Effects of Green Business on Firm Value

by

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Abstract

This event study tests the impact corporate environmental announcements have on the financial valuation of a firm. The research looks at the set of companies listed in the Dow Jones Industrial Average from 1998 through 2008. Public environmental announcements made by each of the companies were tracked over time using two major news sources, The Wall Street Journal and The New York Times. An event study performed on both positive and negative announcements allows a better understanding of how investors react to different types of environmental news. While the study found that the abnormal returns of positive announcements had no statistical significance, the study analysis attempts to develop a better understanding of why firms chose to undertake positive environmental policies.

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1. Introduction

Environmental issues have become a concern on a global level. Increasingly reliable climatologists' studies show that the global temperature will increase 2°C over the next fifty years if the world continues to operate without substantial change in environmental policy (Shiers & Nurmohamed, 2009). This degree of climate change in such a short period of time is more drastic than has ever been seen by our world and is causing alarm for many people. Because large corporations are an integral part of global society, many are beginning to feel pressure from their constituents to operate in a more environmentally-friendly manner to help solve the problem. Every stakeholder, from shareholders and consumers to community members and competitors, is affected by the actions a company takes regarding the environment. No longer do firms simply act in accordance with environmental legislation, and in avoidance of regulatory fines (Hoffman, 2000). In today's rapidly growing economy, firms are expected to fully understand the impact they have on the resources that will be available for future generations (Marcus & Fremeth, 2009). All of this increased attention to environmental responsibility has brought up questions as to what the financial implications are for firms that chose to operate in an environmentally-friendly manner.

The purpose of this investigation will be to analyze whether, and to what extent, there have been financial performance benefits realized by major corporations in various industries that have implemented positive changes to their environmental strategies. I hope to build on existing research that has already attempted to identify financial reasons that firms would chose to undertake these types of initiatives. The focus of my study will be on large, publicly traded firms that have had sustained success as members of the Dow Jones industrial average over the ten year period from 1998 through 2008. This post-Kyoto period has brought many changes in firm's strategies in regards to the environment, specifically relating to emissions controls, and

the worldwide media attention brought about by the "green" phenomenon. It will be easiest to track firms from the Dow Jones Industrial Average due to the amount of attention they are given by widely read sources of financial news such as the *Wall Street Journal* and the *New York Times*. Stock valuation will be the measure of firm financial performance as it is publicly available and market participants are quick to react to any changes. This comparison will then allow me to analyze if, and the extent to which, investors respond to positive green announcements when they occur without knowledge of the full extent of the future benefits or costs. This fluctuation will be compared to what would be expected under the capital asset pricing model (CAPM) with the assumption of efficient markets. According to this model, investors are rational, calculating, and self-interested. Their investment decisions are based on their best assessments of the future costs and benefits of these announcements on the firm's bottom line.

My hypothesis is that there will be a positive change in stock price greater than would be expected without the announcement of the event. I hypothesize that shareholders will anticipate long-term benefits of business acting in an environmentally responsible manner. Of course, it is possible that investors may view these events in a different light and according to a different scheme of reasoning than the one presented here. They may actually believe that acting in an environmentally responsible manner will hurt a firm's future financial prospects and may punish the firm by withdrawing their support and selling the stock. My hypothesis that investors will react positively to environmental responsibility rests on the assumption that shareholder interests and environmental responsibility are in alignment and that investors will perceive positive benefits in responsible actions, but the opposite may be the case and investors may see environmental responsibility as being potentially costly and hurting the firm's bottom line.

Regardless of how investors behave in response to announcements of environmental responsibility, they can be mistaken if efficient market assumptions are relaxed and the inherent uncertainty of the future costs and benefits of any corporate action is considered.

The driving question behind the research is if firms are truly undertaking these green policies to improve financial performance or if they feel it is simply moral responsibility. If there is a positive association between investor reaction and environmental responsibility, then one can infer that corporate financial performance and responsibility are in harmony. That is to say that responsible action is a win for both companies and the environment. On the other hand, if the association is negative, then corporations that act in an environmentally responsible way are doing so without the benefit of market reward. From Kantian or deontological perspective of pure duty regardless of consequences, they are displaying a higher level of moral responsibility, one that they are pursuing regardless of the benefits to shareholders or immediate financial gain. In the past, some of a firm's morally responsible behavior has–it has been argued—routinely resulted in increased profits. As stated by Mark White (1992) in *The Greening of American Business*, "It has been argued that investments in better working conditions, equal opportunity programs, and community affairs benefit companies and shareholders in the long run (p. 52)." This study will see if shareholders support this view with regard to the environmentally responsible actions of Dow Jones companies in the time period of 1998 through 2008.

Section 2 will include a literature review of past articles that are relevant to my work. Section 3 will lay out the methodology of the study in more detail. Section 4 will describe the results and Section 5 will include the analysis. The final section will interpret the meaning and significance of the results.

2. Literature Review

2.1. Corporate Social Responsibility and Environmental Awareness

Ethics in business is a topic of recent discussion by scholars from all disciplines. Firms are realizing the backlash of poor ethics on their brand equity as well. Large scandals such as that at Enron or Arthur Anderson are the extreme cases. More subtle ethical violations have emerged and are becoming a recurring topic in popular documentaries such as *The Big One* (Michael Moore, 1998) and *The Corporation* (Mark Achbar & Jennifer Abbott, 2003). This has led stakeholders of a firm to emerge as a broader group that corporations need to worry about opposed to solely shareholders and profits.

There is no obvious answer as to what role the corporation should play in society. Corporate Social Responsibility (CSR) is a term that has been coined to describe the relationship between business and society (Snider et al., 2003). Terms such as "socially responsible" and "corporate citizen" are sought after by the most admired firms in the United States and worldwide. For example, *Corporate Responsibility Magazine* releases an annual report on the 100 Best Corporate Citizens, a designation which does not come easily to its winners. The three pillars of CSR are widely recognized as economic, social and environmental. Economic responsibility refers to the firm being profitable and a sustainable business entity. The social and environmental responsibility aspects can have different meanings to different businesses, but in general refer to how the firm deals with these types of issues through their operations. Social issues are generally more related to people, such as treatment of workers and impact on people in the community. Firms usually take on these issues by implementing internal controls or through ethical sourcing such as volunteer work and donations. Environmental issues relate to everything in the physical environment of the world. This covers a wide range of issues, such as controlling

packaging waste and energy consumption to ceasing to use toxic chemicals in the production process. In the end, the term generally relates to natural resource use and preservation. The environmental pillar of the CSR framework will be the focus of this paper.

Over the course of just a few decades we have witnessed a change in how corporations view their environmental responsibilities. Hoffman (2000), in his book *Competitive Environmental Strategy* breaks down the past views into four periods; industrial environmentalism (1960-1970), regulatory environmentalism (1971-1981), environmentalism as social responsibility (1982-1988), and strategic environmentalism (1989-1999). During the 1960s, corporations were first introduced to the idea of corporate environmental responsibility as environmental groups began to form as a reaction to environmental crises caused by corporate activities. The year 1970 brought about the government formed Environmental Protection Agency (EPA). This era brought about changes to legislation and the development of a "checks and balances" system to monitor how different companies treat the environment. Corporations soon began to fear being subject to costly fines and violations so much so that some began to go beyond mere compliance with the law. Operating in accordance with the environment began to be seen as a risk mitigation strategy to avoid the possibility of future fines. As President Ronald Regan took office and began to reduce regulation on business, social activism increased, taking the people's voices straight to the company through public displays. Fearing harm to their image, corporations took an even stronger role in establishing acceptable environmental practices to promote social responsibility. These changes have brought about new discussions regarding what view the firm should take toward its natural environment.

2.2. Development of Environmental Strategy

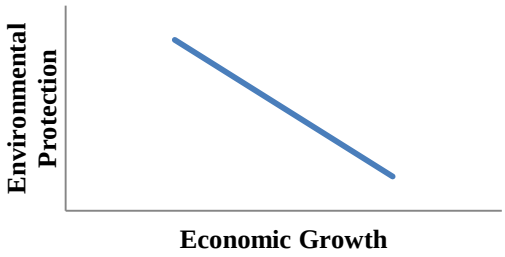
As environmental awareness continues to increase, corporations are beginning to view the benefits that can be achieved through strong environmental performance. Many large corporations are forming an environment function in their corporate structure that no longer simply monitors regulations, but has a strategic role in the company. These companies are realizing that there are many opportunities to apply the concepts of sustainability and the three R's (reduce, reuse, and recycle) in the business world. In many cases, these types of actions lead to increased efficiency and cost reductions, and entrepreneurial opportunities for new product introductions to solve environmental problems.

Operating in an environmentally-sustainable manner may not always be the most effective way to operate, especially if there are increased costs involved; however, many firms are still undertaking these initiatives. The question asked by many researchers (Klassen & McLaughlin, 1996; Filbeck & Gorman, 2004; Gilley, et al., 2000; Molina-Azonrín, et al., 2009) is what benefits do firms receive from being "green"? Is this something that shareholders value? Past research has been driving to answer these questions through a variety of different methods, yet no concrete agreements have been reached. The bulk of evidence either suggests it pays to be green or does not negatively affect a firm's bottom line, but the context and conditions under which it pays to be green are still controversial. For instance, it may pay only for startups in environmentally-friendly businesses, for firms that can demonstrate lower costs through waste reduction or for mid-size firms with prior poor environmental reputations that make improvements in environmental performance. The conditions under which it pays or fails to pay to be green have to be better specified. This section will look at how past research has advanced

the discussion around why firms undertake environmental management strategies and how to evaluate the effect on firm profitability.

One idea is what is known today as the "win-lose" perspective. This is the traditional way firms began to look at environmental strategy. As shown below in Figure 1, the "win-lose" proposition states that environmental benefits can only be achieved through increased costs (Hoffman, 2000).

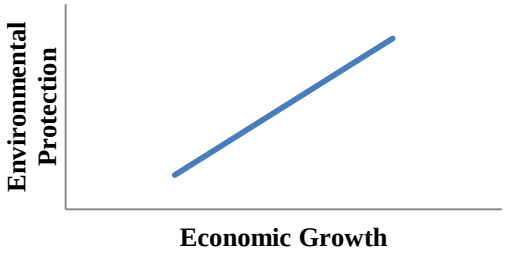
Figure 1: Win-Lose Scenario



Source: Figure 1.1 from Hoffman (2000, p. 5)

Opposing the "win-lose" perspective; the "win-win" perspective says that environmental and economic benefits can come together. Figure 2 shows how "costs of addressing environmental regulations can be minimized, if not eliminated, through innovation that delivers other competitive benefits to the firm" (Hoffman 2000, p. 6). For example, the argument is not that a reduction of pollution is always accompanied by better economic performance, but rather to say that the expenses incurred to reduce pollution can be partly or completely offset by gains made elsewhere, such as fewer regulatory fines or cleanup costs (Ambec & Lanioe, 2008). Both of these perspectives hold valid points, so it is nearly impossible to defend one as holding true under every situation.

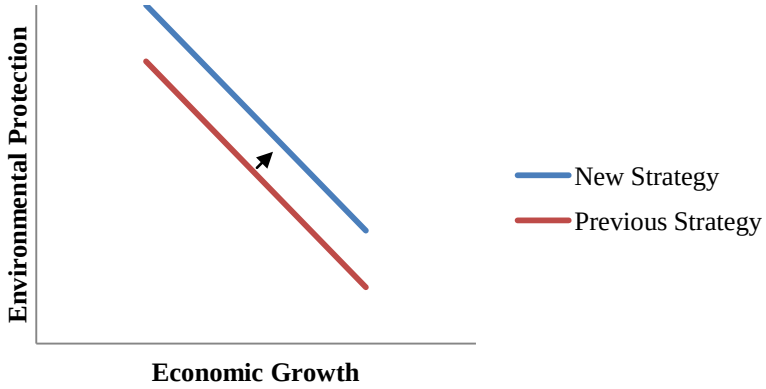
Figure 2: Win-Win Scenario



Source: Figure 1.2 from Hoffman (2000, p. 7)

Indeed, there has been a recognized shift in how companies approach environmentalism. Over time, more and more companies view going green as an environmental strategy with possible benefits to the firm as opposed to simply environmental management or something they have to do because of regulatory compliance (Hoffman, 2000). No longer are many firms simply acting to comply with regulations, but they have in many cases identified competitive advantages by being better environmental stewards. Examples of such benefits are less waste, new product introductions for which a "green-minded" consumer may be willing to pay a premium, less regulatory scrutiny or better reputation. It is for these reasons that a mixed-motive perspective also has gained its popularity. Essentially fusing the "win-win" and "win-lose" perspectives, the mixed-motive model acknowledges the possibility of economic gain from environmental protection, as well as the possibility for higher costs. As shown below in Figure 3, the mixed-motive perspective demonstrates that while there are higher costs that come with increases in environmental protection, it is possible to have positive impact on both fronts.

Figure 3: Mixed-Motive Scenario



Source: Figure 1.3 from Hoffman (2000, p. 8)

A more intriguing way of looking at environmental efforts is the possibility that firms are not acting in an environmentally-friendly manner to increase their profit margins, but are doing what will truly make all stakeholders better off. This benefit could be in the form of less pollution, preservation of resources, lower waste containment and energy costs or a variety of other benefits. As Hoffman (2000) describes, "shareholder equity may remain the single most important criterion for corporate survival, but environmental responsibilities are infiltrating the taken-for-granted beliefs that have previously guided that pursuit" (p. 14). In a 2007 study conducted by Ernst & Young, it was found that 35% of valuation decisions are based on non-financial data and that strategy execution is the most important non-financial factor driving shareholder valuations. Raised awareness of non-financial considerations has caused more information to be publicly available, and investors are increasingly reacting to this type of knowledge.

One way that firms are trying to demonstrate their commitment to the environment is through CSR reports. A study on CSR reporting finds that is not uncommon among U.S. firms; however, the authors note that due to the overall positive tone of these disclosures, that they are

being used mainly as a means of marketing (Holder-Webb et al., 2009). It is also commonly thought that firms do not fully understand what they should be reporting to their constituents. Ullmann (1985) found that self-disclosure of policies relating to environmental issues does not always correlate with objective, third-party measures of environmental performance. Holder-Webb (2009) notes that, while environmental matters were not discussed as often as other CSR activities in their survey of disclosures, these types of disclosures received considerable focus when they were discussed. A 2005 KPMG International survey also notes that only 21% of companies actively seek to provide the information requested by shareholders regarding CSR (KPMG, 2005). All of this research signifies that while environmental reporting is important to constituents, firms have not yet found effective ways to market their social responsibility to their stakeholders. If this is truly the case, stakeholders are likely turning to other sources, such as the media, rather than company created reports to find unbiased information on firm practices. Because of this, I have chosen to analyze articles from the *New York Times* and *Wall Street Journal* in my study as it would appear that these articles would be less biased. These articles are also more likely to include new information on firm undertakings, where a year-end report is likely already known information in the market.

The interesting aspect of CSR is that there are varying degrees of beliefs about whether more socially responsible firms always generate greater returns. In one report conducted by the Alliance for Environmental Innovation, 70 studies on this topic were reviewed and it was concluded that companies that outperform peers on environmental dimensions also outperform on stock returns by about 2% (Hoffman 2000). This seems to contradict the findings of Benson et al. (2006) in their study of socially responsible investment (SRI) funds, in which it was found that SRI funds do not significantly outperform conventional funds. Benson et al.'s results seem

to indicate that the only benefit investors receive is the "feel-good" factor. If this is the case, are firms simply ignoring greater returns in lieu of fulfilling a certain role in society?

In a recent exchange in the *Academy of Management Perspectives*, two opposing viewpoints are discussed. Siegel (2009) argues for the more traditional view on green management in saying that managers "have an obligation to deploy the firm's resources as effectively as possible…to maximize the wealth of the firm (p. 10)." Marcus and Fremeth (2009) take a holistic approach in saying that society expects management to act in an environmentally responsible manner when making decisions. Their piece poses the question that even if it does not pay more, does it really pay any less in comparison to other potentially risky initiatives such as mergers and acquisitions or fundamental innovation in products, services and business models? The unanswered question is: to what extent do firms feel compelled to act in an environmentally ethical manner, or are all actions taken in hopes of generating higher profits?

2.3. Testing of Environmental and Financial Performance Benefits

Testing the benefits that environmental strategy brings to corporations has proven to be a difficult task. One reason is that there are many variables that play a role in how financial performance and how environmental performance are measured. Molina-Azonrín, Claver-Cortés, López-Gamero, and Tarí (2009) conducted a literature review of 32 studies that tested the correlation between environmental performance and financial performance. Through their work they concluded that while the impact of environmental management on performance is not always easy to understand, a real commitment to green management may result in a positive influence on financial performance. The study also recognized that there may be a two-way interaction between financial performance and environmental performance, which makes it hard

to conclude cause-and-effect relationships (Molina-Azonrín, et al., 2009). Hoffman (2000) agrees with these findings in saying that "…no case studies can claim a cause-and-effect relationship between environmental performance and financial performance, [however] a correlation between the two is a powerful indicator of future success" (p. 80).

One method of analyzing performance is looking at how a company's stock price reacts to the announcement of environmental performance. Arguably, the most widely recognized method of testing a causal relationship in the financial world is the event study. Event studies were originally derived from Fama (1970) with his work on efficient capital markets. His theory on efficient capital markets says that the stock price of a firm should reflect all publicly available information at that point in time. From this, we should be able to tell if a certain announcement affects the stock price of a firm to a greater degree than what would be normally expected given the random variation of stock prices. This event study methodology allows the statistical testing of how any perceived events affect the price of a stock assuming efficient capital markets.

Event studies have been often used in the area of environmental research, but rarely do they test for an event having a positive effect (Ambec & Lanoie, 2008). One example where the event was hypothesized to have a positive effect is in a study by Klassen and McLaughlin (1996). They attempt to assess financial benefits realized from operating greener, specifically long-term cost savings resulting from reduced emissions, greater resource efficiency, or fewer legal and regulatory fines using an event study. Events were defined to be environmental awards (positive events) or environmental crisis (negative events). They find a positive effect of such positive events and also find that the degree of the effect on financial performance tends to vary across industries. These findings apply to news articles containing specific keywords from the NEXIS database of newswire services over the time period of 1985 to 1991. The implication is

that a positive award, while not directly affecting financial performance and under the assumption that investors are evaluating the event in terms of generation of future cash flows, will indicate the prospects of higher future performance and more cost reductions through a better environmental consciousness. The opposite can also be said of a crisis's negative implications. This finding indicates that investors do place value on a firm being recognized as environmentally responsible. This idea of stock price reaction to positive announcements is the main driver of the research presented in this paper.

The idea of environmental event studies has been replicated by other notable studies as well. Gilley et al. (2000) used an event study to test the influence of environmental initiatives on anticipated economic performance. This study also looked at environmental announcements in the *Wall Street Journal* over the period of 1983 through 1996. Another similar study was conducted by Filbeck & Gorman (2004). This event study looked at how different types of environmental announcements affected Standard and Poor's 500 indexed companies based on articles listed in the News and Bibliography Section of Investor Responsibility Research Center during the period of 1999 and 2001. My research will examine the same question addressed by these cited studies among Dow Jones companies over the recent ten year period of 1998 through 2008. The Dow Jones company selection may be different than previous samples in that they are thought to be the most influential firms in the economy and therefore likely to be more closely followed by the popular press.

While the research has shown that there are some links between firm performance measures and environmental announcements, there is still no clear distinction of why these policies are being undertaken. Traditional financial theory assumes that firms undertake certain policies to appease the requests of their shareholders. This study will test to see if this holds true

with environmental related policies. To prove this I have analyzed stock price movement around events thought to be "green" which should give us an indication of how shareholders value these types of announcements. My research attempts to estimate the benefits that shareholders see in the implementation of environmentally-friendly practices across firms and industries. That is if, and to what extent, shareholders actually realize these benefits, or if they perceive environmentally responsible actions as costs. I hope to advance the research about why firms adapt environmentally-friendly policies; if it is to boost financial performance or if it is to fulfill a different obligation held by non-financial stakeholders of the firm. That is, do shareholders see environmental announcements as an investment for the future or as an unnecessary additional cost? It is intended to spur interest in corporate environmental policies as well as to provoke shareholders to hold firms to a greater degree of responsibility. The hope is that similar studies will be undertaken in order to truly understand the motivations of corporations when implementing these changes.

3. Methodology

My study estimates the effects of publicly announced, positive green business undertakings on the financial performance of large U.S. firms. Market value of the firm's stock is used as the measurement of performance for the firm under the assumption that firms are acting in the interests of their shareholders. My thesis uses an event study approach to evaluate how shareholders of the firm react to a firm's announcements of positive green business compared to what would be expected in the absence of such an announcement.

An event study is the best way to answer the research question at hand because it allows me to analyze a large number of announcements. Event studies are built off the assumption that

markets act efficiently. This study assumes the semi-strong form market efficiency, meaning that all previous firm announcements are already reflected in the stock price, and any new announcement that is made will be immediately reflected by a change in stock price (Fama, 1970). A change in stock price is widely believed to indicate a change in expectations about future performance. In previous environmental literature, event studies have been used as a tool to evaluate effects on firm performance (Klassen & McLaughlin, 1996). I have built my study methodology off of that described by MacKinlay (1997) in his seminal article. This article is cited in similar environmental announcement event studies (e.g., Nagayama & Fumiko, 2006) and can be followed as a detailed template for event study methodologies. In order to be consistent with other environmental event studies, I will use much of the terminology used by Gilley et al. (2000). All of the event study methodology will be run through Eventus on the University of Pennsylvania Wharton Research Data Services website [see Appendix D]. The steps for completing the research will be as follows:

1. *Identify events and event windows*

   The event in my study is the public announcement of a green development within a firm. Selection of a green announcement has been decided based upon the inclusion of at least one keyword from a list of environmentally related terms in the articles headline or abstract [see Appendix B]. Results returned under these key words have been sorted through, and only the relevant articles containing what is deemed as "new information" have been included. Events were classified as being positive or negative in terms of how the firm acted regarding the environment. These categorizations were made by the author using subjective judgment. All announcements were made in two widely read sources that are

considered to be reliable by investors, the *New York Times* and *Wall Street Journal*.

According to McKinlay (1997), "it is customary to define the event window larger than the specific period of interest. This permits examination of periods surrounding the event (p 14-15)." For this reason, I have tested multiple event windows in my study. This allows a better examination of how the period surrounding the event has been affected. Also, an event could be skewed if it coincides with other announcements that could affect the pricing of the security during the event window (e.g. M&A, earnings announcements, stock splits). The impact of co-occurring announcements will be effectively negated by the size of the data.

2. *Determine selection criteria of firms to be included in the study*

The study will attempt to see the impact of events on large U.S.-based firms that have been successful during the period. Based on these criteria, a firm being listed in the Dow Jones Industrial Average index for the past ten years is used as the basis of inclusion. I will be looking at the 21 firms that were included in the Dow Jones Industrial Average during the entire period from January 1, 1998 through December 31, 2008 [see Appendix A]. While this may create a source of selection bias, it has been done in order to look at only the largest, most successful companies over the last ten years. I have chosen to look at the past ten years because of the increased awareness of environmental problems during this period.

3. *Measure abnormal returns in order to test event's impact*

With event study methodologies, the returns of each firm's common stock are compared to the stock market index to identify abnormalities. The actual common stock returns over event windows are compared to the normal/expected returns, and the differences are called abnormal returns (Gilley et al. 2000). This can be represented through the use of Equation 1:

$$A_{it} = R_{it} - R_{it}^{e} \quad (1)$$

Equation 1 measures the abnormal return, A_{it}, for the firm *i* at time *t*. Time *t* will encompass the entire event window. R_{it} is the actual return observed on time *t*, and R_{it}^{e} is the return that would have been expected based on the market model (defined below). I have chosen to use the University of Chicago's Center for Research in Security Prices (CRSP) value-weighted index to represent market returns. Using the value-weighted index is recommended by Canina, Michaely, Thaler, & Womack (1998) in their article on CRSP value-weighted versus equal weighted index use with the statement "most financial economists know that compounding the returns on any portfolio, other than the value-weighted index portfolio, induces an upward bias…" (p.403). Historical returns of each firm plus the movement of this market index will be used to predict the expected return. In order to calculate the expected return of a stock, this is illustrated by the following pricing model based on CAPM:

$$R_{it}^{e} = \alpha_i + \beta_{i,m} * R_{mt} \quad (2)$$

where R_{it}^{e} is the expected return for firm *i* at time *t*, α_i is the difference between the observed price of stock *i* and the price of stock *i* predicted by the model over the estimation window, $\beta_{i,m}$ is the measure of correlation between the firm *i* and the market over the estimation window, and R_{mt} is the observed return of the market at time *t*. In order to get the variables α_i and $\beta_{i,m}$, a regression is run on the historical returns of the stock price of stock *i* and on the market value of the market index over the estimation window (defined below).

4. *Define the estimation window*

The estimation window is the time period used to calculate R_{it}^{e} in the formula in step 3. The estimation window of 200 days ending 50 days before the event date will be used. Estimation windows vary greatly amongst past research (Klassen and McLaughlin (1996), McKinlay (1997) & Filbeck & Gorman (2004)). After testing the differential effects estimation windows played on the data, it was concluded that role was minimal. For this reason, I chose to use an estimation window that incorporated the different event windows used by these three main studies that I have followed. The estimation window does not include the event window *t* in order to prevent the event from influencing the normal returns. A regression has been run over the data of R_{mt} and historic R_{it} during the estimation window for each event in order to calculate variables α_i and $\beta_{i,m}$.

5. *Design of the testing framework*

The statistical tests will be done using the STATA program [see Appendix E for STATA commands used]. The first step is to find the cumulative abnormal return, CAR_i, for each event window *t* over a specific interval indicated by *T1* to *T2* (*T1* is the starting day of the event window and *T2* is the ending day):

$$CAR_i = \sum_{t=T1}^{T2} A_{it} \tag{3}$$

The abnormal returns will be averaged across events to provide mean cumulative average abnormal returns across *N* events.

$$\overline{CAR} = \frac{1}{N}\sum_{i=1}^{N} CAR_i \tag{4}$$

This formula can be used to find the cumulative average return for a specific type of announcement, for all announcements by firm, or for the overall cumulative effect by adjusting the *N*. The null hypothesis is that environmental events have no impact on the behavior of the returns, while the alternative is that returns are different from 0:

$$H_o: \mu = 0 \tag{5}$$

$$H_A: \mu \neq 0 \tag{6}$$

To show this, I will test the significance of the cumulative average abnormal returns to see if they are statistically different from 0. This will involve the use of a *t* test. The first step will be to find the estimated standard deviation, which can be done with the following equation:

$$S = \sqrt{\frac{1}{N-1}\sum_{i=T1}^{T2}(CAR_i - \overline{CAR})^2} \quad (7)$$

Once the estimated standard deviation has been calculated I can calculate the *t* value using the following equation:

$$t = \frac{\mu CAR}{\sigma_e / \sqrt{N}} \quad (8)$$

Finally, I can compute the $\bar{p}$ value to determine if the abnormal returns caused by this event are statistically significant (p-value will be compared to a significance level of .05 and 0.10). Using this statistical test, I will be able to accept or reject the null hypothesis in an attempt to draw conclusions about how shareholders view green announcements.

I evaluated two different hypotheses in my research. The first hypothesis is that there is a correlation between positive environmental announcements and the change in stock price. To test this hypothesis, I ran a regression on the mean abnormal returns of the different events and if the event is classified as a positive or negative event. My second hypothesis is that positive environmental announcements correlate with positive change in stock price. To test this

hypothesis, I have looked at the aggregate mean abnormal returns for positive events and for negative events.

4. Results

From the data collected, it is difficult to make strong conclusions about how shareholders react to environmentally positive events. Table 1 displays that there is little statistical significance between an event being positive or negative and the event window return. This would mean the null hypothesis is not rejected, as the mean abnormal returns are not statistically different from 0. Based on the high P-scores, it can be said that it is nearly impossible to predict whether returns will be positive or negative after an environmentally related announcement and that there is no correlation between positive environmental announcements and changes in stock price.

Table 2 shows, that there was a tendency for negative environmental events to have a greater return than positive events in this specific data set [See Appendix F for average daily returns for the different announcement types]. This evidence fails to support hypothesis 2, that positive events will on average produce higher returns than negative events. It is also important to note that there were nearly twice as many positive events as negative events. This could just be sampling error, and if more events were analyzed, the average returns may begin to even out between the two different categories as the average for all returns is relatively close to 0.

Table 1: Regression results showing statistical significance of different event windows

Event Window	P- Value
(-10,10)	0.843
(-5, 5)	0.568
(-3,3)	0.843
(-1,1)	0.791
(-1,0)	0.946
Number of observations:	242

Included controls: Assets, Employees, Net Income, EBIT and Revenue

**p<.01, *p<.05 are significant

Table 2: Event window returns for different types of announcements

Days	Positive Announcements (N=178)	Negative Announcements (N=65)	All Announcements (N=243)
(-5,+5)	0.16%	0.44%	0.24%
(-1,+5)	-0.33%	0.67%	-0.06%
(-1,+1)	-0.21%	0.46%	-0.03%
(-1,0)	0.01%	-0.06%	-0.01%
(0,+1)	-0.14%	0.49%	0.03%
(-1,+2)	-0.16%	0.41%	-0.01%

5. Discussion

My results are similar to those of other event studies. Gilley et al. (2000) found that there was no overall effect of environmental announcements, but the type of environmental initiative does make a difference. Filbeck & Gorman (2004) proved similar findings. While they did identify certain categories of announcements that did have strong effects, such as environmental awards and lawsuits as originally studied by Klassen & McLaughlin (1996), the vast majority of

positive and negative announcements showed no significance. My results, that a positive "environmental" event has no statistical relation to stock price movements, are consistent with the findings of these previous studies.

While it is hard to draw any major conclusions from the results, there is still room for discussion around how environmental announcements affect a company's financial performance. The main driving question behind the research is why do firms partake in environmental initiatives? In traditional finance literature, the main reason a firm would undertake any action is to benefit shareholders (Palmer et al., 1995). Based on the results from this study, it is clear that environmental announcements do not have a consistent effect on equity valuation. There are multiples ways one could explain this finding.

The first would be that firms may no longer see their shareholders as their main constituents. As mentioned before, recent literature identifies a wide array of firm stakeholders that should be included in any decision the firm makes. This would say that while shareholders do not see the value of an environmental decision, the net benefit to the stakeholders outweighs the shareholders in this specific case. This would indicate a radical shift in the way corporations view their obligations to society. While this is a possible explanation, it may not be the most plausible.

A second potential explanation would be that investors do not realize the value of environmental initiatives. Benner (2009) explains this in relation to how analysts react to firms undertaking new technological pursuits. It was found that in the two cases Benner analyzed (transition to digital film and changes in telecommunications), analysts did not react positively to incumbent firms trying to change their core technology. Analysts did not believe that firms had the capacity to deal with such large technological changes, and it was thought that these changes

would upset the firm's existing models of profitability. In the end, these firms were bypassed by competitors entering into these markets with new technologies. This shows that analysts are highly skeptical of a firm trying to completely alter its core strategy through new technology. This may be the same case as with environmental strategy; analysts may not have a good idea of how the markets will change based on new environmental initiatives. While startup firms can easily incorporate new environmental practices, mature firms find it more difficult to adapt old practices to compete. This would also follow the findings of Cochran and Wood (1984) that asset age is negatively correlated with CSR rankings. Older firms have trouble reacting to new environmental programs because of the high capital investments they have in their current assets, and the negative reaction investors have to higher costs. It is thus thought that management may have to act against shareholder short-term interests in some certain cases in order to ensure the firm's long-term survival and competitiveness (Benner, 2009). In order to get investors and analysts to support the change, management needs to convince them of the future benefits that are provided by the change.

A third possibility would be that shareholders of these companies already expected the companies to be green. According to market efficiency theory, all information in the market should be priced into current equity valuation. It is very possible that these companies were already thought to be green by shareholders and that the announcements brought no new information to the market. This could have to do with the size of the companies analyzed or the types of announcements selected. It is very possible that due to their size, information is discovered long before it is finally announced by the firm. If a firm makes a credible attempt at being known as environmentally friendly, any further actions may just be supporting this initial announcement. It is also possible that investors just expect firms to follow these types of actions

and it is not surprising to them when the firm actually announces them. They may even be expecting more in certain cases so when the announcement does come, the shareholders are slightly disappointed at the firm's attempts to be green. This could also support the findings of Klassen & McLaughlin (1996). Investors are pleasantly surprised when a firm wins an award, and investors need to adjust their valuation of the company upwards. However, when an environmental crisis occurs, investors are shocked by lack of environmental controls the company had in place.

A final possibility is that shareholders simply do not trade based on information presented in these specific news publications. While the *Wall Street Journal* and the *New York Times* are very reputable sources and many previous environmental event studies have used them (Gilley et al., 2000), it is difficult to say if they are the leading sources investors use to make investment decisions regarding environmental initiatives. It is also possible that the types of events being announced by these sources are not pieces of news that investors find useful. It is thought that firms usually announce positive things themselves in order to develop good public relations (Holder-Web et al., 2008). News sources then may only be reiterating information that the firm has already made clear to its shareholders. On the other hand, if something is unannounced by the firm, news sources will only announce the material that they find relevant, which may be information that is not highly valued by investors.

6. Conclusion

The purpose of this study is to add insight into the question of why firms pursue positive environmental initiatives. While past literature has done a good job of looking at how investors react to negative environmental announcements, reactions to positive announcements has been

much harder to understand. This paper used methodologies developed in the past on a new sample of firms and a different source of announcements. While the results showed no strong conclusions about how investors price the announcements, there are many explanations which deserve future consideration.

While it is difficult to say for certain why the results came out the way they did, there are many aspects of the study that can be built upon by future research. Future studies would be encouraged to expand the announcement base. This would allow more companies to be analyzed as well as more events. It would also be beneficial to take a closer look at the keywords used and the criteria used for including an announcement. This list may need to be expanded in order to incorporate a larger variety of environmental announcements. I also recommend looking at news published in other sources. Third party sources are recommended due to noted examples of firms using self announced environmental news as public relations material more than as meaningful news items, but it is important to find articles that bring new information to the market. One option to study this may be to look only at disclosures that are filed with the SEC to avoid a bias effect. Finally, timing of the announcements could play a role. Management may strategically time press releases to get the most positive reaction, or cause the least harm, in financial markets.

Future studies also should more closely examine the effects event window size has on results. It would seem plausible to get desired results through data mining the event window size. It needs to be agreed upon over what size event window an environmental announcement has an impact on trading. There may be opportunity to conduct long run event studies on this topic to see how green firms compare to competitors in the long run. This may be even more intriguing to look at industry specific cases.

Lastly, it is important to note the trend of firm environmental initiatives. As displayed in Appendix C, the number of announcements recognized by this study has increased drastically over time. This is something that should be considered going forward with environmental event studies as more announcements are clearly being made. The nature of these more numerous recent announcements should be compared to past announcements to possibly get a better understanding of why firms are continually announcing more environmental initiatives if there really is no recognized financial benefit.

The question of why firms undertake environmental initiatives will continue to be researched. It could be said that at the very least environmentally positive announcements don't hurt shareholders, as the benefits are clearly not "win-win" in all cases. This means that the tangible and intangible benefits of environmentally-friendly actions may exactly equal the costs of pursuing these initiatives. There is also something to be said about the possible insurance effect of being green. Having strong goodwill built up in the environmental community can be very beneficial when a crisis does occur. Continued research is encouraged to build upon the findings of this and other past studies to further understand the role of environmental responsibility in the business world.

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Appendices

Appendix A. Full list of firms analyzed

Company Name	Ticker
3M Company	MMM
Alcoa Incorporated	AA
American Express Company	AXP
Boeing Corporation	BA
Caterpillar Incorporated	CAT
Citigroup Incorporated (formerly Traveler's Group)	C
Coca-Cola Company	KO
DuPont	DD
Exxon Mobil Corporation	XOM
General Electric Company	GE
General Motors Corporation	GM
Hewlett-Packard Company	HPQ
International Business Machines	IBM
Johnson & Johnson	JNJ
J.P. Morgan Chase & Company	JPM
McDonald's Corporation	MCD
Merck & Company, Incorporated	MRK
Procter & Gamble Company	PG
United Technologies Corporation	UTX
Wal-Mart Stores Incorporated	WMT
Walt Disney Company	DIS

Appendix B. Factiva search details

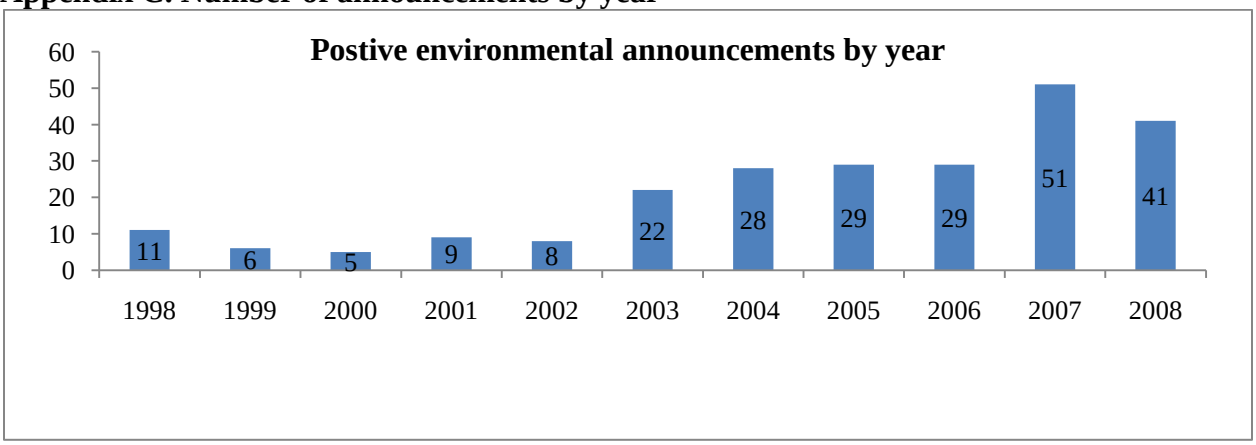
The searches for articles were done through the Factiva search. The parameters were as follows:

- Articles published during the time period from January 1, 1998 through December 31, 2008.
- Articles published by the Wall Street Journal or the New York Times in the print or online editions.
- Keywords were located in the articles headline or lead paragraph.
- The articles needed to contain at least one of the following words:

alternative fuel	carbon trad*	EPA	ISO 140*
battery	clean air	ethanol	Kyoto
biodegradable	climate change	fuel cell	Life Cycle
biofuel	coal gasification	global warming	recycl*
cap and trade	energy efficien*	green	renewable energy
carbon emission	Environmental Protection Agency	greenhouse gas	solar
carbon neutral	environmental*	hybrid	wind

**=word is truncated and can contain any characters following*

Appendix C. Number of announcements by year



Appendix D. Eventus setup options

- Basic daily returns
- CRSP value weighted market index
- Market-adjusted returns were used
- Autodate was used for events occurring on non-trading days (move to next day if happen on non-trade day)
- Ordinary Least Squares (OLS) estimate method

Appendix E. STATA command used for regression

reg: x1 ivar1 ivar2 ivar3 ivar4 ivar5, robust

x1 = Mean total return
ivar1 = Asset size
ivar2 = Employees
ivar3 = Net Income
ivar4 = Earnings Before Interest and Tax
ivar5 = Revenue

All independent variables are taken from the previous year-end report.

Appendix F. Abnormal returns for each day using different announcement types

Day	Positive Announcements (N=178)	Negative Announcements (N=65)	All Announcements (N=243)
-10	-0.15%	0.16%	-0.06%
-9	-0.07%	0.15%	-0.01%
-8	-0.10%	-0.11%	-0.11%
-7	-0.04%	0.13%	0.00%
-6	-0.03%	-0.23%	-0.08%
-5	0.24%	0.14%	0.22%
-4	0.10%	-0.02%	0.07%
-3	0.19%	-0.22%	0.08%
-2	-0.04%	-0.14%	-0.06%
-1	-0.07%	-0.03%	-0.06%
0	0.08%	-0.03%	0.05%
1	-0.22%	0.52%	-0.02%
2	0.05%	-0.05%	0.02%
3	-0.22%	-0.01%	-0.16%
4	0.10%	-0.07%	0.06%
5	-0.06%	0.34%	0.04%
6	-0.19%	-0.24%	-0.20%
7	-0.15%	0.05%	-0.10%
8	-0.28%	-0.11%	-0.23%
9	-0.18%	-0.17%	-0.18%
10	-0.02%	0.00%	-0.01%