The Carbon Disclosure Project, an Evolution in International Environmental Corporate Governance: Motivations and Determinants of Market Response to Voluntary Disclosures

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Abstract

This paper examines the factors associated with Canadian firms voluntarily disclosing climate change information through the Carbon Disclosure Project. Five hypotheses are presented to explain the factors influencing management's decision to disclose this information. These hypotheses include a response to shareholder activism, domestic institutional investor shareholder activism, signalling, litigation risk, and low cost publicity. Both binary logistic regressions as well as a cross-sectional analysis of the equity market's response to the environmental disclosures being made were used to test these hypotheses. Support was found for shareholder activism, low cost publicity, and litigation risk. However, the equity market's response was not found to be statistically significant.

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Table of Contents

Tables

1.0 Introduction

In recent years the growing trend of social concern over climate change has left a significant amount of uncertainty within the business community. Attitudes towards global warming have shifted from whether or not it is an issue to what should be done to mitigate the damages. This has left governments from around the world looking for answers. Inevitably this will lead to increased regulations on greenhouse gas (GHG) emissions, which are believed to play a significant role in global warming. These GHG emissions are a by-product of the business processes used by many industries. The integral role these emissions have within the business process has generated concern in the investing community over how well firms will be able to compete in a GHG emissions constrained environment. To answer this question, investors need information pertaining to firms' GHG emissions and how well it is positioned to make the transition to a new environment.

Shortcomings in current disclosure regulations have investors looking for alternative means to force companies to disclose this environmental information. As the Canadian Institute of Chartered Accountants (CICA) points out in its Executive Briefing Climate Change 2008 report, for many firms, the environmental disclosures being made through the CDP are required under Canadian Securities Administrators' National Instrument 51-102. However, even with this standard, environmental disclosures have been both inconsistent and biased (Li, Richardson and Thornton [1997]). These issues have helped to encourage institutional investors to seek new ways to gain the information they require.

The Carbon Disclosure Project (CDP), a United Kingdom's based not-for-profit organization, is one new way[1] investors are pursuing. Formed in 2000, as a United Nations initiative, its mission is to gather and disseminate climate change information in an effort to

[1] Part XIX of the Security Act (Ontario) is a formal mechanism that allows for the forwarding of shareholder proposals to be added to the proxy for voting. The mechanism allows for the request for environmental disclosures to be forwarded to firms.

create a unified response against global warming[2]. To accomplish this goal it enlists the support of institutional investors. The CDP refers to these institutional investors as signatory investors. On February 1 of each year the CDP sends a questionnaire to the largest global companies requesting climate change information on behalf of these signatory investors. The results are accessible by the signatory investors as they are received by the CDP and publicly released between September and December.

1.1 Problem

The combination of the CDP and its signatory investors has formed a new global environmental corporate governance mechanism that has yet to receive a significant amount of academic attention. The CDP and the signatory investors have been highly successful at encouraging firms to disclose climate change information. The overall response rate to the CDP request was roughly 74% in 2008. This far exceeds previously reported rates of 10% for similar requests (Rojas, M'zali, Turcotte and Merrigan [2009]). This large difference in terms of success raises questions concerning management's motivation to disclose through the CDP.

A second issue arises in the signatory investor's use of the information the CDP is acquiring. The signatory investors are the institutional investors that have signed the requests being made by the CDP. These investors are purposely requesting climate change information to be used in the investment decision making process. The request for the disclosures implies that the investors do not currently have access to the information. Therefore, if the information disclosed through the CDP is value relevant, we would expect to see a statistically significant market response based upon the new information. However, the current literature suggests that the information being provided by the CDP is not useful to investors (Kolk, Levy and Pinkse [2008]); this conclusion, however, was based upon characteristics of the data being provided

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[2] What We Do. Carbon Disclosure Project. <https://www.cdproject.net/en-US/WhatWeDo/Pages/overview.aspx.> Retrieved October 20, 2009.

rather than an empirical test of the value relevance. A test of the market reaction will help to estimate the value relevance of the information being disclosed through the CDP.

1.2 Uniqueness of CDP disclosures

The data provided by the CDP have several unique features that will add value to an empirical study based on environmental disclosures. Normally, environmental information is disclosed within an annual report or sustainability report (Stanny and Ely [2008]). Both of these types of reports go beyond the scope of climate change information. They include other relevant information that will impact an investor's decision making process. When environmental information is disclosed within annual reports, the financial information that is disclosed with the environmental information is likely to influence investors, while sustainability reports include environmental information that goes beyond climate change information. This makes it difficult to make inferences about one specific type of environmental information, such as climate change information, since any observed market reaction could be influenced by the other relevant information. However, the CDP collects and distributes ONLY climate change information. Furthermore, CDP releases its reports independent from the company's annual reports or other sustainability reports; this makes it easy to isolate the impact of climate change information. This makes the CDP's disclosures more valuable in the assessment of the impact of a specific set of environmental disclosures, since it is free from other confounding environmental or financial information.

Furthermore, the CDP releases standardized questionnaires to firms and analyses the results to develop easily read reports. Since the questionnaires ask the same questions of each firm, it is possible to compare many of the disclosures across both industries and time. The Carbon Disclosure Project Canada 200 reports provide a summary table of climate change related actions firms have taken. Examples of these include: assigning board responsibility for the climate change issue, disclosing emissions levels, having emissions verified by a third party and having greenhouse gas emissions reduction plans. Since these disclosures create a set of indicator

variables, it is possible to use principal component analysis to form a continuous variable representing a firm's commitment to the climate change issue for disclosing firms.

These environmental disclosures are also being promoted as a benefit, rather than a liability. The CDP encourages firms to disclose by framing the disclosures as an opportunity to distinguish a firm as being positioned to mitigate the risks associated with climate change and to take advantage of the opportunities being created. By emphasising the possible benefits, they draw attention away from the fact that emissions are pollution. Since the costs of this pollution are currently being externalized[3], it is likely that society will eventually look to hold firms responsible for the damages. This would imply that GHG emissions create a contingent liability. Historically, attempts at increasing the level of contingent liability reporting have been met with resistance, as seen with the Financial Accounting Standards Board's (FASB) attempt to make changes to FASB Statement No. 5 in 2008[4]. However, the CDP's high response rate indicates that management is less resistant to disclosing environmental information in this positive light. This has created a different set of firms willing to disclose environmental information than has been previously studied.

The CDP's data will also allow us to build upon our understanding of shareholder activism. The disclosures being made through the CDP are unique because they are being made in response to investor requests. The CDP represents a large number of institutional investors, and they request information from a large number of firms. In 2008, the CDP represented 385 investors and approached over 3,000 firms. Furthermore, it gathers information from 66 countries around the world. This represents a form of global environmental corporate governance that has yet to receive a significant amount of academic attention. While the CDP does not use a formal

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[3] The cost of GHG pollution can be viewed as the physical changes associated with climate change. These costs are considered as external since they will affect all of society.

[4] On June 5, 2008 FASB released an exposure draft proposing changes to FASB Statement No. 5 which would change the requirements for a contingent liability to require disclosure. In its current form FASB 5 requires a firm to disclose contingent liabilities when they are probable and can be reasonably estimated. The proposed changes would require firms to disclose all contingent liabilities unless the probability of loss is remote. The proposal failed to pass after meeting with a considerable amount of resistance from industry. It is currently being rewritten.

mechanism such as the SEC Rule 14a-8, it has received considerably more success in terms of getting firms to disclose environmental information. Thomas and Cotter (2007) found SEC Rule 14a-8 to be highly ineffective for social issues such as increased climate change disclosures. However, the CDP's overall success rate in terms of firms responding to its request was approximately 74% in 2008. The CDP also provides the percentage of each firm's ownership controlled by the CDP's signatory investors. While institutional investors have been credited as an important control mechanism, Del Guercio and Hawkins (1999) find that significant heterogeneity exists between institutional investors' objectives, tactics and success in terms of shareholder activism. This suggests that studies could benefit by being able to distinguish between active and passive institutional investors. By becoming a signatory investor, an institutional investor is identifying itself as an active investor. Therefore, the use of signatory investors, rather than all institutional investors, will create a clearer proxy for this aspect of corporate governance.

The shareholder activism being displayed by the CDP and its signatory investors is public in nature. The request for information cannot be circumvented by management. Proposals forwarded through formal mechanisms such as SEC Rule 14a-8 have rules that allow management to remove the proposal from the proxy material if specific criteria are met. However, regardless of management's actions, the CDP approaches the largest firms by market capitalization. They cannot conceal the issue to avoid making a decision pertaining to the disclosures being requested. If a firm chooses not to disclose, the choice itself is made public.

1.3 Objectives and Expected Contribution

The first objective of this study is to develop explanations and testable hypotheses for management's motivation to disclose information through the CDP. Furthermore, the study will examine the characteristics which discriminate between disclosing and non-disclosing firms. The second objective is to examine the market reaction to the disclosures being made to determine the informational value of CDP disclosures. The third objective is to perform a cross sectional

analysis on the equity market reaction to examine the determinants of the market response and whether disclosures hold value to investors.

This study is expected to extend our understanding of shareholder activism. By examining the factors that motivate a firm to respond to the CDP, we can begin to understand why this global environmental corporate governance group has received such a large increase in success compared to the shareholder activism performed by independent institutional investors. This information will be beneficial to academics as well as active investors who wish to promote change within an organization.

The ability to isolate active institutional investors will also extend our understanding of how institutional investors fit into corporate governance. This information will be beneficial to academics wishing to use institutional investors as a proxy for corporate governance.

The remainder of the paper will be presented as follows: Section 2.0 Background and Literature Review, Section 3.0 Hypothesis Development, Section 4.0 Data Collection and Method of Analysis, Section 5.0 Empirical Results, and Section 6.0 Conclusions.

2.0 Background and Literature Review

2.1 Climate Change

Climate change is defined as a change in the state of the climate (mean or variability) that persists over an extended period of time. The Intergovernmental Panel on Climate Change (IPCC) was established by the United Nations Environment Programme and the World Meteorological Organization, it is the leading body for the assessment of climate change, and it stated in 2007 that:

> *Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level (IPCC, 30)*

The IPCC has also stated that most of the observed increase in average temperatures is *very likely* to have been caused by greenhouse gas (GHG) emissions that are manmade. Therefore, if further

damage to the climate is to be mitigated, it will require the altering of human behaviour. As things stand now, business is a large source of GHG emissions. This will target high GHG emitting industries, as society looks for ways to contend with the issue of climate change. There are many ecological changes associated with climate change. These changes will cause problems for businesses in a variety of industries, making climate change an important issue for firms to consider.

The physical changes associated with climate change have the potential to affect many industries. Warmer weather is associated with wildfires and the spread of pests, which are destructive to crops. Both of these will have dramatic effects upon the agriculture industry. According to the NASA Goddard Institute, greenhouse gases are responsible for "a mean warming rate of ~0.15°C per decade"[5]. Rising temperatures have already facilitated the spread of pine beetles which have been devastating to the forest industry. Extreme weather is another physical effect of climate change. For example, Hurricane Katrina caused $135 billion in property damage along the Gulf coast in 2005. Coastal areas also need to be concerned with the rising sea levels created by melting ice caps. Real estate investment firms need to consider the loss of property that will occur as the sea level rises. Cogan (2006) provides a good example of the implication this physical risk can have on long-term planning:

> *a proposed $7 billion pipeline in Canada's Mackenzie Valley is dependent on permafrost, or frozen ground, as a supportive structure. When permafrost thaws, a process that has already begun, long-term investments in the pipeline will be at risk. (Cogan, 11)*

This example highlights the type of climate change threats with which businesses will have to contend. Projects that firms determine to have positive net present values could potentially lead to large losses if the dangers of climate change are not properly considered.

Along with the physical implications of global warming, firms must contend with increases in regulatory risk, which could have cash flow implications as well. The Kyoto Protocol

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[5] GISS Surface Temperature Analysis Global Temperature Trends: 2008 Annual Summation. Goddard Institute for Space Studies. <http://data.giss.nasa.gov/gistemp/2008/>

is an example of how social concern has spilled over into the political arena. The Kyoto Protocol evolved from the United Nations Framework Convention on Climate Change, which is an international treaty focused on global warming concerns. The Protocol is a legally binding agreement that requires those countries involved to lower their emissions levels. It represents a globally unified political effort to bring emissions down to scientifically acceptable levels. The Protocol only requires the countries involved to lower emissions; while it does give advice on how countries can achieve these lower emissions, each country is free to pursue the goal in their own way. This leaves individual countries room to enact its own policies.

Currently, regulations are very lax in Canada. While regulations require the mandatory reporting of greenhouse gases for companies that produce more than 100,000 tons[6] of carbon dioxide equivalent units, there are no penalties or fines for excessive levels. However, it is not very likely that regulations will stay this way. The Canadian government has already stated that it "is committed to developing and implementing a North American cap and trade system for greenhouse gases"[7]. A cap and trade system would first quantify pollution levels by breaking them down into units. An acceptable level of pollution (the cap) would then be set. Companies with emissions levels lower than the cap would be able to sell unused units, while companies that pollute at levels exceeding the cap would be required to either buy additional units or reduce emissions. In this system not all companies would incur additional costs. In fact, if a company has low emissions levels, it could earn additional revenue streams through the sale of extra carbon units.

Excessive polluters will also face reputation problems and potential litigation as the concern with global warming grows. Both litigation risk and reputational risk are closely tied together. As physical changes in the environment become more apparent and media attention grows, companies will have to contend with changes in social attitudes. This could potentially

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[6] The 100,000 ton mandatory reporting threshold was lowered to 50,000 tons in the summer of 2009.
[7] Cap and Trade. Government of Canada. <http://www.climatechange.gc.ca/default.asp?lang=En&n=8343927F-1.> Retrieved November 5, 2009.

affect businesses in many ways, depending on emissions levels and social concern. To begin with, given two equal products at the same price, consumers concerned with the environment will choose the alternative that is less harmful to the environment. As social concern grows, this could change from choosing the greener product to boycotting the firms with high emissions levels. The worst case scenario would involve lawsuits for the damages related to climate change.

2.2 Carbon Disclosure Project

The Carbon Disclosure Project is a United Kingdom based not-for-profit organization that formed as a United Nation's initiative. It enlists the support of institutional investors to advocate its environmental awareness agenda. This includes getting the largest global firms to disclose greenhouse gas emissions and action plans concerning climate change. The belief is that the disclosure of this environmental information will act as a quasi-regulation. Firms will improve their environmental performance rather than disclose poor performance results to avoid a negative reaction as evidenced by a change in share price. This theory that environmental disclosures can work as a quasi-regulation has gained empirical support from Konar and Cohen (1997) who studied firms' responses to disclosures labelling them as the "worst" polluters. They concluded that the firms that suffered the largest decreases in share value at the time of the disclosure had greater subsequent improvements to environmental performance than industry rivals. However, Konar and Cohen (1997) tested the market's response to a disclosure that was simple to understand. Kolk et al. (2008) claimed that, although the Carbon Disclosure Project has been successful in terms of getting firms to disclose environmental information, the information disclosed is too complex and not comparable enough to be useful for investors.

At this point very few empirical studies have taken advantage of the data provided by the CDP. Kolk et al. (2008) examined the CDP from an institutionalization and corporate governance perspective. They discussed the CDP in terms of the strategies that are being used to change the focus of corporate governance to include climate change, and evaluated the success of the CDP's initiatives. They concluded that the CDP was successful in its effort to use institutional investors

to encourage companies to disclose environmental information. However, they also determined that the information being disclosed was not beneficial to investors on the ground that firms' responses to questions were not considered comparable.

The other paper that uses CDP data was a study by Stanny and Ely (2008) which examined the factors that are associated with a firm's decision to disclose environmental information through the CDP. Their results pertaining to institutional investors' role in motivating firms to disclose climate change information contradict the findings of Kolk et al. (2008). While Kolk et al. (2008) attributed the success of the CDP in getting firms to disclose information to institutional investors, Stanny and Ely [2008] found that there was no statistically significant relationship between disclosure rates and institutional ownership. The factors that Stanny and Ely (2008) found to be statistically significant were size, previous disclosures and foreign sales. Both of these papers followed very different methods of analysis. Kolk et al. (2008) compared the regional response rates from the CDP's Global 500 sample to the number of signatory investors with origins in each region. Stanny and Ely (2008) reached their conclusion by using institutional investors as an independent variable within a logistic regression. A firm answering the CDP's questionnaire was the dependent variable in the model. Stanny and Ely (2008) used the US S&P 500 sample provided by the CDP. Therefore, differences in the results of the two studies could also be related to the samples used. There is overlap between the two samples (many of the US S&P 500 firms are also listed in the Global FT 500 sample), but there were very different response rates. The Global FT 500 had a 77% response rate in 2007 while the US S&P 500 only had a 56% response rate. The different response rates suggest that there might be differences between the samples.

While this study uses a similar methodology to the Stanny and Ely (2008) study, there is a key difference in the use of institutional investors as an independent variable. Stanny and Ely (2008) used institutional investors as a proxy for increased scrutiny. As Gillian and Starks (2000) point out, large shareholders that hold a large stake in a firm have motivation both to actively

participate in a firm's strategic direction and to monitor the firm's activities. It is the monitoring performed by institutional investors that Stanny and Ely (2008) were attempting to capture. However, as Del Guercio and Hawkins (1999) point out, heterogeneity exists among institutional investors. Not all institutional investors will follow investment strategies that require the influencing of management's decisions or the monitoring of a firm. This study uses signatory ownership to proxy for the signatory investor's role in corporate governance. While each signatory investor's investment strategies are unknown, the act of joining the CDP identifies the institutional investor as an active investor. While all of the differences between institutional investors are not removed, this distinction allows for the identification of a group of known active investors. Since these investors are active, they will be more likely both to control and to monitor a firm's behaviour. This will translate into a cleaner proxy for institutional investors' role in corporate governance.

The data provided by the CDP offers some unique opportunities for environmental disclosure research. Empirically testing the value of environmental information can be a difficult proposition. As Stanny and Ely (2008) point out, research studying the voluntary release of environmental information tends to focus on annual reports and sustainability reports (Ingram and Frazier [1980], Wiseman [1982], Hughes, Anderson, and Golden [2001], Hedberg and von Malmborg [2003], Al-Tuwaijri, Christensen, and Hughes [2004], Sahay [2004], Brammer and Pavelin [2006], Clarkson, Li, Richardson, and Vasvari [2008], Hossain and Reaz [2007], Ans [2008]). Both of these reports are very broad in nature. They include information about all major sustainability issues, making inferences about specific environmental issues very difficult. Furthermore, annual reports include financial information and as Cormier, Magnan and Morard (1993) point out, any market reaction could be caused by correlated relevant financial information. The data provided by the CDP is information specifically related to the issue of climate change and the reports are released independent of annual reports or other financial information.

2.3 Motivation for Voluntary Disclosure

In Akerloff's (1970) seminal paper on the market for lemons, he introduces the concept that information asymmetries between management and investors could destroy markets. Due to this information asymmetry issue, management will disclose information to distinguish their firm from the worst performing firms. However, this theory would indicate that a firm would always disclose inside information, a situation that does not account for the discretion displayed by management in their disclosure decisions. Due to this limitation, subsequent research introduced the concept of proprietary information (Verrecchia [1983]). Proprietary information can be defined as information that by being disclosed can alter a firm's future cash flows. Dye (1985) includes information that could generate regulatory action or create potential legal liabilities among proprietary costs. Given the nature of the current greenhouse gas regulation environment, the information being disclosed through the CDP could definitely be considered as potentially generating regulatory action. Therefore, the information being requested for by the CDP and its signatory investors can be considered proprietary in nature. As Healy and Palepu (2001) point out in their review of the extant disclosure literature, several studies have concluded that firms have an incentive not to disclose proprietary information when it will reduce their competitive advantage (Verrecchia [1983]; Darrough and Stoughton [1990]; Wagenhofer [1990]; Feltham and Xie [1992]; Newman and Sansing [1993]; Darrough [1993]; Gigler [1994]). Since the climate change related disclosures being made through the CDP are proprietary in nature, the anticipated lose of competitive position will be considered by management prior to the disclosing of the environmental information.

2.4 Determinants of Voluntary Environmental Disclosures

Previous environmental disclosure literature has examined the determinants of voluntary environmental disclosures from several perspectives. Patten (1992) examined social disclosures from a legitimacy theory approach. He studied the inter-industry change in environmental

disclosure patterns after the Alaskan oil spill and concluded that firms increased environmental disclosures to maintain legitimacy. Barth, McNichols and Wilson (1997) examined the motivations for firms with substantial superfund involvement to voluntarily disclose environmental liabilities. They concluded that the voluntary disclosure of environmental liabilities is influenced by regulations, litigation and negotiation concerns, capital market requirements and other regulatory influences. Li, Richardson and Thornton (1997) provide evidence that a firm is more likely to disclose environmental information as its propensity to pollute increases, outside knowledge of the firm's environmental liability increases and the costs of disclosing decrease. Brammer and Pavelin's (2006) study of environmental disclosures made by large UK firms conclude that larger firms with disperse ownership and lower levels of debt are more likely to make environmental disclosures. Stanny and Ely (2008) examined disclosures made by the CDP using factors related to the level of scrutiny a firm receives. They concluded that size, previous disclosures and foreign sales all influence a firm's decision to disclose environmental information.

3.0 Hypothesis Development

3.1 Shareholder Activism:

The CDP's use of the signatory investors to pressure companies to disclose environmental information can be viewed as the next evolution in shareholder activism. Gillian and Stark (2007) point out how shareholder activism has changed over time and acknowledge that shareholder activism could occur in a wide range of forms, stating that anything from the selling of ones' shares to a hostile takeover could be viewed as shareholder activism. Yet, their concept of changing shareholder activism only dealt with changes in the type of investors using shareholder activism and the issues being targeted for reform. They failed to consider any evolution within the form of shareholder activism itself. One possible explanation for why they take this stance is that the extant literature focuses on only one form of shareholder activism: shareholder proposals. The vast majority of studies examine shareholder activism in terms of

shareholders forwarding proposals to management with the intention of having them added to the company's proxy material (Ferri and Sandino [2009]; Thomas and Cotter [2007]; Gillian and Starks [2000]; Del Guercio and Hawkins [1999]). The material is then presented at the next shareholder meeting to be voted upon. Success of the shareholder activism is then related to how much shareholder voting support the issue received. These studies generally focus on institutional investor's use of Rule 14a-8 of the Securities Exchange Act. Rule 14a-8 was established to allow an investor to include a proposal in a company's proxy material. It is a means by which an investor can influence change within an organization. However, Rule 14a-8 is subject to a number of limitations. To begin with, an investor is only allowed to submit one proposal per firm each proxy season. Furthermore, management can remove the proposal if the same issue has been included in the proxy in previous years and failed to meet the required level of votes[8]. While the evidence suggests that these shareholder proposals have been effective for corporate governance issues in the post-SOX environment (Ferri and Sandino [2009]; Del Guercio, Seery and Woidtke [2008]; Thomas and Cotter [2007]), social reform issues, such as environmental disclosures, have been considerably less successful. Thomas and Cotter (2007) found that environmental issues that made it to a firm's proxy for voting between 2002 and 2004 received an average of 10.79% of the votes with a standard deviation of 7.5%. Not only do environmental issues fail to reach a majority vote, but whenever a shareholder proposal concerning environmental issues makes it to the proxy, it runs the risk of receiving too few votes to be accepted in future years. This makes Rule 14a-8 highly ineffective for environmental issues such as the request for disclosures pertaining to climate change. Since an investor is only allowed to submit one proposal for each firm, a highly active institutional investor is likely to use Rule 14a-8 for an issue that has a greater chance of success. Institutional investors concerned with the implications of climate change have begun to

[8] If the issue had been in the proxy for one of the last five years, it must have obtained a minimum of 3% of the vote. If the issue had been in the proxy for two of the last five years, it must have obtained a minimum of 6% of the vote. If the issue had been in the proxy for the three of the last five years, it must have obtained a minimum of 10% of the vote.

use a new form of shareholder activism as witnessed by the success of the CDP in terms of recruiting signatory investors.

One of the key differences between the CDP's request for information and an institutional investor's use of Rule 14a-8 is the number of parties involved. Under Rule 14a-8, a single investor forwards a proposal to management. This initial proposal represents a one-to-one relationship. The CDP, on the other hand, sent the same request to over 3,000 firms on behalf of 385 institutional investors in 2008. This represents a many-to-many relationship. Since the CDP publicly lists all of the signatory investors, firms are aware of the percentage of ownership that is requesting the information. Song and Szewczyk (2003) suggest that the added pressure of being targeted by a group of investors could enhance effectiveness in promoting change within the organization. The combination of investors will form a block that equates to a higher percentage of firm ownership than would be expected from a shareholder proposal being forwarded by a solitary institutional investor. This higher level of ownership will be more effective at influencing management. The first hypothesis is as follows:

> H_1: The higher the percentage of signatory investor ownership, the more likely a firm will respond to the CDP and disclose environmental information.

The percentage of signatory ownership is provided by the CDP within Carbon Disclosure Project Canada 200 reports that are distributed annually. This percentage of total signatory ownership (TOTSIG) is used to proxy for shareholder activism and it is predicted to have a positive coefficient. However, this signatory ownership block consists of both foreign and domestic ownership. Local investors have a better understanding of a firm's environment than a foreign investor. They will be aware of a firm's reputation within the community and have a better idea of the likely direction future regulations will take. This knowledge will make it increasingly difficult for a firm to justify the withholding of information. Therefore, firms with higher levels of domestic signatory investor ownership should be more sensitive to the pressure

being applied by the CDP to disclose environmental information. The second hypothesis is as follows:

> H_2: The higher the percentage of domestic signatory investor ownership, the more likely a firm will respond to the CDP and disclose environmental information.

The CDP includes the domestic signatory ownership along with the total signatory ownership information in the Carbon Disclosure Project Canada 200 reports that are released annually. The relationship between the domestic signatory investors and management's decision to disclose climate change information was captured in two ways. The first logistic model ran included a variable containing the relative domestic signatory firm ownership. This variable (RelativeDOMSIG) was calculated by dividing the firm's domestic signatory ownership by its total signatory investor ownership. The relative domestic signatory ownership variable was included in the logistic regression model which included total signatory ownership. The second means by which the domestic signatory investors' role in shareholder activism was captured was through a logistic regression model using the actual percentage of domestic signatory investor ownership (DOMSIG), as well as the foreign signatory investor ownership (FORSIG). The foreign signatory ownership was calculated by subtracting the domestic signatory investor ownership from the total signatory investor ownership. As with TOTSIG, it is predicted that RelativeDOMSIG, DOMSIG and FORSIG will all have positive coefficients.

3.2 Signalling

The disclosures made through the CDP are voluntary in nature. They go beyond the mandatory disclosures required by standard setting organizations. Furthermore, these disclosures are non-financial, environmental disclosures. The CDP's request for information is motivated by the desire to create a unified action against climate change[9]. Building upon the earlier work of

[9] "The Carbon Disclosure Project launched in 2000 to collect and distribute high quality information that motivates investors, corporations and governments to take action to prevent dangerous climate change." Excerpt taken from "What We Do". Carbon Disclosure Project. <https://www.cdproject.net/en-US/WhatWeDo/Pages/overview.aspx.> Retrieved October 7, 2009.

Salop and Scheffman (1983), Denicolo (2008) offers an explanation as to why firms would wish to overcomply with environmental regulations. Early adopters of "green" technologies used to lower emissions have an incentive to disclose through the CDP to signal to standard setting agencies that the cost of complying with stricter regulations is affordable. Denicolo (2008) developed a model in which regulatory overcompliance can be used as a signalling device. In the model, when three conditions are met, a signalling equilibrium forms where overcomplying firms will attempt to sway governments into passing tougher regulations. The three conditions that are required include: the signalling firm must be able to benefit from the increased regulations; the stricter regulations can only be beneficial if the costs associated with adhering to the regulations are not too high; and the regulation setting body must demonstrate an unwillingness to set the regulation without more information pertaining to its costs.

Firms that have made commitments to lowering GHG emissions would benefit from increased regulations in a variety of ways. These firms have made investments in technologies that reduce GHG emissions. These investments will place firms in a better position to contend with future regulations than competitors that have chosen not to make similar investments. However, the costs of emitting these gases are currently externalized. This is to say that the dangers associated with climate change are spread over the whole of society. In the current environment, firms that produce excessive levels of GHG emissions are neither required to pay fines nor forced to compensate injured parties. While there are still advantages to investing in "green" technologies in the current environment (i.e., lower energy costs, improved reputation), the investments represent costs that competitors that have chosen not to make similar investments have avoided. Increased regulations mandating the lowering of GHG emissions would force these competitors to make investments in "green" technology. This would raise the competitors' costs, benefiting the firm that is currently emitting lower levels of greenhouse gases. Firms with lower GHG emissions levels would also benefit from mandatory reporting regulations. While the

climate change information disclosed through the CDP has continuously improved, there are still gaps in the disclosures that create comparability problems. The CDP acknowledges this flaw in its 2009 Investor Research Project. It points out that:

> *there are still gaps in the data that hamper an investor's ability to fully integrate climate into investment decision making processes. (Mercer, 5)*

They proceed to credit this situation to the voluntary nature of the environmental reporting. Introducing mandatory reporting requirements would fill these gaps and allow investors to fully incorporate climate change information into investment decisions. This would be beneficial to firms that have invested in "green" projects.

Furthermore, the signal sent by firms disclosing through the CDP is both credible and reliable. The disclosures being made through the CDP are a means to inform investors about the actions that a firm has taken to address the global warming issue. These actions that are being disclosed have associated costs. For example, making investments in technologies that will lower greenhouse gases emissions represents an additional expenditure beyond what would have been required had the firm not chosen to address the global warming issue. The cash flow implications of these actions related to climate change demonstrate the commitment a firm has to the prevention of dangerous climate change and add credibility to the disclosures. The disclosures are reliable because they cannot be imitated by a "bad" environmentally performing firm. To start with, a "bad" performing firm will not have taken climate change related actions to disclose. However, more importantly, these firms are not positioned to contend with future regulations. These firms are aware that future regulations will have adverse cash flow implications. This means they cannot signal the market that they are prepared for them, since the future regulations are not wanted.

Unfortunately, a firm's intention to use the CDP as a means to signal standard setters is not directly observable. However, the underlying intention of a firm using the CDP to signal the

market is to gain an economic benefit. Therefore, we would expect to see a positive market reaction to the release of the signal.

> H_3 The announcement period Cumulative Average Abnormal Return (CAAR) for firms that have disclosed information indicating their commitment to the climate change issue is expected to generate a positive and significant market reaction.

Support for this hypothesis will be found through a cross-sectional analysis of the market response to the disclosures being made. The Carbon Disclosure Project Canada 200 reports issued by the CDP include a summary table which provides information pertaining to the actions a firm has taken to address climate change. These tables form a set of indicator variables. Eight specific climate change relevant actions were included for all years covered by our sample. These tables report whether or not the firm: assigned board representation for the issue of climate change; assigned a senior executive with responsibility for the issue of climate change; disclosed emissions data; followed third party protocol in the calculation of emissions; had emission data externally verified; took steps to prepare for future trading regimes; had a plan to reduce its emissions; and provided a formal plan with defined goals and timelines for the reduction of greenhouse gases. Each of these disclosures represents a costly activity that demonstrates a firm's commitment to the climate change issue. It is this costly signal that the firm is committed to the climate change issue, common across all eight indicator variables, that will be used to proxy for signalling. Principal component analysis will be used to capture the common variation explained by these indicator variables. The object scores for the first principal component will then be used to form a continuous independent variable (SIGNAL) to proxy for signalling. A positive coefficient within the cross-sectional analysis is predicted for the SIGNAL proxy.

3.3 Litigation Risk

Current literature points out a situation in which "bad" performing firms will wish to disclose environmental information. Skinner (1994) hypothesizes that "bad" performing firms will voluntarily disclose information to reduce future litigation costs. The CICA points out the

risk of litigation in its' Executive Briefing Climate Change and Related Disclosures 2008 report where it states:

> *For public companies, executives and directors (among others) need to consider the potential for lawsuits in Canada whereby they can be at risk for providing misleading public disclosures or failing to make timely disclosures. (CICA, 10)*

As has been previously stated, future regulations are highly likely. These regulations will adversely affect the "bad" GHG emitting firms. The increased cost of complying with the new regulations will lower future cash flows, which will lower share prices. Investors that are caught by surprise with the loss in share value may fault firms for not making material disclosures. The disclosing of the "bad" climate change information will act as a defence to this type of lawsuit.

However, the disclosures being made are environmental disclosures. The information being requested could be used to link a firm to its contribution to global warming. Since the ecological changes that are associated with climate change will affect a broad base of the population, there is a risk of lawsuits that seek to compensate parties for the damages they have received due to global warming. In the United States, lawsuits pertaining to climate change have already begun. The first case involving climate change was decided on September 15, 2005. In this case several States sued for an injunction against the public nuisance of global warming by six different electric power corporations[10]. On June 30, 2006 Ned Comer led a class action suit against several American oil, coal and electric power companies. The plaintiffs sought restitution for the damages caused by Hurricane Katrina alleging that the defendants' GHG emissions contributed to the extreme weather[11]. On September 20, 2006, the State of California sued members of the automotive industry for their role in global warming[12]. On February 26, 2008 the Village of Kivalina sued several power companies for damages caused by global warming[13]. While none of these cases were successful, they do indicate that society is already looking for

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10 State of Connecticut, et al. v. American Electric Power Company Inc., et al.
11 Ned Comer, et al. v. Murphy Oil USA, et al.
12 People of the State of California v. General Motors Corporation, et al.
13 Native Village of Kivalina v. Exxonmobil Corporation et al.

restitution for the damages caused by global warming. This litigious trend will create an incentive for firms to avoid disclosing environmental information. Hypothesis four is as follows:

> H_4: The higher a firm's exposure to litigation risk, the greater the likelihood that the litigation risk will influence the firm's decision to disclose environmental information through the CDP.

Each firm has a different level of exposure to litigation risk. The higher a firm's litigation risk, the more likely it will influence a firm's decision to disclose environmental information. Since this litigation risk is not directly measurable, an indicator variable (LIT) will be used to proxy for it. A code of 1 will be assigned for all firms that have been listed in environmental litigation within the five year period prior to the CDP's request for environmental disclosures; all other firms are assigned a code of 0. No direction is being hypothesized for this variable.

3.4 Low Cost Publicity

Clarkson, Li, and Richardson (2004) identified several benefits associated with being considered a "green" firm. For many firms competing in industries such as retail or information technology, the emissions created through processing, packaging, and transportation are higher than the emissions created through its own business practices. Since a firm's carbon footprint goes beyond its own direct emissions, some companies such as WalMart, PepsiCo and IBM have begun to use supply-chain management, choosing suppliers with lower emissions levels[14]. Walton, Handfield, and Melnyk (1998) provided empirical support for this concept when they found that firms in the pulp and paper industry with lower polluting levels than industry rivals were in a superior position to gain long-term contracts with "green" customers. There is also the concept of "green goodwill" which implies that, if consumers prefer to buy a "greener" product, they will be willing to pay a premium for it (Kristrom and Lundgren [2003]). Blend and Ravenswaay (1999) provide empirical support for consumers wanting "greener" products in terms

[14] Carbon Disclosure Project (CDP). 2009. <https://www.cdproject.net/en-US/Programmes/Pages/CDP-Supply-Chain.aspx.> Retrieved September 29, 2009.

of apples. Their study examined the demand for eco-labeled apples and they found there was a significant demand for the "greener" product.

For firms in low carbon intensive industries, the CDP represents an inexpensive means to build a "green" reputation. Low carbon intensive industries include: Financial Services; Hospitality, Leisure, and Business Services; Retail and Consumer; and Technology, Media, and Telecommunications. These industries have low greenhouse gas emissions and are therefore less likely to be considered responsible for the physical damages that have already occurred due to global warming. These firms will also have less difficulty transitioning to a carbon constrained economy. To elaborate on this point, Merrill Lynch & Co. had a carbon intensity[15] of 6 in 2008. In comparison, Ameren Corporation, a firm which competes in the Utilities Industry, had a carbon intensity of 9,036 in 2008[16]. While these carbon intensity values are unique to these firms, they do highlight a clear difference between the pollution levels that exist among companies that disclose through the CDP. For firms with extremely low carbon emissions, such as Merrill Lynch & Co, there is little fear that the information it discloses will lead the market to re-evaluate how susceptible it is to the risks associated with global warming. This means that low carbon intensity firms are unlikely to suffer a negative market reaction due to the disclosing of greenhouse gas emissions. Furthermore, the costs associated with collecting emissions data are considerably lower for low carbon intensive firms. According to the Greenhouse Gas Protocol, the leading body in setting greenhouse gas reporting standards, the only sources of direct emissions for office-based organizations come from owning vehicles, stationary combustion devices or refrigerators and air conditioning equipment[17]. High carbon intensive firms, on the other hand, must examine their entire business process. They must calculate direct emissions from physical or

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[15] Carbon Intensity is calculated by dividing the firms disclosed carbon emissions by its disclosed annual revenue. The numbers are given as a means of demonstrating the extreme differences that exist between industries. I am not aware of any standards or benchmarks that can be used to evaluate each firm's individual performance.

[16] Carbon Disclosure Project (CDP) Report. 2008. USA S&P 500. <https://www.cdproject.net/en-US/Results/Pages/Investors-2008-Reports.aspx.> Retrieved September 29, 2009.

[17] Corporate Accounting and Reporting Standards (Corporate Standard). The Greenhouse Gas Protocol Initiative. <http://www.ghgprotocol.org/standards.> [Retrieved 29 September 2009]

chemical processes, as well as identify emissions caused by the wearing down of equipment. This is a far more involved procedure with higher costs. For a firm that already has a low emissions level, only a minimal amount of effort is required to collect emissions information, and in doing so, the firm can claim that it is a "green" company.

For these firms with low emissions, the CDP can be used as a means to increase its reputation through positive publicity. The role of publicity in corporate governance is an important issue that has thus far received little academic attention (Zingales [2000]). Wu (2004) examined the impact publicity had upon corporate governance through the examination of firms that had been publicly targeted by the California Public Employees' Retirement System (CalPERS). The negative publicity generated by being targeted by CalPERS was found to be associated with corporate governance changes. Barton (2005) found that firms with greater media exposure were quicker to replace Arthur Anderson LLP after its highly publicized audit failure of Enron. Furthermore, many of these highly public firms replaced Arthur Anderson LLP with another Big Five auditor. The use of Big Five auditors is generally considered as a means to improve a firm's reputation for having credible financial reporting. The rapid switching of auditors after the current auditor suffers a loss in reputation suggests that visible firms are interested in maintaining and building reputations. Taken together, these papers demonstrate management's concern for publicity. The CDP represents a highly publicized global forum for the release of environmental information. A firm that either knows it has low carbon intensity or that competes in an industry with low emission levels is able to capitalize on the publicity generated through the CDP without the fear of being negatively affected by the report.

H_5: Firm's that do not produce scope 1 direct GHG emissions will be more likely to respond to the CDP by disclosing environmental information.

An indicator variable (LOWGHG) was used to proxy for firms that produce low levels of greenhouse gases. The variable was constructed by first determining which firms are currently expected to be affected by future greenhouse gas emission regulations. The Environmental

Protection Agencies' 2009 Mandatory Reporting of Greenhouse Gases; Proposed Rule was used for guidance and additional firms were added when listed by the CDP as competing in carbon intensive industries. Examples of the high carbon impact sectors listed by the CDP include Manufacturing, Oil & Gas, Mining and Transportation. When available, a firm's direct emissions were also used to ensure firms were properly coded. Firms identified as high greenhouse gas producers were coded as a 0 and all others were assigned a 1. The proxy for low cost publicity is expected to have a positive coefficient.

4.0 Data Collection and Method of Analysis

4.1 Data Collection

The sample used in this study was taken from the CDP Core database. The CDP currently controls the world's largest database of primary corporate climate change information. The database provides information concerning the firms' responses to its questionnaires, firm characteristics such as market capitalization and industry, as well information pertaining to the signatory investors' ownership stake in each firm. The sample has been restricted to the firms from the CDP's Canada 200 data sets. Canada has high levels of socially responsible investing, so that Canadian firms should be sensitive to the shareholder activism being displayed by the CDP. Bauer, Derwall and Otten (2007) estimate the Canadian socially responsible investment retail industry to be the second largest in the world. Furthermore, the Canadian sample includes a breakdown of each firm's percentage of signatory investor ownership; information that is not available in the CDP's other samples. Observations were taken for the period 2006 to 2009.

Data for total, domestic and foreign signatory investors, as well as relative domestic signatory ownership, was retrieved from the CDP's annual reports. The reports released with information concerning Canadian firms include both total signatory ownership percentages and domestic signatory ownership percentages. The total signatory ownership (TOTSIG) and the domestic signatory ownership (DOMSIG) variables consisted of the information provided directly through these reports, while the foreign signatory ownership (FORSIG) variable was

constructed by removing the percentage of domestic signatory ownership from the total signatory ownership percentage provided by the CDP. The relative domestic signatory ownership (RelativeDOMSIG) was calculated by dividing the domestic signatory ownership by the total signatory ownership.

Data for construction of the litigation risk proxy (LIT) was retrieved from LawSource[18]. A case search was run for each firm in the sample using the option to limit the results by the "environmental" subject area. Each case was then reviewed to ensure that it was environmental litigation and the company in question was named as a defendant. An indicator variable was then created with a 1 representing that the firm had been listed as a defendant in an environmental litigation case within a five year period prior to being asked to disclose environmental information through the CDP.

Two sources were used to establish which firms produced lower levels of greenhouse gases. Stanny (2009) used the Environmental Protection Agencies' 2009 Mandatory Reporting of Greenhouse Gases; Proposed Rule to establish which firms would be affected by proposed future regulations. The document lists industries by the North American Industry Classification System (NAICS) codes. Since the LOWGHG proxy is intending to capture firms that are not likely to be affected by future regulations, the same list Stanny (2009) used from the Mandatory Reporting of Greenhouse Gases; Proposed Rule was used as a starting point to identify firms that would be given a 0. Information from the CDP reports indicating industries that are high polluters was then used to ensure all high greenhouse gas producers had been identified. All firms that were not identified were coded as a 1, indicating that they were not likely to be affected by future regulations.

Four variables were added to control for firm performance and three variables were added for time effects. The four variables added to control for performance were SIZE, ROA, LEV, and TOBINQ. The natural log of a firm's total assets averaged over the prior two years of being

[18] LawSource is a database that provides information pertaining to Canadian case law.

approached by the CDP was used as a proxy for size (SIZE). Larger firms receive more media attention than smaller firms. This increase in attention increases the level of scrutiny a larger firm must endure. This higher level of scrutiny will make it more difficult for a larger firm to justify the withholding of climate change information. The larger a firm is the more likely they will be to disclose information through the CDP. The return on assets (ROA) was calculated by dividing net income averaged over the prior two years by total assets averaged over the prior two years. A firm's return on assets is a measure of its profitability. A more profitable firm has an incentive to release climate change information to ensure investors that the higher level of profitability has not come at the expense of neglecting the climate change issue. As we move to a carbon constrained economy, firms that have not properly addressed the issue will face additional costs which will lower their profitability. A more profitable firm will want to inform investors that they have a higher quality of earnings, which will remain intact even with higher levels of environmental regulation. The firm leverage (LEV) was calculated by dividing the firm's total debt averaged over the prior two years by the total assets averaged over the prior two years. Higher leveraged firms are more likely to have debt covenants. Firms with debt covenants will be more cautious in making disclosures since they will not wish to take any actions that risk breaking the existing debt covenant. Therefore, higher leveraged firms will be less likely to disclose through the CDP. The Tobin Q (TOBINQ) was calculated by the total market value averaged over the prior two years divided by total assets averaged over the prior two years. A Tobin Q higher than one shows that a firm is worth more than the value of its assets. Firms with higher Tobin Q scores tend to be forward looking. These firms will recognize the need to prepare for the business implications associated with climate change. A firm with a higher Tobin Q will be more likely to disclose through the CDP. The data used to construct these variables was retrieved from DataStream. The indicator variables used to control for time effects are CDP5, CDP6 and CDP7. These variables represent data from 2007, 2008, and 2009 respectively, with 2006 being used as the base year.

INSERT TABLE 1

The original sample consisted of 858 firm year observations. However, as shown by table 1, 40 observations were removed from the sample due to incomplete financial information, leaving a sample consisting of 818 firm year observations for the logistic regression. Table 2 lists the descriptive statistics for the sample. Means, medians and standard deviations are given for the percentages of both domestic and foreign signatory investor ownership, total assets, market value, long-term debt, total liabilities, total shareholder equity and net income. Statistics are provided for firms that disclosed, firms that did not disclose, and the difference between the two samples. Table 3 lists the frequencies and percentages of occurrence for all of the binary variables to be included within the logistic regression. Statistics are provided for the entire sample as well as for the subsets of the sample that either disclosed or did not disclose.

INSERT TABLE 2

A visual inspection of the descriptive statistics listed in table 2 reveal some key differences between the disclosing firms and non-disclosing firms. Even though the firm with the highest level of domestic signatory investor ownership is a non-disclosing firm, it appears to be an anomaly since on average there is a higher level of signatory investor ownership for disclosing firms. This higher level of domestic signatory firm ownership for disclosing firms is consistent with hypothesis two which predicted that higher levels of domestic signatory firm ownership would be associated with higher disclosure levels. The descriptive statistics also reveal that the disclosing firms have on average higher levels of total assets, long-term debt, total liabilities, and total shareholders equity as well as greater market values and net income. However, there is also a higher level of variability within the disclosing sample, so these differences should be read with caution.

INSERT TABLE 3

Table 3 shows that the disclosing firms consist of a higher percentage of firms that have been previously exposed to environmental litigation. The sample of disclosing firms had 19.1% of the sample exposed to litigation risk while the non-disclosing firms had only 5.4% of the

sample exposed to litigation risk. This finding supports hypothesis four which predicted that there would be an association between litigation risk and disclosures. Table 3 also reveals that 58.9% of the non-disclosing firms produced low levels of greenhouse gases while 51.6% of the disclosing firms produced low levels of greenhouse gases. This does not support hypothesis five which predicted that firms producing low levels of greenhouse gases would be more likely to disclose to take advantage of low cost publicity.

The CDP releases the surveys it receives to the signatory investors as it collects them. These signatory investors are large institutional investors; this means there should be evidence of a market response on the private dates that the information is received by them. Since the date this information is released is private, there existed a challenge in determining when the information reached the market. Each individual questionnaire was read in an effort to determine when this information was given to the signatory investors. Dates were taken from two sources. The first source was from respondents that dated the actual response, and the second was taken from the creation date found within the attributes of any portable document format (PDF) file attached to the response. All attached PDF files were examined with care to determine that they were created for the CDP and not formerly released documents meant to demonstrate the firm's commitment to climate change. When dates were determined a search on Google was used to make sure no other confounding financial information was released around the same time as the CDP survey. The final sample for the event study and cross section analysis consisted of 107 firm year observations. Stock return information for the tests was retrieved from DataStream.

Table 4 lists the descriptive statistics and table 4 lists the frequencies for the sample to be used for the event study and cross-sectional regression. The tables follow the same formats as table 2 and table 3. Since all observations in the sample consist of firms that disclosed environmental information through the CDP, only statistics for the entire sample are given.

INSERT TABLE 4

The descriptive statistics displayed in table 4 highlight some different characteristics between the sample of 107 disclosing firms used in the event study and the 351 disclosing firms used in the logistic regression. All variables, except the percentage of foreign signatory ownership, are higher in the event study sample than the logistic regression sample. This indicates that the event study will capture the market response to the larger, more profitable firms with higher signatory firm ownership. This difference in firm characteristics is confirmed by the percentages of occurrences listed in table 5. There are higher occurrence levels for both litigation risk and of low greenhouse gas producing firms in the event sample study as opposed to the disclosing firms from the logistic regression. This is not a surprising difference between sample characteristics. The collection of the data for the private event study required the disclosures to have some form of date stamp. This inclusion of a date could be considered as a higher quality of disclosure which would be consistent with larger firms.

INSERT TABLE 5

Four additional control variables were added to the cross-sectional regression to control for disclosure characteristics that could potentially influence the market reaction. The variable INITIAL is a binary variable coded as a 1 if the disclosure was the first time a firm had responded to the CDP and a 0 otherwise. Since these disclosures are the first time a firm has disclosed through the CDP they have the added quality of informing investors that a firm is willing to provide the information they are requesting. Furthermore, the CDP requests similar disclosures each year which creates a considerable amount of overlap within a firm's disclosures from one year to the next. The first disclosure made through the CDP contains only information that has not previously been disclosed through the CDP. Due to these disclosure characteristics, a firm will receive a greater positive market response for its first disclosure. LEADER is a binary variable coded as a 1 for firms that were identified by the CDP as disclosure leaders and a 0 otherwise. Higher disclosure levels will be better at reducing the information asymmetry gap between management and investors. This will create lower levels of uncertainty which will result

in a greater positive market response. FOLLOWED is a binary variable coded as 1 for disclosures that consisted of information that was previously disclosed through the firm's annual report. This variable represents information that is not new; it represents disclosures that should already be reflected in share prices. This information should not influence the market reaction. GOODNEWS is a continuous variable created to represent how well a firm is positioned to contend with the climate change issue. Each questionnaire was carefully read. Information disclosed pertaining to a firm being exposed to risk related to climate change, revealing a failure to lower greenhouse gas emissions, or any actual emission levels would lower a firms GOODNEWS score by 1. While information pertaining to a firm's actions to address the climate change issue, successes in lowering emissions, or indicators that the firm is taking the climate change issue seriously such as improvements in environmental corporate governance or having emissions audited would increase the GOODNEWS score by 1. This process produced a variable that was positive for firms that had released more information concerning how it was dealing with the climate change issue than information pertaining to how adversely the firm would be affected by climate change and a negative value when the information content was reversed. This should be read with caution since evidence suggests that the information disclosed is not comparable. However, even with this data issue, the net effect of the positive verse negative news should have a positive effect on the market response to the disclosures being made.

4.2 Logistic Regression

The following binary logistic model was used to test hypotheses one, two, four and five:

$$f(AQ) = \frac{1}{1+e^{-AQ}} \tag{1}$$

Two different sets of independent variables were employed. The first model is as follows:

$$\begin{aligned} AQ = {} & \beta_0 + \beta_1 TOTSIG + \beta_2 \text{Re}lativeDOMSIG + \beta_3 LIT + \beta_4 LOWGHG \\ & + \beta_5 SIZE + \beta_6 ROA + \beta_7 LEV + \beta_8 TOBINQ + \beta_9 CDP5 + \beta_{10} CDP6 \\ & + \beta_{11} CDP7 + \varepsilon \end{aligned} \tag{2}$$

The second model was as follows:

$$AQ = \beta_0 + \beta_1 DOMSIG + \beta_2 FORSIG + \beta_3 LIT + \beta_4 LOWGHG + \beta_5 SIZE + \beta_6 ROA + \beta_7 LEV + \beta_6 TOBINQ + \beta_7 CDP5 + \beta_8 CDP6 + \beta_9 CDP7 + \varepsilon \quad (3)$$

where,

AQ	is 1 if the firm answered the CDP questionnaire.
TOTSIG	is the percentage of signatory firm ownership.
RelativeDOMSIG	is the domestic signatory firm ownership divided by the total signatory firm ownership.
DOMSIG	is the percentage of domestic signatory firm ownership.
FORSIG	is the percentage of foreign signatory firm ownership.
LIT	is 1 if a firm has been listed in an environmental lawsuit within the previous 5 years.
LOWGHG	is 1 if a firm's business process does not produce a significant level of GHG emissions.
SIZE	is the natural log of total shareholder's equity averaged over the prior two years.
ROA	is the net income averaged over the prior two years divided by the total assets averaged over the prior two years.
LEV	is the total debt averaged over the prior two years divided by the total assets averaged over the prior two years.
TOBINQ	is the total market value averaged over the prior two years divided by total assets averaged over the prior two years.
CDP5	is 1 for observations from the 2007 sample.
CDP6	is 1 for observations from the 2008 sample.
CDP7	is 1 for observations from the 2009 sample.

Seven control variables were added to both of the binary logistic models. These include the size of the firm, the return on assets, leverage and the firm's Tobin Q as well as three dummy variables used to control for time effects. The reason for the inclusion of these variables has been previously discussed within the data collection section of this paper.

4.3 Market Reaction to CDP Disclosures

Event study methodology was used to analyze the market reaction to firms' responses to the CDP. The methodology was originally developed by Ball and Brown (1968) and received further examination by Brown and Warner (1985). The following single factor market model was employed:

$$R_{j,t} = \alpha_j + \beta_j R_{m,t} + \varepsilon_{j,t} \qquad (4)$$

where,

$R_{j,t}$ = The continuously compounded rate of return on security j on day t;

$R_{m,t}$ = The rate of return on the value weighted market index on day t;

α_j = The intercept of the linear relationship for security j;

β_j = The slope of the linear relationship between security j and the return on the market index; and

$\varepsilon_{j,t}$ = Random variable with expected value of zero.

An OLS regression model was used to estimate the coefficients using data from trading day t – 210 through trading day t – 61 relative to the announcement day of t = 0. The market reaction to the CDP disclosures was then captured between trading day t – 1 and trading day t + 1 and between trading day t – 5through t +5. Abnormal returns (A_{jt}) were calculated using equation (5) for the j^{th} firm on day t.

$$A_{jt} = R_{jt} - \left(\hat{\alpha}_j + \hat{\beta}_j R_{mt}\right) \tag{5}$$

Equation (6) was used to calculate the cumulative abnormal return ($CAR_{T1j,T2j}$) for firm j. The window being tested is represented by a starting date of T_{1j} and an ending date of T_{2j}.

$$CAR_{T_{1j},T_{2j}} = \left[\sum_{t=T_{1j}}^{T_{2j}} A_{j,t}\right] \tag{6}$$

Due to the nature of the disclosures being requested, there is an expectation that event-induced variance will exist within the data. Each industry has a different exposure level to the risks and rewards associated with climate change. Therefore, it is anticipated that investors will respond differently to each firm depending on its situation. For example, we would expect to witness a different market response for banks that disclose environmental information than oil and gas companies. Therefore, the standardized cross-sectional method was used to test for the statistical significance of the cumulative abnormal return. The standardized cross-sectional method standardizes residuals before forming portfolios as shown in equation (7). This will allow for heteroskedastic event day residuals and ensure that securities with large variances do not dominate the test. This test was introduced by Boehmer, Musumeci, and Poulsen (1991) who also documented its empirical properties.

$$SCAR_{T_{1j},T_{2j}} = \left(CAR_{T_{1j},T_{2j}} \Big/ {}^{S}CAR_{T_{1j},T_{2j}}\right) \tag{7}$$

where,

$$S^2{}_{CAR_{T_{1j},T_{2j}}} = s^2{}_{A_j}\left\{L_j\left[1 + \frac{L_j}{M_j} + \frac{\left(\sum_{t=T_{1j}}^{T_{2j}} R_{mt} - L_j\overline{R_{mEst}}\right)^2}{\sum_{k=1}^{M_j}\left(R_{mk} - \overline{R_{mEst}}\right)^2}\right]\right\} \tag{8}$$

where,

L_j is the length of the window, or event date being tested, in trading days as calculated by equation (9) and M_j is the number of non-missing returns in the estimation period:

$$L_j = T_{2j} - T_{1j} + 1 \tag{9}$$

Equation (10) was used to determine the standardized cross-sectional test statistic.

$$z_t = \frac{\sum_{i=1}^{N} SCAR_{T_{1j},T_{2j}}}{N^{\frac{1}{2}} S_{SCAR_t}} \tag{10}$$

where,

$$S^2_{SCAR_t} = \frac{1}{N-1}\sum\left[SCAR_{T_{1i},T_{2i}} - \frac{1}{N}\sum_{j=1}^{N} SCAR_{T_{1j},T_{2j}}\right]^2 \tag{11}$$

A binomial sign test will also be used to help verify that the results are not being driven by a small group of firms. Results will be compared to the fraction of positive returns in the estimation period. This methodology has been used by Chen, Hu, and Shieh (1991) and Cowan (1992).

4.4 Principal Component Analysis

Principal component analysis was used to form a proxy to represent a firm's intention to signal to the market its commitment to the climate change issue. Principal component analysis is used to explain the variance-covariance structure through linear combinations of the variables in question. These linear combinations can then be used to reproduce the total variability through a smaller number of components. The principal component can then replace the original variables for further testing.

Similar to Demirguc-Kunt and Detragiache [2002], an aggregate index was formed through principal component analysis using several binary variables provided by the CDP. Demirguc-Kunt and Detragiache [2002] used principal component analysis to form an index to

represent moral hazard using eight dummy variables. The Canadian reports issued by the CDP include a summary table of the disclosures each firm made. These summary tables list specific disclosures and provide an indicator variable as to whether or not a firm made the disclosure. Only eight specific disclosures were consistently provided through the full four years used in this study. These disclosures were then used to form binary variables. The eight binary variables used were: whether or not the firm had assigned board representation for the issue of climate change, whether or not the firm had assigned a senior executive with responsibility for the issue of climate change, whether or not emissions data was disclosed, whether or not third party protocol was followed in the calculation of emissions, whether or not emission data had been externally verified, whether or not the firm has taken steps to prepare for future trading regimes, whether or not the firm had a plan to reduce its emissions, and whether or not the firm provided a formal plan with defined goals and timelines for the reduction of greenhouse gases. Since principal component analysis is better suited for larger samples, the entire sample of 366 firm year observations for disclosing firms from the original sample 858 firm year observations was used for the analysis. All variables loaded onto the first component at 0.555 or higher. The cronbach alpha for the first component was 0.871. However, it only explains 52.5% of the total variation which is lower than the 83% of total variation the principal component Demirguc-Kunt and Detragiache [2002] used. The second component in the analysis explained 11% of the variation while the second component in Demirguc-Kunt and Detragiache's [2002] study explained 10%. The remainder of the components in the Demirguc-Kunt and Detragiache [2002] study explained less than 1% each, while the remaining components for this study explained between 10% and 2% of the variation. While this does represent a deviation from the Demirguc-Kunt and Detragiache [2002] study the signalling index formed from the analysis should still be an acceptable proxy for signalling. Since all eight components only loaded strongly on the first component, the 52.5% of total variation explained represents the common aspect between the eight variables used. It is the representation of a dedication to the climate change issue that each

of these eight variables has in common and it is this dedication that the principal component analysis is trying to capture. Therefore, the object scores should work as an effective proxy for signalling.

4.5 Cross-Sectional Analysis

A cross-sectional analysis was used to find support for hypothesis three. The following two OLS regression model were employed:

$$\begin{aligned} CAAR = {} & \beta_0 + \beta_1 SIGNAL + \beta_2 INITIAL + \beta_3 LEADER + \beta_4 FOLLOWED \\ & + \beta_5 GOODNEWS + \beta_6 TOTSIG + \beta_7 \text{Re}lativeDOMSIG + \beta_8 LIT \\ & + \beta_9 LOWGHG + \beta_{10} SIZE + \beta_{11} ROA + \beta_{12} LEV + \beta_{13} TOBINQ + \beta_{14} CDP5 \\ & + \beta_{15} CDP6 + \beta_{16} CDP7 + \varepsilon \end{aligned} \tag{12}$$

The second model was as follows:

$$\begin{aligned} CAAR = {} & \beta_0 + \beta_1 SIGNAL + \beta_2 INITIAL + \beta_3 LEADER + \beta_4 FOLLOWED \\ & + \beta_5 GOODNEWS + \beta_6 DOMSIG + \beta_7 FORSIG + \beta_8 LIT \\ & + \beta_9 LOWGHG + \beta_{10} SIZE + \beta_{11} ROA + \beta_{12} LEV + \beta_{13} TOBINQ \\ & + \beta_{14} CDP5 + \beta_{15} CDP6 + \beta_{16} CDP7 + \varepsilon \end{aligned} \tag{13}$$

where,

CAAR	is the cumulative average abnormal return from the event study. Both an eleven day window and three day window are used.
SIGNAL	is the object scores from the principal component analysis.
INITIAL	is 1 if the disclosure is the first disclosure a firm has made through the CDP.
LEADER	is 1 for firms that were identified as disclosure leaders by the CDP.
FOLLOWED	is 1 for disclosures that were previously made through a firms annual report.
GOODNEWS	is a continuous variable that was constructed by adding a 1 for all disclosures that would be considered "good" news and

	subtracting a 1 for all disclosures that would be considered "bad" news.
TOTSIG	is the percentage of signatory firm ownership.
RelativeDOMSIG	is the domestic signatory firm ownership divided by the total signatory firm ownership.
DOMSIG	is the percentage of domestic signatory firm ownership.
FORSIG	is the percentage of foreign signatory firm ownership.
LIT	is 1 if a firm has been listed in an environmental lawsuit within the previous 5 years.
LOWGHG	is 1 if a firm's business process does not produce a significant level of GHG emissions.
SIZE	is the natural log of total shareholder's equity averaged over the prior two years.
ROA	is the net income averaged over the prior two years divided by the total assets averaged over the prior two years.
LEV	is the total debt averaged over the prior two years divided by the total assets averaged over the prior two years.
TOBINQ	is the total market value averaged over the prior two years divided by total assets averaged over the prior two years.
CDP5	is 1 for observations from the 2007 sample.
CDP6	is 1 for observations from the 2008 sample.
CDP7	is 1 for observations from the 2009 sample.

The CAAR from the event study is used as the dependant variable. Each model was run twice, the first time included the three day window CAAR as the dependant variable, while the second time used the eleven day CAAR as the dependant variable. Four control variables were

added to account for disclosure characteristics. These variables and the reasons for there inclusion is discussed in the data collection section of this paper. Variables from the logistic regression were also added to control for the influencing factors for the disclosures being made.

5.0 Empirical Results

5.1 Logistic Regression

Table 6 displays the correlations between the variables included within both of the logistic regression models. As would be expected, TOTSIG is highly correlated with DOMSIG and FORSIG. This is most likely due to TOTSIG being the sum of DOMSIG and FORSIG. TOTSIG is not used in the same model as DOMSIG and FORSIG, so the high correlation will not cause any problems within the analysis. RelativeDOMSIG is also highly correlated with both DOMSIG and FORSIG. Much like TOTSIG, it was calculated using DOMSIG and FORSIG, so the correlation is not surprising. Since RelativeDOMSIG is not used in models with DOMSIG and FORSIG, it will not create any multicollinearity issues. There is a statistically significant correlation of 0.635 between SIZE and LEV. Collinearity diagnostic was run to ensure no multicollinearity existed. All variables had a tolerance greater than 0.5 and the highest variance inflation factor was 2.05. Therefore, since all tolerance values were greater than 0.2 and all VIF values were less than 5, multicollinearity should not be an issue. There are also statistically significant correlations between AQ and CDP6 as well as CDP7, giving support for the inclusion of control variables for the time effects. The correlations also show that LIT is negatively correlated to LOWGHG at a highly significant level. This result is not surprising since lower greenhouse producing firms should be less likely to be involved in environmental litigation. LIT is also positively correlated with SIZE at a statistically significant level. This suggests that larger firms are more likely to get sued.

INSERT TABLE 6

The results from the binary logistic regression are displayed in Table 7. Nagelkerke's Pseudo-R Square and the model Likelihood Ratio were used to test the models goodness of fit.

The first model's Likelihood Ratio was significant with a p-value<0.000. The Nagelkerke R Square was 0.259 representing an adequate fit. The second model has some minor improvements in fit with a Likelihood Ratio that is significant at a p-value<0.000 and a Pseudo R Square of 0.262.

The coefficient for the percentage of total signatory investors had a positive direction; however, it failed to have any statistical significance. This finding fails to support the first hypothesis that predicts management disclosing information as a response to shareholder activism. The relative level of domestic signatory investors also lacks any significant influence on management's decision to disclose environmental information through the CDP. However, the domestic signatory firm ownership in the second model was positive and statistically significant at a p-value of less than 0.05. Taken together, it appears that groups of domestic institutional investors are capable of influencing a firm's response to shareholder activism. However, foreign institutional investors do not seem to share the same benefit.

The estimated coefficient for the litigation risk variable is significant at a p<0.01 level in both models. The sign of the coefficient was not hypothesized. The results indicate a negative influence. Therefore, there is support for litigation risk influencing the decision to disclose, and findings suggest that firms do not believe that premature disclosures will be beneficial in the defence of environmental litigation. Rather, it appears that firms concerned with potential lawsuits are choosing not to disclose information.

INSERT TABLE 7

The results give support for the fifth hypothesis that predicts that firms with low emissions levels are disclosing for low cost publicity. The estimated coefficient for the variable representing low greenhouse gas emitting firms was both positive and significant at the p<0.05 level in both models. This indicates that firms with low cost of compliance are more likely to disclose than those firms that need to be concerned with future regulations.

5.2 Market Reaction to the CDP Disclosures

Table 8 displays the results from the market reaction to the release of the CDP questionnaires to the signatory investors. With the exception of day t -3, there are no statistically significant average abnormal returns (AAR) within either of the event windows. Neither the CAAR from the three day window from day t – 1 to day t + 1 nor the CAAR from the 11 day window from day t – 5 to day t +5 are statistically significant. This lack of significant results could be related to individual disclosure characteristics that differ across the sample. Therefore, further univariate tests of the market reaction were conducted. The CAAR for both the t -1 to t +1 and t - 5 to t +5 windows will still be used within the cross-sectional regression. However, results from the regression analysis will need to be read with caution since they are based on results that are not statistically significant.

INSERT TABLE 8

5.3 Univariate Tests of Market Reaction

Three subsamples from the 107 observations used in the event study were tested to determine if the market reaction to the disclosures being made was dependant upon disclosure characteristics. The three binary variables included in the cross-sectional regression models to control for disclosure characteristics were used to split the sample. The first subsample used in an event study included all firms that were coded with a 1 for the INITIAL variable. This event study tests the market reaction to the first time a firm disclosed climate change related information through the CDP. The sample consisted of 38 firm year observations. Results are displayed in table 9. Consistent with the findings from the original event study, there was not a significant market response.

INSERT TABLE 9

The second subsample used consists of all firms that had been identified as disclosure leaders by the CDP. The sample consisted of 26 firm year observations. Results are displayed in table 10. As with the original event study, there was not a statistically significant market reaction.

INSERT TABLE 10

The final event study included all firms that were coded as a 0 for the FOLLOWED variable. By performing this event study, the market response is analysed for firms that released new information. The sample consisted of 45 firm year observations. As with the original event study, there was not a statistically significant market response.

INSERT TABLE 11

The lack of a statistically significant market response is consistent with the findings of Kolk et al. (2008). Kolk et al. (2008) concluded that the information being provided through the CDP was not useful to investors. The lack of a statistically significant market response supports their findings.

5.4 Cross-Sectional Analysis

Table 12 is the correlation matrix for the variables included within the cross-sectional analysis of the market response to the information released through the CDP.

INSERT TABLE 12

As would be expected, the three day CAAR is highly correlated to the eleven day CAAR. The SIGNAL variable is correlated to all four of the disclosure characteristic control variables at a statistically significant level. This result is not surprising since the SIGNAL variable was constructed by using disclosure information. There are no significant correlations between the dependant variables from either model and the control variables for either firm or the time effects. Similar to the correlations from the logistic regression, TOTSIG and RelativeDOMSIG are highly correlated to both DOMSIG and FORSIG. As with the logistic regression analysis, these variables are run in separate models. The only other highly correlated variables were SIZE and LEV. As with the logistic regression, collinearity diagnostic was ran. The lowest tolerance was 0.343 which is greater than 0.2. The highest variance inflation factor was 2.912 which is less than 5. Therefore, multicollinearity should not be an issue. There are statistically significant correlations between the variable constructed to represent signalling (SIGNAL) and litigation risk

(LIT), low greenhouse gas emitting firms (LOWGHG) as well as SIZE and LEV. These relationships seem intuitive; firms that have been subjected to environmental litigation in previous years would be interested in signalling to the market that they are no longer poor environmental performers. Those firms with low emission levels would have less to lose by signalling the market, and large firms are more visible and are more likely to benefit from being promoted as a "green" firm.

INSERT TABLE 13

Table 13 displays the results from the cross-sectional analysis. Neither of the models ran with the three days window had statistically significant results for the SIGNAL variable. The two models ran with the eleven days window failed to have statistically significant results for the SIGNAL variable as well. Furthermore, the adjusted R-squared for the models run with the three days window as the dependant variable were extremely low showing the models to be poor fits. The adjusted R-squared values for the models with the eleven days window CAAR used as the dependant variables were larger than the adjusted R-squared values from the three days window CAAR models; the model ran with TOTSIG and RelativeDOMSIG had an adjusted R-squared of 0.164 and the model ran with DOMSIG and FORSIG had an adjusted R-squared value of 0.137. Furthermore, the only statistically significant results were found in the models ran with the CAAR (-5, +5) as the dependant variable. In both of these models, GOODNEWS was found to be statistically significant; however, in each case it has a negative value. This negative coefficient raises an issue pertaining to how effective these climate change disclosures can be as a quasi-regulation for pollution control. The negative finding suggests that investors are punishing firms that are making early preparations to contend with the climate change issue rather than rewarding them. This response would create the opposite effect in terms of pollution control, instead of encouraging companies to improve environmental performance it would promote waiting until greenhouse gas reduction was necessary before investing in greenhouse gas reduction technology. RelativeDOMSIG was significant in model three at a p-value of less than 0.05 and the level of

foreign signatory investor ownership in model 4 was statistically significant at less than 5 percent. However, these results should be taken lightly since they are only found in the CAAR (-5, +5) models and are based on a market response that was not found to be statistically significant. Therefore, I am unable to find support for hypothesis three that management is signalling the market. This also raises questions pertaining to the effectiveness of using the CDP as low cost publicity.

6.0 Conclusions

Five hypotheses were presented to help understand management's decision to disclose information pertaining to climate change through the CDP. The first set of these hypotheses considers the CDP and its signatory investors as a new corporate governance mechanism. The results indicate that a firm's decision making process can be influenced by domestic institutional investors. However, this ability to influence a firm through a combined effort is only significant for domestic investors. The lack of support for hypothesis one, that greater levels of signatory investors would be associated with higher disclosure levels, highlights a limitation in the new corporate governance mechanism that has been created by the CDP and its signatory investors. This finding will be useful to parties interested in duplicating the CDP's efforts. While the evidence provided suggests that the success of shareholder activism for social issues can be improved, it will require support from investors in each market if a globally unified response is desired.

The third hypothesis looked at the disclosures as a means for a firm to signal to the market that they are good environmental performers and that they can operate with greater regulations. The market reactions to the disclosures being made through the CDP were inspected to find support for this hypothesis. However, there was a lack of a statistically significant response to the disclosures being made. Therefore, no support was found for hypothesis three. Further analysis also gave indication that firms releasing "good" news were receiving a negative market response. This raises concerns about how effective the CDP can be at performing as a

quasi-regulation. With investors punishing firms that are preparing for the climate change issue with higher costs of capital, this mechanism will have the opposite effect, encouraging firms to continue with the greenhouse gas emissions. This finding was exclusive to the models containing the eleven days window CAAR as the dependant variables and the cross-sectional regression analysis was based upon an event date that was not found to be statistically significant. Therefore, it should be read with caution; however, it gives clear indication that the area should receive more attention in future studies.

The fourth hypothesis considers the effects of environmental litigation on a firm's decision to disclose environmental information. Support was found for environmental litigation risk influencing a management's decision to disclose climate change information through the CDP. The direction of the coefficient was negative suggesting that the threat of shareholder litigation is not motivating firms to disclose climate change information. Rather, firms are choosing not to disclose information related to climate change when they are exposed to higher levels of environmental litigation risk.

The final hypothesis considered whether the disclosures made through the CDP are low cost publicity. There is support for low polluting firms being more likely to disclose environmental information through the CDP. This indicates that the CDP is being used as an avenue to gain low cost publicity. However, the lack of a statistically significant market response implies that even though firms are attempting to use it for low cost publicity, they are not being rewarded with a lower cost of capital.

When considering all of these results collectively, we can start to form a picture of the CDP, its signatory investors and the effectiveness of the international corporate governance mechanism they form. The first two hypotheses are reflective of the tactics that the CDP has chosen to follow. Since the CDP has gathered the signatory investors together to apply pressure on firms to disclose climate change information, we can view these hypotheses as being directly related to the success it has enjoyed. However, even though the CDP is an international corporate

governance mechanism, evidence supports its requirement of local institutional investors in order to be successful. Furthermore, this new form of shareholder activism appears to be more successful at altering the behaviour of those firms that are not likely to endure any negative effects if stricture regulations are passed. This is not to say that the positive results are limited to these firms, but rather suggests that further investigation is required before this mechanism can be considered as a viable substitute for mandatory reporting. This suggestion is reiterated by the results from both the signalling hypothesis and the litigation risk hypothesis. The lack of a statistically significant market response implies that investors do not value the information being disclosed, while the negative estimated coefficient from the litigation risk proxy supports the concept that those firms that should be disclosing are not voluntarily disclosing through the CDP.

Table 1: Initial Sample and Reasons for Deletion

The following table displays the original sample size, the reasons for the removal of observations, the number of observations removed, the final sample sizes for the logistic regression analysis, and the final sample size for the event study and cross-sectional regression analysis.

	Disclosing Firms	Non-Disclosing Firms	Total
Initial Sample	366	492	858
Observations removed due to lack of financial information	15	25	40
Final Sample for Logistic Regression	351	467	818
Observations removed due to unknown event date	244		
Final Sample for Event Study and Cross-Sectional Analysis	107		

Table 2: Descriptive Statistics, Full Sample

The following table displays descriptive statistics for both firms that disclosed climate change information through the CDP and firms that did not disclose information through the CDP. The mean, median and standard deviation are given for the percentage of domestic signatory ownership, the percentage of foreign signatory ownership, the firms total assets, market value, long-term debt, total liabilities, total shareholders equity and net income. Differences between the disclosing firms and non-disclosing firms are also given.

	Disclosing Firms N=351			Non-Disclosing Firms N=467			Difference	
Variable	**Mean**	**Median**	**Standard Deviation**	**Mean**	**Median**	**Standard Deviation**	**Mean**	**Median**
Domestic Signatory Investors	7.92	6.64	6.39	6.06	4.31	6.40	1.87	2.33
Foreign Signatory Investors	4.86	2.38	5.82	5.40	2.36	6.63	-0.54	0.02
Total Assets	36813.09	4652.20	100150.81	6205.58	1710.79	18936.88	30607.51	2941.41
Market Value	10391.64	3451.07	13448.02	3249.10	1728.00	5286.36	7142.53	1723.07
Long-Term Debt	2326.09	851.94	3263.19	958.43	342.91	2065.66	1367.66	509.03
Total Liabilities	32215.09	2418.52	95521.83	4512.24	854.07	16173.38	27702.85	1564.46
Total Stockholders Equity	4380.99	1828.05	5615.78	1379.95	751.74	2058.04	3001.04	1076.31
Net Income	651.28	228.90	1091.75	181.16	79.36	428.44	470.12	149.54

Table 3: Frequencies, Full Sample

The following table displays the frequencies and percentages of all binary variables included within the logistic regression analysis. Each variable lists the possible responses as well as the meaning of each response. Statistics are listed for the full sample as well as breakdowns for the subset of the sample that answered the questionnaire as well the subset of the sample that did not answer the CDP's questionnaire.

Variable and Response	Frequency	Percentage
Complete Sample N=818		
AQ		
1. Disclosed climate change information	351	42.9
0. Did not disclose climate change information	467	57.1
LIT		
1. Listed as a defendant in environmental litigation within 5 years prior to being approached by the CDP	92	11.2
0. Not listed as a defendant in environmental litigation within 5 years prior to being approached by the CDP	726	88.8
LOWGHG		
1. Firm's business process produces low levels of greenhouse gases	456	44.3
0. Firm's business process produces high levels of greenhouse gases	362	55.7
CDP5		
1. Observation taken from 2007	183	22.4
0. Observation not taken from 2007	635	77.6
CDP6		
1. Observation taken from 2008	177	21.6
0. Observation not taken from 2008	641	78.4
CDP7		
1. Observation taken from 2009	193	23.6
0. Observation not taken from 2009	625	76.4
Disclosing Firms N=351		
LIT		
1. Listed as a defendant in environmental litigation within 5 years prior to being approached by the CDP	67	19.1
0. Not listed as a defendant in environmental litigation within 5 years prior to being approached by the CDP	284	80.9
LOWGHG		
1. Firm's business process produces low levels of greenhouse gases	181	51.6
0. Firm's business process produces high levels of greenhouse gases	170	48.4
CDP5		
1. Observation taken from 2007	83	23.6
0. Observation not taken from 2007	268	76.4
CDP6		
1. Observation taken from 2008	98	27.9
0. Observation not taken from 2008	253	72.1
CDP7		
1. Observation taken from 2009	97	27.6
0. Observation not taken from 2009	254	72.4
Non-Disclosing Firms N=467		
LIT		
1. Listed as a defendant in environmental litigation within 5 years prior to being approached by the CDP	25	5.4
0. Not listed as a defendant in environmental litigation within 5 years prior to being approached by the CDP	442	94.6
LOWGHG		
1. Firm's business process produces low levels of greenhouse gases	275	58.9
0. Firm's business process produces high levels of greenhouse gases	192	41.1
CDP5		
1. Observation taken from 2007	100	21.4
0. Observation not taken from 2007	367	78.6
CDP6		
1. Observation taken from 2008	79	16.9
0. Observation not taken from 2008	388	83.1
CDP7		
1. Observation taken from 2009	96	20.6
0. Observation not taken from 2009	371	79.4

Table 4: Descriptive Statistics, Private Event Study Sample

The following table displays descriptive statistics for the sample used in the private date

Variable	N	Mean	Median	Standard Deviation
Domestic Signatory Investors	107	9.24	8.16	7.14
Foreign Signatory Investors	107	4.18	2.09	4.59
Total Assets	107	65871.37	11559.25	141982.00
Market Value	107	15389.45	8350.32	16472.65
Long-Term Debt	107	3413.81	2514.40	3437.30
Total Liabilities	107	59153.25	5550.23	136149.00
Total Stockholders Equity	107	6344.19	3680.25	6774.32
Net Income	107	1057.98	461.53	1353.71

Table 5: Frequencies, Private Date Event Study

The following table displays the frequencies and percentages of all binary variables included within the cross-sectional regression analysis. Each variable lists the possible responses as well as the meaning of each response.

Variable and Response	Frequency	Percentage
N=107		
LIT		
1. Listed as a defendant in environmental litigation within 5 years prior to being approached by the CDP	29	27.1
0. Not listed as a defendant in environmental litigation within 5 years prior to being approached by the CDP	78	72.9
LOWGHG		
1. Firm's business process produces low levels of greenhouse gases	62	57.9
0. Firm's business process produces high levels of greenhouse gases	45	42.1
CDP5		
1. Observation taken from 2007	38	35.5
0. Observation not taken from 2007	69	64.5
CDP6		
1. Observation taken from 2008	19	17.8
0. Observation not taken from 2008	88	82.2
CDP7		
1. Observation taken from 2009	23	21.5
0. Observation not taken from 2009	84	78.5

Table 6: Correlation Matrix, Full Sample

This table lists the correlations between all variables used in both of the logistic regression models. AQ is the dependant variable, it is a dummy variable coded as a 1 for firms that disclosed through the CDP and 0 otherwise. TOTSIG is the percentage of signatory firm ownership. RelativeSIG is the firms' domestic signatory ownership divided by the firms' total signatory ownership.DOMSIG is the percentage of domestic signatory ownerhip. FORSIG is the percentage of foreign signatory firm ownership. LIT is a dummy variable representing litigation risk, it is coded 1 for all firms that were listed as defendants in environmental litigation within 5 years prior to being approached by the CDP. LOWGHG is a dummy variable coded 1 for firms that produce low levels of greenhouse gases and 0 otherwise. SIZE is the natural log of the total assets averaged over the prior two years. ROA is the firms' net income averaged over the prior two years divided by total assets averaged over the prior two years. LEV is the firms' total debt averaged over the prior two years divided by the total assets averaged over the prior two years. TOBINQ is the firms' market value of equity averaged over the prior two years divided by the firms book value of equity averaged over the prior two years. CDP5, CDP6, and CDP 7 are dummy variable included to capture time effects, they represent 2007, 2008, and 2009 respectively.

	AQ	TOTSIG	RelativeDOMSIG	DOMSIG	FORSIG	LIT	LOWGHG	SIZE	ROA	LEV	TOBINQ	CDP5	CDP6	CDP7
AQ	1													
TOTSIG	0.076*	1												
RelativeDOMSIG	0.089*	-0.212**	1											
DOMSIG	0.143**	0.693**	0.432**	1										
FORSIG	-0.042	0.673**	-0.727**	-0.068	1									
LIT	0.215**	0.032	0.061	0.065	-0.022	1								
LOWGHG	-0.073*	0.063	0.114**	0.135**	-0.051	-0.236**	1							
SIZE	0.374**	0.166**	0.212**	0.268**	-0.044	0.165**	0.183**	1						
ROA	0	-0.042	0.137**	0.011	-0.069*	0.038	-0.079*	-0.075*	1					
LEV	0.144**	0.084*	0.220**	0.211**	-0.100**	0	0.333**	0.635**	-0.127**	1				
TOBINQ	-0.033	-0.04	-0.034	-0.053	-0.001	-0.05	-0.035	-0.128**	0.107**	0.044	1			
CDP5	0.027	-0.106**	0.461**	0.192**	-0.344**	0.004	-0.036	0.042	0.06	0.036	0.007	1		
CDP6	0.132**	-0.312**	0.072*	-0.204**	-0.223**	0.038	0.002	0.126**	0.026	0.031	0.061	-0.282**	1	
CDP7	0.083*	0.340**	-0.212**	0.149**	0.317**	0.003	0.002	0.115**	-0.090**	0.026	-0.051	-0.298**	-0.292**	1

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 7: Logistic Regression

This table lists the results from two logistic regressions where the dependant variable for both is a dummy variable coded as a 1 for firms that disclosed through the CDP and 0 otherwise. Predicted sign, the coefficient estimate, standard error and wald statistic are given for the intercept as well as all independent variables. The first model includes TOTSIG which is the percentage of signatory firm ownership. RelativeSIG is the firms' domestic signatory ownership divided by the firms' total signatory ownership. LIT is a dummy variable representing litigation risk, it is coded 1 for all firms that were listed as defendants in environmental litigation within 5 years prior to being approached by the CDP. LOWGHG is a dummy variable coded 1 for firms that produce low levels of greenhouse gases and 0 otherwise. SIZE is the natural log of the total assets averaged over the prior two years. ROA is the firms' net income averaged over the prior two years divided by total assets averaged over the prior two years. LEV is the firms' total debt averaged over the prior two years divided by the total assets averaged over the prior two years. TOBINQ is the firms' market value of equity averaged over the prior two years divided by the firms book value of equity averaged over the prior two years. CDP5, CDP6, and CDP 7 are dummy variable included to capture time effects; they represent 2007, 2008, and 2009 respectively. The second model replaces TOTSIG and RelativeDOMSIG with DOMSIG and FORSIG. DOMSIG is the percentage of domestic signatory ownership. FORSIG is the percentage of foreign signatory firm ownership. 819 firm year observations were used for both models. Model One had a likelihood ratio of 168.641 with 11 degrees of freedom and was significant at all levels and a pseudo R-squared of 0.258. Model Two had a likelihood ratio of 177.804 with 11 degrees of freedom and was significant at all levels and a pseudo R-squared of 0.262.

		Model One			Model Two		
Variable	**Predicted Sign**	**Estimate**	**Standard Error**	**Wald Statistic**	**Estimate**	**Standard Error**	**Wald Statistic**
Intercept		-2.556***	0.839	9.287	-2.764***	0.811	11.625
TOTSIG	+	0.012	0.01	1.428			
RelativeDOMSIG	+	-0.085	0.286	0.089			
DOMSIG	+				0.026**	0.013	3.919
FORSIG	+				-0.005	0.015	0.11
LIT	+/-	-0.916***	0.272	11.335	-0.88***	0.273	10.414
LOWGHG	+	0.409**	0.174	5.527	0.45**	0.175	6.618
SIZE	+	0.597***	0.077	60.382	0.594***	0.077	59.747
ROA	+	0.208	0.903	0.053	0.074	0.894	0.007
LEV	-	-0.959*	0.525	3.329	-1.054**	0.527	4.002
TOBINQ	+	0.01	0.019	0.27	0.011	0.019	0.36
CDP5	+/-	-0.571**	0.248	5.301	-0.402*	0.24	2.806
CDP6	+/-	-0.892***	0.239	13.953	-0.836***	0.238	12.347
CDP7	+/-	-0.573**	0.224	6.525	-0.574**	0.225	6.525
N		819			819		
Psuedo R-Squared		0.259			0.262		
Model L.R. (d.f., p-value)		175.170 (11, 0.000)			177.804 (11, 0.000)		

***, **, and * indicate significance at the one, five, and 10 percent level, respectively

Table 8: Market Reaction to Disclosures Made Through the CDP: Private Date

Day is the day relative to the announcement day. AAR is the average abnormal return from the single factor market model. CAAR is the cumulative average abnormal return. StdCsect Z is a standardized cross-sectional z test. Rank Test is a nonparametric test statistic to test for a significant difference in the ratios of positive, relative to negative, abnormal returns. Positive:Negative is a nonparametric test comparing the fraction of positive signs to the fraction of positive signs in the estimation period.

Day	AAR	CAAR	StdCsect Z	Rank Test	Positive:Negative
-60	-0.12	-0.12	-1.277	-0.622	50:57
-40	0.3	0.89	0.718	0.543	53:54
-20	-0.12	1.14	-2.105**	-1.760*	48:59
-10	-0.03	1.96	-0.547	-0.02	49:58
-5	0.11	2.25	0.177	0.405	58:49
-4	0.07	2.32	0.587	1.081	55:52
-3	-0.42	1.9	-2.628***	-2.697***	38:69<<
-2	0.22	2.11	1.128	1.296	57:50
-1	-0.01	2.1	0.043	-0.108	51:56
0	-0.04	2.07	0.045	-0.574	43:64(
1	-0.16	1.91	-1.099	-0.83	48:59
2	-0.11	1.79	-1.188	-0.227	49:58
3	-0.03	1.77	-0.136	0.445	52:55
4	0.08	1.85	0.035	0.326	53:54
5	0.07	1.92	0.129	0.527	55:52
10	-0.06	2.36	-0.622	0.146	54:53
20	0.2	2.11	1.124	1.317	59:48
40	0.01	2.49	-0.672	-0.261	52:55
60	-0.01	2.33	0.237	1.072	59:48
Window		**CAAR**	**StdCsect Z**	**Rank Test**	**Positive:Negative**
-1, 1		-0.21	-0.61	-0.873	42:65(
-5, 5		-0.22	-0.793	-0.107	53:54

***, **, and * indicate significance at the one, five, and 10 percent level, respectively

<<, <, and (indicate direction and significance at the one, five, and 10 percent level, respectively

Table 9: Market Reaction to Disclosures Made Through the CDP: Firm's First Response to CDP

Day is the day relative to the announcement day. AAR is the average abnormal return from the single factor market model. CAAR is the cumulative average abnormal return. StdCsect Z is a standardized cross-sectional z test. Rank Test is a nonparametric test statistic to test for a significant difference in the ratios of positive, relative to negative, abnormal returns. Positive:Negative is a nonparametric test comparing the fraction of positive signs to the fraction of positive signs in the estimation period.

Day	AAR	CAAR	StdCsect Z	Rank Test	Positive:Negative
-60	-0.15	-0.15	-0.3	-0.144	20:18
-40	-0.44	-0.32	-1.178	-1.599	12:26<
-20	-0.13	-1.03	-0.753	-0.635	18:20
-10	-0.11	-1.48	-0.813	-0.306	17:21
-5	0	-1.12	-0.333	-0.586	19:19
-4	0.06	-1.07	0.522	1.127	22:16
-3	-0.3	-1.37	-0.7	-1.341	15:23
-2	0.21	-1.16	0.826	0.669	21:17
-1	0.02	-1.14	0.322	0.116	17:21
0	0.19	-0.95	0.813	0.354	16:22
1	0.03	-0.92	-0.031	0.005	17:21
2	-0.04	-0.95	-0.205	0.34	18:20
3	-0.07	-1.03	-0.121	-0.157	15:23
4	0.11	-0.92	0.283	0.809	19:19
5	-0.17	-1.09	-0.45	-0.275	18:20
10	0.03	-1.13	-0.011	0.078	20:18
20	0.13	-1.77	0.303	0.116	18:20
40	0.21	-1.08	0.776	0.922	21:17
60	0.51	-0.61	2.210*	2.710**	27:11>>
Window		**CAAR**	**StdCsect Z**	**Rank Test**	**Positive:Negative**
-1, 1		0.24	0.595	0.274	15:23
-5, 5		0.04	0.305	0.32	22:16

***, **, and * indicate significance at the one, five, and 10 percent level, respectively

<<, <, and (indicate direction and significance at the one, five, and 10 percent level, respectively

Table 10: Market Reaction to Disclosures Made Through the CDP: CDP Disclosure Leaders

Day is the day relative to the announcement day. AAR is the average abnormal return from the single factor market model. CAAR is the cumulative average abnormal return. StdCsect Z is a standardized cross-sectional z test. Rank Test is a nonparametric test statistic to test for a significant difference in the ratios of positive, relative to negative, abnormal returns. Positive:Negative is a nonparametric test comparing the fraction of positive signs to the fraction of positive signs in the estimation period.

Day	AAR	CAAR	StdCsect Z	Rank Test	Positive:Negative
-60	-0.2	-0.2	-0.957	-0.597	11:15
-40	0.37	1.74	0.976	0.584	14:12
-20	0.28	2.5	-0.768	-0.398	12:14
-10	-0.13	2.69	-0.584	-0.697	9:17
-5	-0.14	1.94	-0.195	-0.1	16:10
-4	-0.02	1.92	-0.24	0.064	12:14
-3	0	1.92	0.352	0.507	15:11
-2	0.29	2.2	0.24	0.631	13:13
-1	0.03	2.23	0.008	-0.366	12:14
0	-0.13	2.1	-1.231	-0.94	11:15
1	0.16	2.27	0.538	0.901	17:9
2	-0.36	1.91	-0.97	-1.003	9:17
3	0.29	2.2	0.237	0.808	14:12
4	-0.01	2.19	-0.324	-0.282	13:13
5	-0.07	2.12	-0.358	-0.016	13:13
10	0.24	2.02	0.734	0.864	15:11
20	0.29	1.01	0.414	0.549	14:12
40	-0.31	3.35	-1.503	-1.112	11:15
60	0.12	6.23	0.453	0.507	15:11
Window		**CAAR**	**StdCsect Z**	**Rank Test**	**Positive:Negative**
-1, 1		0.06	-0.151	-0.233	12:14
-5, 5		0.04	-0.364	0.062	12:14

***, **, and * indicate significance at the one, five, and 10 percent level, respectively

<<, <, and (indicate direction and significance at the one, five, and 10 percent level, respectively

Table 11: Market Reaction to Disclosures Made Through the CDP: New Information Disclosed

Day is the day relative to the announcement day. AAR is the average abnormal return from the single factor market model. CAAR is the cumulative average abnormal return. StdCsect Z is a standardized cross-sectional z test. Rank Test is a nonparametric test statistic to test for a significant difference in the ratios of positive, relative to negative, abnormal returns. Positive:Negative is a nonparametric test comparing the fraction of positive signs to the fraction of positive signs in the estimation period.

Day	AAR	CAAR	StdCsect Z	Rank Test	Positive:Negative
-60	-0.15	-0.15	-0.169	0.177	23:22
-40	0.37	-2.82	0.853	0.502	21:24
-20	-0.18	-5.63	-1.076	-1.03	20:25
-10	0.07	-5.76	0.02	0.688	22:23
-5	0.22	-5.49	0.408	0.133	21:24
-4	-0.11	-5.6	-0.311	0.005	19:26
-3	-0.46	-6.06	-1.912$	-2.131*	14:31<
-2	-0.06	-6.12	-0.169	-0.129	22:23
-1	0.15	-5.96	0.815	0.954	22:23
0	-0.07	-6.03	-0.614	-1.024	14:31<
1	-0.31	-6.34	-0.951	-0.956	18:27
2	-0.14	-6.48	-1.293	-0.41	20:25
3	-0.13	-6.61	0.02	0.586	22:23
4	0.15	-6.46	0.52	0.871	25:20
5	0.38	-6.08	0.692	1.201	26:19
10	-0.33	-6.19	-1.087	-0.611	20:25
20	0.41	-5.84	1.964*	1.939$	25:20
40	0.11	-6.92	0.138	0.378	23:22
60	0.12	-8.99	-1.398	-0.574	21:24
Window		**CAAR**	**StdCsect Z**	**Rank Test**	**Positive:Negative**
-1, 1		-0.22	-0.571	-0.593	16:29(
-5, 5		-0.37	-0.648	-0.272	24:21

***, **, and * indicate significance at the one, five, and 10 percent level, respectively

<<, <, and (indicate direction and significance at the one, five, and 10 percent level, respectively

Table 12: Correlation Matrix: Cross-Sectional Analysis

This table lists the correlations between all variables used in the cross-sectional analysis of the market response to the disclosures made through the CDP. CAAR (-1,+1) is the dependant variable from model 1 and model 3. CAAR (-5,+5) is the dependant variables for model 2 and model 4. They are the cumulative average abnormal return for the three day window and eleven day window. SIGNAL is an aggregate index representing a firm's commitment to the climate change issue, it wascreated through a principal component analysis. INITIAL is a binary variable coded 1 if a disclosure was the firm's first response to the CDP. LEADER is a binary variable coded 1 if the firm was identified by the CDP as a disclosure leader. FOLLOWER is a binary variable coded 1 if the information disclosed through the CDP was previously disclosed within the firm's annual report. GOODNEWS is a continuous variable that rates how well a firm's disclosures show them to be positioned to contend with the climate change issue. TOTSIG is the total signatory investor ownership. RelativeSIG is the domestic signatory ownership divided by the total signatory ownership. DOMSIG is the percentage of domestic signatory ownerhip. FORSIG is the percentage of foreign signatory firm ownership. LIT is a dummy variable representing litigation risk, it is coded 1 for all firms that were listed as defendants in environmental litigation within 5 years prior to being approached by the CDP. LOWGHG is a dummy variable coded 1 for firms that produce low levels of greenhouse gases and 0 otherwise. SIZE is the natural log of the total assets averaged over the prior two years. ROA is the net income averaged over th eprior two years divided by the total assets averaged over the prior two years. LEV is the total debt averaged over the prior two years divided by the total assets averaged over the prior two years. TOBINQ is the firms market value of equity averaged over the prior two years divided by the book value of equity averaged over the prior two years. CDP5, CDP6, and CDP 7 are dummy variable included to capture time effects, they represent 2007, 2008, and 2009 respectively.

	CAAR (-1,+1)	CAAR (-5,+5)	SIGNAL	INITIAL	LEADER	FOLLOWER	GOODNEWS	TOTSIG	RelativeDOMSIG	DOMSIG	FORSIG	LIT	LOWGHG	SIZE	ROA	LEV	TOBINQ	CDP5	CDP6	CDP7
CAAR (-1,+1)	1																			
CAAR (-5,+5)	0.554**	1																		
SIGNAL	0.01	-0.054	1																	
INITIAL	0.121	0.032	-0.279**	1																
LEADER	0.059	0.029	0.415**	-0.329**	1															
FOLLOWER	0.028	0.018	0.297**	-0.188	0.376**	1														
GOODNEWS	-0.061	-0.127	0.336**	-0.179	0.294**	0.074	1													
TOTSIG	0.003	-0.145	0.181	-0.385**	0.166	0.214*	0.119	1												
RelativeDOMSIG	0.149	0.269**	-0.101	-0.056	-0.025	-0.192*	-0.041	-0.053	1											
DOMSIG	0.096	-0.025	0.105	-0.344**	0.145	0.133	0.108	0.842**	0.394**	1										
FORSIG	-0.144	-0.231*	0.174	-0.179	0.081	0.190*	0.051	0.545**	-0.705**	0.007	1									
LIT	-0.098	0.053	0.352**	-0.101	0.194*	0.371**	0.202*	0.126	-0.019	0.089	0.095	1								
LOWGHG	-0.029	0.105	0.273**	0.078	-0.003	0.306**	-0.085	-0.145	0.055	-0.156	-0.026	0.307**	1							
SIZE	-0.013	-0.109	0.265**	-0.481**	0.227*	0.13	0.205*	0.469**	0.117	0.448**	0.173	-0.028	-0.299**	1						
ROA	0.001	0.221*	0.065	0.053	0.017	0.002	-0.046	-0.107	0.078	-0.123	-0.008	-0.037	0.328**	-0.177	1					
LEV	0.053	-0.012	0.217*	-0.326**	0.201*	0.047	0.191*	0.338**	0.117	0.364**	0.061	-0.096	-0.407**	0.708**	-0.349**	1				
TOBINQ	-0.071	-0.114	0.025	0.046	-0.057	-0.178	-0.025	-0.157	0.031	-0.154	-0.052	-0.007	0.061	-0.119	0.303**	0.053	1			
CDP5	0.04	0.071	-0.155	0.102	-0.011	-0.308**	-0.058	-0.046	0.615**	0.275**	-0.514**	-0.057	-0.08	-0.071	0.174	-0.07	0.233*	1		
CDP6	0.001	-0.032	0.172	-0.192*	0.193*	0.231*	0.018	-0.250**	0.031	-0.157	-0.220*	0.102	0.148	0.074	-0.081	0.004	-0.071	-0.345**	1	
CDP7	-0.096	-0.052	0.132	-0.388**	0.181	0.336**	-0.159	0.410**	-0.416**	0.062	0.665**	0.09	0.031	0.163	0.056	0.088	-0.171	-0.388**	-0.243*	1

Table 13: Cross Sectional Regression: Private Date

This table lists the results from the cross-sectional regression where the dependant variable is either a three day window from the event study (CAAR (-1, +1)) or an eleven day window from the event study (CAAR (-5,+5)). Two models are given for each of the dependant variables. Predicted sign, the coefficient estimate, standard error and t-statistic are given for the intercept as well as all independant variables. SIGNAL is an aggregate index representing a firm's commitment to the climate change issue, it was created through a principal component analysis. INITIAL is a binary variable coded as a 1 for disclosures that were a firm's first time responding to the CDP and 0 otherwise. LEADER is a binary variable coded 1 for firms that were classified by the CDP as disclosure leaders. FOLLOWED is a binary variable coded as a 1 for responses to the CDP that were previously disclosed through annual reports and 0 otherwise. GoodNews is a variable rating a firm's environmental performance. Model 1 and Model 3 use the independant variables TOTSIG and RelativeDOMSIG. TOTSIG is the percentage of signatory firm ownership. RelativeDOMSIG was calculated by dividing the percentage of domestic signatory ownership by the total signatory ownership. Model 3 and Model 4 include DOMSIG and FORSIG. DOMSIG is the percentage of domestic signatory ownerhip. FORSIG is the percentage of foreign signatory firm ownership. The remaining independant variables are included in all four models. LIT is a dummy variable representing litigation risk, it is coded 1 for all firms that were listed as defendants in environmental litigation within 5 years prior to being approached by the CDP. LOWGHG is a dummy variable coded 1 for firms that produce low levels of greenhouse gases and 0 otherwise. SIZE is the natural log of the total assets averaged over the prior two years. ROA is the net income averaged over the prior two years divided by the total assets averaged over the prior two years. LEV is the total debt averaged over the prior two years divided by the total assets averaged over the prior two years. TOBINQ is the firms market value averaged over the prior two years divided by the book value of equity averaged over the prior two years. CDP5, CDP6, and CDP 7 are dummy variable included to capture time effects, they represent 2007, 2008, and 2009 respectively. 107 firm year observations were used.

		CAAR (-1,1)						CAAR (-5, 5)					
		Model 1			Model 2			Model 3			Model 4		
Variable	Predicted Sign	Estimate	Standard Error	t-Stat	Estimate	Standard Error	t-Stat	Estimate	Standard Error	t-Stat	Estimate	Standard Error	t-Stat
Intercept		-0.005	0.024	-0.211	0.005	0.023	0.237	0.038	0.045	0.855	0.058	0.044	1.334
SIGNAL	+	0.003	0.004	0.794	0.002	0.004	0.66	-0.003	0.007	-0.425	-0.005	0.007	-0.804
INITIAL		0.008	0.008	0.973	0.009	0.008	1.077	-0.018	0.015	-1.210	-0.018	0.015	-1.158
LEADER		0.007	0.008	0.912	0.007	0.008	0.934	0.017	0.015	1.148	0.015	0.015	0.998
FOLLOWED		0.005	0.007	0.741	0.002	0.007	0.338	0.003	0.014	0.209	-0.003	0.014	-0.182
GOODNEWS		-0.001	0.002	-0.898	-0.001	0.001	-0.863	-0.006**	0.003	-2.021	-0.005*	0.003	-1.925
TOTSIG	+/-	0.000	0.000	0.575				-0.001	0.001	-0.972			
RelativeDOMSIG	+/-	0.026	0.016	1.587				0.067**	0.030	2.237			
DOMSIG	+/-				0.001	0.001	1.290				-0.001	0.001	-0.550
FORSIG	+/-				-0.001	0.001	-1.075				-0.003*	0.002	-1.875
LIT	+/-	-0.007	0.007	-0.994	-0.006	0.007	-0.869	0.022	0.014	1.659	0.024*	0.014	1.779
LOWGHG	+/-	-0.005	0.008	-0.638	-0.002	0.007	-0.314	-0.003	0.014	-0.182	0.006	0.014	0.421
SIZE	+/-	-0.002	0.003	-0.714	-0.001	0.002	-0.470	-0.01**	0.005	-2.144	-0.008	0.005	-1.643
ROA	+/-	0.025	0.064	0.389	0.033	0.063	0.531	0.429***	0.118	3.631	0.439***	0.118	3.711
LEV	+/-	0.009	0.023	0.406	0.010	0.023	0.453	0.100**	0.043	2.344	0.111**	0.044	2.547
TOBIN	+/-	-0.002	0.003	-0.584	-0.002	0.003	-0.524	-0.015***	0.006	-2.771	-0.016***	0.006	-2.815
CDP5	+/-	-0.009	0.010	-0.947	-0.008	0.010	-0.868	-0.036*	0.018	-1.953	-0.024	0.018	-1.305
CDP6	+/-	-0.005	0.011	-0.489	-0.005	0.011	-0.471	-0.038*	0.020	-1.887	-0.036*	0.020	-1.749
CDP7	+/-	-0.009	0.012	-0.722	-0.004	0.012	-0.345	-0.036	0.022	-1.648	-0.025	0.024	-1.065
N		107			107			107			107		
R-Squared		-0.061			-0.062			0.164			0.137		

***, **, and * indicate significance at the one, five, and 10 percent level, respectively

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