesis, we expect managers of companies involved in higher concentration (i.e., less competitive) industries are more likely to disclose GHG information.

In addition to the firm's differentiation benefits from voluntary disclosure, management also has particular interest in the personal benefits of increasing the liquidity of their stock price in order to issue equities or sell shares of their firm stock obtained as part of their compensation plans. By increasing the amount and quality of GHG voluntary disclosure, management can magnify firm transparency (Dhaliwal et al. 2011). We control for the liquidity of a firm's stock by including *LIQUIDITY* and measure it as the

ratio of the number of shares traded in the year to the total shares outstanding at the end of the year, adjusted for industry medians by year.

As previously stated, firms must have a significant allotment of resources to manage, measure and report carbon emissions. As such, firms with greater financial performance are likely to have the available resources to participate and report GHG information. Accordingly, we control for firm performance by including *ROA*, measured as the income before extraordinary items, divided by total assets at the beginning of each year and adjusted for the industry median by year. Following prior accounting literature, we also include *SIZE*, calculated as the natural log of total sales adjusted for industry medians each year, to control for the size of the firm. Larger firms are likely to draw greater attention from stakeholders and have greater amounts of free resources to invest in capital intensive projects (Lang and Lundholm 1993); therefore, we expect a positive relationship between size and GHG disclosure.

As a firm's level of debt increases, the market monitoring mechanism requires greater amounts and quality of information. This information demand creates a greater incentive for managers to voluntarily disclose information. Therefore, we include a firm's leverage (*LEV*), as measured by total debt divided by total assets adjusted for industry each year, and expect it to be positively associated with a firm's overall amount of disclosure (Leftwich et al. 1981). Finally, we include, but do not provide tabulated results for, control variables for each year of the CDP in our sample *YR02*, *YR03*, *YR04* and *YR05* to control for systematic year effects.

Environmental Committee and Sustainability Officer Characteristics

As a secondary analysis we investigate whether specific characteristics of the environmental committee and sustainability officer increase the likelihood and quality of firm-specific GHG reporting (summarized in Table 2, Panel B, and described as follows). Similar to prior literature, we measure *COMMSZ* as the number of individuals serving on the environmental committee (e.g. Kalbers and Fogarty 1993; Farber 2005). We also include *COMMED*, measured as the number of environmental committee members adjusted for the median number of committee members for all environmental committees in the sample. We evaluate the relationship between the diligence of the committee and GHG

disclosure by incorporating a measurement for the number of meetings that the environmental committee held during the fiscal year (*COMMET*). We expect a positive relationship between environmental committee size and meetings and the likelihood of GHG disclosure as well as disclosure quality.

We also anticipate greater expertise (*COMEXP*) in sustainability issues to be associated with an increased likelihood of participation in and disclosure quality of GHG information. Consistent with prior corporate governance literature (e.g. Abbott et al. 2004), we assign a value of 1 to *COMEXP* if there is an expert on the committee, 0 otherwise. Similar to Dixon-Fowler et al. (2010), we measure committee member expertise as a director currently or previously employed in an environmental governing agency, a non-governmental organization (NGO), or a director who also holds environmental directorships in other organizations. Additionally, these individuals can be academics or scientists with research in, or work relating to, environmentally related disciplines.²⁴ We also measure expertise on the committee using *COMXPRT*, which represents the ratio of sustainability experts assigned to the committee in relation to the total number of committee members.

In addition to committee members, we also evaluate the expertise of the CSO position and measure *OFFEXP* as 1 if the firm employs a sustainability officer and the officer has a background in environmental issues. We then create the variable *OFFNOEXP* and measure this as a 1 if the firm has a sustainability officer, but the officer does not possess expertise in environmental issues (the remaining intercept captures the firms who do not employ a CSO position). The determination of expert for the officer is similar to the process we employ for the committee members, except that it focuses more on education and experience. Executive qualifications in the form of degrees, certifications, and work experience is very common in accounting literature as it relates to management turnover, restatements, earnings management, etc. We expect to find a positive relationship between *OFFEXP* and the amount and quality of GHG disclosure.

²⁴ An example from a director assigned to environmental committees with both Ashland, Inc. and International Paper includes the fact that this individual was the founder and Chairman Emeritus of The Conservation Fund, a NGO dedicated to conserving America's natural and historic heritage and a former president of The Nature Conservancy from 1973-1980.

Due to the diverse nature of sustainability (i.e. environmental, social, and economic), a diverse knowledge base is expected to assist in understanding and strategizing around sustainability initiatives. When members of the audit committee also serve on the environmental committee, the economic/financial expertise is expected to spill over into the environmental committee. The combination of economic and sustainability knowledge possessed by these members will increase the understanding of disclosure issues and innovative participation in sustainability initiatives. We examine this relationship by including three different variables for committee overlap. We measure *COMOVL* as the existence of an overlap between the audit committee and the environmental committee. We measure *COMNUOV* as the total number of overlaps between the two committees and *COMOVRT* as the ratio of overlaps to the total number of environmental committee members. We expect a positive relationship between overlap and the choice to measure and disclose GHG information. Additionally, we expect a positive relationship between committee overlap and disclosure quality.

V. RESULTS

Table 3 presents descriptive statistics related to the CDP sample. Panel A includes the general characteristics and Panel B provides the characteristics of the environmental committees and CSOs in the sample. The disclosure rate for the entire sample period is approximately 44 percent, with the average quality of disclosure (of the firms disclosing) at a 47 percent rating. Approximately 18 percent of the firms utilized an environmental committee (*COMMITTEE*), while twenty one percent of firms employed a sustainability officer. Environmental performance for the firms in this sample is also quite low, with a range of 0 to 4; the average environmental strength rating is 0.396.²⁵ A small number of firms had disclosed GHG information with the CDP in previous years, with a range between 0 and 4 and a mean value of only 0.517. The CDP sample also exhibits a small number of cross-listed firms, with a mean value of only 0.121. Almost two-thirds of our sample report foreign income (0.656). On average, firms are listed on at least one out of three possible sustainability indices and are not likely to belong to an environmentally sensitive industry (0.204). Similarly, it appears most firms do not operate in high-

²⁵ All industry adjusted independent variables are presented in raw form in the descriptive statistics.

litigation industries (mean = 0.291) and have less debt (0.218). Institutional ownership appears to be pervasive among CDP firms (mean = 0.905). The average firm size is reflective of the CDP requesting participation from the largest firms in each country.

Panel B provides a breakdown of the committee and officer characteristics. On average, the committees contain 4.7 members. The mean number of meetings is 3.3. Approximately 9 percent of firms had committees that included members with sustainability expertise. The ratio of experts on the committee ranged from 0 to 75 percent with a mean of 10 percent. Approximately 13 percent of firms had committees that included overlapping members with the audit committee. The average number of member overlaps per committee is 1.7. The average percentage of overlap between the environmental and audit committee members is 15 percent. Approximately 12 percent of firms employing sustainability officers, chose to hire officers with sustainability expertise.

Insert Table 3 here

As previously discussed, the composition of the CDP's respondent list varies slightly from year to year. Table 4 presents the annual sample size and the associated disclosure rates. A breakdown of specific firm responses, including an indication of the rate of disclosure for each response, is included. In 2002, the disclosure rate is 22 percent, increasing to 58 percent by 2004. This is indicative of the initial years of the project. The addition of many new firms unfamiliar with the GHG measurement process in 2005 brings the disclosure rate down to 40 percent, followed by an increase in 2006 to 53 percent. Of the total disclosures made over the sample period, the majority of the firms answered the questionnaire in full as opposed to providing a smaller set of information. Approximately 40 percent of firms chose to refrain from any type of response (i.e. declined to participate or provided no response).

Insert Table 4 here

Table 5 indicates the timing of environmental committee implementation and CSO hiring in relation to GHG disclosure and in relation to one another. It is fairly common for firms to hire a CSO and develop a committee prior to the decision to disclose. In the sample, a CSO was hired 68 times before disclosure, as opposed to 21 times where the company disclosed GHG information prior to hiring the CSO.

Similarly, firms developed environmental committees 71 times before disclosing GHG information and only 4 times after disclosure. The table also indicates that, when these firms have both an officer and a committee and they are not developed or hired during the same year, it appears firms are more likely to establish the committee prior to hiring a CSO. Sharing these governance structures is rare. Most firms, during our sample period, only have one or the other.

****Insert Table 5 here****

Table 6 presents the univariate results and indicates there is a significant difference between the number of environmental committees and sustainability officers in firms that disclose versus those that do not disclose GHG accounting information with the CDP. Both environmental committees and sustainability officers are significantly more common among disclosing firms. Disclosing firms also have significantly better environmental performance than non-disclosing firms. Firms disclosing GHG information are significantly more likely to have participated and disclosed before, are more likely cross-listed, have foreign operations, are on sustainability indices, and are larger. Disclosing firms are also more likely to belong to an environmentally sensitive industry and less likely to belong to a high risk litigation industry. Disclosers appear to exhibit majority ownership by institutional shareholders. Disclosing firms are statistically more likely to establish more active and diligent committees and appoint executive officers with greater environmental expertise. Table 7 presents the Pearson correlations.²⁶

*****Insert Table 6 here*****

*****Insert Table 7 here*****

Table 8 presents the results of the probit (DISC) and Heckman two-stage (QUALITY) regression analyses. The disclosure quality (QUALITY) analysis examines a smaller sample (N = 549) of only those firms that choose to disclose GHG information. *IMR* is the variable representing the Inverse Mills Ratio. This ratio is significant, indicating it is necessary to control for sample selection bias when evaluating the

²⁶ With the significance associated with some of the independent variables in our analysis, there is the possibility of incorrect inferences due to multicollinearity. All independent variables are evaluated for multicollinearity and variance inflation factors are below the stringent logistic regression threshold of 2 (well below the regression threshold of 10).

quality of GHG disclosures. Governance variables of interest are both significant and in the anticipated direction. In support of H1a, firms with an environmental committee (COMMITTEE) are more likely to disclose their GHG emission accounting information ($p \leq .05$). Results also indicate a sustainability officer is associated with greater propensity to disclose GHG emissions information, supporting H2a. In both cases, the pressure to disclose GHG emission information appears to outweigh the proprietary nature of the information. In relation to the quality of these disclosures, firms that disclose GHG accounting information and have a sustainability committee have greater quality disclosures. Similarly, a stronger relationship exists between firm CSOs and the quality of disclosure ($p \leq .01$), supporting H2a and H2b. These results indicate that firms strategically committing to sustainability endeavors, by hiring the appropriate personnel and strengthening their governance, are the same firms measuring and disclosing their GHG information and the same firms providing better quality disclosures to investors. Results also support public claims that increased executive level and board committee support will strengthen a firm's commitment to climate change risk mitigation.²⁷

Similar to evidence from the univariate results, firms with greater environmental performance are significantly more likely to disclose GHG emission accounting information and provide greater quality disclosures. Firms previously participating in CDP disclosure are also more likely to disclose in the current year, but for firms choosing disclosure, prior participation does not increase the quality of those disclosures. As expected, cross-listed firms are significantly more likely to disclose GHG information as well ($p \leq .01$); however, being listed on foreign exchanges appears to actually be associated with reduced disclosure quality. Surprisingly, firms on sustainability indices and firms with greater institutional ownership concentration are not associated with greater amounts of disclosure, but do exhibit significantly lower quality disclosures. As expected, firms in ESIs have greater latitude to disclose climate change information, so these firms are more likely to disclose information and it is of better quality. In

²⁷ Prior literature finds that the existence of an environmental committee is related to the decision to hire a Chief Sustainability Officer (Atherton et al. 2010). Because there is a possibility of an interrelationship in this model, we test for endogeneity between these two independent variables and the choice to disclose GHG emissions. Results indicate *COMMITTEE* and *OFFICER* are exogenous independent variables in relation to the analysis of GHG disclosures and therefore do not unduly influence the dependent variable.

partial support of prior literature, firms in high litigation industries and firms with greater financial performance appear to be less likely to disclose GHG emissions, but once they do choose disclosure, they have better quality disclosures. Both firms operating in industries with greater concentration (i.e. less competition) and larger firms are associated with greater levels of voluntary GHG disclosure, but these firm attributes do not appear to affect disclosure quality. Finally, in support of prior literature, firms going to the markets for financing are more likely to disclose GHG information.²⁸

Insert Table 8 here

Table 9 provides further analysis of association between disclosure and the specific characteristics of the environmental committees. Columns 1 – 8 represent the results when COMMITTEE is replaced with the individual committee characteristics (COMMSZ, COMMED, COMMET, COMEXP, COMXPRT, COMOVLP, COMNUOV, and COMOVRT). The size and activity of the committee are associated with an increased likelihood of the firm's management to measure and report GHG information (*COMMSZ* \leq .05, *COMMED* \leq .10 and *COMMET* \leq .05). Similar to prior accounting literature on audit committees, the size and activity of the committee create a greater knowledge base and a more diligent monitoring effect that are associated with better GHG measurement and reporting performance. We also evaluate the expertise of the environmental committee and, again, find results similar to prior accounting literature. The presence of an overall sustainability expert on the environmental committee is not associated with greater disclosure (*COMEXP* $z = 0.89$) when we merely count the number of experts represented on the committee. However, when we measure expertise using a ratio of experts to total members, we do find a significant relationship ($p \leq .05$). Greater expertise on the environmental committee increases the likelihood of GHG disclosure, especially when that expertise dominates participation.

Table 9 also reveals the results from analyzing the effects of the knowledge spillover from the audit committee and environmental committee overlap. Due to the knowledge required to understand both the

²⁸ In an attempt to address any bias in significant findings, we also analyze the likelihood of disclosure taking out those firms considered 'no response' firms. While we believe these firms are signaling their decision not to participate in a GHG reporting strategy, we remove them and evaluate the sample again. Untabulated results indicate the variables of interest remain significant and in the anticipated direction.

complexities of corporate disclosure and the implementation of sustainability strategies, we anticipate firms with greater overlap between the audit committee and the environmental committee will have greater monitoring abilities. In turn this should lead to a higher likelihood GHG measurement and disclosure. The overlap between the committees is associated with greater sustainability initiative involvement where GHG measurement is concerned. All three variables representing overlap (*COMOVLP*, *COMNUOV*, and *COMOVRT*) are positively associated with CDP GHG disclosure. All control variable relationships are similar to the main analysis. Additionally, the existence of a sustainability officer remains positively significant throughout this entire analysis.

Insert Table 9 here

Table 10 examines the relationship between the same independent committee and officer activity and expertise variables, but in relation to the quality of a firm's GHG disclosure. Similar to the previous analysis, the CSO variable remains extremely significant throughout the quality analysis. The only environmental committee characteristic variables that appear to motivate increased disclosure quality are those associated with expertise on the committee. Both the existence of environmental expertise on the environmental committee and the ratio of environmental experts in relation to the total size of the committee significantly influence GHG disclosure quality (*COMEXP* and *COMXPRT* $\leq .01$). In sharp contrast to expectations, among firms that disclose GHG emissions, those with larger environmental committees exhibit a significantly negative relationship to the quality of disclosure (*COMMED* $\leq .10$). These findings are consistent with Yermack (1996) who finds that firms with larger board of directors perform worse than firms with smaller boards. It appears committees with a greater number of members may have knowledge and opinions at odds with one another, resulting in lesser quality disclosure. All control variable relationships are similar to the main analysis.

Insert Table 10 here

Table 11 reveals sustainability expertise is also an important attribute of sustainability officers. Firms employing sustainability officers with expertise (*OFFEXP*) are significantly more likely to measure and disclose GHG information ($p \leq .01$), and that information is statistically of greater quality ($p \leq .01$). It

is important to note when a firm has a sustainability officer that does not possess expertise in sustainability, there is no relationship with the decision to disclose or with disclosure quality. In other words, these firms are not different from firms that do not employ a sustainability officer. These results appear to support anecdotal evidence suggesting firms with experienced sustainability officers are more inclined towards a proactive corporate sustainability strategy, which likely includes GHG reporting. The results also indicate that in the presence of an expert sustainability officer, having an environmental committee continues to be a factor in GHG disclosure ($p \leq .01$) and in higher disclosure quality ($p \leq .10$). It is important to note that throughout each of our analyses, firm size has a significant influence in the decision to disclose, but does not affect disclosure quality.

Insert Table 11 here

Limitations and Discussion

This study is an early attempt to examine sustainability corporate governance characteristics in association with GHG disclosure. Similar to extant corporate governance research, our findings are subject to specific limitations. To address these issues, we incorporate specific research designs to mitigate certain concerns. Endogeneity could potentially affect our regression results. We combat this issue by incorporating lagged independent variables. As such, our variables capture whether the prior existence of environmental committee and sustainability officer is associated with future period disclosures. As mentioned earlier, we also control for past disclosure and provide robust standard error estimates by clustering based on firm.

To our knowledge, this is one of the first studies to consider the specific characteristics of environmental committees and sustainability officers in an accounting setting. While we view this as an important contribution, we recognize that there are likely other possible ways to identify or measure such governance characteristics. We have attempted to design the governance variables in ways that are consistent with prior corporate governance research. To date, there are no resources available to identify every CSO-related position, environmental committees or similar positions with different names. There are possible oversights in the identification of CSOs and environmental committees, although we were

Careful to follow prior accounting literature for common archival coding procedures. We believe we were conservative in our inclusion of CSOs and environmental committees. Moreover, to the extent we have not included unobservable CSO-related positions or environmental committees, our tests should bias us away from our findings. Based upon discussions with CSOs in the field, future research may benefit the development of commonly used CSO activities and positions in practice. Similar to the development of the audit committee literature, we consider these areas to be fruitful areas of future research.

VI. CONCLUSION

Regulators increasingly express concern over deficiencies in corporate disclosures concerning risks to operations. In the absence of prior research examining the relationship between corporate governance and risk disclosures, it is important to understand what factors contribute to voluntary, firm-specific risk information. Because the SEC's recent interpretive guidance acknowledges climate change as a specific risk companies face, our study investigates the relationship between governance and risk disclosures by investigating whether sustainability corporate governance characteristics are associated with an increased likelihood and quality of voluntary disclosure of corporate GHG accounting information. We extend the accounting literature by examining the potential role of corporate governance mechanisms in relation to the propensity of voluntary disclosure and disclosure quality of risk information. We also extend prior environmental accounting literature by examining additional factors associated with GHG accounting disclosures. The CDP setting provides a unique opportunity to understand how sustainability-oriented corporate governance mechanisms might influence disclosure.

Our study answers the call from prior literature to extend analysis from the effects of other types of corporate governance on other forms of accounting reporting (Carcello et al. 2011). Using a sample of firms participating in the Carbon Disclosure Project (CDP) from 2002 through 2006, we find that GHG disclosure and disclosure quality are positively associated with the presence of environmental committees on boards of directors and corporate sustainability officers (CSOs). Results indicate that the existence of

an environmental committee and a sustainability officer are associated with the likelihood and quality of GHG disclosures. Pressures officers face to disclose GHG information appears to outweigh fears of its proprietary nature. Additional environmental characteristics associated with the probability of disclosure are committee size, number of committee meetings, expertise of committee members, overlap between the environmental committee and the audit committee, and CSO expertise. Only expertise of the environmental committee members and CSO expertise are associated with better quality GHG disclosures, while larger committees tend to be associated with lower quality disclosures. This evidence is also consistent with the overall rigor or composite design of the environmental committee influencing voluntary disclosure and the firm's environmental transparency.

Our results suggest, analogous to the relationship between audit committees and financial reporting, that firms should also consider the impact of sustainability-oriented corporate governance mechanisms in responding to the call of regulators and stakeholders for greater transparency of corporate climate risks. These results are also important for practitioners as the increasing need for accounting expertise in the area of sustainability measurement, reporting and assurance continues to rise.

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TABLE 1
Sample Selection
2002-2006

	Firms
All firms observations invited to participate in the Carbon Disclosure Project questionnaire process	1620
Less:	
Firm year observations without Compustat data available	(47)
Firm year observations in the finance/banking industry	(174)
Firm year observations KLD Analytics data available	(36)
Firm year observations without Proxy information	(26)
Firm year observations without Corporate Library governance information	(49)
Firm year observations lacking at least two observations in an industry for a given year	(50)
Total firm year observations available	1238

TABLE 2
Variable Descriptions

Panel A: Primary Test Variables

<i>DISC</i>	=	1 if the firm discloses GHG disclosure response, 0 otherwise;
<i>QUALITY</i>	=	disclosure quality rating based on the CDP 2010 disclosure rating methodology;
<i>COMMITTEE</i>	=	1 if the firm's board committees includes an environmental committee, or environmental responsibilities assigned to a standing board sub-committee, 0 otherwise;
<i>OFFICER</i>	=	1 if the firm's management includes a sustainability officer, 0 otherwise;
<i>ENVST</i>	=	a firm's total environmental strength score obtained from KLD Analytics, adjusted for industry median each year.
<i>PRIOR</i>	=	the firm's cumulative number of previous disclosures;
<i>CROSSLIST</i>	=	1 if the firm is cross-listed on a foreign stock exchange, 0 otherwise;
<i>FOR_OP</i>	=	11 if the firm reports foreign income, 0 otherwise;
<i>ENVINDEX</i>	=	aggregate firm score for inclusion on three distinct sustainability indices;
<i>ESI</i>	=	1 if the firm belongs to any one of five environmentally sensitive industries (two-digit SIC codes of 13, 26, 28, 29, 33), 0 otherwise;
<i>CAPX</i>	=	a firm's capital intensity measured as the ratio of total capital spending to total sales, adjusted for industry median each year;
<i>PPE_NEW</i>	=	the newness of a firm's assets measured as the ratio of net PPE to gross PPE, adjusted for industry median each year;
<i>LITIGATION</i>	=	1 if the firm operates in any one of the high-litigation industries (SIC codes of 2833-2836, 3570-3577, 3600-3674, 5200-5961, and 7370), 0 otherwise;
<i>INSTOWN</i>	=	1 if the majority of the firm's ownership is institutional ownership, 0 otherwise;
<i>TOBINSQ</i>	=	growth measured as the market value of common equity plus book value of preferred stocks, book value of long term debt and current liabilities, divided by book value of total assets, adjusted by industry median each year;
<i>FINANCING</i>	=	amount of debt or equity capital raised by the firm during the year, scaled by total assets of that year and adjusted by industry median each year;
<i>HERF</i>	=	a firm's level of competition measured as the sum of the squares of each individual firm's market share, multiplied by -1;
<i>LIQUIDITY</i>	=	the ratio of the number of shares traded in the year to the total shares outstanding at the end of the year, adjusted for industry medians by each year;
<i>ROA</i>	=	return on assets measured as the ratio of income before extraordinary items to total assets at the beginning of each year, adjusted for industry medians each year;
<i>SIZE</i>	=	natural log of total sales, adjusted for industry medians each year;
<i>LEV</i>	=	ratio of total debt to total assets, adjusted for industry medians each year.

Panel B: Environmental Committee and Sustainability Officer Characteristics

<i>COMMSZ</i>	=	the number of individuals serving on the environmental committee of the board of directors;
<i>COMMED</i>	=	the number of the firm's environmental committee members adjusted for the median of all environmental committee members;
<i>COMMET</i>	=	the number of meetings the environmental committee held during the fiscal year;
<i>COMEXP</i>	=	1 if the environmental committee includes a sustainability expert, 0 otherwise;
<i>COMXPRT</i>	=	the ratio of experts to total environmental committee members;
<i>COMOVL</i>	=	1 if the environmental committee includes an individual whom also serves on the audit committee, 0 otherwise;
<i>COMNUOV</i>	=	the number of overlaps between the environmental committee and the audit committee;
<i>COMOVRT</i>	=	the ratio of overlapping members between the environmental and audit committees compared to the total members on the environmental committee;
<i>OFFEXP</i>	=	1 if the firm's sustainability officer is an expert, 0 otherwise;
<i>OFFNOEXP</i>	=	1 if the firm's sustainability officer is not an expert, 0 otherwise;

TABLE 3
Descriptive Statistics

PANEL A – Main Model Variables

Variable	N	Mean	Median	Max	Min	Std Dev
<i>DISC</i>	1238	0.443	0	1	0	0.497
<i>QUALITY</i>	549	0.466	0.52	0.98	0.00	0.277
<i>COMMITTEE</i>	1238	0.179	0	1	0	0.384
<i>OFFICER</i>	1238	0.210	0	1	0	0.407
<i>ENVST</i>	1238	0.396	0	4	0	0.775
<i>PRIOR</i>	1238	0.517	0	4	0	0.928
<i>CROSSLIST</i>	1238	0.121	0	1	0	0.326
<i>FOR_OP</i>	1238	0.656	1	1	0	0.475
<i>ENVINDEX</i>	1238	0.961	1	3	0	0.815
<i>ESI</i>	1238	0.204	0	1	0	0.404
<i>CAPX</i>	1238	0.070	0.042	1.191	0	0.091
<i>PPE_NEW</i>	1238	0.516	0.513	1.773	0	0.165
<i>LITIGATION</i>	1238	0.291	0	1	0	0.454
<i>INSTOWN</i>	1238	0.905	1	1	0	0.294
<i>TOBINSQ</i>	1238	3.161	1.577	98.394	0.105	6.252
<i>FINANCING</i>	1238	-211.732	-221.500	58,723	-7,712	3,673
<i>HERF</i>	1238	-0.057	-0.037	-0.010	-0.382	0.064
<i>LIQUIDITY</i>	1238	1.966	1.494	18.900	0.542	1.500
<i>ROA</i>	1238	0.066	0.064	0.503	-0.136	0.073
<i>SIZE</i>	1238	9.181	9.193	12.754	6.743	1.165
<i>LEV</i>	1238	0.218	0.209	0.892	0	0.157

PANEL B – Corporate Governance Quality Variables

Variable	N	Mean	Median	Max	Min	Std Dev
<i>COMMSZ</i>	222	4.770	5	9	1	1.384
<i>COMMED</i>	222	0.770	1	5	-3	1.387
<i>COMMET</i>	222	3.266	3	10	1	1.351
<i>COMEXP</i>	1238	0.093	0	1	0	0.290
<i>COMXPRT</i>	222	0.104	0	0.75	0	0.153
<i>COMOVLV</i>	1238	0.129	0	1	0	0.338
<i>COMNUOV</i>	222	1.658	1	7	0	1.492
<i>COMOVRT</i>	222	0.153	0.167	1.00	0	0.120
<i>OFFICEREX</i>	1238	0.118	0	1	0	0.323
<i>OFFICERNOEXP</i>	1238	0.084	0	1	0	0.289

*All industry adjusted independent variables are presented in raw form for descriptive statistics.

**All continuous corporate governance quality variables descriptive statistics are presented for the sample of those firms that have environmental committees only.

TABLE 4
Breakdown of Disclosure Sample by Year

Year	N	Disclose	% of Sample by Year Disclosure	Answered Questionnaire-Permission to Disclose Granted	Answered Questionnaire-Permission to Disclose Denied	Provided Information Permission to Disclose Granted	Provided Information Permission to Disclose Denied	Declined to Participate	No Response
2002	151	33	.22	33	15	0	18	41	44
2003	161	69	.43	62	10	7	14	37	31
2004	161	94	.58	86	16	8	14	16	21
2005	382	151	.40	126	55	25	13	18	145
2006	383	202	.53	185	46	17	4	48	83
Total	1238			492	142	57	63	160	324
% of each response to total N				39.7%	11.5%	4.6%	5.1%	12.9%	26.2%

Table 5
Evaluation of the timing between CSO hire and Environmental Committee development
and the relation of these corporate governance structures to the timing of GHG disclosures

N = 1238	Officer	Committee
Total	260	222
Unique	89	75
<i>In comparison to disclosure timing:</i>		
Before Disclosure	68	71
After Disclosure	21	4
<i>In comparison to development of officer/committee counterpart position(if within same firm):</i>		
Before	2	5
After	5	2

TABLE 6
Univariate Results

Variables	Disclose (n=549) Mean	Non- Disclose (n=689) Mean	t-stat		Disclose (n=549) Median	Non- Disclose (n=689) Median	Median z-stat ^a	
<i>COMMITTEE</i>	0.2750	0.1030	-8.03	***	-	-		
<i>OFFICER</i>	0.3315	0.1132	-9.71	***	-	-		
<i>ENVST</i>	0.6594	0.1858	-11.21	***	0	0	-11.18	***
<i>PRIOR</i>	1.0237	0.1132	-19.64	***	1	0	-18.31	***
<i>CROSSLIST</i>	0.2040	0.0552	-8.18	***	-	-		
<i>FOR_OP</i>	0.7013	0.6197	-3.01	***	-	-		
<i>ENVINDEX</i>	1.0055	0.9260	-1.54		1	1	-2.05	**
<i>ESI</i>	0.2696	0.1524	-5.13	***	-	-		
<i>CAPX</i>	0.0812	0.0601	-4.05	***	0.0364	0.0512	-7.84	***
<i>PPE_NEW</i>	0.5246	0.5083	-1.72	*	0.5090	0.5213	-1.45	
<i>LITIGATION</i>	0.2532	0.3208	2.61	***	-	-		
<i>INSTOWN</i>	0.9235	0.8897	-2.01	**	-	-		
<i>TOBINSQ</i>	2.6529	3.5652	2.57	***	1.7111	1.4447	3.99	***
<i>FINANCING</i>	-177.20	-239.25	-0.30		-179.10	-301.91	2.95	***
<i>HERF</i>	0.0481	0.0637	4.32	***	0.0382	0.0342	6.26	***
<i>LIQUIDITY</i>	1.7345	2.1418	4.83	***	1.6702	1.2655	6.83	***
<i>ROA</i>	0.0640	0.0681	1.00		0.0663	0.0619	1.02	
<i>SIZE</i>	26,966	14,385	-6.37	***	7,665	12,370	-8.96	***
<i>LEV</i>	0.2368	0.2029	-3.80	***	0.1792	0.2302	-4.32	***
<i>COMMSZ</i>	1.3188	0.4862	-7.75	***	0	0	-7.82	***
<i>COMMED</i>	0.2188	0.0740	-3.87	***	0	0		
<i>COMMET</i>	0.9107	0.3266	-7.58	***	0	0	-7.86	***
<i>COMEXP</i>	0.1384	0.0566	-4.97	***	-	-		
<i>COMXPRT</i>	0.0302	0.0093	-4.82	***	0	0	-4.96	***
<i>COMOVL</i>	0.1967	0.0754	-6.37	***	-	-		
<i>COMNUOV</i>	0.4481	0.1771	-5.34	***	0	0	-6.33	***
<i>COMOVRT</i>	0.0422	0.0158	-6.00	***	0	0	-6.36	***
<i>OFFICEREX</i>	0.2113	0.0435	-9.40	***	-	-	-9.09	***
<i>OFFICERNOEXP</i>	0.1202	0.0697	-3.07	***	-	-	-3.06	***
<i>COMMST</i>	0.8045	0.2714	-10.20	***	0	0	-10.96	***

^a Tests of differences in medians are not presented for dichotomous variables.

TABLE 7
Correlation Coefficients for GHG Disclosure (n = 1238)

	<i>DISC</i>	<i>QUALITY</i>	<i>COMMITTEE</i>	<i>OFFICER</i>	<i>ENVST</i>	<i>PRIOR</i>	<i>CROSSLIST</i>	<i>FOR_OP</i>	<i>ENVINDEX</i>
<i>QUALITY</i>	0.783***								
<i>COMMITTEE</i>	0.223***	0.274***							
<i>OFFICER</i>	0.263***	0.357***	0.260***						
<i>ENVST</i>	0.304***	0.404***	0.338***	0.351***					
<i>PRIOR</i>	0.487***	0.556***	0.232***	0.341***	0.448***				
<i>CROSSLIST</i>	0.227***	0.258***	0.265***	0.343***	0.152***	0.263***			
<i>FOR_OP</i>	0.085***	0.099***	0.117***	0.131***	0.206***	0.120***	0.160***		
<i>ENVINDEX</i>	0.044	0.048*	0.006	0.158***	0.130***	0.100***	0.021	0.103***	
<i>ESI</i>	0.144***	0.216***	0.233***	0.157***	0.181***	0.156***	0.125***	0.224***	0.011
<i>CAPX</i>	0.039	0.040	-0.027	-0.005	0.034	0.012	0.013	0.009	0.044
<i>PPE_NEW</i>	-0.002*	-0.015	-0.092***	-0.030	-0.034	0.024	0.049*	0.047*	0.037
<i>LITIGATION</i>	-0.074***	-0.025	-0.142***	0.063**	-0.008	-0.041	-0.042	0.074***	0.156***
<i>INSTOWN</i>	0.057**	0.027	0.001	0.067**	0.070***	0.086***	0.036	0.072***	0.029
<i>TOBINSQ</i>	-0.078**	-0.052*	-0.092***	-0.063*	-0.087***	-0.076***	-0.069**	0.027	0.002
<i>FINANCING</i>	0.003	-0.010	0.028	-0.034	0.008	-0.052*	0.050*	-0.024	-0.089***
<i>HERF</i>	0.122***	0.134***	0.013	0.039	0.084***	0.095***	0.032	0.072***	0.006
<i>LIQUIDITY</i>	-0.111***	-0.111***	-0.076***	-0.106***	-0.062**	-0.126***	-0.133***	0.025	-0.042
<i>ROA</i>	-0.016	-0.004	-0.032	0.036	-0.021	0.030	0.048*	-0.003	0.029
<i>SIZE</i>	0.286***	0.323***	0.258***	0.346***	0.317***	0.387***	0.372***	0.126***	0.154***
<i>LEV</i>	-0.006	-0.004	0.043	0.035	0.051*	-0.030	0.056**	0.001	-0.054*

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TABLE 7 (CONTINUED)
Correlation Coefficients for GHG Disclosure (n = 1462)

	<i>ESI</i>	<i>CAPX</i>	<i>PPE_NEW</i>	<i>LITIGATION</i>	<i>INSTOWN</i>	<i>TOBINSQ</i>	<i>FINANCING</i>	<i>HERF</i>	<i>LIQUIDITY</i>	<i>ROA</i>	<i>SIZE</i>
<i>QUALITY COMMITTEE OFFICER</i>											
<i>ENVST PRIOR CROSSLIST FOR_OP ENVINDEX</i>											
<i>ESI</i>											
<i>CAPX</i>	0.109***										
<i>PPE_NEW</i>	-0.008	-0.155***									
<i>LITIGATION</i>	0.073***	0.030	0.131***								
<i>INSTOWN</i>	0.103***	-0.000	0.036	0.044							
<i>TOBINSQ</i>	0.055**	-0.004	0.011	0.009	-0.014						
<i>FINANCING</i>	-0.032	0.097	0.091***	-0.064**	-0.019	0.012					
<i>HERF</i>	0.200***	0.062**	0.002	-0.184***	-0.031	0.050*	0.003				
<i>LIQUIDITY</i>	0.013	0.079***	0.111***	0.111***	-0.018	0.129***	0.050*	0.039			
<i>ROA</i>	-0.019	-0.024	0.006	-0.051*	0.125***	0.175***	-0.059**	-0.042	-0.079***		
<i>SIZE</i>	-0.032	-0.043	0.026	0.016	-0.012	-0.225***	-0.060**	-0.050*	-0.367***	-0.002	
<i>LEV</i>	-0.084***	0.029	0.009	-0.081***	-0.107***	-0.017	0.199***	0.021	-0.031	-0.234***	0.062**

***, **, and * denotes significance at the 1%, 5%, and 10% levels, respectively.

TABLE 8
GHG Disclosure Determinants - Cross-Sectional Probit Regression, Clustering on Firm and Heckman Sample Selection Model

$$\begin{aligned}
 DISC_{i,t} = & \beta_0 + \beta_1 COMMITTEE_{i,t-1} + \beta_2 OFFICER_{i,t-1} + \beta_3 ENVST_{i,t-1} + \beta_4 PRIOR_{i,t-1} + \\
 & \beta_5 CROSSLIST_{i,t-1} + \beta_6 ENVINDEX_{i,t-1} + \beta_7 ESI_{i,t-1} + \beta_8 CAPX_{i,t-1} + \beta_9 PPE_NEW_{i,t-1} + \\
 & \beta_{10} LITIGATION_{i,t-1} + \beta_{11} INSTOWN_{i,t-1} + \beta_{12} TOBINSQ_{i,t-1} + \beta_{13} FINANCING_{i,t-1} + \\
 & \beta_{14} HERF_{i,t-1} + \beta_{15} LIQUIDITY_{i,t-1} + \beta_{16} ROA_{i,t-1} + \beta_{17} SIZE_{i,t-1} + \beta_{18} LEV_{i,t-1}
 \end{aligned}$$

Variable	DISC - Probit			QUALITY - Heckman		
	Coefficient	z		Coefficient	t	
<i>COMMITTEE</i>	0.256	1.90	**	0.035	1.29	*
<i>OFFICER</i>	0.239	1.63	*	0.065	2.42	***
<i>ENVST</i>	0.167	2.12	**	0.032	2.40	***
<i>PRIOR</i>	0.820	9.15	***	0.023	1.11	
<i>CROSSLIST</i>	0.398	2.25	***	-0.050	-1.59	*
<i>FOR_OP</i>	-0.031	-0.32		-0.026	-1.01	
<i>ENVINDEX</i>	-0.038	-0.70		-0.016	-1.39	*
<i>ESI</i>	0.162	1.29	*	0.063	2.31	***
<i>CAPX</i>	0.603	1.12		0.093	0.58	
<i>PPE_NEW</i>	-0.038	-0.12				
<i>LITIGATION</i>	-0.128	-1.27	*	0.056	2.08	**
<i>INSTOWN</i>	0.048	0.34		-0.074	-1.82	**
<i>TOBINSQ</i>	0.003	0.44		0.000	0.10	
<i>FINANCING</i>	0.000	1.26	*	-0.000	-0.57	
<i>HERF</i>	1.560	2.25	***	0.036	0.17	
<i>LIQUIDITY</i>	-0.008	-0.20		0.005	0.48	
<i>ROA</i>	-0.889	-1.37	*	0.255	1.52	*
<i>SIZE</i>	0.169	2.64	***	-0.004	-0.22	
<i>LEV</i>	-0.287	-0.83		0.053	0.56	
<i>IMR</i>				-0.166	-2.86	***
<i>Year Effects</i>	Yes			Yes		
N	1238			N	549	
Wald Chi ²	242.38			F	8.58	
P-value	.0000			P-value	.0000	
Pseudo R ²	0.27			R ²	0.27	

***, **, and * denotes significance at the 1%, 5%, and 10% levels, respectively. Adjusted statistics clustered by firm.

TABLE 9
Carbon Disclosure Determinants – Environmental Committee Characteristics
Cross-Sectional Probit Regression, Clustering on Firm

Variable	(1) COMMSZ	(2) COMMED	(3) COMMET	(4) COMEXP	(5) COMXPRT	(6) COMOVL	(7) COMNUOV	(8) COMOVRT
<i>COMMITTEE</i>	0.052 ** 1.95	0.096 * 1.27	0.061 ** 1.76	0.166 0.89	1.090 ** 1.63	0.246 * 1.56	0.097 ** 1.95	1.152 ** 1.79
<i>OFFICER</i>	0.241 ** 1.64	0.260 ** 1.79	0.241 ** 1.66	0.245 ** 1.69	0.251 ** 1.73	0.254 ** 1.74	0.261 ** 1.79	0.254 ** 1.73
<i>ENVST</i>	0.171 ** 2.17	0.191 *** 2.43	0.172 *** 2.18	0.184 *** 2.36	0.173 *** 2.20	0.180 *** 2.33	0.184 *** 2.37	0.180 *** 2.32
<i>PRIOR</i>	0.820 *** 9.15	0.821 *** 9.09	0.820 *** 9.12	0.824 *** 9.10	0.827 *** 9.14	0.819 *** 9.07	0.820 *** 9.09	0.819 *** 9.06
<i>CROSSLIST</i>	0.391 ** 2.20	0.410 *** 2.34	0.413 *** 2.35	0.433 *** 2.51	0.415 *** 2.40	0.407 *** 2.32	0.408 *** 2.35	0.416 *** 2.39
<i>FOR_OP</i>	-0.028 -0.29	-0.025 -0.26	-0.030 -0.31	-0.031 -0.32	-0.039 -0.41	-0.027 -0.28	-0.024 -0.25	-0.030 -0.31
<i>ENVINDEX</i>	-0.038 -0.69	-0.039 -0.72	-0.037 -0.67	-0.040 -0.74	-0.034 -0.73	-0.037 -0.67	-0.034 -0.63	-0.036 -0.65
<i>ESI</i>	0.159 * 1.26	0.190 * 1.50	0.174 * 1.39	0.185 * 1.45	0.185 * 1.46	0.175 * 1.39	0.171 * 1.36	0.181 * 1.44
<i>CAPX</i>	0.622 1.15	0.606 1.11	0.584 1.08	0.591 1.08	0.602 1.10	0.562 1.04	0.586 1.08	0.539 1.01
<i>PPE_NEW</i>	-0.031 -0.10	-0.070 -0.22	-0.067 -0.20	-0.104 -0.32	-0.129 -0.40	-0.052 -0.16	-0.064 -0.20	-0.058 -0.18
<i>LITIGATION</i>	-0.125 -1.25	-0.142 * -1.44	-0.130 * -1.29	-0.137 * -1.36	-0.130 * -1.30	-0.140 * -1.41	-0.138 * -1.39	-0.143 * -1.44
<i>INSTOWN</i>	0.056 0.39	0.054 0.39	0.044 0.32	0.045 0.32	0.040 0.29	0.015 0.37	0.054 0.38	0.045 0.32
<i>TOBINSQ</i>	0.002 0.41	0.002 0.29	0.002 0.41	0.002 0.36	0.002 0.39	0.002 0.41	0.002 0.36	0.003 0.43
<i>FINANCING</i>	0.000 1.21	0.000 1.17	0.00 * 1.32	0.000 * 1.29	0.000 * 1.28	0.000 * 1.26	0.000 1.23	0.000 1.28

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TABLE 9 (CONTINUED)

Variable	(1) COMMSZ	(2) COMMED	(3) COMMET	(4) COMEXP	(5) COMXPRT	(6) COMOVLP	(7) COMNUOV	(8) COMOVRT
<i>HERF</i>	1.556 *** 2.24	1.470 ** 2.14	1.55 *** 2.24	1.532 *** 2.22	1.54 *** 2.25	1.497 ** 2.16	1.546 *** 2.23	1.494 ** 2.15
<i>LIQUIDITY</i>	-0.010 -0.24	-0.008 -0.21	-0.007 -0.17	-0.006 -0.15	-0.007 -0.18	-0.008 -0.19	-0.010 -0.25	-0.006 -0.16
<i>ROA</i>	-0.890 * -1.37	-0.900 * -1.39	-0.881 * -1.36	-0.191 * -1.42	-0.872 * -1.35	-0.914 * -1.42	-0.891 * -1.38	-0.915 * -1.42
<i>SIZE</i>	0.168 *** 2.63	0.175 *** 2.75	0.172 *** 2.69	0.176 *** 2.76	0.178 *** 2.79	0.170 *** 2.66	0.166 *** 2.60	0.171 *** 2.68
<i>LEV</i>	-0.280 -0.80	-0.265 -0.76	-0.277 -0.80	-0.269 -0.78	-0.300 -0.86	-0.291 -0.83	-0.268 -0.77	-0.299 -0.85
<i>Year Effects</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1238	1238	1238	1238	1238	1238	1238	1238
Wald Chi2	243.8	244.3	243.5	240.9	245.6	240.8	241.2	239.5
P-value	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
Pseudo R2	27.12	26.97	27.04	26.92	27.04	27.05	27.10	27.10

***, **, and * denotes significance at the 1%, 5%, and 10% levels, respectively. Adjusted statistics clustered by firm.

Columns 1 – 8 represent the results when COMMITTEE is replaced with the different committee characteristics measured as COMMSZ, COMMED, COMMET, COMEXP, COMXPRT, COMOVLP, COMNUOV, and COMOVRT.

TABLE 10
Carbon Disclosure Quality Determinants – Environmental Committee Characteristics
Heckman Sample Selection Model

Variable	(1) COMMSZ	(2) COMMED	(3) COMMET	(4) COMEXP	(5) COMXPRT	(6) COMOVLV	(7) COMNUOV	(8) COMOVRT
<i>COMMITTEE</i>	0.002	-0.020 *	-0.001	0.107 ***	0.305 ***	-0.010	-0.012	0.052
	0.37	-1.53	-0.08	3.14	2.63	-0.34	-1.15	0.45
<i>OFFICER</i>	0.065 ***	0.066 ***	0.065 ***	0.053 **	0.057 **	0.065 ***	0.063 ***	0.065 ***
	2.40	2.45	2.40	1.96	2.10	2.38	2.32	2.42
<i>ENVST</i>	0.034 ***	0.035 ***	0.034 ***	0.031 ***	0.031 ***	0.034 ***	0.034 ***	0.034 ***
	2.51	2.65	2.56	2.34	2.30	2.58	2.58	2.54
<i>PRIOR</i>	0.019	0.015	0.017	0.022	0.022	0.017	0.014	0.019
	0.94	0.77	0.87	1.12	1.13	0.84	0.70	0.93
<i>CROSSLIST</i>	-0.048 *	-0.041 *	-0.047 *	-0.059 **	-0.054 **	-0.046 *	-0.045 *	-0.047 *
	-1.52	-1.29	-1.47	-1.86	-1.70	-1.22	-1.42	-1.49
<i>FOR_OP</i>	-0.025	-0.025	-0.024	-0.028	-0.028	-0.024	-0.025	-0.025
	-0.96	-0.98	-0.95	-1.09	-1.09	-0.95	-0.99	-0.97
<i>ENVINDEX</i>	-0.016 *	-0.017 *	-0.016 *	-0.014	-0.016 *	-0.016 *	-0.017 *	-0.016 *
	-1.40	-1.47	-1.42	-1.19	-1.41	-1.42	-1.48	-1.40
<i>ESI</i>	0.067 ***	0.073 ***	0.069 ***	0.053 **	0.062 ***	0.070 ***	0.073 ***	0.068 ***
	2.47	2.70	2.56	1.97	2.30	2.60	2.71	2.51
<i>CAPX</i>	0.078	0.041	0.069	0.122	0.099	0.066	0.057	0.073
	0.49	0.26	0.43	0.77	0.63	0.41	0.36	0.46
<i>LITIGATION</i>	0.051 **	0.045 **	0.049 **	0.072 ***	0.065 ***	0.048 **	0.047 **	0.050 **
	1.89	1.70	1.81	2.64	2.39	1.81	1.78	1.88
<i>INSTOWN</i>	-0.075 **	-0.084 **	-0.077 **	-0.067 **	-0.072 **	-0.079 **	-0.081 **	-0.076 **
	-1.85	-2.06	-1.90	-1.66	-1.79	-1.92	-2.00	-1.87
<i>TOBINSQ</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.06	0.14	0.06	0.07	0.14	0.05	0.06	0.07
<i>FINANCING</i>	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	-0.59	-0.53	-0.59	-0.21	-0.43	-0.60	-0.62	-0.57

Table Continued on Following Page

TABLE 10 (CONTINUED)

Variable	(1) COMMSZ	(2) COMMED	(3) COMMET	(4) COMEXP	(5) COMXPRT	(6) COMOVL	(7) COMNUOV	(8) COMOVRT
<i>HERF</i>	0.028	-0.057	-0.015	0.110	0.054	-0.020	-0.040	-0.007
	0.01	-0.27	-0.07	0.51	0.25	-0.09	-0.19	0.03
<i>LIQUIDITY</i>	0.006	0.008	0.007	0.004	0.004	0.007	0.008	0.007
	0.58	0.69	0.63	0.40	0.37	0.64	0.72	0.61
<i>ROA</i>	0.263 *	0.262 *	0.265 *	0.238 *	0.266 *	0.268 *	0.272 **	0.260 *
	1.57	1.57	1.58	1.43	1.60	1.60	1.62	1.55
<i>SIZE</i>	-0.003	-0.003	-0.003	-0.004	-0.003	-0.003	-0.002	-0.003
	-0.17	-0.19	-0.16	-0.24	-0.20	-0.16	-0.12	-0.16
<i>LEV</i>	0.053	0.055	0.053	0.047	0.037	0.053	0.053	0.054
	0.56	0.58	0.56	0.50	0.38	0.56	0.56	0.57
<i>IMR</i>	-0.179 ***	-0.190 ***	-0.184 ***	-0.171 ***	-0.174 ***	-0.187 ***	-0.195 ***	-0.179 ***
	-3.10	-3.38	-3.22	-3.07	-3.10	-3.27	-3.42	-3.15
<i>Year Effects</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	549	549	549	549	549	549	549	549
F	8.49	8.62	8.48	9.07	8.89	8.49	8.56	8.49
P-value	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
R ²	27.10	27.41	27.09	28.43	28.03	27.10	27.27	27.11

TABLE 11
GHG Disclosure Determinants – Sustainability Officer Expertise Cross-Sectional Probit
Regression, Clustering on Firm and Heckman Sample Selection Model

$$DISC_{i,t} = \beta_0 + \beta_1 COMMITTEE_{i,t-1} + \beta_2 OFFICEREX_{i,t-1} + \beta_3 OFFICERNOEXP_{i,t-1} + \beta_4 ENVST_{i,t-1} + \beta_5 PRIOR_{i,t-1} + \beta_6 CROSSLIST_{i,t-1} + \beta_7 FOROP_{i,t-1} + \beta_8 ENVINDEX_{i,t-1} + \beta_9 ESI_{i,t-1} + \beta_{10} CAPX_{i,t-1} + \beta_{11} PPE_NEW_{i,t-1} + \beta_{12} LITIGATION_{i,t-1} + \beta_{13} INSTOWN_{i,t-1} + \beta_{14} TOBINSQ_{i,t-1} + \beta_{15} FINANCING_{i,t-1} + \beta_{16} HERF_{i,t-1} + \beta_{17} LIQUIDITY_{i,t-1} + \beta_{18} ROA_{i,t-1} + \beta_{19} SIZE_{i,t-1} + \beta_{20} LEV_{i,t-1}$$

Variable	DISC - Probit			QUALITY – Heckman		
	Coefficient	z		Coefficient	t	
<i>COMMITTEE</i>	0.308	2.33	***	0.042	1.51	*
<i>OFFEXP</i>	0.601	3.38	***	0.089	2.86	***
<i>OFFNOEXP</i>	-0.204	-1.05		0.025	0.65	
<i>ENVST</i>	0.156	1.96	**	0.032	2.36	***
<i>PRIOR</i>	0.800	8.87	***	0.023	1.14	
<i>CROSSLIST</i>	0.429	2.46	***	-0.046	-1.43	*
<i>FOROP</i>	-0.042	-0.44		-0.024	-0.92	
<i>ENVINDEX</i>	-0.045	-0.82		-0.018	-1.57	**
<i>ESI</i>	0.198	1.58	*	0.064	2.34	***
<i>CAPX</i>	0.564	1.04		0.094	0.59	
<i>PPE_NEW</i>	-0.118	-0.37				
<i>LITIGATION</i>	-0.175	-1.74	**	0.046	1.66	**
<i>INSTOWN</i>	0.007	0.05		-0.077	-1.91	**
<i>TOBINSQ</i>	0.003	0.52		0.001	0.19	
<i>FINANCING</i>	0.000	1.26	*	-0.000	-0.52	
<i>HERF</i>	1.278	1.91	**	-0.008	-0.04	
<i>LIQUIDITY</i>	-0.009	-0.21		0.006	0.58	
<i>ROA</i>	-0.772	-1.17		0.265	1.58	*
<i>SIZE</i>	0.181	2.77	***	-0.002	-0.14	
<i>LEV</i>	-0.194	-0.56		0.074	0.77	
<i>IMR</i>				-0.162	-2.81	***
<i>Year Effects</i>	Yes			Yes		
N	1238			N	549	
Wald chi2	238.00			F	8.34	
P-value	.0000			P-value	.0000	
Pseudo R2	0.28			R2	27.64	

***, **, and * denotes significance at the 1%, 5%, and 10% levels, respectively.
Adjusted statistics clustered by firm.