SHAREHOLDER REACTION TO CORPORATE WATER ACTIONS AND THE
REPUTATIONAL EFFECTS OF CSR

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ABSTRACT

Water is increasingly being recognized as an important strategic resource carrying significant business risks and opportunities, but very little empirical work has been done so far to analyze its implications for corporate financial performance. In response, we present an event study approach to investigate market reactions to corporate water actions based on S&P 500 firms during the period 2005 to June 2017. Our results show that the stock market reacts positively to responsible (positive) water actions, and negatively to irresponsible (negative) actions. We also show that previous good or bad performance with regard to CSR in general helps create reputational capital and reputational liabilities respectively, which in turn impact the market reaction to a subsequent corporate water action. We propose a two by two matrix relating CSR reputational capital and liability to abnormal returns from positive and negative water actions, outlining four effects: diminishing marginal returns, offsetting, insurance and punitive effects. Our multivariate analysis provides evidence for all four effects. This study corroborates and extends arguments from theories that position CSR as a competitive resource, and demonstrates that the reputational effects of CSR function like an economic asset or liability that can influence shareholder reactions to corporate water actions.

Keywords:
CSR; corporate water actions; competitive advantage and strategy; reputational asset; reputational liability; risk management and finance; empirical study; event study; diminishing marginal returns, offsetting, insurance, and punitive effects; cumulative abnormal returns (CARs); shareholder reaction
INTRODUCTION

The connection between corporate social responsibility (CSR) and corporate financial performance (CFP) has long been a matter of extensive academic research. Though the research approaches, methodologies, context and findings have varied, consolidating results through meta-analyses has mostly shown a positive relationship (Friede, Busch, & Bassen, 2015; Margolis, Elfenbein, & Walsh, 2007; Margolis & Walsh, 2003; Orlitzky, Schmidt, & Rynes, 2003). However, the conclusion remains quite unresolved (Wang & Bansal, 2012). Both CSR and CFP are huge constructs of broad nature and scope, and the recent emphasis in academic research has been to narrow down the focus on specialized and meaningful subsets within these broad areas for better analysis (Ortiz-de-Mandojana & Bansal, 2016; Cheng, Ioannou, & Serafeim, 2014; Endrikat, Guenther, & Hoppe, 2014; Delmas, Hoffmann, & Kuss, 2011; Orlitzky, Siegel, & Waldman, 2011; Etzion, 2007).

While CSR was once limited to a few charitable actions, the concept has evolved over the years to a comprehensive approach to sustainability by delivering economic, social, and environmental good to all stakeholders. The natural environment is a key element of sustainability, gaining attention at accelerating rate in both business and academic fields (Flammer, 2013). One of the most important components of this natural environment that has slowly started to make its own individual mark, is water. According to a 2010 report by National Geographic news, 80% of global water supplies are already at risk – both river biodiversity and human water security were found to be in serious trouble (Inman, 2010). On the one hand, increasing global population and growing economies and industries are putting higher pressure on already depleted water supplies, and, on the other hand, water pollution is turning out to be a leading environmental problem, jeopardizing human health and ecosystems (Bowen, Bansal, & Slawinski, 2018; Fogel & Palmer,
Water demand is projected to rise by 55% between 2020 and 2050, with a whopping 400% increase coming from the manufacturing sector alone (OECD, 2012). By 2030 water supplies will satisfy only 60 percent of global demand on average (Boccaletti et al., 2009).

The challenge for business organizations is two-fold. Firstly, water is a critical resource for business processes and products, and organizations need to balance the rising costs and scarce supply of water by using it more efficiently. Secondly, the social and environmental impacts of business water use are considerable - starting from depletion of a critical natural resource to contributing heavily to water pollution, hampering fundamental human right of access to safe and clean water. Water security is also identified as one of the central support pillars in fighting against harmful greenhouse gas emissions and adverse climate change (CDP, 2016). Stakeholder awareness in this field appears to be increasing with time. The CDP program, launched 7 years back, now already works on behalf of 643 institutional investors and, as of 2016, 607 companies (almost 50% of those approached) provided water data to investors via CDP - an increase of 10% over last year (CDP, 2016). So, not only do organizations today have to accommodate the ever-expanding rules and regulations relating to water, but an increasingly aware and demanding stakeholder base expect organizations to go beyond that periphery of mandates to address water issues and needs in society. In identifying the top sustainable business trends of 2014, Makower (2013) emphasized how water is directly associated with business risk and crisis, while KPMG (2012) identified water scarcity as one of the 10 sustainability mega forces, with “water shortages, decline in water quality, water price volatility, and reputational impacts” being the main challenges for business organizations. As Adriaens (2012) and Burritt, Christ, & Omori (2016) noted, this
water risk can have serious impacts on corporate growth, market valuation, corporate
creditworthiness, and bond rating.

However, awareness about the water actions of firms and structured monitoring and
reporting in this area is a relatively new concept, at least compared to other environmental aspects
like carbon emissions. Academic research from this field is also quite inadequate (Whiteman,
Walker, & Perego, 2013). Studies so far have been mostly confined to the quantity of water used
(Jeswani & Azapagic, 2011) and have primarily applied qualitative approaches and case studies,
doing an analysis of the extent and quality of water disclosure/transparency by firms (Kleinman,
Kuei, & Lee, 2017; Money A. , 2014; Burritt, et al., 2016; Leong, Hazelton, Taplin, Timms, &
Laurence, 2014; Linneman, Hoekstra, & Berkhout, 2015), or doing some form of water footprint
assessment (Hoekstra et al. 2016), or prescribing water accounting tools for better management of
water resources (Christ & Burritt, 2017).

No empirical research work yet investigated the direct financial impacts brought about by
a responsible or irresponsible water action by a firm. In response, our study analyzes the market
reaction brought about by the announcement of a particular positive or negative water action
featuring a firm, through an event study approach. This adds new, unexplored dimensions to this
field in two ways. First, we are able to assess all kinds of positive and negative water related actions
by firms and come out of the narrow focus of just looking at water consumption. Second, we can
uncover one of the most important angles of impact analysis, that is, the financial rewards or
punishment associated with corporate water stewardship, or lack of it, reflected through investor
reaction in the stock market.

A particular contribution of our approach is that we investigate if and how this market
reaction to a specific water action is moderated by the reputational advantages or disadvantages
arising out of a company’s good or bad CSR participation in the immediate past. Different CSR theories have established CSR as an important corporate resource, capable of creating unique competitive advantages (Hart, 1995; Jones, 1995; Bansal & Roth, 2000; Benabou & Tirole, 2010) and intangible benefits in the form good reputation among stakeholders (Fombrun, Gardberg, & Sever, 2000; Godfrey, 2005). Some effects of this CSR reputation have already received attention in extant literature, especially the “insurance effect” proposed by Godfrey (2009) and “diminishing marginal returns effect” proposed by Flammer (2013), both applicable in the case of positive prior reputation. Both of these studies worked with particular types of CSR, and did not look at the general CSR participation by the firm as a composite construct. In our study we look at this overall CSR participation and complete the grid of effects, highlighting the notion that a firm participating in good and/or bad CSR actions might experience positive and/or negative reputation as a result, and these may coexist given the fact that the firm may have good actions and reputation in some CSR areas and bad in others. We term these reputational effects as reputational capital and reputational liability, and propose a two-by-two matrix relating these to abnormal returns from positive and negative water actions. We also conduct additional analysis to see if the basic propositions of our matrix hold true when we look at the immediately proximate reputation from the field of water performance only.

The fundamental research question driving our research is: to what extent does a prior positive or negative general CSR reputation influence shareholders’ reactions to corporate water actions. We answer this question using announcements of water actions from S&P 500 firms in the US from 2005 to 2017. We conclude with the implications of our approach for future research on corporate water actions and the relationships between CSR and CFP.
THEORY AND HYPOTHESIS DEVELOPMENT

Investor Reaction to Responsible/Irresponsible Corporate Water Actions

The ultimate measure of shareholders’ wealth is the market value of shares, and this is determined by two primary factors: return potential of the firm and associated risk. Explanations for why CSR in general, or any particular form of it like corporate water actions, might be linked with the risk and return expectations associated with a company are rooted in the stakeholder theory of the firm (Freeman, 1984). As Jensen (2002) put it, shareholder wealth maximization and creating value for other stakeholders are not mutually exclusive. Although it might take time, a firm’s CSR initiatives would eventually be reflected in stakeholder loyalty, cash flows and a reduction in risk factors, eventually being captured in the market value of shares. A good number of CSR theorists (Hart, 1995; Jones, 1995; Bansal & Roth, 2000; Benabou & Tirole, 2010) have argued that CSR creates important competitive advantages that can lead to increase in the profit potential of corporations and/or reduction of corporate risk (Peloza, 2006; Vilanova, Lozano, & Arinas, 2009).

The same theories can be expected to apply in the specific case of corporate water actions. The World Economic Forum has ranked water crises as the second most severe risk that the business community faces in terms of impact (Howell, 2013). What makes water risk so critical is that it is not just a subset of environmental concern, but also a critical resource for carrying out business (Money, 2014). Burton (2010) separated water risk into 4 components: physical, reputational, regulatory and litigation risk. The World Business Council for sustainable development (WBCSD-SIUN, 2012) went into further details and grouped business threats related to water into 5 main groups: financial, resulting from increasing investor awareness and preference that may lead to restricted access to capital, higher interest rates, etc.; operational, resulting from increase in production costs and disruptions because of lack in smooth supply of water resources;
product, resulting from loss of customers because of increasing awareness and preference against water unfriendly products and companies; reputational, resulting from negative impacts on communities or society owing to business water related actions; and regulatory, resulting from fees, fines and lawsuits in case of water regulation violations.

While failure to perform satisfactorily across water parameters might expose organizations to these threat factors, responsible water stewardship might help organizations to turn the same factors into opportunities (Burritt et al., 2016; Jones, Hillier, & Comfort, 2015). Just like any other branch of CSR, water can be an important area where shareholders and other stakeholders expect and reward responsible actions by business organizations and penalize irresponsible actions, in accordance with the enlightened stakeholder theory of CSR (Jensen, 2002). Prior research has shown that a number of stakeholders - including suppliers, investors, rating agencies, creditors, customers, communities, government, regulatory agencies, and NGOs, have started to take interest in water related actions and disclosure by firms (Burritt et al., 2016).

The opportunities associated with water can be expected to reflect positively and the threats negatively, in the financial performance of organizations through return and risk channels (Oikonomou, Brooks, & Pavelin, 2012; Aguinis & Glavas, 2012). Due to responsible water actions the firm might experience lower costs, higher sales and increased profitability. It may also lead to the creditors having more confidence in the firm’s future potential through higher and more stable financial returns, allowing the firm better access to creditor capital and/or more favorable rates, reducing the risk and cost of equity for the equity holders. According to rational choice theory, shareholders can be expected to react positively to any possibility of higher financial returns and lower risk in the future, and negatively otherwise. If the market is efficient, the shareholders should
typically react to any event that suggests change in the risk-return expectations of a firm within a short window of time to adjust market prices.

A few studies have already investigated the market reaction to CSR events and shown that investors react immediately to the release of new information (Hamilton, 1995; Konar & Cohen, 1997; Flammer, 2013; Kruger 2015). However, no such study has been conducted in the context of water. The first hypothesis we propose for this study is therefore as follows:

*Hypothesis 1 (a): Shareholders react positively to the announcement of a responsible (positive) water action.*

In line with the previous arguments, an irresponsible (negative) water action, for example, a water pollution report, can lead to loss in reputation, brand equity, employee morale, and customer loyalty and cause other forms of negative effects on stakeholders. Also, legal costs might be involved. This might imply an induced competitive disadvantage and the share market, therefore, might react negatively to a negative water action. However, negative and positive events need to be investigated separately, and one should not be seen as the natural reciprocal of the other, as the nature and extent of the impact and share market reaction vary greatly for the two (Flammer 2013, Kruger 2015). Mattingly and Berman (2006) concluded that positive and negative CSR actions are both empirically and conceptually distinct concepts and should not be combined in future research. We therefore propose a separate hypothesis for negative events:

*Hypothesis 1 (b): Shareholders react negatively to the announcement of an irresponsible (negative) water action.*

**CSR as Reputational Capital and Liability**

Past research has shown that CSR can create competitive advantage, just like any other tangible or intangible assets/resources owned by the firm (Branco & Rodrigues, 2006; Simon, 1995). Though the company receives no explicit tangible exchange value against it, CSR can emerge as a strategic
asset in the form of “reputational capital” (Fombrun, Gardberg, & Sever, 2000) or “moral capital” (Godfrey, 2005). In this study, we take this idea forward and propose, just as a previous stock of good CSR performance can be a strategic asset, a previous stock of bad CSR performance can be a strategic liability and create negative moral or reputational capital. Drawing from here, we aim to resolve two very important questions: Firstly, can previous CSR reputational capital, or the lack of it (henceforth mentioned as CSR reputational liability), be operationalized in the context of water actions? Secondly, given a firm’s previous stock of good or bad CSR performance, how does the firm’s CSR reputational capital or reputational liability affect the consequences of one subsequent responsible or irresponsible water action?

In order to address the first question, we need to consider how the reputational capital or liability is created. As Fombrun and Shanley (1990) put it, stakeholders pick up cues from different sources like media, firms, monitoring bodies etc. and form an overall impression about the firm’s relative position in its organizational field that constitutes its good or bad reputation. Various studies have shown different extents of reputational effects posed by different CSR dimensions (Lii & Lee, 2011; Godfrey, 2009; Pirsch, Gupta, & Grau, 2006; Fombrun, 2000) depending on the type of stakeholder, nature of the CSR action, and the level of altruism signal sent out by the event. Godfrey (2009) established that institutional CSR from the fields of diversity and community create strong moral capital that provides less earnings loss in case of any kind of negative events in future; Muthuri, Matten, & Moon (2009) showed that employee involvement in community programs can enhance firm’s reputation among all stakeholders; and Lijun, Su, & Zhang (2014) demonstrated that charitable donations by firms enhance its goodwill among suppliers. So, for example, the good/bad reputation from a firm’s diversity or community programs might very well affect market reaction to a subsequent action from the field of environment or even
product/employee, and vice versa. Similarly, in order to affect market reaction to a CSR action involving water, the reputation does not necessarily have to be based on the same stream of CSR as the event, rather it could be a mix of reputational factors coming from different areas of CSR by the firm.

Coming to the second issue of how this good or bad prior reputation might affect market reaction in case of a responsible or irresponsible water action, we introduce a two-by-two matrix to summarize the hypothesized effects, as shown in Table 1 below. Details of each effect and corresponding hypothesis follow next.

Insert Table 1 about here

Effects of CSR reputational capital and reputational liability for positive water events

From the literature and theories discussed in our previous section, CSR has been claimed to create reputational capital or asset. Extending this idea, we argue that CSR can be expected to demonstrate the same characteristics as any other productive assets like financial capital or labor. We therefore propose that the theory of diminishing marginal returns for assets commonly assumed in neo-classical economics should equally apply to CSR investments as well. Diminishing returns are the decrease in the marginal output (not total output) as the amount of a single input factor or resource increases, while all other factors and inputs stay constant (Samuelson & Nordhaus, 2001). In the case of CSR, this could mean that if a firm keeps investing heavily in CSR, the marginal return from one additional CSR activity will keep decreasing after a point. Flammer (2013) provides evidence on diminishing marginal returns for environmental CSR. We extend the same notion to the reputational capital created by overall CSR participation and test whether the effect holds even when we look at a niche subset of CSR like water.
When a firm first decides to engage in CSR, it can easily go for the more obvious and easier changes in terms of effort and money commitment, and reap quick benefits out of it. It is often easier to enhance one’s CSR image when one is starting from a low base or with no prominent CSR presence. However, for a company that has already invested heavily in CSR and developed a sound reputation, it can be very difficult to reap additional benefits by doing something extra. When the CSR base and people’s expectations are already high, creating any additional incremental value requires substantial effort and investment. So, in the case of water actions, we expect that firms that are already enjoying a high CSR reputational capital will be awarded less by the stock market as a result of one additional responsible initiative in a new context such as water, and we hypothesize:

*Hypothesis 2: Shareholders react less positively to a positive water action for a firm with higher CSR reputational capital than for a firm with lower CSR reputational capital.*

Mattingly & Berman (2006), in their study based on KLD data, demonstrated that positive CSR performance (KLD strengths) and negative CSR performance (KLD concerns) are different constructs and should be investigated separately. Lack of a good CSR action, does not mean bad CSR action, and vice versa. While good CSR performance can be seen as a source of competitive advantage and lead to the creation of reputational capital, bad CSR performance can be seen as a potential source of competitive disadvantage and lead to the creation of reputational liability. It is often seen that firms with prior records of CSR concerns engage in subsequent good CSR action to discharge that reputational liability (Kotchen & Moon, 2012; Konar & Cohen, 1997). For example, whenever a firm becomes embroiled in a negative controversy or is featured in negative news like an oil spill in the recent past, the firm would have a direct impetus to change its corporate behavior in the immediate future, and shareholders would value that action more than if it seemed
to have come out of nowhere. Kruger (2015) described an “offsetting effect”, whereby shareholders reward positive CSR events that are efforts by the organization to compensate for its previous negative CSR. Shareholders can be expected to interpret such changes as a direct indication of performance improvement and react more positively than they would have had there been no direct reason for the firm to engage in the CSR. This leads to our next hypothesis:

*Hypothesis 3: Shareholders react more positively to a positive water action for a firm with higher CSR reputational liability than for a firm with lower CSR reputational liability.*

**Effects of CSR reputational capital and reputational liability for negative water events**

When it comes to negative CSR events, the reputational capital of good CSR performance can be expected to provide mitigating or hedging benefits against negative market reactions. This reputational capital does not directly generate economic or exchange value in this case, but nonetheless functions like an “insurance effect” by helping to preserve economic value (Shiu & Yang, 2015; Godfrey, 2009). Godfrey (2005) described that the moral capital created by good CSR performance helps the shareholders see the company in a more favorable light and assess its subsequent negative action less severely. Thus, he proposed that in addition to the commonly argued wealth creation features, CSR also possesses wealth protective features in case of a negative event concerning the firm or even a shock at the broader economic level.

Along a similar line, Ducassy (2013) provided evidence that CSR provides insurance-like protection in times of financial crisis in the economy; Minor & Morgan (2011) showed that CSR insures firms against loss of reputation in case of an adverse event; Peloza (2006) argued CSR can help firms withstand threats and maintain financial performance; and Bhattacharya & Sen (2004) argued CSR builds a reservoir of goodwill that can be drawn upon in times of crisis. Godfrey (2009) provided empirical evidence that institutional CSR in the field of community and diversity
provided this insurance like benefit, but that technical CSR in product and employee realms didn’t. Without going into this segregation by stakeholder type, we test the insurance-like protection offered by overall reputational capital arising out of all types of good CSR performance in the context of the firm getting involved in a subsequent negative water event:

**Hypothesis 4:** Shareholders react less negatively to a negative water action for a firm with higher CSR reputational capital than for a firm with lower CSR reputational capital.

We extend the same argument to claim that reputational liability creates negative goodwill and additional risk factors for investors. This may lead to more severe or more negatively biased assessments of the firm when it gets involved in one additional negative event. Firms that already have a poor track record with regard to CSR and have raised previous concerns can be expected to be under more public scrutiny and the condemnation by stakeholders can be expected to be more severe the higher the previous levels of misdeeds. Works in behavioral decision theory have already established that social or environmental risk is an active component of the set of comprehensive risk evaluated by investors at the time of assessing a company, arising out of different sources like future cost-benefit analysis, social dilemmas, etc. (Vleka & Keren, 1992). According to the asset valuation principles of finance, any additional risk exposure for the investors, without potential for increasing returns, must compensate them accordingly through lower prices, that is, the intrinsic value of the instrument goes down. For example, a firm that is low on liability can expect to acquire additional debt easily and on more favorable terms, while firms that are already burdened with high liability will have difficulty acquiring further debt and have to pay high rates for it to compensate for the risk associated with high leverage. Reputational liability, being a liability after all, can be expected to warrant similar psychology and effects because of the risks associated with it. While people might take one or two negative deeds lightly,
repeat mistakes will generate higher penalties. Therefore, any further negative CSR event regarding the firm will be penalized at a higher rate. We term this as a punitive effect and propose the following hypothesis:

_Hypothesis 5: Shareholders react more negatively to a negative water action for a firm with higher CSR reputational liability than for a firm with lower CSR reputational liability._

**DATA COLLECTION AND METHODOLOGY**

**Sample Construction**

We used the S&P 500 firm list as on September 8, 2017 (S&P 500 Companies by Weight, 2017) to construct the sample. S&P 500 firms cover a market capitalization of about 70%-80% of the total US stock market and this sample selection also ensures good data availability from all sources. The sample period started from 2005 and went up to June 2017. We took 2005 as our starting year because Trucost started providing water data that year, reflecting increased awareness of water actions and accountability around that time.

The first step of the event study was to identify and record important water events related to the sample firms over the sample period. The entire dataset of water events used in this study was constructed from scratch using FACTIVA, a business information and research tool owned by Dow Jones & Company. Two topmost international journals for business and financial news, The Wall Street Journal (WSJ) and The Financial Times (FT), were accessed through FACTIVA. The journals were selected considering their credibility, significant global reach and impact factor. We thoroughly searched both newspapers using a combination of different keywords that helped identify the articles related to particular water issues or events. We systematically combined one company name at a time with each keyword so that we could clearly identify water events that got featured against each specific company. The keywords used are: flood, drought, oil spill, hazardous waste, toxic, radiation (when the words appeared in the same paragraph as water);
contamination, pollution, recycling, treatment, preservation, reduction, consumption, scarcity, shortage, usage, efficiency, waste (when any forms of the words appeared within 3 words of water); safe water, fresh water, clean water, used water (when the words appeared anywhere in the article).

Each reported event was against a specific company name, so in case an article featured multiple companies at the same time, multiple entries, one for each company, were made. If the article mentioned or did a general feature on an important water topic, like hydraulic fracking, green investing, or similar, relating to a company-specific event that took place earlier but was not reported at that time, we further investigated to reveal the exact date associated with the event from other sources in FACTIVA. If events could be traced, then we recorded it against the original date.

We looked at only those positive or negative CSR actions by organizations that involved some sort of impact on water resources, and we carefully read through the retrieved articles and assessed for the context in which the keywords appeared. Negative activities in this regard included activities like polluting or contaminating water, water inefficiency, and depletion of water resources, while positive activities included examples like water efficient processes and products, water treatment, or supplying fresh water to communities. Based on the nature of the retained events in our sample, we generated a new classification of three broad categories of water events:

- **Water usage and savings**, including, but not limited to, product or process related water efficiency/inefficiency and water saving/depletion captured through keywords like water preservation, usage, consumption, reduction, scarcity, and shortage.

- **Contribution to, or refraining from, water pollution/contamination**, captured through keywords like oil spill, toxic/hazardous waste, contamination, pollution, and radiation.
-Charity or voluntary actions, with regard to the provision of clean water, cleansing of water bodies, or fighting for any other water related issues, captured through keywords like flood, drought, clean/fresh/safe water, recycling, and treatment of water.

Initially, our search generated a sample of 570 events from 120 companies. Each of these events was scrutinized individually and further screening was done in three stages. Firstly, events which could not be traced back to a single non-dubious date of occurrence were removed; Secondly, the retained articles were checked for confounding messages - if an article contained a mix of both positive and negative notes, or the article talked about multiple aspects like financial and environmental performance, the article was removed. Lastly, in some cases, especially, in cases of some form of legal or regulatory suits, many of the recorded events were found to be trailing from a previous big mishap like a spillage or water contamination, as the media kept featuring updates for some time after the event. In follow-up events like these, we exercised careful judgment to decide if the subsequent news published in the wake of a big event introduced substantial new information with regard to the event. If not, the event was discarded. After applying all these filters, we ultimately ended up with 294 events from 77 companies during the period 2005 to June 2017.

Event Study Specification
The main dependent variable of interest in this study is cumulative abnormal returns (CAR) following an event. We use market model to calculate CAR, and report market model CAR throughout our main analysis. For robustness, we also replaced the market model CAR with Fama-French 3 factor model\(^1\) CAR, and report the results in Table 7.

\(^1\) Fama–French three-factor model is a common model in Finance widely used to describe stock returns, designed by Eugene Fama and Kenneth French. It accommodates 3 additional factors while calculating abnormal returns of stocks - (1) market risk, (2) the outperformance of small versus big companies, and (3) the outperformance of high book/market versus small book/market companies.
The event date, denoted as “day 0”, was taken to be the date a news article was published in the chosen journals. The common approach in the finance literature is to expand the event window to include a few days before and after the news publication, to cater to the fact that some market adjustment begins to take place even before the actual news publication due to information spillage, but that the full market adjustment needs some time to sink and settle. The windows usually range from 2 to 21 days, depending on the nature of the study, but longer windows are riskier as other events might creep in the window period and dilute the results of the event being monitored. McWilliams & Siegel (1997) provided details on the theoretical and empirical issues of event studies. We used a reasonable window of 3 days (-1, 1) to estimate CAR in the base regression model. But, both a shorter window (-1, 0) and a longer window (-2, 2) were used for robustness checks and qualitatively produced the same results, though weaker in some cases.

**Regression Specification**

The main objective of our study is to see how the stock market reacts to a given responsible or irresponsible corporate water action, and how this reaction is moderated by the extent of reputational capital or liability built by the firm’s previous record of overall good or bad CSR performance. The cumulative abnormal returns (CARs) calculated over the 3-day window remain our dependent variable all throughout. To test for the effect of the CSR reputation, we used the following regression model:

\[
\text{CAR}_{ij} = \alpha + (\beta \times \text{Reputational Capital}_{i}) + (\gamma \times \text{Reputational Liability}_{i}) + \theta' X_{ij} + \varepsilon_{ij}
\]

Here \(i\) indexes firms and \(j\) indexes events, and \(\text{CAR}_{ij}\) represents CAR against each firm-event combination calculated over the 3 day window; \(\alpha\) is the constant, \(\beta\) and \(\gamma\) are the two coefficients of interest against our two main independent variables, reputational capital (good CSR performance) and reputational liability (bad CSR performance), respectively. \(X\) is a vector of control variables and \(\varepsilon\) is the error term. Ordinary least squares (OLS) regression method was used.
and the error variance was clustered at industry level. Following are the details on each variable that was used in the regression, and how they were calculated:

**Main independent variable**

In order to test hypothesis 2 to 5, the independent variables needed to be a reasonable measure of the previous records of good or bad CSR participation by the firm that could act as proxies for the reputational capital and reputational liability of the firm. In order to determine the level of CSR performance we used KLD ESG data by MSCI - a data set with annual snap-shots of the environmental, social, and governance performance of publicly listed US firms, and one of the most widely used source of CSR data in the extant literature (Cheng, Ioannou, & Serafeim, 2014; Flammer, 2013; Godfrey, 2009; Kruger, 2015, etc.). The CSR ratings are calculated by KLD analysts based on a comprehensive set of available information like news stories, press materials, other forms of published events, government and private databases and company interviews. KLD STATS assigns scores against CSR performance of firms across 7 key ESG stakeholder issue areas: community, corporate governance, diversity, employee relations, environment, human rights, and product. Under each of these issue areas, there are multiple indicators of CSR strengths and concerns, specified separately, against which KLD STATS issues a binary score, with a “1” representing the presence of a strength/concern and “0” the absence. Whenever a firm engages in a good CSR action from any area, say starting a charity school for community development, it gets recorded as “1” under one of the strength indicators, in this example, which may be “education” under the community heading. Similarly, any bad CSR action, say encroaching on a community land, gets recorded as “1” against a concern indicator under community. Total strength and concern from each of the issue areas can be derived simply by summing up the score against each indicator.
under that issue area, and the sum against all seven CSR areas provide composite scores for total CSR strength and concern.

The total strength and concern scores, therefore, can act as good proxies for representing previous records of good and bad CSR actions, and can serve as indicators of the firm’s overall reputational capital and liability on an annual basis. The advantage of using KLD data is that it recognizes that the same firm might be having good performance and reputation in some CSR issue areas and bad in others simultaneously, and so we get parallel strength and concern scores. A one-year lag was used for these variables because the immediate past scores are likely to form the latest and most relevant reputational image that the investors likely carry in their minds.

Since all the firms in our sample came from the S&P list, which contains the biggest US companies in terms of market capitalization, and then the events were picked from two of the topmost international business journals - considering audience and impact factors, all firms covered in the sample events were of a substantial size and standing. While differentiating between them in terms of CSR performance, we used high-low dummies for both strength (reputational capital) and concern (reputational liability) based on a cutoff point, as that proved more effective than using continuous scores. In their research insight report for MSCI, Giese & Nagy (2018) showed that the market reacted less severely to new positive or negative information for companies that did not have extreme CSR scores, that is, when the score was neither very low nor very high. So, the effects we propose in hypothesis 2 through 5 can be expected to be best demonstrated when the difference between the high-low groups in our reputation dummies is substantial.

We, therefore, used the bottom decile (10%) as the cutoff point, and defined those firms with CSR strengths and concerns below their corresponding decile values as the low group in reputational capital and reputational liability, respectively, and high group otherwise. The bottom
decile strength and concern scores were calculated based on all our sample firms over the entire sample period. These dummies based on CSR strength and concern scores from the year before an event (1-year time lag) were the main independent variables used in our regression model. In our results table we consistently term these as “high strength” and “high concern” dummies and use them as proxies for high reputational capital and liability.

For robustness checks on our base regression model, we used an alternative measure for absolute CSR strength and concern score from KLD, which we called the adjusted score, and formed our independent variable dummies based on these scores. The number of strength and concern indicators under each of the KLD issue areas may vary from year to year, as new indicators might be added or some of the old indicators might be dropped or changed. Also, the number of indicators used may vary across companies, as there might be some indicators that apply to and are evaluated for some but not others. The absolute CSR score, which is simply the summation of all these strength and concern points, may therefore not be reliably comparable across years or companies (Deng, Kang, & Low, 2013; Mănescu, 2011). For example, if company A is evaluated against 5 strength indicators and scores a ‘1’ against 3 of them, and company B has only 4 strength indicators that apply and scores “1” against 3 of them as well, in absolute terms both have the same score, but in percentage terms B’s score should be higher. In order to adjust for these possible anomalies that could be caused by using the absolute summation of points, we used the methodology employed by Deng et al. (2013). We divided the strength and concern score for each company by the respective number of strength and concern indicators that the company was evaluated against in that year, hence getting rid of the bias caused by the number of indicators. Then we used the weight-adjusted strength and concern scores to form the dummies based on corresponding bottom decile, as discussed above.
Another robustness check was applied by using a different cut off point for high-low reputational capital and liability grouping in our base regression model. We still used the bottom decile, but this time calculated it using the subsample of firms and years we had in our event sample list (this is a different value because not all firms have events in all years). Also, we calculated the deciles separately for firms involved in positive and negative events. This gave us higher decile values than the one we used in our base regression mode, and the dummies were then formed accordingly.

We also produced an auxiliary set of results using Trucost data for our measure of CSR reputational capital. Trucost has been providing different water use data starting from 2005, currently covering about 93% of global markets by capitalization and widely in use by investors and other stakeholders (Trucost, 2015). Water consumption data from Trucost helped to provide a proxy for reputation from the immediate CSR field of water, so that we could verify if the results were compatible with what we got for general reputation in overall CSR performance. However, Trucost does not provide strengths and concerns separately, and we could not form two separate independent variables for reputational capital and liability, but rather had to use one single reputational estimate based on water performance by firms.

We used the water consumption data provided by Trucost on an annual basis, specifically the water intensity ratio, which is calculated by dividing water processed and purchased by the revenue of a company. This helped to neutralize any firm size effects and associated water use impacts. To further reduce the problem of size and type of industry on water consumption, we used percentage change in water intensity, and to get rid of any yearly anomalies, we calculated the change over the last 2 years before an event. Trucost being continuous data, we had more flexibility in deciding the cut off for the reputation dummy. We used a median split to group firms into a
single high-low reputation dummy that we used as independent variable in our auxiliary regression.

**Control variables**

We controlled for a number of variables in our regression models. First of all, we controlled for time and industry fixed effects by using time and industry dummies, and also their interaction. Time was the year in which the water event took place and industry was captured at the 2-digit SIC code level. Our vector of control variables $X_i$ also included a standard measure of profitability, return on assets, calculated by dividing net income by total assets, and a standard measure of risk, leverage, calculated by dividing total liabilities by total assets. Next, we included control for Tobin's q using the calculation: $(\text{equity market value} + \text{liabilities market value}) / (\text{equity book value} + \text{liabilities book value})$. This helps us understand the market value of the firm, relative to its asset replacement cost, and works as a good indicator of firm stock market performance. We also controlled for firm size taking the natural logarithm of sales, and age, taking the natural logarithm of number of years since the formation of the company, as both these variables may be related with stock market reaction. Lastly, how the market reacts to the release of a new company related information can also be expected to depend on the number of analysts following a company and the S&P issuer credit rating. The former gives a direct indication of how much scrutiny the company is under, and the latter reflects the company’s reliability, trust and credit worthiness. We took the natural logarithm for number of analysts as well, to smooth out the extreme differences in numbers.

The industry codes and all the other control variables, except number of analysts, were extracted from Standard and Poor’s Compustat. Thomson Reuter’s data platform Eikon provided the number of analysts following a firm. All variables were lagged for one year, the data for the
fiscal year preceding an event were taken, to reflect the company’s position prior to an event and aligning with the timeframe for which the KLD score was taken.

RESULTS AND FINDINGS

Stock Market Reaction to Positive and Negative Water Events

We initially started off with 294 events from our sample collection. But, two of our important control variables – number of analysts following a firm and S&P issuer rating had missing data for 37 of our observations. Table 2 provide by year and by industry summary of our core set of 257 events, showing that there is a good spread of events over time and across industries.

In order to test hypothesis 1 (a) and 1 (b) we analyzed if the cumulative abnormal returns (CARs) following responsible (positive) and irresponsible (negative) water actions are significantly different from 0 over different CAR calculation windows, the results of which are shown in Table 3. The mean CAR is positive for positive events and negative for negative events over all three windows, and the results are all significant at a 1% level, validating that there was a significant positive market reaction and abnormal rise in share price following a responsible water event and significant negative market reaction and fall in share price following an irresponsible water event.

Effects of Reputational Capital and Liability on Market Reaction

Next, we estimated the reputational capital and liability of the sample firms using their last year CSR strength and concern scores by KLD. We formed high strength and high concern dummies based on these scores, using the decile cut off point. In order see if these strength and concern dummies show any substantial difference in CAR between the high and low groups in case of a positive or negative water event, we ran univariate tests, the results of which are shown in Table
4. As we can see from Table 4, in the case of a positive water event both high and low strength groups experienced positive market reaction, by 37 basis points and 432 basis points respectively. The CAR for low strength was however significantly higher by 395 basis points compared to high strength, validating grounds for hypothesis 2 that firms which already have strong reputational capital because of high CSR strengths earn less CAR due to diminishing marginal returns, compared to their counterparts who have weaker reputational capital because of low CSR strengths. But when the high strength firms got involved with a negative water event, the high CSR strength provided them with insurance coverage, as proposed in hypothesis 4, and they experienced a smaller fall in share price - only 50 basis points, compared to the firms who had low CSR strength and, thereby, had a fall of 262 basis points. This difference of 212 basis points is highly significant.

For firms with high concern, when they took a positive water action they were rewarded by the market with a CAR of 51 basis points, which was significant at 5%, providing some support for the offsetting effect stipulated in hypothesis 3, but their low concern counterpart did not see significant increase in share price. In the case of a negative water event, however, both the high concern firms and low concern firms received negative market reaction, though the CAR for the high concern firms carried higher significance giving us reasons to believe the punitive effect proposed in hypothesis 5 holds true. To further explore our hypothesis and validate the indications from univariate analysis, we applied multivariate regression.

Regression results

First, we provide summary statistics of the continuous variables used in our multivariate analysis and the correlation coefficients between them in Table 5. None of the standard deviations or correlation coefficients are high enough to be a cause of concern.
Moving onto our regression model, we regressed the cumulative abnormal returns on a three-day window, from positive and negative events separately, on our list of control variables and our main two dummies of interest. Table 6 shows our main regression results. We conducted three regression models for robustness. In the first model, we controlled for only industry fixed effects by using industry dummies represented by 2-digit SIC industry codes. In the second, we controlled for both industry and time fixed effects by taking dummies for industry and year of event. Finally, in the third model, we controlled for industry and time interaction as well as individual industry and time dummies.

In the case of positive events, we can see the high strength group consistently experienced lower CARs than their lower strength counterparts and this difference was highly significant in all three models. This provides support for hypothesis 2 that reputational capital built through high CSR strengths exhibit diminishing marginal returns, and that the share market reacts less positively to a positive water initiative by the high strength group than it does for the low strength group. The CAR for high strength firms is lower by 410 basis points than for low strength in model 3, which we will refer to as our base model in the remainder of this section. When we look at the reputational liability of firms in the case of a positive event, the high concern group with more reputational liability is seen to have earned significantly more CAR in all scenarios, higher by 480 basis points in the base model, with respect to the low concern group, providing evidence for hypothesis 3.

Coming to negative events, the insurance effect of reputational capital as proposed in hypothesis 4 can be observed to protect the high strength group, as their CARs in all three models were much higher than their low strength counterparts, with the difference amounting to 190 basis points, and carrying high significance. The CARs were still negative on average of course, as we
saw in our univariate tests, but the fall in share price (negative CAR) was lower for the high strength group than for low strength. Finally, when we turn to the high concern groups in case of negative events, we see that they do experience lower CARs than low concern in case of our base model by 150 basis points, when we fully accommodate all our controls including industry and time interactions. This can be attributed to the bigger burden of reputational liability for the high concern group and validates the premise of hypothesis 5. However, this punitive effect appears to be weaker and the least robust of the four effects, and meaningfully so. When a company has reputational liability people can be expected to react negatively to further negative actions, sometimes perhaps not caring so much about how high or low the previous concerns were, that is, how big the reputational liability was. However, in most of our robustness tests as reported next, the punitive effect does turn out to be strong, giving us grounds to believe it does exist, but may be on a more limited scale than the other three effects. All these results hold qualitatively when we apply alternative 2-day and 5-day windows.

Robustness and alternative models

In order to check the robustness of our main regression results, first of all we used the Fama French three-factor model to calculate the cumulative abnormal returns instead of the market model as shown in Model 1 Table 7. The results are consistent with those from our base model in Table 6, showing significant differences between high and low strength, and high and low concern, in favor of all four effects proposed in hypothesis 2 to 5.

Then we used a different measure for strength and concern score calculation, the adjusted KLD score. Instead of taking a simple addition of the strengths and concerns across the seven CSR issue areas, we weighted the individual scores for the number of indicators under each issue area
to calculate the overall CSR strength and concern score. This is supposed to be less biased to any one particular issue area and work as a better indicator of CSR performance and reputation. Then we did the high concern and high strength grouping in the same manner we did before, using population decile cut-offs. Model 2, Table 7 shows the results when we used this measure. We get significant differences in CAR between high and low strength and concern groups, in support of the diminishing marginal returns, offsetting effect and insurance effect stipulated in hypothesis 2 to 4. Only the punitive effect in hypothesis 5 loses significance.

Finally, we tried a different cut-off point for defining our high strength and high concern dummies, getting a different mix of firms under the high-low groups for strengths and concerns. We used a subsample decile cut off point (see the methodology section for details of the calculation). The results are shown in Model 3 Table 7, and reveal significant differences to provide evidence for hypothesis 2, 4, and 5, only excepting the offsetting effect in hypothesis 3.

Overall, the differences in CAR between our high strength and high concern dummies are significant over different scenarios and the results remain very robust. However, of the four effects, the diminishing marginal returns and insurance effects seem stronger and more robust than the offsetting and punitive effects, suggesting that the difference in CSR strength and the subsequent high or low reputational capital matter more in the share market and bring about more differences in CAR than differences in CSR concerns and subsequent high or low reputational liability.

Auxiliary Results using Trucost

So far we have looked at the overall CSR reputational capital and liability of a company arising out of its CSR strengths and concerns provided by KLD. We also carried out some auxiliary tests using water consumption data from Trucost to check if previous performance from the immediate
CSR field of water creates enough reputational benefit or disadvantage to produce results compatible with what we got for general CSR strengths and concerns. Though Trucost data does not provide separate indications of strengths and concerns, the water performance indicated through its water consumption data can be used as a reasonable basis to group companies into high and low groups of water performance as a proxy for net water reputation. So, instead of using separate variables for reputational capital and liability, we could only use a net measure of water reputation and we checked if that has any connection with the way the market reacts to a subsequent positive or negative water action.

Table 8 shows our regression results using the 3-day CAR as the dependent variable and the same set of controls as in our base model for KLD. The main independent variable is changed to a single high water performance dummy based on median cut-off of Trucost’s score of all sample firms over the entire sample period. Errors are clustered at three-digit SIC industry code. The number of observations is different than in the KLD model because some firm-years that were included in our previous analysis had missing data for Trucost.

The results show that the high water performance group experienced lower CARs than the low water performance group, and the difference is significant in the case of positive events. This indicates that diminishing marginal returns are strongly evident even when we look at the immediately proximate reputation in the field of water and use a net water reputation measure from Trucost. Similarly, for negative events, the insurance effect is strongly evident and significant, as high water performance group enjoyed higher CARs, that is, less fall in share price, than their low performance counterpart.
DISCUSSION

Although prior research has used event study methodologies to some extent in exploring the market reaction to CSR events in different contexts, ours is the first study of which we are aware that tests these effects in the context of corporate water actions. In fact, despite the immense importance of water as a business and natural resource, and growing awareness among all stakeholders about the different risks and opportunities associated with effective water strategies, very little empirical work has been conducted to date to quantitatively monitor the financial impact of water CSR. In response, our study analyzed a carefully constructed event set from FACTIVA through extensive keyword search and contextual study, to monitor stock market reaction to a responsible (positive) or irresponsible (negative) water action. The findings show that the market does react positively to a positive water action, and negatively to a negative water action. This demonstrates, just like any other branch of CSR, water deserves to be considered and incorporated in the CSR strategies of organizations in its own right, not only because it is morally good to do so, but also because it can offer strategic advantages and financial payoffs in the form of higher abnormal market returns. This finding should encourage firms to be more aware of their water actions and engage more responsibly, and also go for more transparent reporting and disclosure.

Next, we argued that since extant literature provides enough evidence that CSR, on a general level, can create competitive advantages and that bad CSR, or social irresponsibility, can lead to the creation of competitive disadvantages, this idea can be extended to the creation of reputational capital and reputational liability. Overall, the stakeholders can be expected to carry a good reputation in their minds based on the aggregate level of positive CSR the firm engages in, and bad reputation based on aggregate level of negative CSR. And both these good and bad reputations may coexist, as the firms might be doing good in some areas and bad in others. KLD
CSR data that scores companies against both strengths and concerns separately and simultaneously serves as an indicator of this fact. We argue that just as a company can have both assets and liabilities at the same time and experience different effects out of them, the CSR strengths and concerns of firms can proxy for reputational capital and reputational liability arising out of good and bad CSR engagement. We proposed a two by two matrix proposing four distinct effects of this reputational capital and liability, and how it affects market reaction when firms engage in one subsequent positive or negative action.

We tested our proposed matrix in the context of positive and negative corporate water actions. Our empirical analysis provides evidence in favor of these four effects: diminishing marginal returns, offsetting effect, insurance effect, and punitive effect. Though some previous studies like Flammer (2013), Godfrey (2009) and Kruger (2015) discussed one or more of these effects, the contexts were very different and the studies focused on various specific areas of CSR, but not water or the overall reputational effects of general CSR as a composite measure. One of the main directions for future research specified in Flammer’s (2013) paper, which worked with environmental CSR, was to investigate if and how the diminishing marginal returns and other effects that her paper demonstrated applies to CSR in general. We answered this call, and investigated the impact of aggregate levels of reputational capital and liability arising out of all kinds of CSR, asking if general CSR reputation influences market reaction in the context of a very niche segment of CSR – water.

Our answer is very much affirmative. In the case of positive water events, high reputational capital attracted lower positive CAR than low reputational capital (diminishing marginal returns), and high reputational liability fetched higher positive CAR than low reputational liability (offsetting effects). This does not mean that companies do not have incentives to invest in
incremental CSR, it simply means CSR does bring returns, but like all other investments, after a point the return increases at a decreasing rate according to economic theory. And for those firms with high CSR reputational liability, they have high incentives to improve their CSR performance and engage in positive actions as the market will encourage and reward them heavily for it.

Coming to negative water events, firms with high CSR reputational capital received strong insurance benefits as their fall in share price was much less (higher CAR) than that for firms with low reputational capital, once again providing strong incentive for investment in CSR. And finally, firms with the high burden of reputational liability were penalized more heavily by the stock market than those with low reputational liability, highlighting the demerits of having CSR concerns.

We obtained similar results when we looked at the water consumption data from Trucost as an indication of water reputation to represent the immediate field of CSR from which the sample events originated. This indicates that no matter what the scope of previous CSR, whether we define it narrowly or widely, if a firm has done good it is duly noted in stakeholder’s minds and contributes towards building and management of reputational capital and liability that can influence market reaction in the case of a subsequent positive or negative CSR action, from related or unrelated field.

Of course, our study has its own limitations. First of all, event studies by their very nature means only analyzing short-term market impacts. Analyzing the long-run financial impact of water CSR is an underexplored area that could provide an important direction for future research. Commonly used long-term firm performance measures like return on assets, free cash flow, Tobin’s Q, etc., that have been investigated with relation to CSR, can now be explored in the context of corporate water actions only. Secondly, we looked at a small sample of S&P 500
companies. A bigger and more heterogeneous sample of firms might help establish better and clearer differences between high and low CSR performers and subsequent reputational capital and liability. Also, future research could consider whether the effects we have uncovered only apply to very large or publicly visible firms. Lastly, the two by two matrix of reputational capital and liability put forward by this study, which we only tested in the context of corporate water actions, can have much bigger implications and testing these effects for all CSR issue areas, separately or on an aggregate level, could reveal very interesting findings for the future.

**CONCLUSION**

This study not only establishes the strategic and financial importance and stock market pay offs for corporate water actions, but also provides evidence that general CSR can be an important strategic asset that can work as both reputational capital and reputational liability. This CSR reputation has strong effects that can influence market reactions when firms undertake subsequent positive or negative CSR actions, even in a niche field like water. Our findings are useful to future researchers, providing new directions and focus for the study of corporate water actions. Corporate strategy and policy makers might also find this work useful when planning and optimizing the firm’s general CSR activities and specific water actions. Lastly, and most importantly, this research corroborates that general CSR, and specific corporate water actions, have important market and financial implications, and should help to convince all direct and indirect stakeholders of the market value of CSR actions.
# TABLES

## Table 1: Effects of CSR Reputational Capital and Liability on Market Reaction to Corporate Water Actions

<table>
<thead>
<tr>
<th>CSR Reputational Capital ($x_1$)</th>
<th>Market Reaction to Positive Water Actions ($y_1$)</th>
<th>Market Reaction to Negative Water Actions ($y_2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Diminishing Effect:</strong> negative relationship between $y_1$ and $x_1$</td>
<td><strong>Insurance Effect:</strong> positive relationship between $y_2$ and $x_1$</td>
</tr>
<tr>
<td>CSR Reputational Liability ($x_2$)</td>
<td><strong>Offsetting Effect:</strong> positive relationship between $y_1$ and $x_2$</td>
<td><strong>Punitive Effect:</strong> negative relationship between $y_2$ and $x_2$</td>
</tr>
</tbody>
</table>

## Table 2: Sample description

Distribution of water events from 2005 to June 2017. MVE is market value of equity in millions.

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Events</th>
<th>Positive Events</th>
<th>Negative Events</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>Avg. MVE</td>
</tr>
<tr>
<td>2005</td>
<td>12</td>
<td>4.67%</td>
<td>146558</td>
</tr>
<tr>
<td>2006</td>
<td>12</td>
<td>4.67%</td>
<td>85385</td>
</tr>
<tr>
<td>2007</td>
<td>24</td>
<td>9.34%</td>
<td>136359</td>
</tr>
<tr>
<td>2008</td>
<td>14</td>
<td>5.45%</td>
<td>87344</td>
</tr>
<tr>
<td>2009</td>
<td>14</td>
<td>5.45%</td>
<td>161378</td>
</tr>
<tr>
<td>2010</td>
<td>29</td>
<td>11.28%</td>
<td>83875</td>
</tr>
<tr>
<td>2011</td>
<td>32</td>
<td>12.45%</td>
<td>126551</td>
</tr>
<tr>
<td>2012</td>
<td>16</td>
<td>6.23%</td>
<td>154514</td>
</tr>
<tr>
<td>2013</td>
<td>16</td>
<td>6.23%</td>
<td>177624</td>
</tr>
<tr>
<td>2014</td>
<td>29</td>
<td>11.28%</td>
<td>94253</td>
</tr>
<tr>
<td>2015</td>
<td>33</td>
<td>12.84%</td>
<td>114834</td>
</tr>
<tr>
<td>2016</td>
<td>20</td>
<td>7.78%</td>
<td>185551</td>
</tr>
<tr>
<td>2017</td>
<td>6</td>
<td>2.33%</td>
<td>211035</td>
</tr>
</tbody>
</table>

Water Events across all years: 257 events, 100% of events, Avg. MVE: 127565, 100%, 143138, 100%, 115027
Panel B: Frequency of water events by broad SIC Divisions

<table>
<thead>
<tr>
<th>Industry</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>T−Stat</th>
<th>Diff. of Mean</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>T−Stat</th>
<th>Diff. of Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining</td>
<td>60</td>
<td>23.35%</td>
<td>34357</td>
<td>20</td>
<td>16.39%</td>
<td>40</td>
<td>29.63%</td>
<td>33013</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>1</td>
<td>0.39%</td>
<td>2821</td>
<td>0</td>
<td>0.00%</td>
<td>1</td>
<td>0.74%</td>
<td>2821</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>115</td>
<td>44.75%</td>
<td>151347</td>
<td>62</td>
<td>50.82%</td>
<td>53</td>
<td>39.26%</td>
<td>171190</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation, Communications, Electric, Gas,</td>
<td>21</td>
<td>8.17%</td>
<td>46449</td>
<td>5</td>
<td>4.10%</td>
<td>16</td>
<td>11.85%</td>
<td>30201</td>
<td></td>
<td></td>
</tr>
<tr>
<td>And Sanitary Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retail Trade</td>
<td>18</td>
<td>7.00%</td>
<td>121402</td>
<td>4</td>
<td>3.28%</td>
<td>14</td>
<td>10.37%</td>
<td>130866</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finance, Insurance, And Real Estate Services</td>
<td>6</td>
<td>2.33%</td>
<td>252856</td>
<td>5</td>
<td>4.10%</td>
<td>1</td>
<td>0.74%</td>
<td>296774</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Classifiable</td>
<td>12</td>
<td>4.67%</td>
<td>206652</td>
<td>9</td>
<td>7.38%</td>
<td>3</td>
<td>2.22%</td>
<td>125177</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Events across industries</td>
<td>257</td>
<td>100%</td>
<td>127565</td>
<td>122</td>
<td>100%</td>
<td>135</td>
<td>100%</td>
<td>115027</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Cumulative Abnormal Returns over Different Windows

CARs over different calculation windows using the market model, reported in %.

<table>
<thead>
<tr>
<th>CAR Window: (−1,0)</th>
<th>Positive Events</th>
<th>Negative Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>122</td>
<td>0.48***</td>
<td>3.04</td>
</tr>
<tr>
<td>135</td>
<td>−0.49***</td>
<td>−3.70</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAR Window: (−1,1)</th>
<th>Positive Events</th>
<th>Negative Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>122</td>
<td>0.54***</td>
<td>2.70</td>
</tr>
<tr>
<td>135</td>
<td>−0.71***</td>
<td>−4.07</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAR Window: (−2,2)</th>
<th>Positive Events</th>
<th>Negative Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>122</td>
<td>0.78***</td>
<td>2.88</td>
</tr>
<tr>
<td>135</td>
<td>−0.74***</td>
<td>−2.91</td>
</tr>
</tbody>
</table>

*p < 0.10
**p < 0.05
***p < 0.01

Two-Tailed Tests

Table 4: CAR comparison between High and Low CSR Strength/Concern Group based on Past Performance

The CARs were calculated over (−1, 1) using the market model, and are reported in %. The values in parentheses are the t values. The High/Low Strength and High/Low Concern groups were based on the bottom 10% cutoff point.

<table>
<thead>
<tr>
<th>Positive Events</th>
<th>Negative Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Mean</td>
</tr>
<tr>
<td>117</td>
<td>0.37***</td>
</tr>
<tr>
<td>5</td>
<td>4.32***</td>
</tr>
</tbody>
</table>

* p < 0.10
**p < 0.05
***p < 0.01

Two-Tailed Tests
Table 6: Regression Analysis of Cumulative Abnormal Returns (-1,1)

We controlled for high strength and high concern dummies, as proxies for reputational capital and liability, respectively. All control variables were lagged for 1 year. Values for size, analysts, and age are in logarithm. The values in parentheses are the t values.

<table>
<thead>
<tr>
<th></th>
<th>Positive Events</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std. Dev.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>High Strength</td>
<td>−0.031***</td>
<td>−0.030***</td>
<td>−0.041***</td>
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<tr>
<td></td>
<td>(−6.1)</td>
<td>(−5.39)</td>
<td>(−3.08)</td>
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<tr>
<td>High Concern</td>
<td>0.021*</td>
<td>0.027***</td>
<td>0.048***</td>
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<td></td>
<td>(1.94)</td>
<td>(3.01)</td>
<td>(2.88)</td>
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<tr>
<td>Profitability</td>
<td>−0.022</td>
<td>−0.063</td>
<td>0.003</td>
<td>−0.015</td>
<td>0.044</td>
<td>0.105***</td>
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<tr>
<td>Leverage</td>
<td>0.016</td>
<td>0.014</td>
<td>0.072</td>
<td>0.022</td>
<td>0.041***</td>
<td>0.083***</td>
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<tr>
<td>Tobin's Q</td>
<td>0.005</td>
<td>0.006</td>
<td>0.006</td>
<td>−0.002</td>
<td>−0.006**</td>
<td>−0.010***</td>
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<tr>
<td>Size</td>
<td>0.006</td>
<td>0.003</td>
<td>0.006</td>
<td>0.0010</td>
<td>0.002</td>
<td>0.004</td>
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<tr>
<td>No. of Analysts</td>
<td>0.004</td>
<td>−0.016</td>
<td>0.066</td>
<td>−0.010**</td>
<td>−0.012*</td>
<td>−0.008</td>
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<tr>
<td>Age</td>
<td>−0.007*</td>
<td>−0.008***</td>
<td>−0.002</td>
<td>0.0020</td>
<td>0.001</td>
<td>0.001</td>
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<tr>
<td>S&amp;P Credit Rating</td>
<td>−0.005**</td>
<td>−0.002</td>
<td>−0.005</td>
<td>−0.001</td>
<td>−0.001</td>
<td>−0.000</td>
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<tr>
<td>Time</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Industry</td>
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<tr>
<td>Time &amp; Industry Interaction</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Observations</td>
<td>122</td>
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<td>122</td>
<td>135</td>
<td>135</td>
<td>135</td>
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<tr>
<td>(R^2)</td>
<td>0.425</td>
<td>0.528</td>
<td>0.706</td>
<td>0.254</td>
<td>0.347</td>
<td>0.483</td>
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</tbody>
</table>

* \(p < 0.10\)

** \(p < 0.05\)

*** \(p < 0.01\)

Two-Tailed Tests
Table 7: Robustness checks on base model for regression of CAR (−1, 1)

Model 1 uses Fama-French 3 factor model for CAR calculation. Model 2 uses weight adjusted CSR strength/concern scores to form the high strength/concern dummies. Model 3 uses subsample decile as cut off point for dummy formation. The values in parentheses are the t values.

<table>
<thead>
<tr>
<th>Positive Events</th>
<th>Negative Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1 Fama French CAR</td>
<td>Model 2 Adjusted KLD</td>
</tr>
<tr>
<td>Fama French CAR</td>
<td>Adjusted KLD</td>
</tr>
</tbody>
</table>

High Strength
-0.039** (−2.7) 0.022** 0.019**
0.041*** (−3.08) 0.025*** (−2.59) 0.015** (−2.22)

High Concern
-0.054*** 0.048*** −0.005 −0.014** −0.002 −0.015**
3.32 2.88 −0.47 −2.16 −0.34 −2.49

Profitability
-0.006 0.002 0.035 0.106*** 0.077*** 0.104***
0.055 0.072 0.022 0.065*** 0.062** 0.082***

Leverage
0.004 0.006 0.002 0.010*** 0.008*** 0.010***
0.004 0.006 0.001 0.005 0.002 0.004

Tobin’s Q
0.004 0.006 0.001 0.005 0.002 0.004

Size
0.040 0.066 −0.005 −0.001 −0.015** −0.008

No. of Analysts
0.040 0.066 −0.005 −0.001 −0.015** −0.008

Age
−0.004 −0.002 −0.010 0.003 0.002 0.001

S&P Credit Rating
−0.004 −0.005 −0.002 −0.001 −0.001 −0.000

Time
✓ ✓ ✓ ✓ ✓ ✓

Industry
✓ ✓ ✓ ✓ ✓ ✓

Time & Industry Interaction
✓ ✓ ✓ ✓ ✓ ✓

Observations
122 122 122 135 135 135

R²
0.719 0.706 0.664 0.471 0.469 0.483

* p < 0.10
** p < 0.05
*** p < 0.01
Two-Tailed Tests

Table 8: Auxiliary Regression Analysis of CARs using Trucost Data

The models control for high water performance dummy as proxy for water reputation, based on water consumption data from Trucost. The values in parentheses are the t values.

<table>
<thead>
<tr>
<th>Positive Events</th>
<th>Negative Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1 Fama French CAR</td>
<td>Model 1 Fama French CAR</td>
</tr>
<tr>
<td>Model 2</td>
<td>Model 2</td>
</tr>
</tbody>
</table>

High Water Performance
−0.007** (−2.37) 0.010** (−2.59) 0.016** (−2.04)
0.019* (−1.82) −0.024 0.014

Profitability
0.047 0.060
0.000 0.016
0.005 0.002

Leverage
0.000 0.003
0.004 0.014
0.007*** 0.014***

Tobin’s Q
−0.002** −0.001 0.001** 0.001**

Size
−0.005 0.002
−0.004 0.002
−0.007*** −0.014**

No. of Analysts
0.004 0.014
−0.007*** −0.014**

Age
−0.007*** −0.014**

S&P Credit Rating
−0.002** −0.001
0.001** 0.001**

Time
✓ ✓ ✓ ✓

Industry
✓ ✓ ✓ ✓

Time & Industry Interaction
✓ ✓ ✓ ✓

Observations
121 121 126 126

R²
0.257 0.561 0.272 0.489

* p < 0.10
** p < 0.05
*** p < 0.01
Two-Tailed Tests
REFERENCES


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