The Impact of Climate and Energy Initiatives on Firm Value

By

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Abstract

This study explores the causal relationship between firms’ climate actions and financial performance. I examined the market reactions associated with announcements of two categories of climate and energy initiatives with the event study approach. The first category includes 20 announcements of major corporations announcing their intent to participate in the U.S. Climate Action Partnership (US CAP) program. The second category includes 100 announcements of these companies’ own specific climate actions or investments. This study finds no significant relationship for the aggregate data or firms’ own climate actions or investments. However, I do find that the market reacts positively to firms’ announcements of participating in the US CAP. This result implies that collective action among corporate leaders does not only have the potential to benefit society in combating climate change, but also to directly create shareholder value.
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1. Introduction

Current economic and policy climate is creating new momentum for sustainable investment in all sectors including manufacturing, banking and energy. The first phase of the Kyoto Protocol will end in 2012. Although the United States is not a member of the Kyoto treaty, the political pressure on its Greenhouse Gas (GHG) emissions is growing as well as for other countries. In February 2010, the U. S. Securities and Exchange Commission approved the world’s first economy-wide guidance for climate risk disclosure in corporate financial filing (EDF, 2010). Early in 2011, China has adopted its 12th five-year development plan that has placed energy efficiency and clean energy at the heart of its economic development for the first time (KPMG, 2011). Climate change and sustainability are becoming fundamental business issues that are opening up new opportunities. Many large corporations began to realize the opportunities associated with applying sustainability concepts. The environment function in those companies is no longer simply monitoring regulation, but has a strategic role in the corporate operations (Tsoutsoura, 2004).

This study aims to assess with an event study approach whether companies’ climate and energy initiatives actually create shareholder value or are merely window dressing. The second objective is to understand sources of value creation and value destruction of such initiatives under the current economic and political climate. The study focuses on firms’ climate and energy related initiatives of large U.S. corporations. The sample of companies used is drawn from initiative announcements of the 20 U.S. Climate Action Partnership (US CAP) member corporations. Founded in January, 2007, US CAP is a coalition of business and environmental leaders that commit themselves to call for mandatory action to address climate change. The study examines market reactions to two types of announcements: 1) companies’ announcements of
participating in US CAP; 2) U.S. CAP member companies’ announcements of specific climate and energy initiatives or investments. By examining the market reaction to environmental performance, one can provide evidence for the debate on the potential of energy and climate initiatives to not only benefit the society but can also to bring value to corporate shareholders. Additionally, by looking at the market reaction to firm’s climate voluntary actions, this will give an overview of the effectiveness, efficiency and the fairness of such actions to inform corporations in their strategic planning in the post-Kyoto Protocol circumstance.

Arguably, the most widely recognized method of testing a causal relationship in finance is the event study approach (Vanden and Thorburn, 2008). Event studies were originally derived from Fama (1970) with his work on efficient capital markets. The premise of the event study approach is to find the abnormal return attributable to the event being studied by adjusting for the return that stems from the price fluctuation of the market as a whole. Event studies have been often used in the studies of the environmental events on firms’ financial performance, but rarely do they test for an event having a positive effect (Ullman 1985, Klassen and McLaughlin 1996, Jacobs, Singhal and Subramanian 2008, Margolis and Walsh 2003). Negative events such as the Deepwater Horizon oil spill are often proven to have direct negative effects on firm value because of the associated fines and their damage to firm reputations.

The hypothesis of my study is that firms’ climate and energy initiatives will have a positive effect on firms’ stock price. This means that shareholders will anticipate long-term benefits of such initiatives. This hypothesis is tested using a sample of 120 announcements of 20 U.S. large corporations during the period 2006 to 2011. The study finds no significant effects of firms’ specific climate initiatives. However, results show that participating in US CAP exerts a positive influence on firms’ stock price, meaning that collective action among corporate leaders
and NGOs not only benefits the society as a whole but also has potential to bring direct value to corporate shareholders.

The paper is organized into the following sections: Section 2 reviews past literature that is relevant to my study. Sections 3 present the data for my study and the event study methodology in detail. Section 4 describes the results and Section 5 discusses the implication of the results and presents conclusions.

2. Literature Review

The linkage between firms’ environmental performance and financial performance is often studied under the field of corporate social responsibility (CSR). According to McWilliams and Siegel (2001: 117), CSR is defined as “actions that appear to further some social good, beyond the interest of the firm and that which is required by law.” Notice that social responsibility implies that what firms do to honor the natural environment, people and society beyond the legislation requirement. Martin (2002) developed the “virtue matrix” as a fundamental tool to understand how CSRs are integrated into business. The matrix is framed into four quadrants. The two bottom quadrants are termed as instrumental. They are CSRs that explicitly serve the purpose of enhancing firm value. The bottom-left quadrant is conduct a company chooses to engage in even though it is not regulated or mandated since the goodwill generated by the behavior obviously outweighs the cost. For example, when companies are not required to provide health benefits, many companies still choose to provide them to attract employees and increase their reputation. The bottom-right quadrant represents conduct that is mandated by common law. Clearly, companies get punished if their conduct is not in compliance (Martin, 2002).
On the other hand, the two top quadrants of the matrix include CSRs that cannot bring directly benefit the firm, which means their value to the firm is either clearly negative or not immediately apparent. The upper left quadrant of the matrix, the strategic frontier, includes activities that may increase shareholder value. The benefits generated from these activities are associated risks. The structural frontier includes activities that are in conflict with shareholders’ interests. The example of Malden Mills demonstrates that corporate social practices with good intentions may not be in the best interest of shareholders’ value (Martin, 2002). The generous act by the Malden Mills leaders continuing to paying employees while re-constructing the new plant after a fire destroyed the textile plant in Lawrence finally lead the firm to file for bankruptcy protection in 2001.

Frontier (intrinsic)

<table>
<thead>
<tr>
<th>Strategic</th>
<th>Structural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choice</td>
<td>Compliance</td>
</tr>
</tbody>
</table>

Civil Foundation (instrumental)

Figure 1: The Virtue Matrix (Martin, 2002)

This study focused on firms’ climate and energy related initiatives of large U.S. corporations. The benefits of energy related initiatives are often associated energy savings and are viewed to be more directly translated into financial performance. Therefore, according to Martin (2002), they should be defined as instrumental. However, climate initiatives such as firms’ voluntary GHG reduction action, which originate from a fact that most GHG are currently not regulated by the U.S. government, should be categorized as intrinsic for it may harm the cost
competitiveness of a firm if its competitors refused to do so. It is becoming common knowledge that it is socially beneficial to reduce overall GHG emissions. However, corporations lack direct economic incentives to voluntarily invest in such actions. Martin (2002) argues that the most effective weapon to overcome this barrier is through collective action among corporate leaders, governments and NGOs. The sample firms used in this study are corporate leaders involved together to encourage climate legislation. Therefore, the results from this study could be used to check the legitimacy of Martin’s arguments.

Researchers debate whether environmental investments reduce or improve firm value. Friedman (1970) argues that any environmental expenses beyond those required for regulatory compliance are not in the best interest of shareholders and will result in degradation of firm performance and firm value. Corporate social responsibility has been traditionally viewed as an inherent conflict to firms’ goal of profit maximization (Palmer et al, 1995; Walley and Whitehead, 1994). However, more recently, an increasing number of researchers argue that good social performance will benefit the firms through direct energy and material savings and/or translate improved financial performance by attracting better quality employees, improving organizational reputation, community relations and expanding market opportunities (Barnett and Salomon, 2006).

First, social responsible behavior may enhance firm reputation. Organizational reputational might be the most important mediator that links CSR to corporate financial performance. Customers and suppliers may be more willing to deal with companies with a good ethical track record (Tsoutsoura, 2004). Additionally, high CSR companies can also benefit through better access to capital. Spicer (1978) shows that high CSR firms can better maintain and improve their business relations with bankers and investors, and thereby have a lower cost of
capital. Empirical research in the past 30 years supports the idea of social responsible practices increasing firm value through enhanced organizational reputation (Orlitzky et al., 2003).

Another benefit that can be derived from CSR practices is that it can reduce the risks of negative environmental events (Orlitzky et al., 2003). High CSR is typically characterized by effective environmental assessment (Wood, 1991). This allows firms to potentially lower their legal costs of negative environmental events as a result of stricter environmental control. Additionally, they could potentially save millions of dollars in public relations campaigns from negative social events which damage their reputation. Consistent with the theoretical expectation, Orlitzky (2003) has found that CSR and risk are inversely correlated.

Companies with better corporate social performance can attract and retain employees (Greening and Turban, 2000). The effect could translate into better financial performance through reduced turnover rate and through savings from recruitment and training costs. Greenings and Turban (2002) show that job seekers will be more attracted to high CSRs because working for these companies can potentially produce positive psychological effects such as enhanced self-image. Companies with low CSR practices are at a human resource disadvantage compared to their competitors with high CSR practices because of a smaller labor pool from which to select employees (Greening and Turban, 2000).

There are several cases of CSR practices that are perceived to have brought significant benefits to companies, whether they are direct or indirect. For example, Procter & Gamble had a strict policy of refusing to pay bribes to win foreign business long before the *Foreign Corrupt Practices Act* (Martin, 2002). The Standard Chartered Bank (SCB) does not fund any company that has logging operations in primary tropical forests or in high conservation value forests within the forestry and palm oil industry. While this may place a competitive disadvantage to those
companies (P&G, SCB and etc.) compared to its competitors, the improved reputation among consumers and suppliers is likely to significantly offset the harm (Standard Chartered Bank, 2011).

Even though it is rather straightforward to identify the benefits associated with socially responsible behaviors, quantifying them has proven to be difficult for several reasons. Firstly, for many companies, the sustainability concept is so embedded into its day-to-day operations and thus it is very difficult or even impossible to isolate the CSR effects from the companies’ sole profit-seeking business. Secondly, the costs and benefits of CSR do not occur simultaneously. Adopting CSRs involves costs and the costs are immediate. However, many of the associated benefits take time to be realized or to be translated into better financial performance. Therefore, in many cases, the time frame for the costs and benefits are out of alignment. Despite the difficulties, two methods have been used to assess the effects of CSRs empirically.

The first uses regression analysis. The idea of the regression analysis approach is to control other factors (e.g. energy prices, industry, firm size etc.) that affect firms’ long-term financial performance and measure the portion of performance attributable to firms’ environmental performance. Regression analysis uses firms’ accounting-based profitability measurements such as return on equity and profitability margin. In Waddock and Graves’s study (1997), corporate social performance is found to be positively associated with prior financial performance and with future financial performance such as ROA in the following year, supporting the theory that good management and corporate social performance are positively related. Regression analysis requires carefully matching the firms and controlling confounding factors to separate out the effect of CSR on financial performance. Additionally, due to the long time horizon studied, too many factors, for example change of management or unexpected
lawsuit, can explain firms’ financial performance. Even when a significant relationship is found, it does not necessarily suggest causality (Tsoutsoura, 2004). For these reasons, this study uses the second type of study for the analysis.

The second type of study is the event study methodology that aims to evaluate the short-run financial impact by looking at the abnormal returns that are attributable to firms’ CSR practices. Results using the event study approach to assess the causal relationship between environmental performance and financial performance are mixed, depending on the characteristics of the sample and the types of environmental announcements being assessed (Tsoutsoura, 2004). Klaseen and McLaughlin (1996) find a positive effect of better environmental performances on financial performance realized from long-term cost savings resulting from reduced emissions and greater resource efficiency. The degree of effects varies across industries, with dirtier industries such as manufacturing showing weaker effects. Vanden and Thorburn (2008) studied the effects of announcing membership in the Climate Leaders program and Ceres – two voluntary environmental programs related to climate change. Their study finds evidence of significant negative abnormal stock returns. The price decline is smaller in carbon-intensive industries and higher book-to-market firms. The study concludes that overall the environmental investments are in conflict with shareholder-value maximization. Jacobs, Signhall and Subramanian (2008) examined the market reaction to two categories environmental performance. The first category includes 430 announcements of voluntary Corporate Environmental Initiatives (CEIs). The second category includes 381 announcements of Environmental Awards and Certifications. No overall effects were found in the aggregated data. However, there were significant effects on stock price of some subcategories of announcements: significant positive market reaction was associated with philanthropic gifts and ISO 14001 certifications.
announcements and significant negative abnormal returns were associated with voluntary emission reductions.

While being traditionally viewed as an inherent conflict to firms’ goal of profit maximization (Friedman 1970, Palmer et al, 1995; Walley and Whitehead, 1994), benefits of better corporate social performances are discussed in the literature and has been increasingly publicly realized by corporate leaders. However, rigorous quantitative research of this relationship has proven to be difficult. Researchers have used regression analysis and the event study approach to explore the relationships. Results from those studies are inconclusive (Corbett and Klassen 2006). This study focuses on firms’ climate and energy related sustainability initiatives. The benefits of energy related sustainability initiatives are likely to be more directly translated into financial performance. Whereas other types of sustainability initiatives such as environmental philanthropy and eco-friendly products are more likely to benefit through long-term and intangible ways. However, companies may lack economic incentives to engage in energy and climate initiatives even though there are direct cost savings from the improved energy efficiency because part of the benefits – GHG emission reduction – are received by the society as a whole. The hypothesis of my study is that climate and energy related initiatives will have a positive effect on firms’ stock price.

Unlike many of those previous studies, I categorized firms’ climate and energy actions as “collective” and “independent”. This study was designed to be a pilot study. By looking at the market reaction to a refined sample of firms who participate in US CAP, I hope to contribute by giving an overview of the effectiveness, the efficiency and the fairness of such actions so as to inform corporations for their strategic planning in the current policy climate. Additionally, as an initial pilot study, it will provide information to those designing a larger-scale study.
3. Materials & Methods

3.1 The U.S. Climate Action Partnership

The sample of firms in this study includes all 20 public listed firms of the United States Climate Action Partnership (U.S. CAP) members. US CAP is an alliance of major businesses and leading climate and environmental groups that commit to “a pathway that will slow, stop and reverse the growth of U.S. emissions” (U.S. Cap website cite). US CAP was founded in January 2007 when it released A Call for Action. The document includes a series of principles and recommendations that call for immediate action to reduce U.S. GHG emissions substantially. US CAP members include corporate leaders such as AES, Exelon and Duke Energy, as well as large NGOs such as the Nature Conservancy, World Resource Institute and Environmental Defense Fund. Table 1 shows all public listed companies of US CAP members. Announcements related to firms’ voluntary climate and/or energy actions from those companies formed the sample for my study.

<table>
<thead>
<tr>
<th>AES</th>
<th>Exelon Corporation</th>
<th>PepsiCo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcoa</td>
<td>General Electric</td>
<td>PG&amp;E Corporation</td>
</tr>
<tr>
<td>Alstom</td>
<td>Honeywell</td>
<td>PNM Resources</td>
</tr>
<tr>
<td>Boston Scientific Corporation</td>
<td>Johnson &amp; Johnson</td>
<td>Rio Tinto</td>
</tr>
<tr>
<td>The Dow Chemical Company</td>
<td>NextEra Energy</td>
<td>Shell</td>
</tr>
<tr>
<td>Duke Energy</td>
<td>NRG Energy</td>
<td>Siemens Corporation</td>
</tr>
<tr>
<td>DuPont</td>
<td></td>
<td>Weyerhaeuser</td>
</tr>
</tbody>
</table>

Table 1: US CAP public listed companies
3.2 Data Collection and Sample Characteristics

Table 2 provides descriptive statistics of the sample firms. Clearly, the sample is biased towards large blue chip companies. However, since this study mainly focuses on investigating the effects of collective action among industry leaders, the bias was not deemed to be a problem.

<table>
<thead>
<tr>
<th></th>
<th>Market Value (B$)</th>
<th>Total Assets (B$)</th>
<th>Sales (B$)</th>
<th>Net Income (M$)</th>
<th>Debt/Equity</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>58.59</td>
<td>87.01</td>
<td>59.19</td>
<td>4562.96</td>
<td>109.55</td>
<td>675361</td>
</tr>
<tr>
<td>Median</td>
<td>27.02</td>
<td>47.29</td>
<td>21.93</td>
<td>1890</td>
<td>99.36</td>
<td>56352</td>
</tr>
<tr>
<td>Range</td>
<td>(1,61, 225.57)</td>
<td>(3.4, 569.67)</td>
<td>(1.73, 470,17)</td>
<td>(-43,3, 30920)</td>
<td>(21.74, 383.84)</td>
<td>(2134, 12000000)</td>
</tr>
</tbody>
</table>

Table 2: Descriptive statistics of the sample firms in the study

The unit of analysis is the environmental announcements/events. Specifically, two types of announcements related to firms’ climate actions have been assessed: 1) companies’ announcements of participating in US CAP; 2) U.S. CAP member companies’ announcements of specific climate and energy related sustainability initiatives. Current members joined the partnership in May, June, July and September, 2007 respectively (US CAP website). The sample of climate and energy announcements was generated through “key-word search” in the press release section of the targeted firms’ corporate websites over the period from January 1, 2005 to December 31, 2011. Table 3 shows the key word/phrases used in data collection.

<table>
<thead>
<tr>
<th>Climate</th>
<th>Green</th>
<th>GHG/Greenhouse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainability</td>
<td>CSR</td>
<td>Social responsibility</td>
</tr>
<tr>
<td>Renewable</td>
<td>Solar/wind/hydro</td>
<td>Carbon footprint</td>
</tr>
</tbody>
</table>

Table 3: Keywords used to search for climate and energy related announcements
Two screens were applied in selecting the events. First, announcements with confounding events were excluded from the analysis. Confounding events are defined as any other public announcements that were made during the targeted environmental event window that can significantly affect the firm value (Jacobs, Singhal and Subramanian 2008). Since it is assumed that any public information will be incorporated immediately into its share price after its being announced, other significant announcements occurred before the event window will not have prolonged effects on the share price (Jacobs, Singhal and Subramanian 2008). Second, events that are very minor in nature were excluded. Frooman (1997) has argued that only events that can potentially affect the welfare of identifiable stakeholders are worthy studying. Therefore, minor events such as sponsorships of local events or CEOs speaking in conferences were excluded. After applying the two screens, our final sample consists of 120 environmental events from these 20 companies. Table 4 illustrates those announcements with respect to years. As can be seen, 2007 has the most climate and energy initiatives announced in my sample. This accord with the political climate at that time when the America’s Climate Security Act of 2007 was under consideration by the United States Senate to reduce GHG emissions. Many corporations launched climate programs partially in response to the possible passage of the Lieberman-Warner bill. The other years in the sample show a relatively even number of announcements.
Some examples of these announcements include:

- 28 January 2011 “Dow to Invest $100 Million to Reduce Energy Use, GHG Emissions”
- 15 July 2008 “Exelon announced a comprehensive environmental plan. The plan, Exelon 2020, details an enterprise-wide approach and a host of initiatives being pursued by Exelon to reduce Exelon’s greenhouse gas emissions and that of its customers, communities, suppliers and markets.

3.3 Event study

For the reasons discussed in Section 2, I use the event study methodology to estimate the market reaction to announcements of climate and energy events. Event studies were originally derived from Fama (1970) with his work on efficient capital markets. The idea of the event study approach is to find the abnormal return attributable to the event being studied by adjusting for the
return that stems from the price fluctuation of the market as a whole. According to the efficient market theory (Fama, 1970), stock prices represent all available information about each company. Unanticipated news should result in stock market adjustment to the affected stock. Event study is a statistical approach that captures the abnormal return in this adjustment process. This abnormal return should reflect the effects attributable to the event.

The first step is to identify the event window, which is the period over which the market reacts to the environmental events. There is no consensus in the event study literature about the length of the event period to calculate the abnormal returns. The uncertainty stems from difficulty in determining how long it takes for the stock market to react to the unanticipated news. A relatively short event window is used to control for the confounding events and the possible leakage of information. In earlier event studies (e.g., Arora 2001, Hendricks and Singhal 2003, Karpoff et al. 2005), a two-day event period was examined, the day of announcement and the preceding trading day. However, a relative longer event period could account for the possible leakage of information, allowing a longer time to react to the events. This study examines and reports market reactions for the day of the announcement, the three-day event period (day -1 to day 1), the eleven-day event period (day -5 to day 5) and the twenty-one-day event period (day -10 to day 10), allowing me to observe differences in results with different event periods.

The Capital Asset Pricing Model (CAPM) is used to predict a theoretically appropriate required rate of return – the counterfactuals. The model was introduced by Jack Treynor (1961, 1962), William Sharpe (1964), John Lintner (1965a,b) and Jan Mossin (1966) independently. It posits a linear relationship between the return on a stock and the market return over a given time period.
\[ R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \]

Where \( R_{it} \) is the return of stock \( i \) on Day \( t \), \( R_{mt} \) is the market return on Day \( t \), \( \beta_i \) is the slope of the relationship for stock \( i \) with respect to the market return.

In event studies, \( \alpha_i \) (y intercept) and \( \beta_i \) (slope) are estimated first using regression analysis on daily stock returns from a “clean” period. The resulting parameters are then used in the market model equation to calculate the residuals (abnormal returns) during the “event” period. Figure 1 illustrates the time frame for the event study approach.

In the study, the event day is called day 0 which is the announcement of launching a specific initiative. The clean period, which is also called the estimation window, consists of the trading range [-209 to -10] days before the announcement, while the trading range [-1 to +1] days constitutes the event period. It is argued that all companies have a systematic relationship with the stock market. Hence the normal relationship between a company’s stock and the market need to be “net out” to get at the firm specific effect of a corporate action or event. The residual return for each trading day during the event period (window) is given by:

\[ A_{it} = R_{it} - (\alpha_i + \beta_i \times R_{mt}) \]
A_{it} is the abnormal return for announcement i at day t. With clean period $\alpha$ and $\beta$, the residual for trading day “zero” (assuming efficient markets) reflects the announcement pricing impact of the event.

$t$-tests were performed to test the hypothesis that the market reacts positively to climate and energy initiatives. The cumulative abnormal return ($\text{CAR}_i$) is the sum of abnormal returns over the event period. In my study, I examined wealth effect on the announcement day, and the cumulative wealth effect over [-1, +1], [-5, +5] and [-10, +10] days. This cumulative abnormal return over the event period is the outcome of interest.

$$\text{CAR}_i = \sum_{t=T1}^{T2} A_{it}$$

In the formula, $T1$ is the start of the event period and $T2$ is the end of the event period. The mean cumulative average abnormal returns is given by averaging the cumulative abnormal return across $N$ events

$$\overline{\text{CAR}} = \frac{1}{N} \sum_{i=1}^{N} \text{CAR}_i$$

The estimated standard deviation is given by the following formula:

$$s = \sqrt{\frac{1}{N-1} \sum_{i=1}^{N} (\text{CAR}_i - \overline{\text{CAR}})^2}$$

The null hypothesis is that the mean accumulative return is zero, i.e. no effect.
\[ H_0: \mu = 0 \]

\[ H_a: \mu > 0 \]

The one-tailed p-value is reported since I hypothesized that abnormal returns should be positive. The p-value was compared to a significance level of 0.05 and 0.10 to determine the wealth effect on the announcement day, and the cumulative wealth effect over \([-1, 1]\), \([-5, 5]\) and \([-10, 10]\).

4. Results

Table 5 and Table 6 show the top five most negative and most positive abnormal returns for my sample. While it is difficult to draw strong conclusions about the similarities of these events from the results, it is worth noting that the positive abnormal return over a three-day event period can be as high as 9.54% and the negative abnormal return is -16.25% when Exelon Energy introduced its Pilot Program for an emission-free energy product.

<table>
<thead>
<tr>
<th>Company name</th>
<th>Event Description</th>
<th>Year</th>
<th>Announcement CAR(-1,1) in%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcoa Inc.</td>
<td>Alcoa Named to Climate Disclosure Leadership Index for Sixth Consecutive Year;</td>
<td>2008</td>
<td>-5.43</td>
</tr>
<tr>
<td></td>
<td>Commended on Quality of Climate Change Disclosure Practice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The AES</td>
<td>Greenhouse Gas Services, a GE AES Venture, to Create Greenhouse Gas Credits in</td>
<td>2008</td>
<td>-6.88</td>
</tr>
<tr>
<td>Corporation</td>
<td>Caldwell County, North Carolina</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exelon</td>
<td>Exelon announced a comprehensive environmental plan. Exelon 2020 details an</td>
<td>2008</td>
<td>-7.26</td>
</tr>
<tr>
<td></td>
<td>enterprise-wide approach and a host of initiatives being pursued by Exelon to</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>reduce Exelon’s greenhouse gas emissions and that of its customers, communities,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>suppliers and markets.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GE</td>
<td>GE To Reduce Annual Energy Consumption By More Than 11 Percent and Water Usage</td>
<td>2009</td>
<td>-9.65</td>
</tr>
</tbody>
</table>
Exelon Energy Introduces Pilot Program for emission-free energy product 2009 -16.25

Table 5: The top 5 most negative events in the study

<table>
<thead>
<tr>
<th>Company name</th>
<th>Event Description</th>
<th>Year</th>
<th>Announcement CAR(-1,1) in%</th>
</tr>
</thead>
<tbody>
<tr>
<td>The AES Corporation</td>
<td>AES Acquires Landfill Gas Project in El Salvador to Reduce GHG and produce renewable energy</td>
<td>2008</td>
<td>9.54</td>
</tr>
<tr>
<td>Rio Tinto</td>
<td>The Exelon Corporation and Rio Tinto have joined the United States Climate Action Partnership</td>
<td>2007</td>
<td>7.92</td>
</tr>
<tr>
<td>Dow</td>
<td>Taloja Manufacturing Site Awarded Top Honour at The National Energy Conservation Awards 2009</td>
<td>2010</td>
<td>7.31</td>
</tr>
<tr>
<td>Dow</td>
<td>Dow earns &quot;A+&quot; For Sustainability Report</td>
<td>2009</td>
<td>6.23</td>
</tr>
<tr>
<td>Alcoa Inc.</td>
<td>Alcoa Announces Investment of $8.6 Million in Conservation and Sustainability Research; Knowledge and Learnings from Research To Be Given Away To Spur Best Practices Worldwide</td>
<td>2006</td>
<td>6.22</td>
</tr>
</tbody>
</table>

Table 6: The top 5 most positive events in the study.

For the aggregated data, the full sample of 120 announcements, Table 7 displays the market reactions for the day of the announcement, the three-day event period (day -1 to day 1), the eleven-day event period (day -5 to day 5) and the twenty-one-day event period (day -10 to day 10). The mean abnormal returns are all positive: 0.11% on the announcement day, and 0.13%, 0.72%, and 0.99% for the three-day, the eleven-day and the twenty-one-day event period. However, the positive observations do not suggest a statistically significant positive relationship at the 5% level. Except for the eleven-day event period t-test, the average cumulative abnormal
return is significantly positive at the 10% level of significance. The associated p-value is 0.0820. Overall, the results indicate that market does not react to the firms’ climate actions.

<table>
<thead>
<tr>
<th>Event Window</th>
<th>N</th>
<th>Mean</th>
<th>P-value</th>
<th>t-statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 0 %</td>
<td>120</td>
<td>0.1173019</td>
<td>0.2653</td>
<td>0.6289</td>
</tr>
<tr>
<td>CAR % (-1,1)</td>
<td>120</td>
<td>0.1374306</td>
<td>0.3188</td>
<td>0.4722</td>
</tr>
<tr>
<td>CAR %(-5,5)</td>
<td>120</td>
<td>0.7259022</td>
<td><strong>0.0820</strong></td>
<td>1.4002</td>
</tr>
<tr>
<td>CAR % (-10,10)</td>
<td>120</td>
<td>0.9888891</td>
<td>0.1265</td>
<td>1.1485</td>
</tr>
</tbody>
</table>

Table 7: Event Study Results

Table 8 presents the t-test results for the sample of type 1 announcements, which measures the effects of firms’ announcements to participate in the US CAP. The mean abnormal returns are 0.01% on the announcement day, and -0.21%, 1.06%, and 3.17% for the three-day, the eleven-day and the twenty-one-day event period. The one-sample test results with the eleven-day and the twenty-one-day event period for type 1 announcements indicate a significant positive market reaction, with the associated p value of 0.023 and 0.0322 respectively. The mean CAR for the eleven-day event period represents a return of 1.96% more than expected, based on the S&P return during the event period. Because the sample size for the type 1 announcements is relatively small (N=20), the result could be contaminated by particularly large or small values. I examined further by looking at the number of positive market reactions for each event period studied. The results are displayed in Table 10. Only 9 out of the 20 stocks have a positive abnormal return to the firms’ announcements of joining US CAP on the announcement day. However, as can be seen in Table 10, the stock market reacted positively for 15 out of the 20 firms for the eleven-day event period and 13 out of 20 for the twenty-one day event period.
For firms’ specific announcements of climate and energy initiatives or investments, Table 11 displays the market reactions for the day of the announcement, the three-day event period (day -1 to day 1), the eleven-day event period (day -5 to day 5) and the twenty-one-day event period (day -10 to day 10). The mean abnormal returns are all positive: 0.12% on the announcement day, and 0.20%, 0.47%, and 0.55% for the three-day, the eleven-day and the twenty-one-day event period. The data shows no significant result for any of these event periods. Overall, the results indicate that the market does not react to firms’ own climate actions.
5. Discussion and Conclusion

Climate change is now one of the greatest global challenges of our time. Successfully addressing climate change will require collective efforts from politicians, environmental NGOs, and businesses. However, efforts in the U.S. to limit GHG emissions through international treaties or through federal legislation have been unsuccessful. The current climate policy relies mostly on voluntary emission reductions. Leading companies are beginning to take independent actions on climate change. Many U.S. companies voluntarily measure and report their GHG emissions and have launched voluntary programs to reduce their GHG emission. At the center of the debate is whether these voluntary programs for GHG reductions are merely a premium to protect the environment or can actually increase shareholder value by creating a competitive advantage in the global market in a carbon constrained future. One way to answer this question is to examine the market response to such initiatives or actions and determine how investors view its value.

This study explored the causal relationship between firms’ voluntary climate actions and financial performance using an event study approach. I examined the market reactions associated with announcements of two categories of climate and energy initiatives. The first category includes 20 announcements of major corporations announcing to participate in the U.S. Climate Action Partnership program. The second category includes 100 announcements of these companies’ about their own specific climate programs or investments. I hypothesized that the market should react positively to firms’ climate and energy initiatives. This means that shareholders will anticipate long-term benefits of such initiatives. I found no significant relationship for firms’ own climate actions or investments. Many previous studies have found significant losses in the market value of firms announcing that they have a goal for GHG
emission reduction or that they are joining a voluntary climate program (Vanden & Thorburn, 2008). Contrary to those studies, I found that the market does not punish such climate actions.

However, announcements of joining in US CAP are found to cause a statistically significant abnormal return over the eleven-day event period of 1.96% and the twenty-day event period of 3.19%. This result suggests that this collective action among U.S. major businesses to call for climate legislation was viewed to bring benefits not only on the societal level but also to firms’ shareholders. This result supports Martin’s argument that the most effective way to overcome the inertia on climate change is collective action, either on the part of governments, non-profit sectors or corporate leaders themselves. Martin (2002) argues that since the U.S. government has given no sign that it will force energy producers, utilities and heavy industries to reduce their GHG emissions, corporate coalitions formed by motivated industry leaders are instrumental in addressing climate change. The idea is simple – get companies working together with their competitors and other stakeholders to create economic incentives. Implementing this idea, however, is more difficult. For example, how and to what extent can corporations reveal and exchange information on their energy savings and technology will undoubtedly raise antitrust issues and other business concerns. But before we get into the collective action, it is important to examine whether there is an economic reason to invest their resources to reduce GHG emission collectively. Corporate participation in climate related collective action will ultimately depend on its payoff to shareholders. This pilot study suggests there may be a positive payoff.

Even though the event study approach is one of the most widely used methods to test causals relationships in finance, the model has several critical limitations. First, as has been mentioned before, the sustainability concept has been so embedded in business that one cannot
readily isolate the effects of the climate initiatives or investments. For example, investments in renewable projects can benefit the society as whole. Investors value its contributions to the society but the profitability of the projects would still mostly depend on the expected cash flows. The stock market will not view the investments as social behavior or for-profit behavior separately. The market combines them together and therefore its reactions to these investments could be mixed depending on the relative forces.

Second, the event study approach assumes a semi-strong efficient market, in which share prices adjust to publicly available new information very rapidly and in an unbiased fashion, such that no excess returns can be earned by trading on that information (Fama, 1970). In other words, the market will only react to new information. It is important for the news or event in an event study to be unanticipated; otherwise the study will be flawed. It is possible that for a very green or sustainable company, investors would expect regular news releases of its social behaviors and these announcements are no longer perceived as new. For example, on September 3rd, 2009, Alcoa was named a component of the Dow Jones Sustainability Index for the eighth consecutive Year. If these types of announcements occur year by year, the market will not react on this information.

Third, although my sample has been carefully screened for confounding events, the model does not adjust for the effects of some macro factors that influence both companies’ decisions in evolving in climate actions and its stock price. For example, companies may be more likely to engage in a GHG emission reduction program when the crude oil price is high to receive double benefits. Clearly, crude oil price, as an important production input for many businesses, has a significant impact on firms’ performance.
Despite those limitations, the study confirmed the value of the industry alliance to engage in GHG emission reduction is not limited to the societal level, but also has a positive wealth effect for shareholders. This finding illustrates that industry coalitions such as the US CAP could be potentially provide economic incentives for corporations to undertake actions on climate change.
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