Valuing “Green”

How “going green” affects a company’s stock price

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ABSTRACT

Environmentally conscious decision making has become a prominent topic in business that has the potential to affect the public opinion and performance of companies. This project seeks to identify whether or not positive changes in excess return might offer an incentive for companies to adopt green initiatives. It examines the ways in which companies' green initiatives, as measured by their annual Carbon Disclosure Project S&P 500 Climate Change Report score, impact their stock price. In other words, is there value in "going green"? It is hypothesized that companies exhibiting greater variance in their environmental initiatives from one year to the next (whether positive or negative) will see larger impacts on their stock price surrounding the release date of the rankings. This paper is an event study comparing the magnitude of the change in a company's annual Carbon Disclosure Project (CDP) score to the magnitude of their percentage excess return change in stock price. In the end, the hypothesis was not proven to be true because the results were not statistically significant.

INTRODUCTION

In 2010 the British Petroleum oil spill made international headlines. This spill lasted for a total of 87 days, making it the largest oil spill recorded in the history of the United States. BP's share price plummeted and individuals worldwide began to question the management, environmental responsibility, transparency and disaster plans of companies in the industry. There was negative press, social outrage and financial repercussions associated with this oil spill. It is evident that investors, stakeholders and the world responded to this crisis in a way that was not beneficial for BP. Is the investment community beginning to punish those companies who do not behave in an environmentally responsible manner?

Humans have been impacting the course of the planet for hundreds of years. However, in recent years it has become apparent that many of our actions have caused catastrophic damage to the land we inhabit. As our ecological footprint continues to grow, so too does the level of environmental degradation we are causing. Though many of these issues can be traced back to the actions of non-point source polluters, point source polluters also have a responsibility to manage their footprint. Large companies have the ability to cause great harm to the planet, but they also have the option to make conscious decisions to limit or eliminate such harmful behaviors.

The Carbon Disclosure Project S&P 500 Climate Change Report seeks to hold companies accountable for their actions in relation to carbon emissions. This report assigns a number score from 0-100 to companies who voluntarily submit information related to their carbon emissions. The report also shows the progress made by companies from one year to the next by directly comparing their current score to that of the previous year. This transparency and accountability are essential in making future strides towards a more sustainable future.

Though rankings and evaluations of companies' "green" actions are available, the question arises: do investors care? If a company makes great progress from one year to the next, will their positive actions be rewarded by investors? To answer this question, an event study is the

most effective method of measuring abnormal returns in response to the release of these rankings.

Event studies are a frequently used method used to show how news or events impact share price. An event study seeks to understand and prove how the market and investors respond to company related news, whether positive or negative. In general, when positive press is generated about a company, their share price will increase. On the contrary, when bad news is released the share price tends to decline. Share prices will usually steady themselves following the disruption caused by the event, though this could take hours or days depending on the size of the story. However, such events do not usually have long-term consequences on share price unless it is astronomically negative, for example, an irreversible scandal or bankruptcy.

This study attempts to understand the interest of the market in relation to environmentally conscious progress and transparency, or lack thereof.

BACKGROUND

It can be difficult to identify and quantify what constitutes "going green." For some, this term means turning off the office lights when leaving for the evening or recycling paper. For others it means changes in natural resource use or waste management. As a result, it can be difficult to define what makes a "green" company. However, among the business and scientific community there is a general recognition that carbon is an effective means of measuring negative environmental impact.

Climate Change

Climate change is a transformation in regional or global climate patterns. In recent years, the primary human activity that has affected the amount and rate of climate change is greenhouse

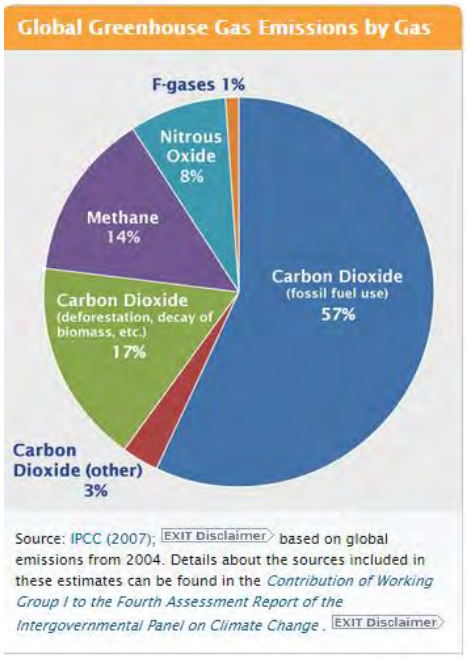
gas emissions from the burning of fossil fuels. Since the start of the Industrial Revolution in the 1760s, carbon dioxide and other heat-trapping gasses have been added to the atmosphere at unsustainable rates. Greenhouse gasses trap heat from the sun in the earth's atmosphere which gradually increases the surface temperature of the planet. This is commonly referred to as the greenhouse effect. As the earth's temperature increases, climate change ensues.

Climate change results in a number of adverse global impacts. One impact is an increase in the frequency and destruction of severe weather patterns. These severe weather patterns have the ability to demolish entire cities and require rebuilding efforts that span many years. Additionally, there is an increased risk of drought, fire and floods. These issues have the potential to impact food supply, human settlements and access to safe drinking water. As large water basins dry up, access to drinking water becomes a life-threatening struggle for many humans across the globe. Furthermore, an increase in certain diseases and illnesses related to climate change threaten human health. Many of these illnesses are water-borne as a result of the lack of clean drinking water. Melting ice caps and rising sea levels are another highly-publicized climate change issue. A review of the polar ice caps over time shows that their size is diminishing on an annual basis. Additionally, many of the world's largest glaciers are melting, causing vast landscape changes. The rising sea levels pose a direct threat to many of the world's largest port cities, like New York, whose very existence is threatened by climate change. Finally, wild life are at risk due to the changing landscape, temperatures and their inability to adapt to such drastic changes.

Carbon Emissions

Carbon dioxide is one of the largest greenhouse gasses and contributors to climate change. Today, levels of carbon dioxide in the earth's atmosphere are the highest they've been in the last 400,000 years (Figure 1 provides a graph displaying historical CO_2 levels which puts into perspective the present issue with carbon emissions). According to NASA, historically

atmospheric CO_2 levels have hovered between 200 ppm and 280 ppm. In fact, carbon dioxide levels had not surpassed 300 ppm for 650,000 years… until now. 2013 saw CO_2 levels higher than 400 ppm for the first time in recorded history. According to the U.S. Environmental Protection Agency, these astronomically high levels of carbon dioxide in the atmosphere are directly related to the burning of fossil fuels. This is supported by the figure at the right. The power that humans have to change the planet, for better or for worse, is astonishing.



Government Policies Related to Climate Change

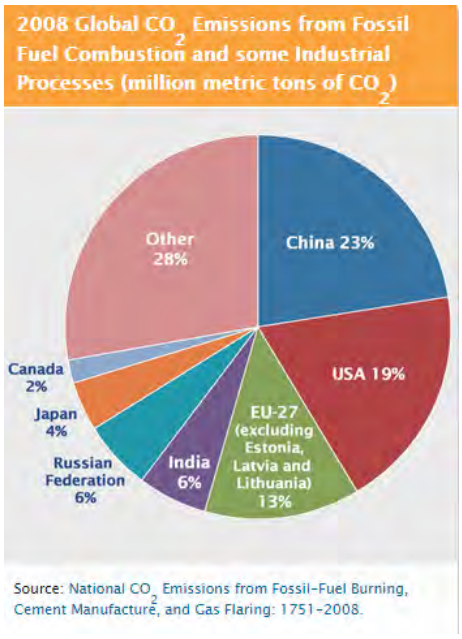
Governments have been displaying concern for the state of the environment for decades; however, the longer humans wait to take action, the more severe the damage becomes. Perhaps one of the most notable displays of the international community's commitment to combat climate change is the Kyoto Protocol. Since its inception in Kyoto, Japan on December 11, 1997, the goal of this international agreement has been to set internationally binding emissions targets. It was enforced on February 16, 2005 with the first commitment period beginning in 2008 and ending in 2012.

In 2012, the Doha Amendment was created at a meeting in Doha, Qatar. This amendment included new commitments for parties who agreed to a second commitment period (which would range from 2013-2020), a revised list of greenhouse gasses and amendments to certain articles. Many countries that completed the first round of emissions reductions did manage to meet their targets. However, participation in international agreements is voluntary. As a result, many nations, including the United States, have not bound themselves to their targets. The United States is a signatory to the protocol, but never ratified it. The Kyoto Protocol is a step in the right direction, however it is ultimately the job of individual nations to take

responsibility for their actions and make strides toward combatting large-scale environmental issues.

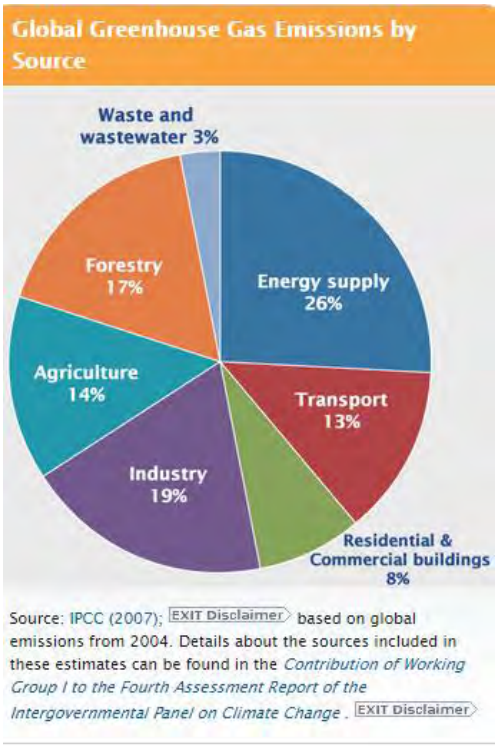
There are many measures of progress and disaster related to climate change, emissions and global warming. Today, concerns regarding the increase in the earth's temperature are at the foreground of the fight against climate change. The UNEP Emissions Gap Report in 2010 stated that it could be possible to keep global warming below 2 degrees Celsius by 2020, however, global efforts must be made to do so. These efforts include pledges and rules, but it is the decision of each individual country whether they will ultimately choose to honor or ignore such efforts. A large contributor to the increase in the earth's temperature is carbon dioxide and other greenhouse gas emissions.

President Obama has recognized the need for businesses to lead the charge on reducing emissions and preventing climate change, as recognized in the 2013 Climate Action Plan. This plan and the country's dedication to combatting climate change and emissions are particularly important given already high emissions. Historically, the United States has not been known for being "eco-friendly." In fact, the country often does not ratify global treaties to reduce climate change, yet produces more than its fair share. The contributions of the United States to climate change are staggering in comparison to many other countries. The pie chart to the right displays the 2008 global CO_2 emissions from fossil fuel combustion and industrial processes. It is clear from this image that the USA is one of the largest contributors to CO_2 emissions, second only to China.



Additionally, when one views the per capita emissions data, it is evident that the United States has more room for improvement than most other countries. The United States is responsible

for about 17.6 metric tons of carbon dioxide emissions per capita. Compare this to the United Kingdom's 7.9 metric tons per capita or China's 6.2 metric tons per capita and the problem becomes evident. Though some of these emissions are the result of non-point source polluters, many of the causes relate directly to business practices and decisions made by American corporations every day. The chart at the right depicts the sources of greenhouse gas emissions in the United States. Energy supply encompasses the burning of coal, oil and natural gas. It is the largest contributor to greenhouse gas emissions. Industry also contributes largely and mostly involves on-site burning of fossil fuels to create products. It is evident that most of these sources are directly related to corporate activities, making this issue a business issue.



Business Risks & Impacts

Increased levels of CO_2 should not only be on the political agenda, they should be especially concerning to businesses as well. In fact, some countries such as the United Kingdom have instituted policies requiring all quoted companies to measure and report their greenhouse gas emissions. In the near future, these issues will become increasingly more applicable for decision makers and corporations.

Many people struggle to find the link between climate change and business decisions. However, there are a plethora of ways in which climate change has the potential to negatively impact businesses. These risks should be taken seriously by executives and stakeholders as long-term decisions and strategies are created.

First, there is an increased market risk for certain businesses and industries. This could be the result of price volatility in carbon and energy prices. Particularly for those companies dependent on fossil fuels (a finite and quickly diminishing resource), market risk will logically increase over time. To mitigate such risks, companies should reduce their exposure as related to the prices of carbon, oil, gas and electricity.

Additionally, there is a climate change policy risk. As countries begin to create and expand upon legislation related to fossil fuel emissions and other related topics, there is an increased risk for businesses who do not comply with these standards. Conversation surrounding a "carbon tax" or other environmentally-focused legislation could be detrimental to carbon-intensive corporations or industries. Particularly for multinational corporations conducting business today in Europe, for example, the standards may be higher than those in the United States. Companies who are unable to match these standards will be at a disadvantage. Furthermore, as policies are created and implemented in all countries, businesses who do not currently comply will be forced to use large amounts of capital to meet these standards. Thus, there is a policy risk for businesses worldwide.

Furthermore, the risk of adverse weather conditions has the ability to impact businesses in a variety of ways. First, if a company owns real estate or is headquartered in an area that is at risk, natural disasters and severe weather patterns have the ability to create serious damage. Additionally, certain industries could be at risk in certain regions of the world. For example, in areas where droughts are becoming more common, agricultural industries will suffer. The work force in these regions will also suffer because if workers to not have access to food, they will be unable to work. There are many ways in which adverse weather conditions can negatively impact companies.

As environmental issues gain relevance and attention, reputation risk also becomes a danger for companies. Public pressure has the ability to impact business decisions, particularly when certain industries or companies are acting unethically. Particularly, if public pressure relates in the generation of negative press, companies may be pushed to implement changes.

Finally, there is financial risk associated with climate-related issues. This risk could be due to investor pressure. Evidence of socially responsible investing can be found in the creation of certain mutual funds and ETFs that choose only to include responsible companies. A variety of funds fitting this description can be found on Morningstar and investment company websites. The simple existence of these funds suggests a shift in investor behavior and priorities. If there is a change in the mindset of investors, they will be likely to encourage "greener" behaviors and choices for their companies. Additionally, the cost of capital for non-carbon reducing projects could be higher over time. If regulations on carbon emissions targets increase, the cost of capital for projects not in compliance could increase.

The focus of any company is to create shareholder value. The shareholders are the owners of a company and it is the job of any company to generate wealth or value for its investors. Having said that, stock prices are largely the result of the public's perception of a company. Stock price is not based directly on a company's financials (though that can certainly have some influence), rather it is based on the estimated present value of future cash flows. That is, it is the present value of the anticipated future gains. Investors seek companies they feel will perform favorably in the future, thus increasing the stock price. Could "going green" increase investor confidence in the future value of a firm?

As Sir Richard Branson stated in a February 2015 article in *The Guardian*, "Taking bold action on climate change simply makes good business sense. It's also the right thing to do for people and the planet. Setting a net-zero GHG emissions target by 2050 will drive innovation, grow jobs, build prosperity and secure a better world for what will soon be 9 billion people. Why would we wait any longer to do that?" However, Branson promptly attacked by a contributor at *Forbes*, Tim Worstall, who believes that this goal set by the B Team would be too expensive and is proposed by business leaders and not environmental experts. It is his belief that from an economic perspective peoples' behaviors must be changed. He claims that the current goal of businesses to reduce their CO_2 emissions is based on expectations of future costs. It is Worstall's belief that spending large amounts of money to avoid future costs ultimately results in high levels of spending. These two conflicting opinions display the

discrepancies in the business community in relation to climate change and carbon emissions. It is for this reason that this study will be particularly interesting and relevant. This is a hot topic in the business community and gauging investor responses is a way to measure how much people believe it matters.

Hypotheses

As a result of the relevance of the world's current environmental crisis, this study will study investor reactions to those companies making environmentally conscious decisions versus those who are not. This study seeks to examine three hypotheses:

> **Hypothesis 1:** Companies with the highest percentage change in CDP S&P 500 Climate Change Report score from 2012 to 2013 will have positive share price returns around the announcement date.
>
> **Hypothesis 2:** Companies with the lowest percentage change in CDP S&P 500 Climate Change Report score from 2012 to 2013 will have negative share price returns around the announcement date.
>
> **Hypothesis 3:** There is a positive return difference between the companies with the highest and lowest percentage changes in CDP S&P 500 Climate Change Report score.

Investors often look at factors other than pure financial indicators when making investment decisions. If these hypotheses are correct, investors will respond favorably to those companies making an effort to improve their scores and will respond negatively to companies who perform on the contrary.

LITERATURE REVIEW

How "Going Green" Affects Business

To begin, it is important to understand the relevance and importance of this topic. Though the green movement has been struggling forward for decades, "going green" has become a trendy term in recent years. The question many CEOs are now asking themselves is; what does it really mean for my company? Too often the concept of environmentally conscious business has been soured by claims of increased costs and limited tangible benefits. This school of thought is similar to that of Worstall. However, an increasing number of people have begun to challenge this age old assumption and promote sustainable practices, as Branson has promoted.

In their 2008 research, Ambec and Lanoie argue against the widely accepted idea that environmental corporate social responsibility is always associated with increased costs and decreased competitiveness. The authors argue that environmentally friendly innovations can lead to increased revenues by offering better access to certain markets, differentiating products, and selling pollution control technology (Ambec 47). This school of thought, supporting the idea that environmentally conscious actions can add to measurable increases in company value, is the basis of this study.

In the same year, an opinion piece was written by Roberto Saco and published in the Journal for Quality & Participation. In it, Saco argues there is much to learn about the utilization of environmental technology and how it works. It raises a valid point; many people do not understand environmental initiatives. This could impact my findings by suggesting that the general public cannot understand the green initiatives that companies have implemented and, therefore, as investors they may respond in an unpredictable manner. Finally, Saco insists that it will be important to keep track of which new technologies are successful or unsuccessful so to better understand how to initiate environmental CSR practices (Saco 39-40).

The importance of environmental responsibility is not only recognized by the business community, but by the government as well. In the release of President Obama's June 2013 Climate Action Plan, it was stated that for the necessary changes to take effect, the business community would have to help lead the charge. The three key pillars of the plan are (1) to cut carbon emission in the United States, (2) to prepare the United States for the impacts of climate change, most notably severe weather patterns, and (3) to lead the international effort to combat global climate change and prepare for its impacts (Executive Office of the President, 5).

An article published in *BusinessWeek* emphasized benefits for green companies in 2008 as well, an interesting suggestion considering the economic downturn that year. The author mentions a study from the University of Oklahoma's Price College of Business that found that companies going green can lower their cost of capital. Researchers argue that investors factor environmental risk management into their evaluations which results in lower risk premiums and higher leverage in addition to higher stock valuation. Meglio notes that, "often, companies look internally to see the benefits of their efforts to help the environment — such as becoming more efficient users of resources. But the professors found that financial markets, particularly equity markets, also reward green efforts" (1). If this hypothesis is correct, the companies who perform favorably in the Carbon Disclosure Project (CDP) report should see favorable returns and a positive correlation between their stock price and CDP score.

Scientific Factors

Though the business implications of reduced carbon emissions are important, the underlying problem is scientific. A 2013 study conducted by Trica and Papuc has again identified resource depletion and damage to the natural environment as key issues, as well as global economic crises and increased consumption habits. The authors argue that, "In 2011, UNEP Green economy report demonstrates that a transition to a green economy is possible by investing 2% of global GDP per year (currently about US 1.3 trillion) between now and 2050 in a green transformation of key sectors, including agriculture, buildings, energy, fisheries,

forests, manufacturing, tourism, transport, water and waste management" (Trica & Papuc 133). However, for such reforms to occur there would need to be a large amount of government reform and cooperation by all. It is evident that it will take much more than government and non-profit action to fix these problems. Corporations must also contribute to the reversal of these issues or they will not have resources to utilize in the future.

Perhaps it is the realization that the earth's resources are limited that has placed emphasis on the essential need for corporations to contribute to sustainability efforts. In an article published by the Bulletin of the Atomic Scientists, Smith argues that resource constraints will be the major driver of sustainability efforts in the future. As the world's problems with carbon emissions and water scarcity continue, we must strive to find sustainable alternatives in order to avoid high costs of products in the future (Smith 47-48).

Industry Reactions

The urgency with which companies must find solutions can be partially attributed to their industry. An industry such as financial services, for example, may not be as highly influenced by carbon emissions as a vehicle manufacturer. An article run in *Medical Design Technology* provides the opinions of executives in the healthcare industry regarding the implementation of environmentally friendly initiatives. Most individuals interviewed agree that such initiatives are necessary and, though no hard data is provided in their interviews, some believe that it will help them to save costs. Others emphasized the positive publicity that would result from "going green" or the company's responsibility to be kind to the environment. Although not a controlled research study, it is beneficial to see what professionals and executives in the field are thinking.

For some industries, voluntary emissions reductions have resulted in moderate successes. A study by Gouldson and Sullivan discussed voluntary emissions reductions implemented by companies in the United Kingdom's grocery sector and concludes that they align with or surpass the climate change policy goals set by national governments. The energy used by supermarkets in the UK account for almost 1% of the entire country's emissions, thus

reductions in this industry are an important aspect of reducing the nation's carbon footprint (Gouldson 3).

As related to industry performance, "green operations" are arguably a key component for increased company performance. A study by Suhong and Ngniatedema defines green operations as, "all aspects related to product manufacturing, usage, handling, logistics and waste management once the design has been finalized (Suhong & Ngniatedema 1180)." It focused on the top 500 publicly traded companies of 2010 based on market cap and number of employees. The results showed the technology sector as the leader in green operations. It ranked food and beverage, oil and gas, and industrial goods in the bottom tier of performance. The study found that the impact of environmentally friendly operations varies by industry and sector, but is positive overall. This study is an excellent segue into the methodology of "going green" as well as the influential studies considered throughout my review of the literature.

Methodologies

One study conducted by the Northeast Region Decision Sciences Institute found that companies who had ISO 14000 certification were rewarded in the stock market, short-term. When un-weighted against the S&P 500 index, these companies performed more favorably and had higher annual returns. These findings were true of all sectors with the exception of the Healthcare sector (Tamimi & Sebastianelli 115). Similarly, Yamaguchi argues that times are changing and, as a result, managers face increased pressure to please the public by implementing environmental initiatives. It takes the Nikkei Environmental Management Ranking survey and compares it to the stock performance of ranked companies. By examining the top 30 companies in the rankings, the study found that the company's stock price was positively influenced as the frequency of rankings increased (Yamaguchi 350). This model is similar to the one that we will be using to conduct our research with the Carbon Disclosure Project S&P 500 Climate Change Report rankings.

Another study conducted by Indranil Bose identified that green supply chain management can influence everything from production to sourcing to product lifecycle. The study found that

overall, green supply chain management initiatives have a positive impact on the shareholders' value of the firm. In particular, investors tend to view green initiatives more favorably in the manufacturing sector (Bose 631). Similarly, Kirchoff, Kosch and Bridget found in their research that "consumer stakeholder value is related to a firm's ability to exhibit high levels of environmental commitment through demand and supply integration (8)."

On the contrary, a Study by Curran and Moran used the FTSE4Good Index to identify whether or not there was a positive correlation between a company's addition to or subtraction from this index and their stock performance. "The FTSE4Good Index is an index of tradable companies ranked by market capitalization selected from a pool of companies that have been screened for their environmental and social performances" (Curran and Moran 534). However, the authors argue that it is still important for companies to strive to be included on such indices as it results in positive positioning in the eyes of the public. This information is contrary to what we expect to find in this research. However, it could be due to the fact that it only considered the importance of one index and there are many ways in which companies can be identified as being environmentally friendly. The methodology used in this study, however, is very similar to the methodology we will be using for my event study.

Perhaps one of the most relevant studies was conducted by an MIT Student, Caroline Flammer. This study proved the positive correlation between companies who announced environmental initiatives and their stock prices within the few days of the announcement in the Wall Street Journal. Over time, the market punishes those who engage in eco-harmful behavior and rewards those who implement green initiatives. Interestingly, the study also found that the market reacts more positively when companies not traditionally perceived as "green" implement environmentally friendly initiatives (Flammer 27-28). This provided the idea to consider not only the implementation of an initiative, but the magnitude of change.

As far as the exact formulas and methodology are concerned, a 2002 study conducted by Asli Ascioglu serves as the basis of the methodology. In this paper, the root of Ascioglu's methodology is attributed to Keown and Pinkerton (1981). We will be using their

methodology for abnormal returns and comparing the event date (or the release date of the CDP report) to the company's Carbon Disclosure Project score. This methodology will be used to conduct my study. We will also follow much of the Curran and Moran study because it is more recent (2007) and follows a similar methodology. It also used an event study based on index rankings, so it is comparable to this project.

The final piece of the puzzle is the selection of rankings. Initially, we intended to use the Newsweek rankings and methodology of the top 500 US companies to provide the basis for my research. The three factors used to produce the Green Score and rank the 500 largest US publicly traded companies include: Environmental Impact Score (45% weight), Environmental Management Score (45% weight) and Environmental Disclosure Score (10% weight). As we read other studies that observed companies' stock prices as related to their positioning in environmental rankings, we believed that this would provide a legitimate basis for my research. However, following a discussion with Judson Bruns, VP Public Policy for The Hartford, it was decided that a shift to an alternative ranking system was best.

The Carbon Disclosure Project is one of the most reliable methodologies in the business community. Its results are highly anticipated and very reliable. Additionally, measuring carbon emissions is one of the only concrete means of measuring how "green" a company is. As the term "going green" is difficult to define, it is necessary to identify some tangible measurement. In the case of this study, the tangible measurement will be a company's carbon emissions. The companies are rated based on information they provide to the CDP.

DATA

CRSP

To obtain the dividend adjusted stock prices for the sixty companies examined in this study, CRSPSift was used. The Center for Research in Security Prices (CRSP) provides research-quality data in finance and economics. It is intended for scholarly use and includes a variety

of indices. The dividend adjusted returns from the CRSPSift program are more accurate and of higher quality than those obtained via other online sources. Accuracy and quality are guaranteed so this program was utilized to obtain stock related information. More specifically, the CRSPSift Stock Data database was used.

CDP S&P 500 Climate Change Report Rankings

As for the rankings, it was decided that based on the percentage change methodology used for this study, an annual ranking release should be used. After review of many annual rankings, the Carbon Disclosure Project S&P 500 Climate Change Report was selected. Examples of other studies considered for use included: Interbrand's Best Global Brands Report, Newsweek's Green Rankings, and the Environmental Protection Agency's Top 100. Ultimately, the CDP S&P 500 Climate Change Report was selected for a few reasons.

The first of these reasons is the study's focus on S&P 500 companies. Because these companies are publicly traded in the United States stock market on the NYSE or NASDAQ, obtaining consistent and comparable information was easier than attempting to compare companies traded on different stock exchanges or privately held corporations. The companies listed on the S&P 500 Index are some of the largest and most widely traded stocks and are representative of the industries in the US economy. Therefore, these companies are largely followed by investors and are in the public eye.

Additionally, the study's measure of "going green" is widely accepted among environmentalists and the business community alike. Measuring carbon output is perhaps one of the most easily measureable and impactful measures of a company's dedication to the environment. After interviewing Judson Bruns, Vice President of Governmental Affairs and head of environmental initiatives at The Hartford Financial Services Group (an S&P 500 company), we were convinced that the CDP rankings were the best. As an expert in the field, Mr. Bruns explained that the CDP rankings were viewed by the industry as a reputable source and that The Hartford was constantly striving to reduce their carbon emissions.

The goal of the Carbon Disclosure Project is to put climate change and energy efficiency onto the business radar. The organization believes that a transformation of our current global economic system is necessary to mitigate and prevent climate change and to combat global warming. The belief is that by creating reports such as the S&P 500 Climate Change Report, the investment community will be better informed and aware of portfolio risk. This will ultimately help investors to achieve sustainable and strong shareholder returns by investing in companies who will be sustainable in the future from both an economic and an environmental perspective.

Companies are scored on two large criteria on an annual basis: disclosure and performance. The disclosure criteria is based on the way in which companies have displayed transparency and accuracy in answering the questions, while the performance criteria measures the corporation's level of action. The companies who score highest are recognized by their entrance into the Climate Disclosure Leadership Index or Climate Performance Leadership Index. To enter the CDLI companies must publicly and accurately submit their information and score within the top 10% of the total S&P 500 population. To enter the CPLI the company needs to accurately submit their information and score, have a performance score greater than 85, and achieve top scores for certain questions included in the survey.

The CDP S&P 500 Climate Change Report rankings were obtained for 316 total companies. It is not mandatory for companies to submit their information to the Carbon Disclosure Project. Submissions are voluntary, and as a result some companies choose to decline or to submit only partial information. These 316 companies consisted of corporations who had voluntarily submitted complete information for both 2012 and 2013. Therefore, there were available rankings for both years and the percentage change in numeric score could be calculated. Of these companies, 234 were found to have positive percentage change from 2012 to 2013, 16 companies stayed constant with 0% change, and 66 companies displayed a negative percentage change.

Once selected, a sample of the top 30 and bottom 30 companies based on their percentage change in score from 2012 to 2013 was selected. It is worth noting some information in regard to these companies. First, there was representation from all sectors in both the top and bottom 30 companies (see figures 2 and 3). Additionally, those companies in the top 30 had higher percentage changes, with the top 30 companies having a maximum of 581.75% change, a minimum of 34.04% and a mean of 95.69%. The bottom 30 companies had a maximum percentage change of -5%, a minimum of -56.56% and a mean of -12.53%. Graphs displaying the distribution of the percentage changes can be found in figures 4 and 5.

METHODS

The first step in conducting this study was to determine which companies had the highest and lowest percentage change in ranking from 2012 to 2013. This calculation was completed for companies with complete information and scores in both 2012 and 2013. Those that did not have a score for both years (due to incomplete or nonexistent submissions) were eliminated from the sample. The percentage change was calculated using the formula:

$$\%\Delta X = \frac{X_{2013} - X_{2012}}{X_{2012}} * 100,$$

where $\%\Delta X$ is the percentage change in score from one year to the next and X is the company's score for the identified year.

Based on this calculation, the top 30 and bottom 30 companies based on percentage change in score were identified and selected as the sample for the study.

Next, the event study was conducted. The first step in conducting an event study is to determine the event date and the event window. The event window is the period of time throughout which the share prices of each firm would be examined. The event window was intentionally made larger than the period of interest, so as to capture a potential early leak in

information or the actions of investors who became aware of the event late. The event of interest was the announcement date of September 23, 2013.

The estimation window used to calculate β was -310 to -21 days before the start of the event window. The event window examined by the study was -20 to +20 days surrounding the event date.

Average return was calculated using the formula:

$$\bar{R}_t = \sum R_{jt} / N,$$

Where N is the number of firms in the sample and R_{jt} is the return on day *t*.

However, average returns are not risk adjusted. Therefore, expected returns were calculated using the market model:

$$R_{jt} = \alpha_j + \beta_j R_{mt} + \varepsilon_{jt},$$

for each company *j* where α measures the mean return over the period not explained by the market, R_{mt} was the return on the S&P 500 (market index) for day t, β is a measure of the sensitivity of a firm to the market, and ε_{jt} is a statistical error term $\sum\varepsilon = 0$. This regression analysis resulted in estimates for α and β for each company *j*. The estimation window of day -310 to day -21 was used in this regression.

The expected returns were then calculated for the event window:

$$E(R_{jt}) = \widehat{\alpha_j} + \widehat{\beta_j} R_{mt} + \varepsilon_{jt},$$

where $\widehat{\beta_j}$ and $\hat{\alpha}_j$ were the values of α and β derived from the previous regression for each company *j*, and the event window was from day -20 to day +20.

The abnormal returns were calculated for the event window by using the formula:

$$AR_{jt} = R_{jt} - E(R_{jt}),$$

where AR_{jt} is the abnormal return for company *j* on day *t*, R_{jt} is the actual return for company *j* on day *t,* and E(R) is the expected share return on day *t*. The actual returns minus the expected returns is equal to the abnormal returns. Expected returns are normalized with β, which shows the market movements and the risk (β) of the market at the time. By normalizing expected returns with β, the abnormal returns and expected returns can be attributed to fluctuations in the returns caused by the announcement date of the Carbon Disclosure Project S&P 500 Climate Change Report.

The abnormal returns were averaged across the two samples separately (the upper 30 and bottom 30 companies):

$$AR_t = \sum AR_{jt} / N,$$

Where N was the number of firms in the sample (30 for each sample).

The cumulative abnormal returns were also calculated:

$$CAR_T = \sum_{t=-20}^{T=+20} AR_t$$

where CAR is the cumulative abnormal return over the T days in the event window (over all times *t*). Cumulative abnormal return is the sum of the differences between the expected return on a stock and the actual return. It is commonly used to evaluate the impact of events or news on a stock price which is why it was used here. Cumulative abnormal returns are also examined to determine if any rumors regarding the rankings were released before the event date.

Using the cumulative abnormal returns, the cumulative average abnormal returns were calculated:

$$CAAR_T = \frac{\sum CAR_{jt}}{N},$$

Where $CAAR_T$ is the sum of the average abnormal returns over T days in the event window (day -20 to +20).

Finally, T-tests and non-parametric tests were used to determine the significance of the average abnormal return.

RESULTS

In examining the results, the period from day -20 to day +20 is examined. This period assumes the event date as Monday, September 23, 2013 which was the release date of the Carbon Disclosure Project S&P 500 Climate Change Report at the New York Stock Exchange. In this section, a smaller window of results is examined to view the market movements directly surrounding the event date. This period is day -1 to day +2.

It can be observed that the average abnormal returns did not have any significant movement on the day of the event study. On day 0 the stock market reaction was positive, but not significantly different from 0. For the top 30, on days -1, 0, +1 and +2 the average abnormal

returns were: 0.0003978, 0.0000595, 0.002777 and 0.001701 respectively. The average abnormal returns remained positive until day 6 when negative average abnormal returns occurred. This can be interpreted as the market reacting favorably to the release, then correcting itself on day +6.

However, there were also positive average abnormal returns for the bottom 30 companies during this period. For the bottom 30 companies on days -1, 0, +1, and +2 the average abnormal returns were: -0.003136, 0.00087, 0.003678, and 0.001347 respectively. By day +3, a negative average abnormal return was recorded. A graphical representation of the average abnormal returns can be viewed in Figure 7 and a table displaying the average abnormal returns as well as the standard deviation, t-stat and p-value can be found in Figure 8.

Cumulative average abnormal returns for companies in both the top and bottom 30 seemed to increase on the day of the event study. These movements can be viewed in graphical form in Figure 9. On day -1 the cumulative average abnormal returns for the top 30 companies was 0.0104252 and it increased to 0.012124477 on day 0. By day +1 it was 0.14901703 and on day +2 it had increased to 0.016603077. The cumulative average abnormal returns continued to increase to a maximum of 0.023220311 on day +20.

As for the bottom 30 companies, the cumulative average abnormal returns were 0.0005503 on day -1, increased on 0.005137331 on day 0, and continued an upward trend on days +1 and +2 where the values were 0.008938234 and 0.010329812 respectively. The maximum cumulative average abnormal returns documented for the bottom 30 companies occurred on day +20 and was 0.018130781.

It appears that the cumulative average abnormal returns for the top 30 companies seem to follow the same general trend as for the bottom 30 companies, yet they are slightly higher. However, upon closer inspection there is a significant jump in cumulative average abnormal returns as well as in abnormal returns. In examining the data, the culprit is found to be day minus 10. On this day, Molex had abnormal returns of about 0.3 which impacted the entire

sample. On this day, September 9, 2013, Molex announced that they would be acquired by Koch Industries for $7.2 billion dollars. This has been identified as the probable reason for this spike. For that reason, cumulative average abnormal returns were calculated for a smaller window of day -6 to day +6 surrounding the event, which resulted in a more accurate depiction of cumulative abnormal returns movement (Figure 11).

A one-tailed t-test was used to determine if there was any statistical significance. Based on this test, it was found that there was no statistical significance. The statistics for these tests can be found in Figure 10.

DISCUSSION

By looking at the average returns for both the top 30 and bottom 30 companies, it appears that both groups moved in a similar direction (see Figure 12). This suggests that their returns were similar to the overall market movements since the two trend lines are so similar.

The first hypothesis postulated that companies with the highest percentage change in score from 2012 to 2013 will have positive and significant share price returns. We cannot accept this hypothesis. Though these companies did see positive abnormal returns, no statistical significance was proven, which means that these movements could be due to chance. Statistical significance is necessary to prove the hypothesis.

The second hypothesis speculated that companies with the lowest percentage change in score from 2012 to 2013 will have negative and significant share price returns. This hypothesis cannot be accepted because the bottom 30 companies did not see a decrease in share price. In fact, the abnormal returns of the bottom 30 companies increased in the days surrounding the event date. We did not expect to see any positive significance for excess returns for the bottom 30 companies, however we did find that excess return on day +1 is statistically significant and positive. On the other hand, positive statistically significant excess returns were only found for this one day, which economically is a very small number, 0.0038009

which is less than 5%. Only 20 of the 30 companies experienced positive excess returns on this day, but we do not believe that it is strong enough to conclude that the market perceives this as a positive event.

The final hypothesis stated that there would be a positive return difference between the companies with the highest and lowest percentage changes in score. This hypothesis is also rejected. Though we did find there to be a positive return difference, the difference was not found to be statistically significant.

We have speculated some possible explanations for these results. It is possible that the reason for the positive excess returns in the bottom companies is the result of their capital allocation decisions. The goal of a corporation is to increase shareholder wealth, so it is possible that companies who are spending money on environmentally responsible projects could be using this capital to increase shareholder wealth. Additionally, it is possible that investors do not respond to percentage change in score, rather they would be more likely to respond to the raw score. For example, a company whose score rises from 7 to 54 has made huge progress in the course of one year. A company that declined from 98 to 90 has performed less favorably from one year to the next, yet their raw score is still higher than that of the company making progress. Finally, due to the use of rankings for only 2012 and 2013, it is possible that the results would be different over the course of more time.

This study adds to the body of literature on corporate social responsibility specifically regarding the CDP S&P 500 Climate Change Report rankings. Prior to this study, no similar study had been conducted using the CDP rankings. Therefore, though no significance was determined the study provided new work in this area.

CONCLUSIONS

This study was an event study examining companies with the highest and lowest percentage change in CDP S&P 500 Climate Change Report Score from 2012 to 2013. Though it was

hypothesized that investors would respond favorably to those companies making positive changes and negatively to companies acting on the contrary, it was determined that there was no statistical significance to prove this theory. The CDP S&P 500 Climate Change Report is an annual report which ranks companies based on their disclosure and performance in regards to carbon emissions.

Though no statistical significance was found to prove the hypotheses, this is not contrary to other similar studies. For example, Curran and Moran's study of the FTSE4Good Index had similar results. This does not mean, however, that corporate social responsibility is not important. For example, companies who are listed on the leader board for the CDP report can use this as positive advertising which could result in positive consumer responses.

In the future, more years could be added to increase the robustness and test the time specificity of the results. By only looking at the change from 2012 to 2013, the results could have been based on time specificity. Additionally, if more years were added and the sample was more robust, some statistical significance might be found.

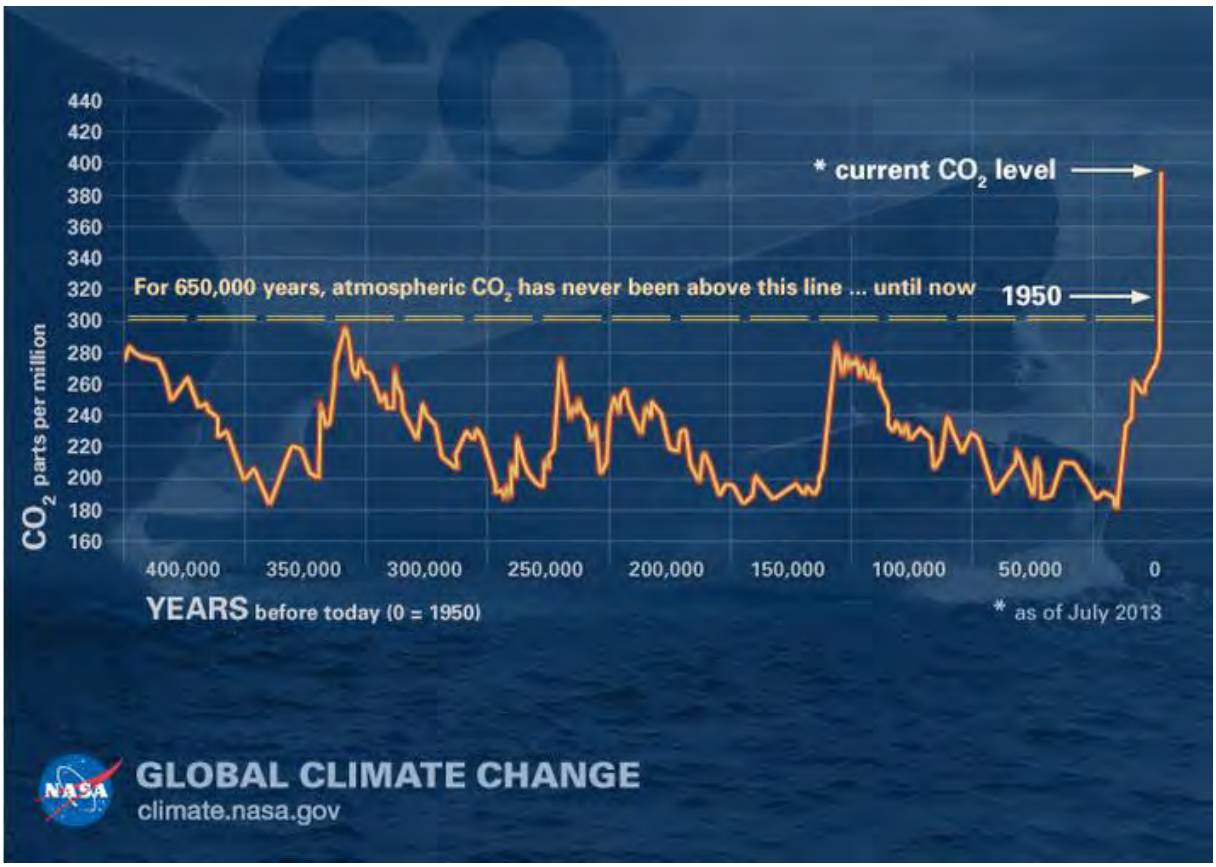
It would also be interesting to conduct a similar study based on the highest and lowest companies by ranking. This study focused on percentage change. However, it is possible that the desired results were not achieved because investors do not focus on percentage change in score, rather they simply consider the raw score. It would be interesting to test the theory that there is a positive relationship between CDP S&P 500 Climate Change Report raw score and stock price for an individual year.

Another possible study could be to conduct a similar event study for those companies who have gained or lost entrance to the Climate Disclosure Leadership Index and the Climate Performance Leadership Index. These indices serve as a sort of leader board for the report so it would be interesting to study whether or not investors respond to these indices.

APPENDIX

Appendix A

Figure 1- The Relentless Rise of Carbon Dioxide



This graph provides evidence that atmospheric CO_2 has increased since the Industrial Revolution. It is based on the comparison of atmospheric samples contained in ice cores and more recent direct measurements, (Credit: Vostok ice core data/J.R. Petit et al.; NOAA Mauna Loa CO2 record.)

Figure 2- Top 30 Companies by Industry

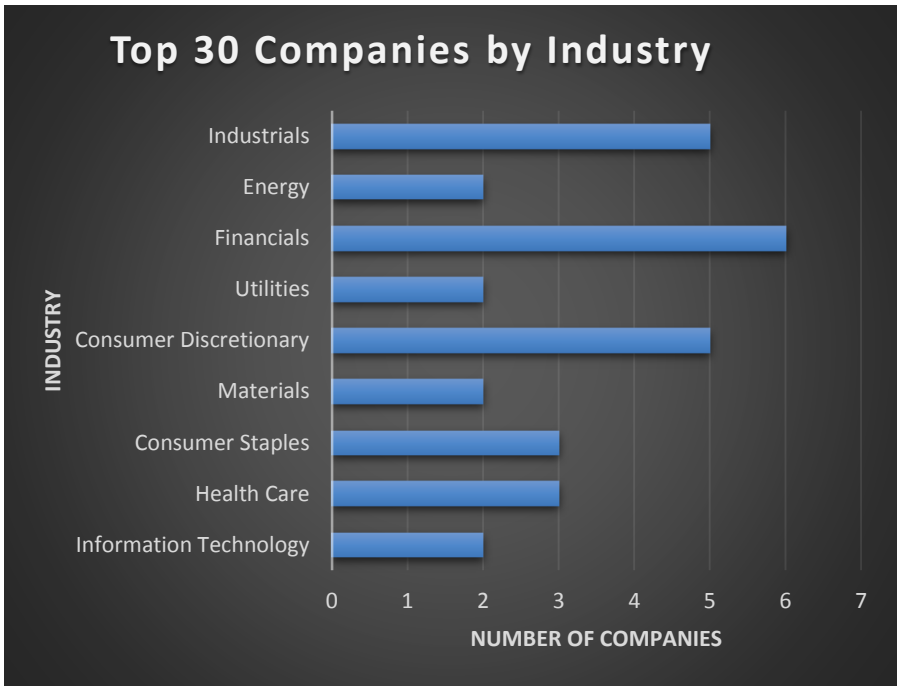


Figure 3- Bottom 30 Companies by Industry

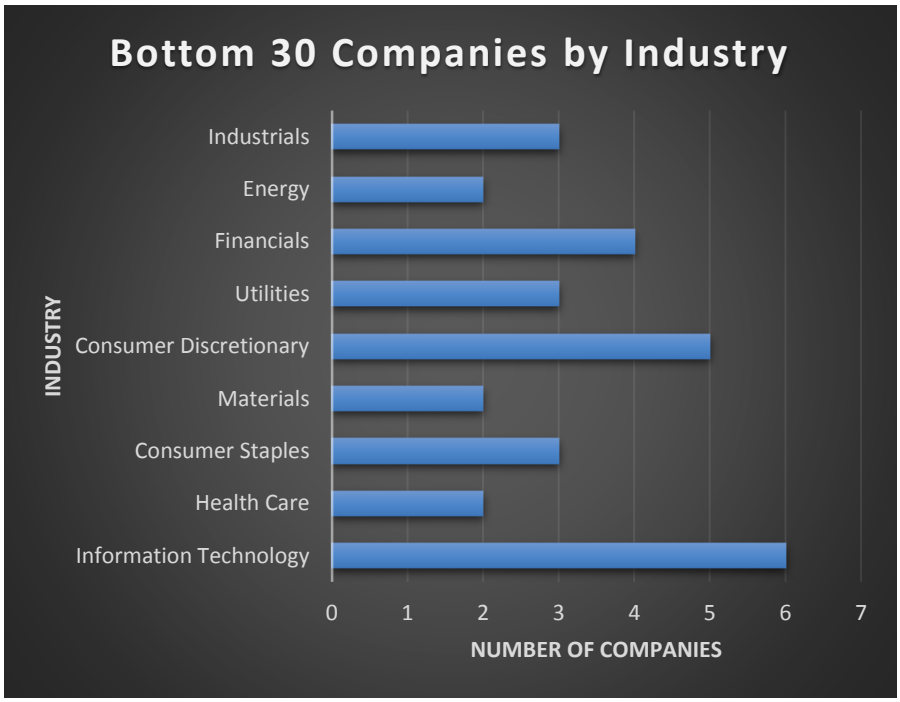


Figure 4-Percentage Change Distribution of Top 30 Companies

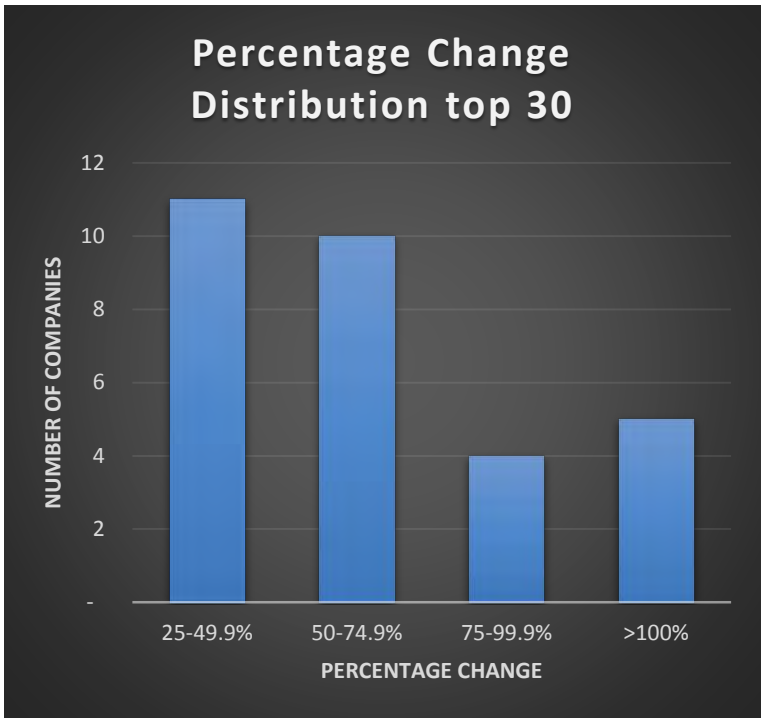


Figure 5- Percentage Change Distribution of Bottom 30 Companies

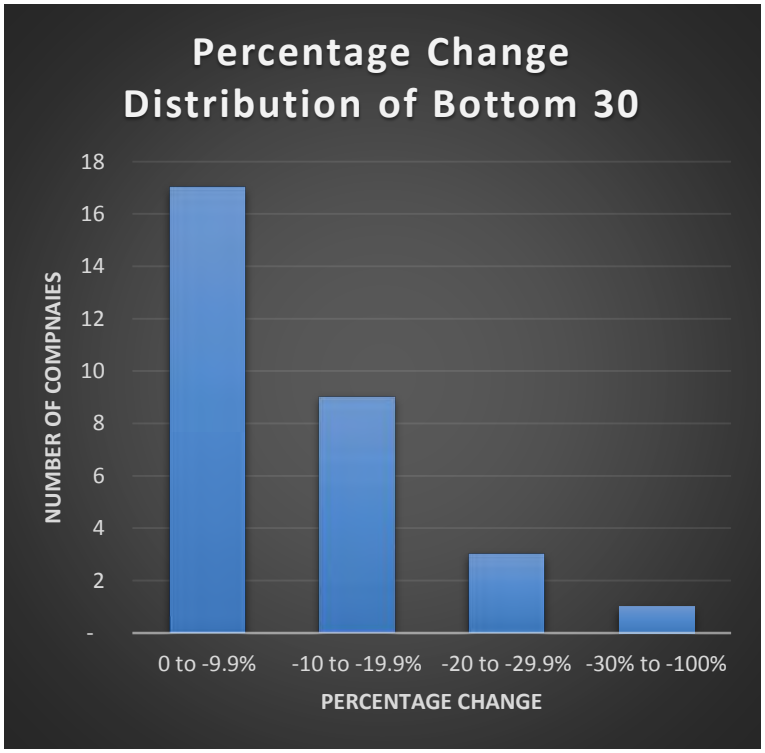


Figure 6- Data for 60 Companies Included in Study

Company	Industry	2013 Disclosure Score	2012 Disclosure Score	% Change 2012-13
Fluor Corporation	Industrials	48	7	585.71%
American International Group, Inc.	Financials	62	14	342.86%
Honeywell International Inc.	Industrials	74	22	236.36%
Viacom Inc.	Consumer Discretionary	60	21	185.71%
CenterPoint Energy, Inc.	Utilities	51	23	121.74%
Cliffs Natural Resources, Inc.	Materials	72	37	94.59%
Big Lots, Inc.	Consumer Discretionary	28	15	86.67%
The AES Corporation	Utilities	66	37	78.38%
Monsanto Company	Materials	70	40	75.00%
Kimco Realty	Financials	83	48	72.92%
Southwest Airlines	Industrials	93	54	72.22%
CONSOL Energy Inc.	Energy	78	46	69.57%
Avon Products, Inc.	Consumer Staples	86	52	65.38%
Mead Johnson Nutrition Company	Consumer Staples	85	53	60.38%
Xylem Inc.	Industrials	72	46	56.52%
Yahoo! Inc.	Information Technology	91	59	54.24%
CBRE Group, Inc.	Financials	98	64	53.13%
Gannet Co., Inc.	Consumer Discretionary	27	18	50.00%
H&R Block Inc.	Consumer Discretionary	27	18	50.00%
UnitedHealth Group Inc.	Health Care	98	66	48.48%
Celgene Corporation	Health Care	80	54	48.15%
Walt Disney Company	Consumer Discretionary	78	53	47.17%
Dr Pepper Snapple Group Inc.	Consumer Staples	88	60	46.67%
Avery Dennison Corporation	Industrials	85	59	44.07%
BlackRock	Financials	79	55	43.64%
Molex Inc.	Information Technology	81	59	37.29%

Covidien Ltd.	Health Care	70	51	37.25%
Baker Hughes Inc.	Energy	90	66	36.36%
Northern Trust	Financials	94	69	36.23%
Prudential Financial, Inc.	Financials	63	47	34.04%
Total System Services (TSYS)	Information Technology	19	20	-5.00%
QUALCOMM Inc.	Information Technology	56	59	-5.08%
Cardinal Health Inc.	Health Care	71	75	-5.33%
Clorox Company	Consumer Staples	82	87	-5.75%
Cognizant Technology Solutions Corp.	Information Technology	64	68	-5.88%
The Coca-Cola Company	Consumer Staples	90	96	-6.25%
PPG Industries, Inc.	Materials	60	64	-6.25%
Mortorola Solutions	Information Technology	74	79	-6.33%
Whirlpool Corporation	Consumer Discretionary	53	57	-7.02%
Northeast Utilities	Utilities	79	85	-7.06%
The Travelers Companies, Inc.	Financials	63	68	-7.35%
Darden Restaurants, Inc.	Consumer Discretionary	74	80	-7.50%
Wyndham Worldwide Corporation	Consumer Discretionary	84	91	-7.69%
Procter & Gamble Company	Consumer Staples	47	51	-7.84%
SanDisk Corporation	Information Technology	82	90	-8.89%
Halliburton Company	Energy	65	72	-9.72%
Schlumberger Ltd.	Energy	83	92	-9.78%
Pall Corporation	Industrials	61	68	-10.29%
The Chubb Corporation	Financials	52	58	-10.34%
American Electric Power Company, Inc.	Utilities	68	76	-10.53%
Xilinx Inc.	Information Technology	46	53	-13.21%
Sealed Air Corp.	Materials	59	69	-14.49%
Moody's Corporation	Financials	21	25	-16.00%
WellPoint, Inc.	Health Care	57	69	-17.39%
Integrys Energy Group, Inc.	Utilities	32	39	-17.95%

Leggett & Platt, Inc.	Consumer Discretionary	22	27	-18.52%
Invesco Ltd.	Financials	65	82	-20.73%
Danaher Corporation	Industrials	12	16	-25.00%
CBS Corp.	Consumer Discretionary	24	33	-27.27%
Robert Half International Inc.	Industrials	4	9	-55.56%
H.J. Heinz Company*	Consumer Staples	27	89	-69.66%

*Acquired by Berkshire Hathaway and 3G Capital in 2013. As a result of the lack of complete stock information, they were not included in this study.

Figure 7- Average Abnormal Returns

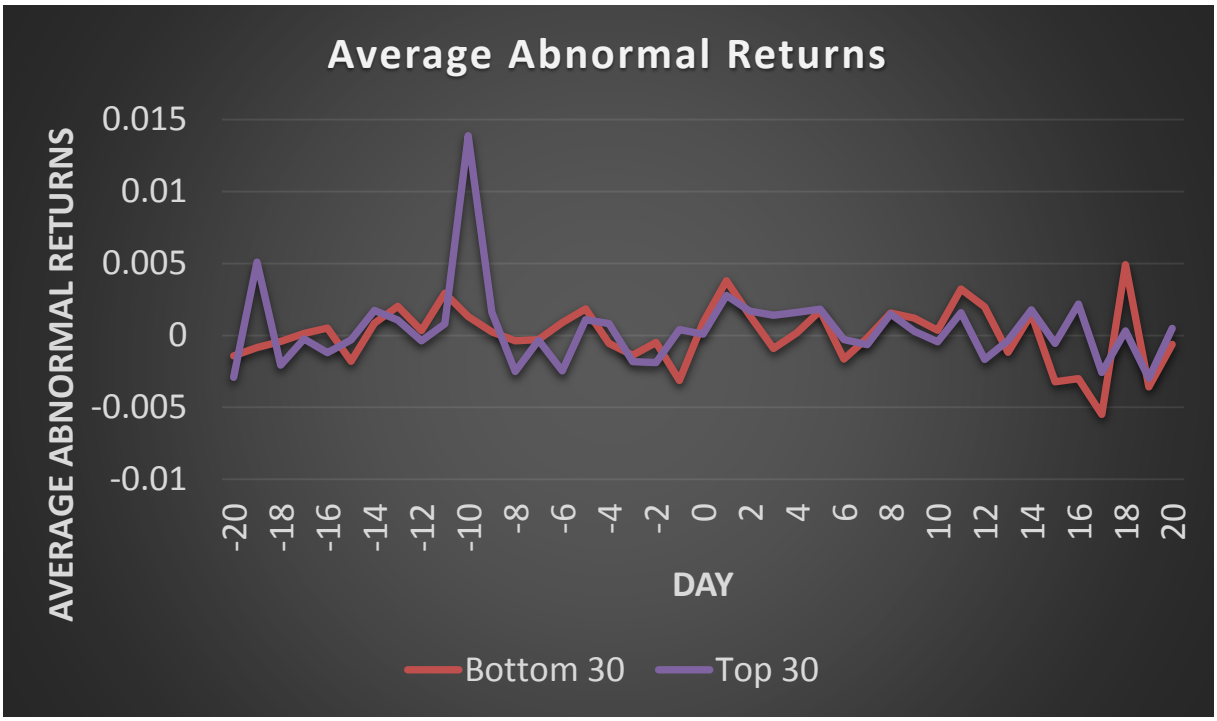


Figure 8- Average Abnormal Returns Data

	Average Abnormal Returns Data Top 30				Average Abnormal Returns Data Bottom 30			
Date	Average	Standard Deviation	T-stat	P-Value	Average	Standard Deviation	T-stat	P-Value
3-Sep-2013	0.00174	0.01144	0.15238	0.99095	0.00083	0.01211	0.06816	0.99042
4-Sep-2013	0.00108	0.00857	0.12558	0.99322	0.00196	0.00834	0.23456	0.99340
5-Sep-2013	-0.00037	0.01098	-0.03371	0.99131	0.00032	0.00891	0.03567	0.99295
6-Sep-2013	0.00080	0.00920	0.08662	0.99272	0.00284	0.00887	0.31990	0.99298
9-Sep-2013	0.01389	0.05656	0.24551	0.95528	0.00127	0.00879	0.14472	0.99305
10-Sep-2013	0.00160	0.01087	0.14692	0.99141	0.00025	0.00578	0.04252	0.99543
11-Sep-2013	-0.00251	0.00975	-0.25704	0.99229	-0.00037	0.01110	-0.03314	0.99122
12-Sep-2013	-0.00033	0.01252	-0.02672	0.99009	-0.00027	0.00726	-0.03691	0.99426
13-Sep-2013	-0.00246	0.00938	-0.26186	0.99258	0.00085	0.00572	0.14908	0.99548
16-Sep-2013	0.00110	0.00858	0.12827	0.99321	0.00179	0.00705	0.25394	0.99442
17-Sep-2013	0.00082	0.00944	0.08729	0.99254	-0.00054	0.00857	-0.06252	0.99322
18-Sep-2013	-0.00183	0.01511	-0.12080	0.98805	-0.00133	0.01639	-0.08086	0.98704
19-Sep-2013	-0.00189	0.01290	-0.14676	0.98979	-0.00047	0.00801	-0.05809	0.99366
20-Sep-2013	0.00040	0.00914	0.04354	0.99277	-0.00304	0.01453	-0.20893	0.98851
23-Sep-2013	0.00009	0.00870	0.01029	0.99312	0.00087	0.01237	0.07029	0.99021
24-Sep-2013	0.00278	0.00994	0.27928	0.99213	0.00368	0.00795	0.46257	0.99371
25-Sep-2013	0.00170	0.01101	0.15454	0.99129	0.00135	0.00695	0.19364	0.99450
26-Sep-2013	0.00141	0.01192	0.11834	0.99057	-0.00087	0.00548	-0.15901	0.99567
27-Sep-2013	0.00161	0.01101	0.14648	0.99129	0.00017	0.00520	0.03249	0.99588
30-Sep-2013	0.00183	0.00698	0.26236	0.99448	0.00167	0.00611	0.27339	0.99517
1-Oct-2013	-0.00028	0.01074	-0.02617	0.99150	-0.00160	0.00854	-0.18728	0.99324
2-Oct-2013	-0.00065	0.01088	-0.05976	0.99140	-0.00017	0.00834	-0.02073	0.99340
3-Oct-2013	0.00150	0.01058	0.14210	0.99163	0.00150	0.00588	0.25540	0.99535
4-Oct-2013	0.00029	0.01117	0.02585	0.99116	0.00116	0.00753	0.15450	0.99404
7-Oct-2013	-0.00044	0.00871	-0.05063	0.99311	0.00034	0.00561	0.06014	0.99556
8-Oct-2013	0.00158	0.00949	0.16624	0.99249	0.00313	0.01113	0.28142	0.99120
9-Oct-2013	-0.00166	0.00940	-0.17641	0.99256	0.00191	0.01506	0.12674	0.98809
10-Oct-2013	-0.00036	0.01032	-0.03474	0.99183	-0.00113	0.00814	-0.13876	0.99356
11-Oct-2013	0.00178	0.01006	0.17731	0.99204	0.00144	0.01031	0.13972	0.99185

Figure 9-Cumulative Average Abnormal Returns

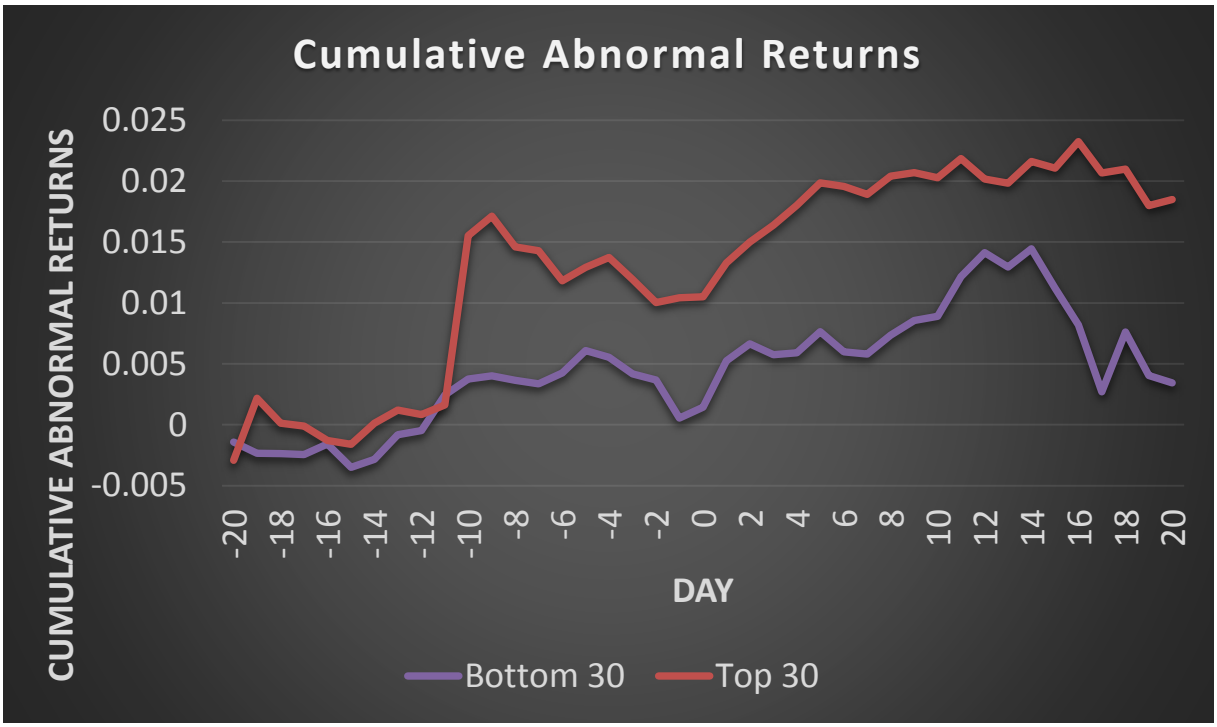


Figure 10- Cumulative Average Abnormal Returns Data

	Cumulative Abnormal Returns Data Top 30				Cumulative Abnormal Returns Data Bottom 30			
Date	Average	Standard Deviation	T-stat	P-Value	Average	Standard Deviation	T-stat	P-Value
3-Sep-2013	0.00174	0.01144	0.15238	0.99095	0.00085	0.01232	0.06925	0.99025
4-Sep-2013	0.00282	0.01549	0.18198	0.98775	0.00288	0.01607	0.17898	0.98729
5-Sep-2013	0.00245	0.02238	0.10943	0.98230	0.00320	0.01950	0.16427	0.98457
6-Sep-2013	0.00325	0.02270	0.14300	0.98204	0.00614	0.02016	0.30446	0.98406
9-Sep-2013	0.01713	0.06270	0.27326	0.95044	0.00745	0.02150	0.34661	0.98300
10-Sep-2013	0.01873	0.06232	0.30056	0.95074	0.00771	0.02297	0.33549	0.98183
11-Sep-2013	0.01622	0.06304	0.25736	0.95017	0.00733	0.02587	0.28315	0.97954
12-Sep-2013	0.01589	0.06086	0.26110	0.95189	0.00705	0.02690	0.26206	0.97873
13-Sep-2013	0.01343	0.05981	0.22457	0.95272	0.00793	0.02591	0.30604	0.97951
16-Sep-2013	0.01453	0.05901	0.24630	0.95335	0.00978	0.02621	0.37314	0.97927
17-Sep-2013	0.01536	0.05866	0.26177	0.95362	0.00923	0.02842	0.32458	0.97752
18-Sep-2013	0.01353	0.05978	0.22635	0.95274	0.00786	0.03187	0.24651	0.97479
19-Sep-2013	0.01164	0.06184	0.18819	0.95112	0.00738	0.03526	0.20917	0.97211
20-Sep-2013	0.01204	0.06301	0.19100	0.95019	0.00424	0.03880	0.10925	0.96932
23-Sep-2013	0.01212	0.06369	0.19038	0.94966	0.00514	0.04309	0.11921	0.96592
24-Sep-2013	0.01490	0.06539	0.22789	0.94831	0.00894	0.04245	0.21057	0.96643
25-Sep-2013	0.01660	0.06671	0.24889	0.94727	0.01033	0.04569	0.22608	0.96387
26-Sep-2013	0.01801	0.07043	0.25578	0.94434	0.00943	0.04291	0.21978	0.96607
27-Sep-2013	0.01963	0.07070	0.27760	0.94412	0.00960	0.04432	0.21671	0.96495
30-Sep-2013	0.02146	0.07108	0.30186	0.94382	0.01133	0.04620	0.24524	0.96347
1-Oct-2013	0.02118	0.07164	0.29559	0.94338	0.00968	0.04508	0.21467	0.96435
2-Oct-2013	0.02053	0.07328	0.28010	0.94209	0.00950	0.04602	0.20640	0.96361
3-Oct-2013	0.02203	0.07605	0.28967	0.93990	0.01105	0.04715	0.23438	0.96271
4-Oct-2013	0.02232	0.07846	0.28443	0.93800	0.01225	0.05020	0.24410	0.96031
7-Oct-2013	0.02188	0.07810	0.28011	0.93828	0.01260	0.05149	0.24474	0.95929
8-Oct-2013	0.02345	0.07841	0.29910	0.93804	0.01584	0.04533	0.34938	0.96415
9-Oct-2013	0.02180	0.07877	0.27670	0.93776	0.01781	0.04744	0.37547	0.96249
10-Oct-2013	0.02144	0.07678	0.27919	0.93932	0.01664	0.04689	0.35493	0.96292
11-Oct-2013	0.02322	0.07997	0.29037	0.93681	0.01813	0.05143	0.35252	0.95933

Figure 11: Cumulative Average Abnormal Returns Day -6 to +6

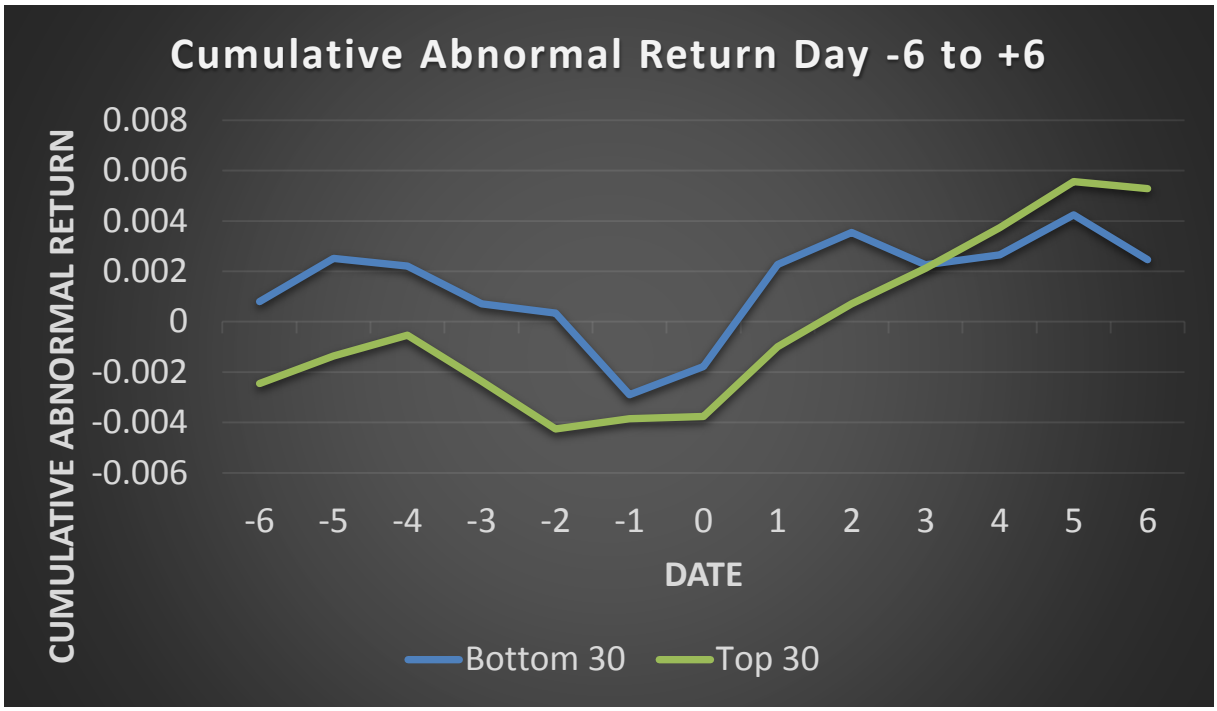


Figure 12- Average Returns

	Cumulative Abnormal Returns Data Top 30				Cumulative Abnormal Returns Data Bottom 30		
Date	Average	Standard Deviation	T-stat	P-Value	Average	Standard Deviation	T-stat
3-Sep-2013	0.00174	0.01144	0.15238	0.99095	0.00085	0.01232	0.06925
4-Sep-2013	0.00282	0.01549	0.18198	0.98775	0.00288	0.01607	0.17898
5-Sep-2013	0.00245	0.02238	0.10943	0.98230	0.00320	0.01950	0.16427
6-Sep-2013	0.00325	0.02270	0.14300	0.98204	0.00614	0.02016	0.30446
9-Sep-2013	0.01713	0.06270	0.27326	0.95044	0.00745	0.02150	0.34661
10-Sep-2013	0.01873	0.06232	0.30056	0.95074	0.00771	0.02297	0.33549
11-Sep-2013	0.01622	0.06304	0.25736	0.95017	0.00733	0.02587	0.28315
12-Sep-2013	0.01589	0.06086	0.26110	0.95189	0.00705	0.02690	0.26206
13-Sep-2013	0.01343	0.05981	0.22457	0.95272	0.00793	0.02591	0.30604
16-Sep-2013	0.01453	0.05901	0.24630	0.95335	0.00978	0.02621	0.37314
17-Sep-2013	0.01536	0.05866	0.26177	0.95362	0.00923	0.02842	0.32458
18-Sep-2013	0.01353	0.05978	0.22635	0.95274	0.00786	0.03187	0.24651
19-Sep-2013	0.01164	0.06184	0.18819	0.95112	0.00738	0.03526	0.20917
20-Sep-2013	0.01204	0.06301	0.19100	0.95019	0.00424	0.03880	0.10925
23-Sep-2013	0.01212	0.06369	0.19038	0.94966	0.00514	0.04309	0.11921
24-Sep-2013	0.01490	0.06539	0.22789	0.94831	0.00894	0.04245	0.21057
25-Sep-2013	0.01660	0.06671	0.24889	0.94727	0.01033	0.04569	0.22608
26-Sep-2013	0.01801	0.07043	0.25578	0.94434	0.00943	0.04291	0.21978
27-Sep-2013	0.01963	0.07070	0.27760	0.94412	0.00960	0.04432	0.21671
30-Sep-2013	0.02146	0.07108	0.30186	0.94382	0.01133	0.04620	0.24524
1-Oct-2013	0.02118	0.07164	0.29559	0.94338	0.00968	0.04508	0.21467
2-Oct-2013	0.02053	0.07328	0.28010	0.94209	0.00950	0.04602	0.20640
3-Oct-2013	0.02203	0.07605	0.28967	0.93990	0.01105	0.04715	0.23438
4-Oct-2013	0.02232	0.07846	0.28443	0.93800	0.01225	0.05020	0.24410

7-Oct-2013	0.02188	0.07810	0.28011	0.93828	0.01260	0.05149	0.24474
8-Oct-2013	0.02345	0.07841	0.29910	0.93804	0.01584	0.04533	0.34938
9-Oct-2013	0.02180	0.07877	0.27670	0.93776	0.01781	0.04744	0.37547
10-Oct-2013	0.02144	0.07678	0.27919	0.93932	0.01664	0.04689	0.35493
11-Oct-2013	0.02322	0.07997	0.29037	0.93681	0.01813	0.05143	0.35252

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