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Stock price reactions to Environmental CSR

An Event Study On Environmental News

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ABSTRACT

This paper examines the shareholder's reactions to environmental news. The study was based on publicly traded companies within Europe with news events ranging from 2000 to 2017. An event study was performed to measure the effect of eco-friendly and eco-harmful events on the stock prices. The sample consists of 98 eco-harmful events and 99 eco-friendly events. This paper finds that there is a significant price decrease following eco-harmful events and a significant increase following eco-friendly events. Furthermore, stock prices react stronger to eco-harmful news then to eco-friendly news. It was also concluded that the reactions to eco-harmful news are increasing throughout time, while the reactions to eco-friendly news are decreasing.

This thesis

Keywords: Sustainability, corporate social responsibility, event study, CSR, stock prices

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Part I: Introduction

In the past week the Business Roundtable[1], a group of 181 of the top CEOs in the USA including J.P Morgan, Boeing, Apple, & Amazon, declared that their companies' purpose is to serve more than just their shareholders and reaffirmed their commitment to their stakeholders. They promised to deliver value to customers, invest in their employees, serve as good partners to other businesses, support the communities in which they work and to protect the environment. This type of commitment to Corporate Social Responsibility (CSR), however, has not always existed. At first, it was believed that a firm's only responsibility was to provide the maximum financial return to its shareholders. But as time progressed it became clear that corporations have a lot more stakeholders other than its shareholders. Especially large corporations have a great deal of influence on their surroundings and they should become more aware of how they affect others. This led to corporations being pressured by both the law and community to run their businesses in a more ethical and moral manner that is better for the community as a whole (Carroll, 1991). This is how the "social" part of CSR started to become increasingly important, and with the help of the media it is now easier than ever to hold firms accountable for their actions. The Commission of the European Communities defines CSR as a concept whereby companies go beyond legal requirements and integrate social and environmental concerns in their business operations. While social practices concern human capital and safety, environmental relates to natural resource management and decreasing pollution when producing (The European Commission, 2001).

In the last decade there has been a surge in popularity and the importance of the sustainability of our planet's resources. This includes using clean energy and fighting against climate change and pollution of the land and seas. The Global Reporting Initiative (GRI) was founded in 1997, this is an independent international organization based in Amsterdam that pioneered in sustainability reporting and is now working together with the United Nations to advance guidelines to corporate responsibility and transparency. GRI has announced that their reports are being produced by over 100 countries and that 93% of the world's largest 250 corporations report their sustainability performance (Blasco & King, 2017). Despite this growing effort into making a more sustainable future not everyone shares this value. To deal with the societal pressure to run their business in a certain manner some businesses have taken to false sustainability reporting by hiding their negative environmental impact or by even placing misrepresenting information in their

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[1] The Business Roundtable is a non-profit association, whose members are the CEOs of many of the USA's largest companies.

sustainability report (Ballou & Heitger, 2005). But what happens when stockholders actually find out the truth about firms' environmental practices?

The aim of this paper is to research how shareholders react to the issuance of firm specific environmental sustainability news for European publicly-traded companies. The shareholders reaction will be measured by the change in stock prices due to the announcement of an ecological occurrence.

A similar research has been done a couple of years ago for publicly traded firms within the USA (Flammer, 2013). This paper will also compare the results of this study with the one done in the US to see if they yield similar results since CSR awareness and shareholder behavior may differ across time and countries. According to Tschopp (2005), there are concerns from conservatives in the US that over-regulation can harm financial markets and that voluntary disclosure is the best option. The US refuses to take part in international agreements because it sees this as unfair to its markets unless it is implemented worldwide. Even though both the US and the European Commission rejected the idea of mandatory CSR reporting a clear difference can be seen in **TABLE 1** between US and EU CSR reporting.

Table 1: CSR reporting USA and EU

CSR standards	USA	EU
SA8000	1%	23%
GRI	20%	55%
ISO 14001	5%	43%

3 internationally accepted CSR reporting standards.
Each standard reports the percentage of its users that is based the USA and the EU.
(Tschopp, 2005)

Some of the EU countries decided to take matters regarding CSR reporting into their own hands. France has become the first country in the world to adopt mandatory CSR reports for publicly traded firms and Spain is passing legislation that would require socially responsibility investment disclosure. Italy, Germany, Sweden and the UK are other European countries with a high CSR reporting rate (Tschopp, 2005). While the USA on the other hand left both 1997 Kyoto treaty and the 2015 Paris accord in favor of its financial market.

In Part II of this paper the theoretical framework that this research is based upon will be discussed. First a broad definition of CSR will be given and discussed then the different papers on how it relates to performance will be explored. Hereafter this paper will go over some behavior characteristics of shareholders and how these may be changing. Part III will show the methodology used for the event study and how the data was acquired and transformed. The results will be shown in Part IV and finally the conclusion and discussion in Part V.

Part II: Literature review

Defining Corporate Social Responsibility

The concept CSR can be traced back at least until the 1930's with Chester Barnard's "*The Functions of the* Executive" (Barnard, 1938) being one of the first. In the beginning CSR was referred to as just Social Responsibility (SR) leaving the "corporate" part separate. This may have been on the ground that it was before dawn of the corporate dominance era. However formal writing on social responsibility first started becoming popular in in United States around the 1950's (Carrol, 1999). In fact the beginning of the modern age of CSR started with the publication of *"Social Responsibilities of the Businessman"* by Bowen (1953). In this book Bowen stated that corporations are vital pillars in the community with enormous power and that their actions impact the lives of many people. From this belief he derived that large businesses should have some social responsibility. In This paper he gave the first notion of what SR should be: "It (SR) refers to the obligations of businessmen to pursue those policies, to make those decisions, or to follow those lines of action which are desirable in terms of the objectives and values of our society".

Soon hereafter Europe and Asia started to get in on this new phenomenon. Europe especially seemed to be fascinated with this new trend and has done considerably large amount of research and formal writing on this subject (Carroll, 2009). CSR became a global phenomenon even though there are many variations due to differences in culture and law in which the company resides. According to the Organization for Economic Co-operation and Development (2001) there are potentially numerous benefits to CSR initiatives as they lower the risk of criminal prosecutions and damage to reputations, boost employee morale and manage relations with others in the society they operate.

According to van Marrewijk (2003) there are 3 approaches when it comes to CSR. The first is the *shareholder approach* which states that a company's SR is simply to increase profits. The second is the *stakeholder approach* in which the company is not only beholden to its owners but also to the stakeholders that can be affected by its operations. Lastly there is *societal approach,* the broad view, which defines CSR as a company's responsibility to society as a whole. This last definition clearly sheds a light on the continuous evolution of CSR. It is an entirely new and philanthropic position on the responsibilities that are expected from companies. This goes to show that as companies become bigger and more powerful more is expected from them regarding the responsibilities towards society.

After the introduction of the societal approach it was only a matter of time for Corporate Sustainability to become a trending topic. A popular definition of Corporate Sustainability is "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland Commission, 1987). There are 3 reasons why a company would adopt sustainability into their business plans (van Marrewijk, 2003). The first being that they are internally motivated to adopt CSR policies. This can mean that they are socially conscious of their power and impact on the natural environment, and that they have a certain philanthropic view on their responsibilities. The second is that companies might feel forced through societal pressure to adopting CSR policies. This can be attributed to the increased societal pressure from stakeholders in these last few decades and especially Non-Governmental Organizations that have been building up power influencing corporations and politics toward a more responsible and sustainable path. The third reason is simply because they are (legally) forced to do so. As society is growing more concerned about the natural environment more laws and regulations are passed to protect it.

For the purposes of this paper the CSR definition provided by the The European Commission (2001) will be used which is a concept whereby companies goes beyond legal requirements and integrate social and environmental concerns in their business operations. This definition corresponds with the *societal approach* to CSR.

Corporate Social Responsibility on performance

As previously mentioned, CSR is a relatively new concept in the business world. Since more and more companies are being pressured into adopting social responsibilities into their business plan it became an important new subject to research. Many papers have taken on trying to gain an understanding of what the actual effect of CSR is on the performance of the companies.

A notable paper on this subject is that of Porter & van der Linde (1995). In this paper they start of by debunking the theory that companies have already reached their cost-minimizing point and that pushing an environmental agenda will lead to an increase in cost. This theory assumes that there is a tradeoff between social benefits and private costs, but the problem with this theory is that it is a static model that expects no further technological developments and assumes that product and customer needs are all fixed. Competition within an industry can appear either by producing at lower cost than rivals or by offering products with superior value. According to this paper competitiveness has been changing in the last couple of decades to focus more on creating superior value. Competitiveness is now based on constant innovation to keep up with the changing demands of the public. In this view the implementation of environmental CSR can simply be seen as a new area on which to compete. Companies try to create superior value and hereby gain a competitive advantage by supporting the social interest of their stakeholders

Therefore competitive advantage lies in the ability to innovate and improve within certain constraints. Such constraints in the environmental area can even lead to innovation that partially or fully cover the cost of complying. Porter & van der Linde (1995) further explain that regulation will help promote innovation as the real world does not follow the *Panglossian model*[2] that claims that firms always make the best decisions. This model is in fact only applicable when information is perfect, and all profitable opportunities have already been discovered. Therefore, in this new era where society's value towards the environment is increasing and firms are uncertain whether innovation in this area will yield more profitable results, they often refrain from taking this risk and do not realize their potential gains. The paper follows up by saying that society is currently in a transitional phase of industrial history where companies still lack the experience of dealing with environmental issues creatively. To demonstrate their point of unrealized gains as a result of not innovating enough they gave an example of the "Green Lights" project. In this program firms volunteered to sell and examine every aspect of electrical energy consumption on some energy saving upgrades and in return they receive advice on efficient lighting, heating and cooling

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[2] Panglossian model: the present moment is the optimum state, and everything will work out in ways not to be fully comprehended. A philosophical optimism based on the ideas of Gottfried Wilhelm Leibniz

operations from the Environmental Protection Agency (EPA). When the EPA examined the data received it showed that nearly 80% had payback in 2 years or less. It was only after these results came out that these companies knew to carry out these profitable projects. DeCanio (1994) stated that the reasons why companies may not be investing in environmental innovations are behavior and not technical. These being that companies are mistakenly focusing on short rather than long term profit as managerial compensation is based on short term performance and it requires high internal hurdles for relatively small cost cutting projects.

In their paper ´ Does It Pay to Be Green? A Systematic Overview"Ambec & Lanoie (2008) expand on the theory of Porter & van Linde (1995) and suggest that ever since the Brundtland Report (1987) got published people have been growing increasingly concerned about sustainable development The normal business practices of the past are now seen as not good enough. Research into global warming, acid rain and holes in the ozone layer are increasing the public concern for sustainability. According to Ambec & Lanoie (2008) companies are not making the best decisions to benefit the natural environment. They attribute this to the inadequacy of ownership rights regarding environmental resources that are available to all. Companies use these resources at zero cost and therefore are not motivated to innovate to improve the use of natural resources. Just like Porter & van der Linde (1995) they agree that there needs to be external pressure to get them to produce more efficiently. Left alone the market will produce too much pollution. For a systematic approach they discuss both the cost-savings and the revenues to be gained by engaging in environmental CSR and provide evidence of their existence.

One of the potential revenue benefits from adopting CSR is that better environmental performance gives access to certain markets. Companies that engage in environmental CSR improve their overall image and increase their customer's loyalty. A new criterion for consumers called "green public purchasing" (GPP) has also been trending as of late. This entails that some public and private organizations prioritize their resources towards environmental suppliers. Companies can also take advantage of the environmentally conscious market by going green. In this case even if the products are more expensive to produce these costs can be carried over to the buyers who are willing to pay more for environmentally friendly products. Ambec & Lanoie (2008) go on to say that product differentiating has been especially big in Europe with the use of Eco labeling. The final revenue increasing method presented is selling pollution control technology. This practice is more difficult than the other mentioned methods since it requires that these companies have research facilities with large resources to be able to sell.

Implementation of environmental CSR can also reduce cost. For instance through improving the relation between companies and their external stakeholder. This is important because less pollution equals less expensive fines, lower liability cost and also less risk associated with scrutiny in the media. In addition, more environmental CSR means lower cost of materiel, energy and services as "pollution is the manifestation of incomplete utilization of resources" (Porter & van der Linde, 1995). Thirdly, better environmental CSR can be associated with lower cost of capital. Environmentally friendly firms have easier access to capital through green mutual funds and banking who only invest or lend their money to firms that meet certain environmental criteria. The last cost benefit that can be obtained is a lower cost of labor. This can be realized by improving to workplace environment and employ moral. People who feel proud of their company which they work not only perform better but also become ambassadors for their company. This is especially important in recruiting talented employees.

According to the papers disused above, CSR increases company value, but how does the market react to CSR news? There are multiple papers aimed at determining the market reaction to negative CSR events. These events included: unethical behavior (Gunthorpe, 1997) , toxic release (Hamilton, 1995), product recalls (Jarrell & Peltzman, 1985), judicial actions following environmental violations (Karpoff, Lott, & Wehrly, The reputational penalties for environmental violations: Empirical evidence, 2005), product tampering (Mitchell, 1989), corporate fraud (Karpoff & Lott, 1993) and massive layoffs (Farber & Hallock, 2009). All these papers provided results that show that the market punishes bad CSR behavior. Other papers examined the market reaction to positive CSR events using CSR rankings (Takeda & Tomozawa, 2008), CSR stock index redefinitions (Capelle-Blancard & Couderc, 2009), CSR certifications and awards (Jacobs, Singhal, & Subramanian, 2010) and voluntary corporate initiatives (Fisher-Vande & Thorburn, 2011).These papers provided proof that the market does value CSR, by reacting positively (Capelle-Blancard & Petit, 2019). Krueger (2015) wrote a paper on positive and negative environmental, social and governance news, with a sample of 2116 negative and positive news concerning 745 companies, his paper confirmed that the market reacts negatively to bad CSR news and positive to good CSR news depending on its relationship with its stakeholders. Good news only had a positive effect in instances where there were poor stakeholders' relations.

Flammers (2013) researched stock reactions to environmental news between 1980 and 2009 in the USA. With a sample of 156 eco-harmful and 117 eco-friendly events. She concluded that eco-harmful news has a negative effect of -0,65% while eco-friendly news has a positive effect of +0,84% on stock prices. She also concluded that external pressure on companies to "go green" is setting the institutional norm to be more CSR conscious, which in turn is affecting the stock price reaction to CSR news throughout time. Thirdly she reported that environmental CSR is a resource with decreasing

marginal returns. Meaning that companies who are highly invested in eco-friendly resources receive relatively less benefit from implementing a new eco-friendly initiative, but reversely they also receive a less negative reaction from an eco-harmful event.

Asymmetric Responses

There is a large body of work suggesting that there are asymmetric responses to positive and negative news. This has been discussed in both political/economic[3] science and psychology[4]. According to these theories a 1-unit increase in negative news is not the exact opposite of a 1-unit decrease. Psychology says that unfavorable information makes a greater impression than favorable information (Ronis & Lipinski, 1985). Most literature suggest that impressions are based on expectations. These expectations can be based on past experience, but most people tend to be optimistic about the future, meaning that on average their expectations for the future are higher. One theory explains that this shift in perspective is the cause of asymmetric responses. Having a naively high benchmark means that the difference between the expected result and a negative result will be bigger. On the other hand having a naively high benchmark means that that the difference between the expected result and a realized positive result will be smaller since a positive result was already somewhat expected (Sherif & Wood Sherif, 1967). Another theory for this phenomenon in psychology is that more attention is given to extreme information. This combined with the fact that people are naively optimistic makes people put more weight on negative news and react accordingly (Fiske, 1980). In economics a similar asymmetry has been pointed out by Kahneman and Tversky (1979). In their Prospect Theory they introduced a concept called loss aversion, which implies that people put a larger weight on a loss than an equal gain. Meaning people tend to react stronger to bad economic news than to good news. The result is that positive news gives small positive reactions while negative news is followed with a drastic negative reaction.

Soroka (2006) wrote a paper on the publics asymmetric responses while adding the impact of the media news cover to the mix. Soroka (2006) wrote there also appears to be an asymmetry in news reporting as there seems to be a lot more negative news coverage than positive. An explanation for this is that Just like everyone else journalist are also exposed to the asymmetric response bias and put more value on negative than on positive news. Journalist are also aware of the public's greater interest in negative news and will therefore report more frequently on bad news. This asymmetry falls in line with the view that journalisms job is to provide transparency by monitoring the people in power and report on potential problems that the public wants to be aware of. Soroka (2006) goes on to explain that the increase in negative coverage combined with the fact that people are already loss averse means that the public response will be significantly larger

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[3] (Daniel & Tversky, 1979); (Soroka, 2006); (Flammer, 2013) & (Capelle-Blancard & Couderc, 2009).
[4] (Ronis & Lipinski, 1985); (Teoh & Singh, 2000); (Van der Pligt & Eiser, 1980); (Fiske, 1980) & (Vonk, 1996)

compared to positive news. Soraka (2006) reports that the media amplifies the public already biased

negative reaction with 16%.

Growing expectations

It has been cited by multiple sources that there is an increasingly growing demand for environmental CSR[5]. Since the end of the Second World War our planet has seen an unprecedented acceleration in the growth in population. The population has grown from 3 billion to 7 billion and is expected to reach 10 billion by 2050. This growth has especially appeared in developing countries, adding more poverty to the world. The huge growth in population has exponentially increased human demand on food energy and raw materials (Falkenberg, 2016). The Brundtland report[6] (1987) stated that the critical environmental problems are the result of poverty and non-sustainable consumption and production patterns. Ambec & Lanoie (2008) wrote that ever since the publication of Brundtland Report and the following Earth Summits in Rio de Janeiro at 1992 and Johannesburg at 2002 people have been growing increasingly concerned about sustainable development. The public took notice that the natural systems are now especially vulnerable to human activities and that we may cause permanent damage if things keep proceeding as they have before. The recurring smog alerts, acid rain, holes in the ozone layer, global warming, and the loss of biodiversity are prime examples that a change in how we treat the planet's resources is clearly needed.

In a report by KPMG (2017) on corporate sustainability reporting they examined the differences in reporting rates of sustainability reports between G250 (USA) and (N100) rest of the world . The N100 refers to the top 100 companies by revenue in the 49 countries they researched. And the second group, the G250, refers to the world's top 250 companies by revenue based on the fortune 500 in 2016. The N100 statistics represents both large and mid-cap firms from around the world. The G250 are the large global companies, usually the leaders and trendsetters for the rest of the market. In this report KPMG measured the reporting rates of sustainability reports by both groups from 1999 till 2017 (Appendix A). The rates increased from 24 for N100 and 35 for G250 to an astounding 75 and 93 percent respectively. The trend in reporting suggest that the N100 is slowly catching up to the G250, meaning that sustainability reporting is becoming the norm.

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[5] (Ambec & Lanoie, 2008), (Carroll, 1991), (Carrol, 1999), (Carroll, 2009), (Flammer, 2013)
[6] The Brundtland Report: a report on the international and interdependence relations of nations to target sustainable development

Hypotheses Development

This paper will build on the theory of both Porter & van der Linde (1995) and Ambec & Lanoie (2008) that engaging in environmental CSR will increase a firm's competitive advantage and therefore create value. The reverse of this can also be said that when a company produces negative CSR this will decrease company value and make a firm lose its competitive advantage. This theory also lines up with the studies of stock reaction to CSR news. That being said the first hypothesis that will be tested is:

Hypothesis 1: Stock prices have a positive reaction to eco-friendly corporate events and a negative reaction to eco-harmful corporate events.

If it stands that shareholders view eco-friendly and eco-harmful as positive and negative news regarding the value of a company than by applying the loss aversion theory to the shareholders' reaction, the second hypothesis will be:

Hypothesis 2: Negative sustainability news makes for stronger reactions than positive news.

As stated above in recent years the general population has become increasingly aware of company's environmental impact. There is a growing demand by the public for transparency regarding the company's production process in order to check its environmental performance, as can be seen by the increased environmental reporting. The expectations regarding environmental performance have thus been growing. Which brings us to the last hypothesis of this paper:

Hypothesis 4: Reactions to environmental news are getting stronger over the years.

Part III: Data and methodology

Data

This paper investigates the stock price reaction to firm-specific environmental news. For this purpose, Factiva was used to find newspaper articles and firm announcements about firms' environmental practices. Factiva is a business information and research tool owned by Dow Jones & Company. It has access to more than 32000 sources such as newspapers journals and magazines and covers nearly every country. The sample period used was between 2000 and 2017, the start of the 21st century and when environmental CSR started becoming more popular.

To find relevant events, Factiva's advanced filter was used to filter on the region of Europe "Natural Environment" was chosen as the subject. This filter was then applied for every year from 2000 to 2017. To narrow the search down, keywords related to eco-friendly or eco-harmful news was utilized. By using Factiva's wild card function, variations of these words were found. The keywords used were: "pollut*", "environment", "eco harmful", "sustainable*, "hazard", "oil spill", "waste", "emissions", "green", "renewable", "energy", "recycle", "ecological" and "renewable" .

After applying a search on these filters and keywords mostly non-firm-specific articles were found. Company articles in Factiva have the relating company tagged to it. To make sure the news was firm-specific, the "recommend company" filter provided by Factiva was then applied. These recommendations are based on the number of articles relating to the companies after the previously mentioned search was done. To avoid biases, this paper tried to limit the number of events per company in the same year. This still provided a large number of results which were not applicable to the topic at hand. To find the articles needed, the titles and headlines were read until enough events per year were found. After reading each article it was either put in the category "eco-friendly" or "eco-harmful" event or omitted from the data if it didn't clearly fit any of the two categories or if it fitted both. After collecting the events, it was checked if this was new news, and if this was the first time it was being reported. If this wasn't the case it meant that the market already reacted to the news when it first came out. To avoid this, the dates had to be adjusted to when the event actually became public knowledge or omit these events if this proved to be impossible. Hereafter it was double-checked if the company is publicly traded and indeed based in Europe. By this point, there was a sample of 217. The next step was to make sure that the sample meets the following criteria: 1) it has at least 252 trading days prior to the event 2) no other significant events are happening around the event date 3) Stock information is available. At this point, a sample of 98 eco-harmful and 99 eco-friendly events remained (Appendix B).

The next phase was to acquire each company's ISIN-code and match each event with the corresponding company code. After which DataStream, a global financial and macroeconomic data platform that provides the necessary stock market indices, was used to download the stock data of each company at its event time. A DataStream function was used to download the stock data of each event and a market-index 252 trading days prior to the event date to 20 trading days after the event took place. S&P500 was chosen as this research's market-index for the reason that it is one of the most followed equity indices and includes many multinational companies much like this paper's dataset.

Tables 2 & 3 shows the Descriptive statistics and Correlations between various CAR's around the event date. The mean eco-harmful events seem to be becoming more negative with a larger event window. The mean of eco-friendly events is decreasing with larger event windows. The event with the highest CAR(-1; 0) for the eco-harmful events, was event 8 and the lowest was event 88. Eco-friendly has event 149 as lowest and event 160 as highest CAR(-1; 0) (see appendix).

Table 2: descriptive statistics; eco-harmful

| | Harmful - CAR | mean | Std deviation | Min | max | correlations | | |
						1	2	3
1	car(-1;0)	-1,02	3,51	-22,28	6,21	1		
2	car(-1;1)	-1,52	5,74	-41,02	8,00	0,86	1	
3	car(-2;2)	-1,67	6,57	-42,71	9,43	0,68	0,90	1
4	car(-3;3)	-1,99	6,61	--39,45	10,51	0,73	0,90	0,93

Table 3: descriptive statistics; eco-friendly

| | Friendly-CAR | mean | Std deviation | Min | max | correlations | | |
						1	2	3
1	car(-1;0)	0,75	2,12	-4,30	6,55	1		
2	car(-1;1)	0,49	2,56	-5,60	6,61	0,81	1	
3	car(-2;2)	0,36	3,67	-11,10	11,98	0,49	0,72	1
4	car(-3;3)	0,26	4,09	-8,89	16,48	0,47	0,62	0,80

Methodology

To measure the effect of an occurrence on the value of a publicly-traded firm, its common to use an event study. The basic principle of an event study is to forecast stock returns under normal circumstances and to compare this afterwards with the real return, which is influenced by the event. The difference between the forecasted and the real returns is the abnormal return, and is thus the effect that the occurrence has had on the stock returns. The mythology for event study is built on the Efficient Market Hypothesis (EMH). There are three stages of the EMH: the weak also known as the random-walk, the semi-strong and strong hypothesis. The Weak form states that the current stock prices reflect all the data of past prices and that successive changes in the stock price are independent and conform to some probability distribution (Fama, 1965). The Semi-strong follows that the current stock prices are based on all past prices plus all public information. Meaning that as new public information becomes available these are immediately incorporated in the stock price. The third and Strong form suggests that all information is incorporated into the price. This entails past prices and public information as the weaker forms but also private information. Because event studies measure the stock reaction to new public news it's based on the semi-strong form. In conclusion, since the EMH has to hold at all times, an announcement of new public news would immediately and completely be assimilated by the market, and thus give a reaction (van der Sar, 2015).

As mentioned above, before anything can be measured, a forecast needs to be made of what the stock returns would be without the event taking place. For this purpose, the market-model approach was used. This model uses the market-returns (S&P500) to determine the (3) returns of an individual stock. The (1) individual stock returns and (2) market returns are generated by subtracting the on lagged logarithm from the stock price$_i$ and market-index$_i$.

(1) $\qquad Stock\_ret_{i,t} = Ln(Stock\_price_{i,t}) - Ln(Stock\_price_{i,t-1})$

(2) $S\&P500\_ret_{i,t} = Ln(S\&P500\_Index_{i,t}) - Ln(S\&P500\_Index_{i,t-1})$

(3) $\qquad R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \qquad E(\varepsilon_{it}) = o$

R_{it} represents the real returns of stock while R_{mt} stands for the market returns and "i" for the event. The parameters α_i and β_i differ across stocks. α_i is the constant difference between market and individual stock returns and β_i measures the sensitivity of a stock relative to market returns. This model assumes a linear relationship between individual stock and market returns. To make a forecast α_i and β_i had to be estimated on a control period. For this period an estimation window of (-292 ; -41)

was chosen, with day zero being the event date. This makes for 252 trading days, which is about one calendar year. The parameters $E(\alpha_i)$ and $E(\beta_i)$ were estimated using an Ordinary Least Squares regression. Next, the (4) predicted/normal returns, R_{it}^* can be estimated using the parameter estimates and the market benchmark:

(4) $\qquad R_{it}^* = E(\alpha_i) + E(\beta_i) R_{mt}$

Hereafter the (5) Abnormal returns (AR) are calculated by subtracting the normal returns (4) from the realized returns (3).

(5) $\qquad AR_{i,t} = R_{it} - R_{it}^*$

By summing up the AR_i per date the (6) Cumulative Abnormal Returns (CAR) can be calculated per event. Due to the multiple events the (7) Average Abnormal returns (AAR) and the (8) Average Cumulative Abnormal Return (ACAR) will also need to be measured.

(6) $\qquad CAR_{i,KL} = \sum_{t=K}^{L} ARi,t$

(7) $\qquad AAR_{AN,t} = 1/N \sum_{i=A}^{N} ARi,t$

(8) $\qquad ACAR_{AN,t} = 1/N \sum_{i=A}^{N} CARi,t$

For this research, an event window of (-40 ; 20) was chosen to allow a comparison to be made with the results of the USA (Flammer, 2013). This wide event window also makes it possible to test multiple AAR & ACAR's around the event date. With this, an examination can be made about how efficiently the market reacts to new news. A problem that may arise from only examining the AR of the event day (day 0) is "Event-day uncertainty". Like the name suggests this is the uncertainty of when the news became public knowledge. By looking at publications as was for this event study there is always a chance that (some) people got wind of the news a day before it was published. The usual practice for dealing with this issue is to include one day prior to the event date in the results (MacKinlay, 1997).

To start, dataset was spilt up in eco-friendly and eco-harmful announcements and the effect of these events on the stock return was tested. A t-test will be performed on the AR between date (-5 ; 5) to determine whether environmental news has an effect on the stock prices. With this method, the number of days affected the event can be observed.

Hypotheses 1 will be tested by running different CAR's at and around the event date. For this hypothesis, eco-harmful and eco-friendly CAR needs be generated and tested separately. The same event windows as Flammer (2013) was chosen, making it possible to compare the results. These being (-40 ; -21) , (-20 ; -11), (-10 ; -6), (-5 ; -2), (-1 : 0), (1 ; 5) and (6 ; 20). Another set of alternative ACAR's will also be tested to see if these can capture the stock reactions better. After testing multiple AR's and CAR's the event window CAR (-1 ; 0) was chosen to test the second and third hypothesis. To test the second hypothesis, that stock prices react stronger to negative news than to positive news, a two-sample mean test will first be performed on eco-friendly CAR and eco-harmful CAR to determine if they differ. This paper will then proceed by running a regression on (1) CAR with eco-friendly/harmful news as a dummy variable, eco-harmful is taken as the base standard this paper. Due to eco-friendly giving positive reactions and eco-harmful giving negative reactions it becomes difficult to test the scope of each reaction. To overcome this hurdle, the CAR's will be transformed into positive values by taking the square root of the CAR's and also by taking the absolute value of the CAR's. Hereafter a regression a will be run the (2) squared CAR and on the (3) absolute CAR with eco-friendly/harmful as the dummy variable again.

(9) $$CAR = \alpha + \beta * News$$

(10) $$CAR^2 = \alpha + \beta * News$$

(11) $$[CAR] = \alpha + \beta * News$$

To test the third hypothesis, the data will be split up in eco-friendly and eco-harmful events. Each category will have events ranging from the year 2000 to 2017. To examine the change in reaction over this period it will be split in 3, amounting to enough events per six years to make valid inferences. This paper will then proceed with a t-test on the CAR of each category in the various intervals. Afterwards, a regression will be done on each (4) (5) CAR with year as the dummy variable. Lastly, the categories of event types will be merged into one and a regression will be run with (6) both news and year as dummies.

(12) $$eco-harmful\ CAR = \alpha + \beta * year$$

(13) $$eco-friendly\ CAR = \alpha + \beta * year$$

(14) $$CAR = \alpha + \beta * year + \beta * News$$

Part IV: Results and discussion

This research is based on the idea that stock prices react to eco-friendly and eco-harmful news. A daily AAR was generated with its corresponding t-statistic around the event date to examine whether there is a stock price reaction. As **TABLE 4** shows there is indeed a significant reaction at the event date for both types of news. The AAR was calculated for 5 days prior to the event to 5 days after to see if there is another event happening around the event date that might affect the AAR at the event date. The results show a significant AAR at day -3 before an eco-harmful announcement, but this may very well be a fluke. Eco- friendly announcements show no significant AAR other than at the event date. Another observation worth noting is that the AAR at the event date is negative for eco-harmful announcements and positive for eco-friendly announcements.

Table 4:AAR's around the event date

	Eco- harmful			Eco-friendly	
days	AAR	t-statistic		AAR	t-statistic
-5	0,27	(1,71)		-0,04	(-0,26)
-4	-0,08	(-0,53)		0,09	(0,60)
-3	-0,40	(-2,30)*		-0,08	(-0,44)
-2	0,05	(0,31)		0,04	(0,19)
-1	-0,16	(-8,29)		0,16	(1,01)
0	-0,86	(-3,07)**		0,59	(4,63)**
1	-0,50	(-1,54)		-0,26	(-1,74)
2	-0,20	(-0,83)		-0,17	(-1,19)
3	0,08	(0,45)		-0,02	(0,11)
4	0,07	(0,52)		-0,05	(-0,30)
5	-0,27	(-1,43)		-0,02	(0,10)

Eco-harmful n= 98; eco-friendly n=99. "AAR" is the average abnormal returns and is expressed as percentage.
*P < 0.05
**p<0.01
Two-tailed test

To test the first hypothesis that stock prices have a positive reaction to eco-friendly corporate events and a negative reaction to eco-harmful corporate events, various ACAR were generated and presented in **TABLE 5**. This table shows ACAR expressed as a percentage with its corresponding t-statistic and the ratio of positive to negative ACAR found at each time interval. Again a period before the event was observed to examine potential deviations in returns that might have been caused by another event. But this time this paper also inspected a period after the event to see if the event had any lingering effect. According to Flammer (2013) it might sometimes take longer for the market to fully establish the characteristics of an event. In this paper the event time windows were styled after her to be able to compare this paper's results with the USA. This paper's results show a significant effect of -1,02% at the announcement of eco-harmful news and a significant effect of at the +0,75%

at announcement of eco-friendly news at date (-1; 0). A significant negative effect at time (-40; -21) of eco-harmful news was also found, but this can very well be a random occurrence. In conclusion, evidence was found of stock prices reacting positively to eco-friendly news and negatively to eco-harmful news and thus this paper can accept the first hypothesis.

Table 5: ACAR's around the event date

	Eco- harmful			Eco-friendly		
Event Time	ACAR	t-statistic	Positive: Negative	CAR	t-statistic	Positive: Negative
(-40; -21)	-1,34	(-2,35)*	43:55	-0,10	(0,16)	45:54
(-20; -11)	0,02	(0,06)	48:50	-0,12	(0,28)	50:49
(-10; -6)	0,11	(0,35)	57:41	-0,13	(0,41)	52:47
(-5; -2)	-0,16	(0,60)	50:48	0,00	(0,01)	44:55
(-1; 0)	-1,02	(-2,88)**	44:54	0,75	(3,58)**	58:41
(1; 5)	-0,82	(-1,38)	52:46	-0,51	(-1,42)	43:56
(6; 20)	0,30	(0,59)	51:47	-0,07	(0,12)	47:52

Eco-harmful n= 98; eco-friendly n=99. "ACAR" is the average cumulative abnormal returns and is expressed as percentage.
    *P < 0.05
    **p<0.01
    Two-tailed test
    Positive: Negative gives the amount of positive to negative CAR ratio's

Flammer (2013) found a significant reaction of -0.65% to eco-harmful news and a significant reaction of +0,84% to eco-friendly news (Appendix C). No trace of significant abnormal return was found before or after the event date. This paper's findings correspond with stock price reactions in the USA. Flammer (2013) however, found a weaker reaction to eco-negative news and a slightly stronger reaction to positive news.

This paper also considered alternative ACAR's to see if they could capture the price reaction better (Appendix D). Every alternative ACAR window used showed significant effect from eco-harmful announcements but none showed a significant effect form eco-friendly announcements. For this reason, the window (-1;0) to was used to measure ecological events.

To test the 2nd hypothesis that eco-harmful news gives rise to stronger reactions than eco-friendly news, this paper started with performing a two-sample mean test on the ACAR produced by friendly and harmful eco news. **TABLE 6** shows that the means are not the same at a significant level of 1%.

Table 6: two-sample mean test; eco-friendly and eco-harmful CAR (-1; 0)

	Mean	N	Std. Err	Std. DEV	
Eco-harmful	-1,02	98	0,04	0,04	t = -4,37**
Eco-friendly	0,75	98	0,02	0,02	Df= 97

Eco-harmful n= 98; eco-friendly n=99. "ACAR" is the average cumulative abnormal returns and is expressed as percentage.
*P < 0.05
**p<0.01
Two-tailed test

To further test the power of the reaction to eco-news regressions (**Table 7**) were conducted 3 on the dummy variable eco-harmful/friendly news with eco-harmful as the base standard. The first regression on CAR (9) showed that eco-friendly news has 1,78% more positive CAR compared to eco-harmful news at (-1; 0). Both regressions on CAR^2 (10) and [CAR] (11) showed a small but negative coefficient. The negative coefficient can be interpreted as a smaller stock price reaction to eco-friendly news compared to eco-harmful news, this supports the second hypothesis. But the effect of the dummies was not significantly different from 0. Regression 9 gives a considerably larger adjusted R^2 compared to the other 2 models, followed by regression 10.

Table 7: Regressions on CAR (-1; 0)

Regression:	(9)	(10)	(11)
	CAR	**CAR^2**	**[CAR]**
D.Eco-news	1,78	-0,08	-0,42
	(4,32)**	(-1,52)	(-1.25)
Constant	-1,02	0,13	2,09
	(-3,48)**	(3,45)**	(8.76)**
Adj R^2	0,087	0,007	0,003
N	197	197	197

OLS regression CAR, squared CAR and absolute value CAR with eco-harmful/friendly news as dummy variable.
Eco-harmful news is taken as the base standard.
The values are expressed as percentage.
*P < 0.05
**p<0.01

To test whether the reaction to eco-news is becoming stronger over the years, the ACAR at 3 intervals was calculated between the period of 2000-2017. The results can be seen in **TABLE 8.** The ACAR to eco-harmful announcements shows that the abnormal negative reaction is growing over the years and becoming increasingly significant. While the ACAR to eco-friendly announcement show a decreasing positive reaction over time. There appears to be a big jump in ACAR in the third period compared to the second. Flammer (2013) has also found an increasingly negative reaction to eco-harmful news and a decreasing reaction to eco-friendly news (Appendix D). Even though both types

of news are trending in the same direction in Europe and the USA it can be seen the reaction in the USA seems to be stronger than Europe in the earlier years. But it seems as though Europe is catching up with a steeper trend. This falls in line with KPMG's report (Blasco & King, 2017) that the N100 is catching up with the G250.

	Eco- harmful			Eco-friendly	
Time period	ACAR	t-statistic		ACAR	t-statistic
2000-05	-0,11	(-0,25)		0,91	(1,98)
2006-11	-0,61	(-1,55)		0,87	(2,46)*
2012-17	-2,87	(-2,80)**		0,52	(1,65)

Eco-harmful n= 98; eco-friendly n=99. "ACAR" average cumulative abnormal and is expressed as percentage.

*P < 0.05
**p<0.01
Two-tailed test

This paper also conducted regressions to measure the effect over time, the results of which can be seen in **TABLE 7**. For the regressions (12), (13) and (14) year 2000-2005 was taken as the base standard for the dummy variable time. Regression (14) included a dummy for news type with eco-harmful as the base standard. The results of eco-harmful CAR (12) shows a negative constant coefficient and negative coefficients for both 2006-11 and 2012-17. While the dummy for 2006-2011 is only -0,50%, the dummy for 2012-17 is a significant -2,76%. This can be interpreted as the reactions becoming increasingly stronger over the years and is in support of the third hypothesis. The regression on eco-friendly(13) news, however, shows a positive constant with the dummies for years 2006-11 and 2012-17 showing negative the coefficient of -0,04% and -0,39% respectively. This result means that the reactions to eco-friendly news is decreasing over time and is inconsistent with the third hypothesis. The third hypothesis is thus rejected. The decreasing positive reactions could be because being environmentally conscious is becoming the norm and eco-friendly behavior is already incorporated in the price. This corresponds with Ronis & Lipinski (1985) that people have a high-expected benchmark and that when they hear positive news it's not as unexpected. Regression (14) shows that eco-friendly news affects increases the CAR in comparison with eco-harmful but the total CAR decreases over time. The decrease is caused by a combination of stronger negative reactions on eco-harmful news and less positive reactions to eco-friendly news. The adjusted R^2 of regression 13 shows that this model has little to non explanatory value.

Table 9: Regression through time

Regression:	(12)	(13)	(14)
	Eco-harmful CAR	**Eco-friendly CAR**	**CAR**
D.Year 2006-11	-0,50	-0,04	-0,30
	(-0,64)	(-0,07)	(-0,62)
D.Year 2012-17	-2,76	-0,39	-1,51
	(-3,10)**	(-0,72)	(-2,89)**
D.Eco-news			1,89
			(4,65)**
Constant	-0,11	0,91	-0,51
	(-0,19)	(2,25)*	(-1,25)
Adj R²	0,081	-0,014	0,116
N	98	99	197

OLS regression on CAR with period of years and friendly/harmful news as dummies
The values are expressed as percentage.
(12) (13) Year 2000-05
(14) Year 2000-05 & Eco-harmful news is taken as the base standard
*P < 0.05
**p<0.01

Part V: Conclusion

This paper conducts an event study to investigate how shareholders react to the issuance of firm specific environmental sustainability news for European publicly-traded companies between 2000 and 2017. The findings of this paper suggest that stock prices react negatively to eco-harmful events and positively to eco-friendly events. The negative reaction was attributed to "punishment" for eco-harmful behavior while the positive was "reward" for engaging in eco-friendly behavior. These results are in accordance with the other papers discussed in the literature review, who has investigated stock price reaction to CSR. There also appears to be an asymmetric reaction to the news type. The results show that the stock prices react stronger to eco-harmful news than they react to eco-friendly news. This paper also measured the reaction to each type of news throughout time. The reaction to eco-harmful news appears to be getting stronger while the reactions to eco-friendly news seems to be getting weaker. This was explained by the fact that people are becoming more environmentally conscious and eco-friendly behavior is becoming the norm. Because of these higher standards regarding environmental behavior, eco-harmful events are bigger deviation from the norm and thus receive larger punishments. While eco-friendly events are small deviation from the expected behavior and receives smaller rewards. This papers shows the same results as Flammers (2013) who has done a similar research for companies based in the USA.

For further research on this topic a larger sample of companies is recommended. Using Factiva's recommended companies gives the most popular companies per year. These are mostly large companies that is often reported upon. The stock reaction to these kind of companies may be somewhat different then on medium and smaller companies that receive smaller media exposure. Future research could also benefit from adding control variables to their regression such as the company size, age, profitability and market to book ratio.

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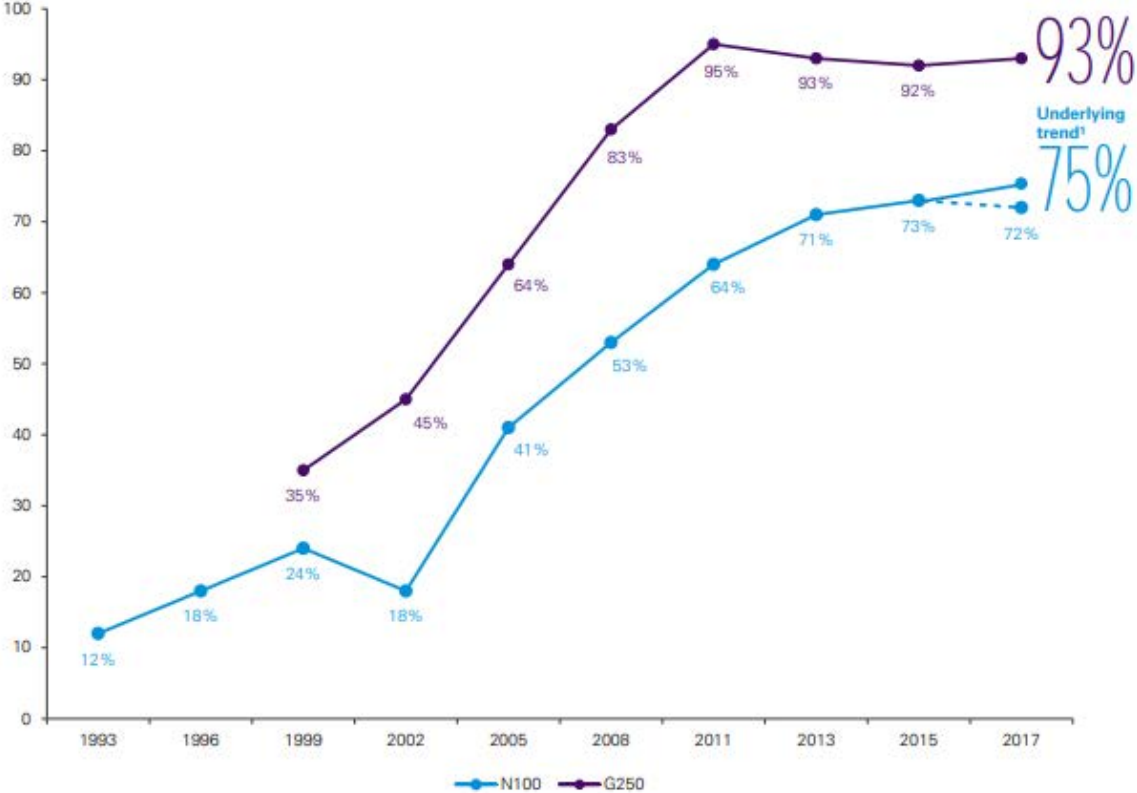
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Appendix A- KPMG report

KPMG sustainability reporting graph& countries (Blasco & King, 2017).

Growth in global CR reporting rates since 1993

Appendix B- Events

Eco-harmful events			
Event number	Company name	Event date	Keyword
1	Daimler AG	6-1-2000	environment
2	Total S.A.	10-1-2000	pollut*
3	paul hartmann company	5-6-2000	Eco harmful
4	upm-kymmene Oyj	17-11-2000	Sustainable
5	Bayer AG	31-12-2000	hazard
6	Imerys SA	14-2-2001	pollut*
7	united utilities group plc	1-6-2001	pollut*
8	RWE AG	28-9-2001	pollut*
9	Norsk Hydro ASA	2-11-2001	pollut*
10	United Utilities Group PLC	19-2-2002	pollut*
11	Royal Dutch Shell	16-4-2002	pollut*
12	BP PLC	7-7-2002	pollut*
13	Royal Dutch Shell	12-11-2002	pollut*
14	Severn Trent Plc	31-7-2003	pollut*
15	BP PLC	31-7-2003	pollut*
16	United Utilities Group PLC	31-7-2003	pollut*
17	Tesco Plc	31-7-2003	pollut*
18	Total S.A.	31-7-2003	pollut*
19	united utilities group plc	31-7-2003	pollut*
20	Royal Dutch Shell	10-1-2004	oil spill
21	united utilities group plc	30-1-2004	pollut*
22	Daimler AG	21-3-2004	pollut*
23	BP PLC	1-6-2004	hazard
24	Royal Dutch Shell	23-6-2004	pollut*
25	united utilities group plc	30-6-2004	pollut*
26	Severn Trent PLC	29-1-2005	waste
27	united utilities group plc	14-4-2005	waste
28	Royal Dutch Shell	2-6-2005	oil spill
29	Royal Dutch Shell	26-7-2005	oil spill
30	Royal Dutch Shell	12-9-2005	oil spill
31	Nestlé SA	21-11-2005	Sustainable
32	Equinor ASA	23-11-2005	oil spill
33	Equinor ASA	8-12-2005	oil spill
34	Royal Dutch Shell	10-5-2006	oil spill
35	BP PLC	14-5-2006	pollut*
36	Royal Dutch Shell	22-5-2006	environment
37	united utilities group plc	26-5-2006	pollut*
38	united utilities group plc	27-7-2006	pollut*
39	Severn Trent PLC	27-7-2006	pollut*
40	BP PLC	13-9-2006	oil spill

41	Royal Dutch Shell	2-2-2007	pollut*
42	Total S.A.	10-2-2007	pollut*
43	Royal Dutch Shell	17-4-2007	pollut*
44	Royal Dutch Shell	4-10-2007	pollut*
45	Bayerische Motoren Werke AG	15-11-2007	emissions
46	BP PLC	30-11-2007	pollut*
47	BP PLC	9-12-2007	pollut*
48	Total S.A.	16-1-2008	oil spill
49	Severn Trent PLC	15-5-2008	waste
50	Royal Dutch Shell	13-8-2008	green
51	Royal Dutch Shell	6-11-2008	oil spill
52	united utilities group plc	19-12-2008	waste
53	Royal Dutch Shell	12-1-2009	pollut*
54	BP PLC	24-3-2009	renewable
55	Royal Dutch Shell	9-4-2009	pollut*
56	Royal Dutch Shell	15-4-2009	oil spill
57	Royal Dutch Shell	7-5-2009	oil spill
58	united utilities group plc	5-6-2009	pollut*
59	BP PLC	29-6-2009	energy
60	Severn Trent PLC	22-9-2009	pollut*
61	Royal Dutch Shell	3-12-2009	oil spill
62	Nestlé SA	18-3-2010	environment
63	Total S.A.	30-3-2010	oil spill
64	BP PLC	20-4-2010	oil spill
65	Equinor ASA	24-5-2010	pollut*
66	united utilities group plc	15-7-2010	pollut*
67	Total S.A.	16-7-2010	pollut*
68	Equinor ASA	26-10-2010	pollut*
69	BP PLC	16-1-2011	environment
70	Royal Dutch Shell	26-1-2011	oil spill
71	Equinor ASA	8-6-2011	oil spill
72	Royal Dutch Shell	4-8-2011	oil spill
73	BP PLC	3-11-2011	emissions
74	Royal Dutch Shell	5-7-2012	emissions
75	BASF SE	13-9-2012	hazard
76	Severn Trent Plc	8-1-2013	pollut*
77	Royal Dutch Shell	30-1-2013	pollut*
78	Royal Dutch Shell	28-3-2013	pollut*
79	Eni SpA	10-7-2013	oil spill
80	Equinor ASA	13-3-2014	pollut*
81	Total S.A.	28-4-2014	oil spill
82	united utilities group plc	3-5-2014	pollut*
83	Severn Trent Plc	14-5-2014	pollut*
84	Volvo AB	21-7-2014	emissions
85	Royal Dutch Shell	9-12-2014	pollut*
86	Royal Dutch Shell	12-8-2015	pollut*

87	Volkswagen AG	18-9-2015	emissions
88	Volkswagen AG	21-9-2015	emissions
89	Audi AG	21-9-2015	emissions
90	Bayerische Motoren Werke AG	24-9-2015	pollut*
91	Equinor ASA	8-1-2016	pollut*
92	Renault SA	14-1-2016	emissions
93	Daimler AG	9-2-2016	emissions
94	Renault SA	16-3-2017	emissions
95	Volkswagen AG	24-6-2017	emissions
96	Eni SpA	19-7-2017	oil spill
97	BP PLC	17-10-2017	oil spill
98	Equinor ASA	24-10-2017	oil spill

Eco-friendly events			
event number	Company name	Event date	keyword
99	arcadis NV	11-1-2000	waste
100	Royal Dutch Shell	27-1-2000	emissions
101	BP PLC	4-5-2000	green
102	BP PLC	25-7-2000	pollut*
103	Kingfisher plc	28-2-2001	hazard
104	Severn Trent PLC	7-6-2001	waste
105	J Sainsbury Plc	13-6-2001	environment
106	Edison S.p.A	26-7-2001	pollut*
107	BASF SE	28-2-2002	emissions
108	Royal Dutch Shell	25-7-2002	Sustainable
109	Severn Trent PLC	10-1-2003	green
110	upm-kymmene Oyj	24-7-2003	recycle
111	Tesco Plc	15-10-2003	recycle
112	united utilities group plc	17-2-2004	pollut*
113	Renault SA	29-7-2004	Sustainable
114	Royal Dutch Shell	29-7-2004	Sustainable
115	Daimler AG	29-7-2004	Sustainable
116	Norsk Hydro ASA	29-7-2004	Sustainable
117	Volkswagen AG	29-7-2004	Sustainable
118	Cie Gnrl des Etblsmnts Michelin SCA	29-7-2004	Sustainable
119	BP PLC	29-7-2004	Sustainable
120	Vodafone Group Plc	27-10-2004	energy
121	Severn Trent PLC	3-1-2005	environment
122	Severn Trent PLC	10-1-2005	waste
123	Severn Trent PLC	23-2-2005	waste
124	Royal Dutch Shell	31-3-2005	oil spill

125	BP PLC	11-4-2005	emissions
126	BP PLC	14-4-2005	oil spill
127	BP PLC	23-1-2006	green
128	Tesco Plc	11-5-2006	green
129	Tesco Plc	4-8-2006	green
130	BP PLC	23-8-2006	emissions
131	J Sainsbury Plc	8-9-2006	green
132	J Sainsbury Plc	26-9-2006	green
133	Tesco Plc	1-12-2006	green
134	Tesco Plc	19-1-2007	green
135	BP PLC	1-2-2007	green
136	BP PLC	5-6-2007	pollut*
137	Peugeot Sa	15-11-2007	emissions
138	Renault SA	15-11-2007	emissions
139	Tesco Plc	1-1-2008	emissions
140	Severn Trent PLC	2-1-2008	waste
141	Tesco Plc	3-1-2008	emissions
142	Royal Dutch Shell	13-2-2008	ecological
143	Tesco Plc	27-2-2008	pollut*
144	Severn Trent PLC	3-4-2008	green
145	united utilities group plc	2-6-2008	waste
146	J Sainsbury Plc	22-7-2008	green
147	J Sainsbury Plc	23-1-2009	green
148	Equinor ASA	9-3-2009	renewable
149	BP PLC	6-4-2009	renewable
150	Royal Dutch Shell	4-5-2009	pollut*
151	BP PLC	28-5-2009	emissions
152	united utilities group plc	16-6-2009	waste
153	united utilities group plc	26-1-2010	emissions
154	Henkel AG & Co. KGaA	25-2-2010	Sustainable
155	Nestlé SA	5-4-2010	emissions
156	Deutsche Telekom AG	14-6-2010	Sustainable
157	Tesco Plc	16-6-2010	green
158	Unilever PLC	15-11-2010	Sustainable
159	Enel S.p.A.	13-1-2011	green
160	Volkswagen AG	28-2-2011	emissions
161	Volvo AB	28-3-2011	Sustainable
162	ČEZ Group	3-5-2011	emissions
163	Audi AG	28-7-2011	emissions
164	Renault SA	28-11-2011	emissions
165	Alstom S.A	1-1-2012	carbon
166	Drax Group Plc	1-1-2012	carbon
167	Volkswagen AG	2-3-2012	renewable
168	Daimler AG	1-4-2012	environment
169	Bayerische Motoren Werke AG	12-7-2012	emissions
170	Porsche Automobil Holding SE	12-9-2012	environment
171	Volvo AB	16-10-2012	emissions

172	Total S.A.	1-3-2013	emissions
173	Tesco Plc	19-5-2013	waste
174	Atos S.A.	3-6-2013	Sustainable
175	Chubb Limited	1-10-2013	Environment
176	Bayerische Motoren Werke AG	20-11-2013	Energy
177	Volkswagen AG	20-11-2013	Energy
178	Daimler AG	21-4-2014	pollut*
179	Bayerische Motoren Werke AG	28-5-2014	pollut*
180	Equinor ASA	22-9-2014	Emissions
181	Peugeot SA	3-11-2014	Emissions
182	Royal Dutch Shell	26-11-2014	Emissions
183	Total S.A.	26-11-2014	Emissions
184	Volkswagen AG	26-2-2015	Environment
185	Audi AG	16-3-2015	pollut*
186	Nestlé SA	8-7-2015	Recycle
187	Total S.A.	10-7-2015	Green
188	Total S.A.	27-4-2016	green
189	Total S.A.	15-6-2016	Green
190	BP PLC	4-11-2016	Emissions
191	Royal Dutch Shell	4-11-2016	emissions
192	Total S.A.	12-12-2016	Recycle
193	Total S.A.	9-3-2017	Emissions
194	Volkswagen AG	28-9-2017	environment
195	BP PLC	22-11-2017	emissions
196	Royal Dutch Shell	22-11-2017	emissions
197	Royal Dutch Shell	11-12-2017	pollut*

Appendix C- USA ACAR

Event Time	Eco- harmful			Eco-friendly		
	ACAR	t-statistic	Positive: Negative	CAR	t-statistic	Positive: Negative
(-40; -21)	-0.88	(-0,92)	73:83	0,17	(0,12)	64:53
(-20; -11)	0,75	(0,39)	72:84	0,32	(0,62)	60:57
(-10; -6)	0,05	(-0,12)	79:77	-0,45	(-1,18)	55:62
(-5; -2)	-0,12	(-0,86)	75:81	-0,20	(0,77)	57:60
(-1; 0)	-0,65	(-3,49) **	60:96	0,84	(3,57)**	79:38
(1; 5)	-0,15	(-0,47)	74:92	0,16	(0,38)	59:58
(6; 20)	-0,04	(-0,26)	73:83	-0,49	(-1,21)	54:63

Eco-harmful n= 156; eco-friendly n=117. "ACAR" average cumulative abnormal returns and is expressed as percentage.

*P < 0.05

**p<0.01

Two-tailed test

Positive: Negative gives the amount of positive to negative CAR ratio's (Flammer, 2013)

Appendix D- Alternative ACAR's

Event Time	Eco- harmful			Eco-friendly		
	ACAR	t-statistic	Positive: Negative	CAR	t-statistic	Positive: Negative
(-1; -1)	-1,52	(-2,62)*	48:50	0,49	(1,96)	53:46
(-2; -2)	-1,67	(-2,51)*	44:54	0,36	(1,00)	57:42
(-3; -3)	-1,99	(-2,97)**	40:58	0,26	(0,66)	53:46
(-5; -5)	-2,00	(-2,40)*	45:53	0,25	(0,46)	51:48
(-1; 2)	-1,72	(-2,64)**	48:50	0,32	(1,14)	57:42
(1; 2)	-1,64	(-2,53)*	46:52	0,31	(1,01)	50:49

Eco-harmful n= 98 ; eco-friendly n=99. "ACAR" average cumulative abnormal returns and is expressed as percentage.

*P < 0.05

**p<0.01

Two-tailed test

Positive: Negative gives the amount of positive to negative CAR ratio's

Appendix E- USA ACAR(-1; 0) across time

Time period	Eco- harmful			Eco-friendly	
	ACAR	t-statistic		ACAR	t-statistic
1980-89	-0,42	(-1,11)		1,19	(2,72)**
1990-99	-0,66	(-2,53)*		0,89	(2,04)*
2000-09	-1,12	(-2,69)**		0,68	(1,76)*

Eco-harmful n= 98; eco-friendly n=99. "ACAR" average cumulative abnormal returns and is expressed as percentage.

*P < 0.05

**p<0.01

Two-tailed test

(Flammer, 2013)