Working Paper

Impact of Environmental Disaster Movies on Corporate Environmental and Financial Performance

Hyun-Do Kim[*]

Abstract

In this paper, I investigate the impact of environmental sentiment, measured by the box office performance of environmental disaster movies, on corporate environmental and financial performance of listed firms in the United States. The influence of mass media on public and investor sentiments is well documented. However, little is known about the effect of movies, although they may influence the public more than other mass media, such as television, newspapers, and magazines because people, regardless of age and gender, enjoy watching movies. Using the unique United States box office data, I find that firms significantly increase their environmental performance in the subsequent year of the release of an environmental disaster movie. More importantly, the positive relationship between corporate environmental performance and financial performance is stronger when the environmental sentiment is higher in the previous year.

Keywords: Environmental movies; corporate environmental performance; corporate financial performance; public sentiment; mass media

[*] PhD Candidate in Finance, College of Business, Korea Advanced Institute of Science and Technology (KAIST); 85 Hoegi-ro, Dongdaemun-gu, Seoul 02455, Korea; Telephone: +82-2-958-3617. Email: justgo@kaist.ac.kr

1. Introduction

People of all ages, genders, and cultures enjoy watching movies. If a person decides to watch a movie, he/she must stay in a dark and quiet space (theater) for at least an hour and focus on the movie alone. According to the 2016 Theatrical Market Statistics Report by the Motion Picture Association of America, the global box office is growing annually, and in 2016, about 71% of the population of the United States (US) and Canada—approximately 246 million people—visited a movie theater at least once. A 2002 parliamentary report on the British film industry by the United Kingdom (UK) House of Commons Digital, Culture, Media, and Sport Committee stated that approximately 20% of visitors in 2001 traveled to the UK because of the country's portrayal in films. Furthermore, for every dollar spent on films, the flow-on benefit to the economy is estimated to be $1.50 (Parliament. House of Commons, 2003).

In India, the former Prime Minister, Nehru, asserted that the influence of films is greater than that of newspapers and books combined. He further mentioned that given movies[1] often reflect the current society and social problems, they are a powerful vehicle for not only culture and leisure but also education and propaganda.

Although movies may strongly influence people and society both economically and psychologically, empirical evidence on the social and economic impact of movies is scarce, especially in the finance literature. By contrast, studies on the role of various types of mass media such as newspaper articles and news broadcasts have been conducted extensively ever since the rise of mass media in the late 20th century. The development of mass media has significantly increased access to any new information, thereby, reducing the informational

[1] To avoid confusion, movies and films are used interchangeably in this study. Further, given the availability and reliability issues, only movies that were released at the box office are considered.

friction among people. However, people can also be easily influenced by mass media, including even fake news occasionally.

In the finance literature, numerous studies examine the relationship between media and the stock market and emphasize the importance of mass media and news coverage (e.g., Klibanoff, Lamont, and Wizman, 1998; Tetlock, 2007; Tetlock, Saar-Tsechansky, and Macskassy, 2008; Fang and Peress, 2009; Engelberg and Parsons, 2011; Griffin, Hirschey, and Kelly, 2011; Dougal, Engelberg, and Parsons, 2012). These studies assume that media coverage is an exogenous event, investigating the causal effect of media coverage on stock or fund prices. Meanwhile, Ahern and Sosyura (2014) argue that firms may manage the mass media to influence their stock prices before and during critical corporate events, while Solomon (2012) and Cahan et al. (2015) demonstrate that firms intentionally manipulate their media coverage.

In addition to finance, the role of mass media is examined empirically in social and environmental literature. Hilgartner and Bosk (1988) contend that mass media is one of the key "public arenas" in which social problems are framed and where they grow. Similarly, Anderson (2009) argues that the news media plays a crucial role in promoting public and political attention to environmental issues. Boykoff and Boykoff (2007) demonstrate that journalistic norms are shaped by politics and influential newspaper and television sources in the US misrepresented the popular scientific perspective on climate, thereby, creating an information bias regarding anthropogenic climate change. Similar studies have been conducted in other countries such as Japan and China. Mikami et al. (1995) examine how mass media in Japan influenced the public awareness of the global environmental issues during and before the United Nations Conference on Environment and Development (UNCED), also known as the Earth Summit, in 1992, while Xu et al. (2016) focus on how media coverage plays an important role in the relationship between environmental violation events and shareholder's wealth in China. In addition, Olsen, Carstensen, and Hoyen (2003) and Brown and Minty (2008) show that media coverage of environmental disasters has a dramatic impact on humanitarian assistance such as donations.

The effect of mass media in many different areas has also been studied extensively. Murray (2017) highlights that how media reports mass killings inspire future killers. Eggermont (2006) and Vandenbosch and Eggermont (2012, 2014) illustrate that exposure to a certain message through media such as television programs, fashion magazines, and social networking sites significantly influences adolescents' development. Wakefield, Loken, and Hornik (2010) find that mass media campaigns can alter health-related behavior positively across large populations. Cohen (1963) and McCombs and Shaw (1972) demonstrate the power of mass media in setting the "agenda" and the audience's perception of a given issue. Andreyenkov et al. (1989) and Robinson et al. (1989) study the relationship between news media and adolescents' opinions about nuclear issues, arguing that students learn more from newspapers than from television news. The impact of mass and social media is also studied in politics (e.g., Iyengar et al., 1997; Buckingham, 1997; Aparaschivei, 2011; Gil de Zuniga et al., 2014; Kruikemeier and Shehata, 2017).

Prior studies, regardless of their research objectives, consistently point out the importance of mass media and media coverage through news broadcasts and newspaper articles and concur with mass media's substantial influence on public sentiment. By contrast, the impact of movies at the box office, an important form of mass media, has not been examined in-depth previously. Movies may have comparative advantages over television news and newspapers because movies attract and encompass all age-groups, whereas television news and newspaper articles focus on a particular age group. Moreover, the number of people regularly watching television news has declined (Buckingham, 1997) while the movie industry is steadily growing. Considering the significant influence of other mass media types on public sentiment, popular movies with a certain message may also affect and mold the sentiment on a particular subject, which, in this study, is the environment. .

This study sheds new light on the unexplored impacts of movies on society and corporations, thereby contributing to the existing literature on mass media. Furthermore, I suggest a new factor that might affect public sentiment toward the environment and CEP. In this study, I focus on the impact of anthropogenic environmental disaster movies, which are, by definition, environmental disasters triggered by human actions (e.g., global warming and climate change). The list of anthropogenic environmental disaster movies considered for this study is presented in the Appendix. One of the sample movies is "*The Day After Tomorrow*," a 2004 American science fiction disaster movie depicting the catastrophic climate change to a new ice age caused by global warming. The movie was a success at the US and international box offices, ranking sixth at the US box office in 2004 with more than 30 million people watching it in the US alone.

Natural disasters, not caused by humans, or disasters not related to the environment have not been considered in this study. For example, the natural disaster movie "*San Andreas*," which depicts devastation in Los Angeles and the San Francisco area due to earthquakes in the San Andreas Fault, are not included. No clear evidence exists of an earthquake being triggered by global warming or human actions. Further, apocalyptic disaster films such as *"Resident Evil"* and *"World War Z"* are not counted as anthropogenic environmental disaster movies in this study because these movies are too unrealistic, although the disasters portrayed in the movies resulted from human actions. Economic disaster movies such as "The Big Short," "Inside Job," and "Too Big to Fail' are not included as well because these movies are not related to environment, but rather they are related to economy.

In addition, documentary films about environmental issues are included in the sample only if they were released at the box office. If not screened in theaters, then documentary films are not considered as anthropogenic environmental disaster movies in this study because it is hard to estimate their performance and to predict their impacts on public sentiment. For brevity, the term "environmental movies" used henceforth in this study implies anthropogenic environmental disaster movies.

The remainder of the study is organized as follows. Section 2 reviews the related literature, outlines the empirical implications, and develops the main hypotheses. Section 3 describes the data sources and research methods. Section 4 discusses the empirical results, and Section 5 summarizes and concludes the paper.

2. Related Literature and Hypotheses Development

2.1 The Role of Media Coverage in Public Sentiment

The crucial role of mass media in conveying information to the public and the financial market is well documented. Klibanoff, Lamont, and Wizman (1998) test if salient country-specific news affects the reaction of closed-end country fund prices to asset value and find that prices respond slowly or quickly depending on news coverage. For example, prices react much faster when the news appears on the front page of *The New York Times*. Tetlock (2007) utilizes daily linguistic content from *The Wall Street Journal* to construct a measure of media content that corresponds to either negative investor sentiment or risk aversion. Further, he studies the interactions between the media content and stock market activity and finds that high media pessimism puts downward pressure on stock prices, and unusually high or low pessimism results in high trading volume. However, the results seem to be temporary, and pessimistic media content does not convey negative fundamental information but a noise that affects the behavior of individual investors. Continuing the linguistic analysis of Tetlock (2007), Tetlock et al. (2008) extend the analysis by adding a continuous intraday news source, the *Dow Jones News Service,* and find that the fraction of negative words used in the news stories does predict low future earnings and stock returns. In other words, linguistic media content reflects hard-to-quantify aspects of firm fundamentals, which investors quickly capture, and the predictability of earnings and return is the strongest for news stories that focus on the fundamentals. In addition, Fang and Peress (2009) highlight the role of mass media in alleviating informational friction because of the ubiquity of mass media. They study the relationship between media coverage and expected stock returns and find that investors and stock prices are affected even by fake news. Particularly, they observe the "no-media premium," in which stocks with no media coverage earn higher returns than stocks with high media coverage after controlling for various risk factors.

Meanwhile, Engelberg and Parsons (2011) propose the problem with a causal assumption on media reports and disentangle the causal impact of media reports from those of the events being reported. To disentangle the causal impact of media reports, they use different media coverage of the same information events and compare investors' behavior. They find that local media coverage is strongly related to local trading volume for earnings announcements of the Standard & Poor's 500 index companies. Griffin, Hirschey, and Kelly (2011) expand the literature and test the relationship between financial media and stock prices in 56 countries. The authors document that firms in the most developed markets experience greater fluctuations in their stock prices when news about them is public. By contrast, stock return volatilities of firms in emerging markets are not significantly different on news and non-news days. They also test several hypotheses for their findings and suggest that cross-country differences in stock price reactions are best explained by insider trading.

Studies on the impact of mass media have also been conducted in the research stream on social issues. Hilgartner and Bosk (1988) propose a "public arenas model," suggesting that mass media is one of the key public arenas in which social problems are framed and where they grow and sometimes fall. Similarly, Anderson (2013) illustrates that the media has played a key role in shaping public perceptions and policy agendas on climate change. Boykoff and Boykoff (2007) argue that mass media coverage of climate change is a social interaction between scientists, policy actors, and the public. They argue that the misrepresentation of the scientific perspective on climate change by influential newspaper and television sources in the US perpetrated information bias on anthropogenic climate change.

Outside the US, Mikami et al. (1995) investigate how television news and newspapers in Japan influenced the public awareness of the global environmental problems during and before the Earth Summit (UNCED) in 1992. They find gradual—rather than immediate—and cumulative effects of media coverage on public awareness. They also find that the amount of television viewing has a positive association with public awareness. Xu et al. (2016) find that corporate environmental violations with high levels of media attention results in greater losses in the Chinese stock market. Interestingly, they only find a weak impact and insignificant results in their previous study (Xu et al., 2012), in which they do not control for the level of media coverage for each environmental violation event.

Olsen, Carstensen, and Hoyen (2003) study the volume of emergency donations attracted by a humanitarian crisis, such as the Indian cyclone of October 1999 and the Mozambique floods of late-January 2000. They argue that the intensity of media coverage, the degree of political interest of donor governments, and the strength of humanitarian non-government and international organizations present in the country ravaged by the crisis are the three main determinants of the amount of assistance rendered. In the same vein, Brown and Minty (2008) use Internet donations data after the 2004 tsunami in the Indian Ocean to study the impact of media coverage on charitable donations. They find that an additional minute in the nightly news and an additional story in major newspapers increase the amount of donations substantially even after controlling for various factors and using the instrumental variable approach. They also highlight that tax incentives play a role in raising charitable donations.

Unlike previous studies, Ahern and Sosyura (2014) highlight a reverse causality issue of media coverage on important corporate events such as a merger negotiation. They argue that firms do have an incentive to manage media coverage to manipulate stock prices. In their study, bidders in stock mergers are likely to create more news immediately after the start of negotiations, optimizing the stock exchange ratio and the takeover price. Solomon (2012) investigates how investor relation (IR) firms impact the relationship between media coverage and stock prices of their client firms. He finds that IR firms can manage the news about their client firms, generating more media coverage of good rather than bad corporate news. In other words, media coverage is manipulated by IR firms to make them more favorable for their client firms. Thus, the previous two papers provide an interesting argument that media coverage can be managed by firms for their private benefits such as desirable stock prices. More recently, Solomon, Soltes, and Sosyura (2014) examine the effect of media coverage of mutual fund holdings on investors' asset allocation. They show that winner stocks covered by major national newspapers in the US, including *The Wall Street Journal*, *The New York Times*, *The Washington Post*, and *USA Today*, attract more capital inflows compared to winner stocks without media coverage. Specifically, media coverage encourages investors to chase past returns rather than facilitate the processing of useful information in fund portfolios. This is consistent with the notion that media coverage strongly influences investor biases and sentiment. Cahan et al. (2015) investigate whether firms that act in more socially responsible ways receive more favorable media coverage. As expected, they find that more socially responsible firms receive more favorable news reportage and have a more positive media image. However, at the same time, these firms are likely to exploit the strong relationship between CSR and media favorability when they have incentives to improve their media image.

Although the causality issue of media coverage remains unsolved, none of the previous studies deny the substantial impact of mass media on people. Besides, the extant research on mass media implies that the influential media or news often represents public sentiment. Therefore, it could be the same for popular movies/films.

2.2 The Effects and Drivers of CEP

Given the acceleration in climate change and the increasing attention on environmental issues across the world, the role of not only an individual but also a corporate in society and the environment comes to the fore and is currently emphasized. Prior studies on corporate environmental activities can be divided into two types, namely, those on the causes/drivers of CEP and those on their results/outcomes. In this research stream, the signs of the relationship and causal direction between CEP and financial performance remain controversial. For example, some studies on the effects of CEP argue that improvement in environmental performance may require a significant amount of money and time, and thus, is a cost burden on firms, whereas others insist that the investment in environmental performance can have bottom-line benefits exceeding the costs in the long-run. Nevertheless, according to the recent studies, the latter view (i.e., the positive impact view) that the benefits of environmental performance outweigh the costs, thereby resulting in better financial performance, is gaining more support because of the aggravation of the global warming challenge.

At the early stage of the research stream on the effect of CEP on financial performance, Spicer (1978) and Mahapatra (1984) examined the relationship between corporate performance on pollution control and financial indicators, although they presented conflicting results. Spicer (1978) finds that companies in the pulp and paper industry with better pollution control records tend to have higher profitability, lower total risk, lower systematic risk, and higher price/earnings ratios than companies with poorer pollution control records. By contrast, using larger sample size and longer time horizon across six different industries, Mahapatra (1984) shows that pollution control expenditures are a drain on resources that could have been invested profitably, and do not reward the companies for their environmentally responsible behavior. More recently, Klassen and McLaughlin (1996), Cohen, Fenn, and Naimon (1995), and Xu et al. (2016) examine the economic consequences of media disclosure related to CEP. All of them support the positive impact view, finding that good environmental performance predicts better financial performance and higher stock returns, whereas negative environmental events such as environmental violations cause significant drops in stock prices and financial performance.

The other side of the research stream on CEP includes the study of Dalhammar, Kogg, and Mont (2003), who identify internal and external factors that may act as drivers of and/or barriers to the development of green products. They suggest that customers and government legislation are the main actors in environmentally-friendly products besides the chief executive officers (CEOs) and competitors. Cronqvist and Yu (2017) provide an interesting study on the role of CEO characteristics in CSR, a more comprehensive concept than CEP. They find that if a CEO has a daughter, then the company has about 9.1% higher CSR rating than the median firm. Even after controlling for several endogenous sources, the results are robust and the strongest for the responsibility/performance on the categories of diversity, environment, and employee relations. Dummett (2006) also discusses drivers and barriers of corporate environmental responsibility (CER) by conducting face-to-face interviews with 25 senior business leaders from major Australian and international companies. He enumerates potential drivers of CEP from prior studies, such as government legislation, pressure from consumers, and societal expectations, and concludes that the threat of legislation is found to be the primary driver of CER. Surprisingly, he finds that business leaders want national governments to intervene more actively to encourage and even force higher CER. In other words, many corporations are still reluctant to voluntarily engage in environmental activities although CER is also an important aspect of corporate policy. Therefore, as shown in Dalhammar, Kogg, and

Mont (2003) and Dummett (2006), firms need "stimuli" to encourage improvement in their environmental performance, rather than just the expectation of better financial outcomes.

In this paper, I argue that movies about anthropogenic (human-made) environmental disasters may also be a "stimulus" for CEP because if these movies are successful at the box office, they would strongly influence the public and investor sentiments, resulting in upward pressure on firms' environmental performance.

2.3 The Impact of Disasters

Furthermore, the effect of disasters, including economic and political crises and natural catastrophes, on people and economy is examined to some extent. For example, Berkman, Jacobsen, and Lee (2011) investigate the relationship between political crises and stock returns internationally using the International Crisis Behavior (ICB) project database. They show that an increase in the average number of international political crises per month leads to a significant impact on world market volatility, and also an economically large and negative impact on stock returns.

Meanwhile, Gourio (2012) presents a theoretical model with business cycle and economic disaster risk. He also tests his model with actual data and finds that an increase in a risk of economic disaster such as the Great Depression leads to a decline of economic outputs and an increase in risky asset prices. Chiu et al. (2018) examine the impact of investor sentiment on equity liquidity and trading behavior during the subprime financial crisis in 2008. They show that pessimistic sentiment caused by the financial crisis increased the quoted bid-ask spread, lead to the evaporation of equity liquidity, and eventually intensified the net-selling pressure during the period. Similarly, Abdelhédi-Zouch, Abbes, and Boujelbéne (2015) and Ryu, Ryu, and Yang (2020) highlight the dominating effect of the subprime financial crisis on investor sentiment.

Gao, Liu, and Shi (2020) examine a degree of people's risk awareness after experiencing catastrophic disasters in Japan. They find that people become relatively insensitive (sensitive) to risk when they experience disasters that have lower (higher) fatalities than expected. Moreover, Ding et al. (2020) investigate the impact of coronavirus disease 2019 (COVID-19) on the reaction of stock returns across 61 economies. They document that the impact may vary based on corporate characteristics such as cash holdings, corporate leverage, existence of the global supply chain, profitability, CSR activities, and corporate governance, but the impact is still substantial to every economy.

Likewise, I believe that environmental disasters depicted in the sample movies can significantly influence people and environmental sentiment, especially when they are successful at the box office and grasp people's attention, even though most of environmental disasters in the movies are unreal or not occurred yet.

2.4 Hypotheses Development

Previous studies on mass media (e.g., Hilgartner and Bosk, 1988; Mikami et al., 1995; Olsen, Carstensen, and Hoyen, 2003; Boykoff and Boykoff, 2007; Brown and Minty, 2008; and Anderson, 2013) consistently show that mass media has a significant impact on the public, and even shapes public perception. However, they all focus on narrow forms of mass media such as news broadcasts and newspapers. Thus, little is known about the movie industry, although it is also an important type of mass media. In this study, I provide new insights into the role of movies beyond just offering leisure. Among various types and genres of movies, I focus on anthropogenic environmental disaster movies because they are socially reflective and realistic. Scientists concur that global warming is a grave concern and its serious consequences are imminent. Building upon the previous studies on the role of mass media and public sentiment, I formulate the first hypothesis:

***H*₁**: *Environmental sentiment, measured by the box office performance of anthropogenic environmental disaster movie(s), is likely to increase CEP.*

As stated in this hypothesis, the box office performance of the movie reflects the level of contemporary environmental sentiment. That is, an environmental movie's success at the box office implies a high level of environmental sentiment. Therefore, I include several characteristics of movies, including box office performance, production budget, and the number of theaters that screen the movies, as proxies of environmental sentiment. For robustness tests of the relationship, I use alternative measures for CEP such as carbon dioxide (CO_2) emissions, greenhouse gas (GHG) emissions, and environmental costs of a firm provided by the Trucost database.

Moreover, I test the relationship between CEP and financial performance as in previous literature but mitigate the previous reverse causality issue by introducing the release of environmental movies as an exogenous shock to all the US firms. Therefore, building upon the results of recent studies on CEP and financial performance, I formulate the second and the most important hypothesis of this study:

***H*₂**: *With a high level of environmental sentiment in the public, measured by the box office performance of anthropogenic environmental disaster movies, firms with better environmental performance have better financial performance in the subsequent year.*

Besides the amplifying effect of the environmental sentiment on corporate financial performance, a high level of environmental sentiment might play an important role in reducing the risk associated with firms regarded as environmentally responsible. Testing this notion, I formulate the last hypothesis:

H_3: *With a high level of environmental sentiment in the public, firms with better environmental performance experience lower risk in the stock market in the subsequent year.*

Finally, I perform several robustness tests to further support these hypotheses. For H_1, I employ the two-stage least squares (2SLS) regression method using an instrumental variable to mitigate possible endogeneity concerns and use alternative movie variables related to the movie performance. For H_2, I select the industries that are related and not related to the environment and conduct a subsample analysis to verify the effect of the environmental sentiment on the CEP–financial performance relationship. For H_3 also, I conduct a subsample analysis after dividing environmentally related and unrelated industries and investigate the changes in institutional stock ownership per the level of the environmental sentiment and CEP.

3. Data and Methodology

3.1 Data Description

The data related to anthropogenic environmental disaster movies are collected from several sources. The main data for this study are sourced from a subscription-based database called Internet Movie Database Pro (IMDbPro), which provides detailed information on movies such as individual movie financials, and daily, weekly, monthly, and annual box office statistics. I collected weekly, monthly, and annual gross profits, the number of tickets sold, production budget, running time, number of released weeks, number of theaters that screened the movies, and other relevant information for each environmental movie. I also collected annual gross revenue and the total number of tickets sold in the US box office for the sample period. I then used other websites that provide information on the movie industry and box offices, such as *The Numbers* and *Box Office Mojo*, to reconfirm the data collected from IMDbPro and reconstruct the missing information, wherever applicable.

The CEP data used here is collected from the MSCI ESG KLD STATS (a. k. a. KLD) database. The KLD database contains annual ratings for seven major categories: community, corporate governance, diversity, employee relations, environment, human rights, and product quality and safety. Each category provides positive (i.e., strength) and negative (i.e., concern) indicators. The number of indicators change almost annually and are different across the categories. If a firm does a good deed (harm), then it is listed as a strength (concern) indicator and is assigned a value of 1, and 0 otherwise. I only use the environment category for this study, and the raw CER score is calculated by subtracting the total number of concerns from the total number of strengths. The total number of strengths (concerns) is calculated by summing up all the strength (concern) indicator variables in a given year. A higher CER score indicates better environmental performance. However, according to Manescu (2009), this simple summation approach is not appropriate to compare scores across years because, as mentioned above, the number of strength and concern indicators varies considerably each year. To overcome this issue, I follow Deng, Kang, and Low (2013) and calculate the adjusted CER measure by dividing the strength and concern scores by the respective number of strength and concern indicators to derive adjusted strength and concern scores, and then take the difference between the adjusted total strength score and the adjusted total concern score. Both the raw and adjusted CER scores are used in this study. Although the results using the raw CER score are qualitatively similar to those using the adjusted CER score, some argue that both raw and adjusted CER scores vary annually. To alleviate this issue, I also implement alternative measures of CEP from the Trucost database. Trucost is a part of S&P Global and provides carbon and environmental data on 15,000 companies globally. More specifically, Trucost collects environmental performance data and disclosure metrics such as CO_2 and GHG emissions, water use, and waste disposal from publicly available sources, including each company's financial statements, 10-K reports, SEC filings, and sustainability reports. Using these metrics and estimated economic damage, Trucost calculates direct and indirect environmental costs associated with each firm. Direct environmental costs measure estimated damage caused by a firm's direct operations on six parameters: GHG, water, waste, land and water pollutants, air pollutants, and natural resource use. Indirect environmental costs are also a consequence of a firm's activities and are calculated based on the same set of six parameters, but occur at sources owned by other firms. To calculate the indirect costs, Trucost uses its own methodology to estimate the effects, ranging from the first-tier upstream supply chain (direct suppliers) to the last one. I add direct and indirect CO_2 emissions, GHG emissions, and environmental costs to create total emissions and costs, which provide alternative measures of CEP in this study.

In addition, following the previous literature, Compustat, ExecuComp, Thomson Reuters, and CRSP databases are used for variables related to each firm's financials and stock market information, and other variables that might affect CEP. I collect the financial and accounting data, including firm size (total assets), leverage ratio (debt to equity), investment opportunity (Tobin's Q), cash flow, capital expenditure, and return on assets (ROA) from the Compustat database. CEO stock ownership and the CEO's position on the board of directors are collected from the ExecuComp database. Institutional ownership data of the sample firms are collected from Thomson Reuters. The data related to the stock market such as a firm's market value is collected from the CRSP database. Lastly, the data on annual climate conditions are obtained from the National Centers for Environmental Information (NCEI) of the National Oceanic and Atmospheric Administration and the World Bank. To minimize the effects of outliers from the data, following Harford, Mansi, and Maxwell (2008), I winsorize all the variables at the 1% level on either tail.

The final sample covers all the listed firms in the US from 1992 to 2016. The sample period is determined by the data availability of CER scores from the KLD database. The timeframe changes to the period between 2002 and 2015 when using environmental costs data from the Trucost database because it is only available from 2002 to 2015.

3.2 Empirical Design

We test the hypotheses using various regression models and the basic models are presented below:

$$\boldsymbol{H_1}: \boldsymbol{Corporate\ Environmental\ Performance_{i,t}}$$
$$= \boldsymbol{\alpha_{i,t} + \beta\ ENV.Movie\ Variable^{2}{}_{i,t-1} + \gamma Control\ Variables^{3}{}_{i,t-1} + Firm\ Fixed\ Effects_i + \epsilon_{i,t}}$$

$$\boldsymbol{H_2}: \boldsymbol{Corporate\ Financial\ Performance_{i,t}}$$
$$= \boldsymbol{\alpha_{i,t} + \beta\ High\ CER\ Firm\ Dummy_{i,t-1} \times Env.Movie\ Performance_{i,t-1}}$$
$$\boldsymbol{+ \gamma Control\ Variables^{4}{}_{i,t-1} + Firm\ Fixed\ Effects_i + Year\ Fixed\ Effects_t + \epsilon_{i,t}}$$

$$\boldsymbol{H_3}: \boldsymbol{Firm\ Risk_{i,t}}$$
$$= \boldsymbol{\alpha_{i,t} + \beta\ High\ CER\ Dummy_{i,t-1} \times Env.Movie\ Performance_{i,t-1} + \gamma Control\ Variables_{i,t-1}}$$
$$\boldsymbol{+ Firm\ Fixed\ Effects_i + Year\ Fixed\ Effects_t + \epsilon_{i,t}}$$

CEP is measured by the raw and adjusted CER scores from MSCI KLD Stats for firm *i* for year *t*. For the robustness check, I also implement environmental variables from the Trucost database. For the environmental movie variable, I use various performance measures. For example, *Annual Top 20* is a binary variable that is assigned a value of 1 if at least one environmental disaster movie is ranked as one of the top 20 movies of the year, *ENV. Movie Performance* represents the ratio of the population that watched the movie and is calculated by dividing the total number of the environmental movie tickets sold at the box office by the total

---

[2] We use various variables related to environmental disaster movies, ranging from the box office performance to the movie rating.

[3] Control variables include ln (total assets), leverage ratio, Tobin's Q, cash flow normalized by total assets, capital expenditures normalized by total assets, institutional ownership, CEO equity ownership, and CEO duality (if CEO is also the chairperson of the board), which were factors of CEP in the previous literature (Du et al., 2014; Cronqvist and Yu, 2017; Chen et al., 2020).

[4] Control variables are ln (total Assets), leverage ratio, capital expenditures normalized by total assets, institutional ownership and CEO equity ownership, following Jo, Kim, and Park (2015) and Lin and Fu (2017).

US population in the release year, and *ENV. Movie Number* is the total number of environmental disaster movie(s) in a given year. I also employ additional movie variables, including the production budget of the environmental movie, the number of weeks the movie is shown in theaters, and the number of theaters that screened the movie. Following previous studies, I also include control variables that may affect CEP. More details on variable definitions are described in the Appendix.

In the regression analyses, I use the lagged terms of movie variables for several reasons. Firstly, it may take several months for enough people to watch the movie and influence the public sentiment on environmental problems. Secondly, it would also take a significant amount of time for firms to respond to environmental sentiment and improve their environmental performance. Lastly, most of the environmental movies in this study are released after June, as shown in the Appendix. If the quarterly data on CEP were available, it would be possible to analyze the effect of the release of environmental movies more accurately. However, as the environmental data from either KLD Stats or Trucost is only provided annually and environmental sentiment may not act on the firm immediately, it is more reasonable to use the subsequent year's environmental performance rather than the given year's performance.

4. Empirical Results

4.1 Summary Statistics and Correlation Matrix

Table 1 in the Appendix shows the summary statistics for all the variables used in the regression analysis. As shown, the 25^{th} percentile, median, mean, and 75^{th} percentile values of both raw and adjusted CER scores are all zero, implying that the environmental performance of most of the sample firms was inadequate. According to the list of environmental movies presented in the Appendix, environmental movies are screened in 10 of the 24 years of the sample period from 1992 to 2016, but the mean value of environmental movie dummy is 0.526, indicating that about half the sample observations are from years with the environmental movie(s). However, the mean value of the annual top 20 dummy is 0.276 because it only takes a value of 1 if an environmental movie is a hit at the box office and ranked among the top 20 movies in the release year. In other words, the annual top 20 dummy is much more conservative than the regular environmental movie dummy. In addition, the environmental movie performance variable is calculated as the ratio of the total number of tickets sold for the environmental movie(s) to the total US population in the release year. Considering that environmental movies were released during half the sample period (10 out of 24 years) and that the mean environmental movie performance is around 5% of the US population, about 10% of the population would watch an environmental movie when it is released. Summary statistics for other variables in Table 1 are not extraordinary and similar to the values in prior studies. On average, institutions hold about 65% of a firm’s shares, which is comparable to the mean value, 50%–60%, from previous studies (Rubin and Smith, 2008; Chung and Zhang, 2011). Further, a CEO owns about 2.5% of a firm’s equity on average. CEO duality is a dummy variable that takes a value of 1 if the CEO is also the chairperson of the firm’s board of directors and 0 otherwise. In more than 75% of the sample firms, the CEO also holds the position of the chairperson of the board of directors, implying poor corporate governance and powerful CEOs.

[Insert Table 1 here]

Next, I check the correlations among the variables of interest. Table 2 shows the correlation matrix of the variables in the regression analysis. As evident, the dependent variables do not have a strong correlation with the main independent variables or control variables (at most −0.2181 between ROA and leverage ratio).

[Insert Table 2 here]

4.2 Event Study on Pacific Gas and Electric Company (PG&E) and Univariate Tests

Before analyzing the effect of environmental movies using multivariable regression models, I first test if an environmental movie impacts the stock market through an event study on the sample movie, *Erin Brockovich*. I also address possible endogeneity concerns with the release of the environmental movie(s). Most of the sample movies in the study are not confined to a particular firm, although *Erin Brockovich* is an environmental movie about the contamination of drinking water with hexavalent chromium by a single firm, PG&E, in the southern California town of Hinkley in 1993, it was released on Friday, March 17, 2000. Therefore, the effect of media coverage on the incident by other mass media types such as news broadcasts and newspapers may not coincide with the impact of the movie.

As illustrated in Table 3-1, PG&E experienced significantly negative abnormal stock returns (between 5% and 10%) around the movie release date even after adjusting the returns with Capital Asset Pricing Model (CAPM) and the Fama-French 3-factor model. The event study results indicate that the movie does have an impact on investors and the stock market. To check for the long-term effect of the movie, I also examine the stock performance of PG&E in the long-run. The 1-year, 2-year, and 5-year buy-and-hold abnormal stock returns are presented in Table 3-2. The buy-and-hold abnormal returns of PG&E stock for one year and two years are negative, whereas the abnormal return becomes positive after five years, suggesting that holding the stock for one or two years after the movie release incurs negative abnormal returns, but not after five years. Naturally, there might be other events and factors that contribute to the negative abnormal returns during the study period, but it is the first step toward understanding the impact.

[Insert Tables 3-1 and 3-2 here]

One may argue that environmental movies are produced because of abnormal environmental conditions in a particular year, and simultaneously, companies also improve their environmental performance as a response to those abnormal conditions. However, this is not a serious concern because it takes a significant amount of time to produce a movie and it is very hard to predict the time for production. Thus, abnormal environmental conditions cannot concurrently affect the "release" of the movies and the improvement in environmental performance.

Yet, one might claim that production companies of environmental movies wait for the best time for the release after they finish production, deciding to release the environmental movies in the year with abnormal environmental conditions. In this case, it is not the environmental movie that affects CEP but the abnormal environmental conditions that affect both the release of the environmental movie and the CEP. To check and alleviate this concern, I conduct univariate tests to examine the relationship between several environmental condition measures and the release of environmental movies. For the environmental condition measures, I use CO_2 emissions per capita, average annual temperature, the total number and cost of natural disasters, and the monthly abnormal temperature. Table 4 presents the results for the univariate tests, indicating that climate conditions between the years (months) with environmental movies and the years (months) without environmental movies do not differ significantly. To some extent, the univariate tests relieve the endogeneity concern that production companies time the release of the environmental movie(s) in the years with abnormal climate conditions. However, endogeneity concerns are not completely resolved yet, therefore, I also include and control for variables related to climate conditions and employ the 2SLS method.

[Insert Table 4 here]

4.3 Environmental Sentiment and CEP

Table 5-1 shows the basic ordinary least squares regression results, testing the first hypothesis. Three main independent variables are related to an environmental movie: *Annual Top 20*, *ENV. Movie Performance*, and *ENV. Movie Number*. The annual top 20 variable is a dummy variable that takes a value of 1 if at least one environmental movie in a given year is released and is also ranked among the top 20 movies of the year at the US box office. This variable is much more conservative than the regular environmental dummy variable because it also reflects the performance of the movie. The environmental movie performance variable is measured by the ratio of the total number of tickets sold (i.e., the total number of people that watched) for the environmental movie to the total US population in the release year of the movie. Lastly, the environmental movie number variable is the total number of environmental movies at the box office in a given year. I use these three variables rather than the regular environmental movie dummy because good movie performance at the box office is essential to represent the public sentiment but the regular dummy variable does not reflect the performance at all. The rest of the variables are control variables. I also add firm fixed effects to control for firm-specific variations. When industry fixed effects are included instead of firm fixed effects, the results are not only the same but also stronger. The main limitation of this analysis is that movie variables are annual and have the same values throughout the year. Therefore, I cannot control for year fixed effects because they possess perfect-collinearity problems with the year fixed effects. Instead, I try to control for time trends using variables related to climate conditions, as used in the previous univariate tests.

[Insert Table 5-1 here]

The coefficients of all the environmental movie variables in Table 5-1 are consistent with the first hypothesis and significantly positive at the 1% level in most cases (5% in the fifth column), indicating that the level of environmental sentiment is positively associated with CEP. Based on the results, if an environmental movie is ranked as one of the top 20 movies of the year, the raw (adjusted) CER score improves by 0.056 (0.012), which is about half (one and a half times) the mean value of raw (adjusted) CER score in the sample. In addition, if one more percent of the US population watches the environmental movie, the raw (adjusted) CER score improves by 0.063 (0.011), which is about two-thirds (one and one-third) of the mean value of the raw (adjusted) CER score. The impacts are not only statistically significant but also meaningful in magnitude. Interpreting the coefficients of other control variables, the Tobin's Q value is negatively associated with CEP in the subsequent year, implying that firms with high growth opportunities are likely to invest in areas other than the environment. Highly significant and negative coefficients of the capital expenditure ratio indicate that firms that employ more resources on capital expenditures have fewer resources to invest in environmental performance. By contrast, firms that hold more cash can afford to invest in environmental performance in the subsequent year. Similar to Graves and Waddock (1994), firms with high institutional stock holdings are more likely to invest in environmental performance as institutional shareholders put pressure on the management to engage in social responsibility. According to the result, a CEO needs higher equity ownership, implying stronger power within the corporation, to pursue improvement in CEP. Lastly, it is expected that abnormal environmental conditions would encourage environmental awareness, and in turn, CEP. However, all the annual climate variables—average natural disaster costs, CO_2 emissions per capita, and abnormal temperature— show negative associations with CEP. These coefficients refute the notion that firms invest in and improve their environmental performance in response to abnormal environmental conditions.

As described in the data description part, the raw or adjusted CER scores can be subdivided into strengths and concerns. The raw CER strengths (concerns) indicate the number of good deeds (wrongdoings) of a firm among the list of CER indicators. Alleviating the issue of annual variations in indicators, the adjusted CER strengths (concerns) are calculated by dividing the raw CER strengths (concerns) by the total number of strength (concern) indicators in a given year. Therefore, I subdivide the adjusted CER score into strength and concern parts and conduct the same regression analysis to examine the effect of environmental sentiment on CEP in more detail. The first three columns in Table 5-2 show the results on the adjusted CER strengths and the last three columns present the adjusted CER concerns. Surprisingly, environmental sentiment positively influences both adjusted CER strengths and concerns, implying that firms increase both good and bad environmental activities with a higher level of environmental sentiment. However, the magnitude and significance of the effect are much stronger (at least three times) for the CER strengths than for the CER concerns. Therefore, environmental sentiment increases the overall CER score.

[Insert Table 5-2 here]

In addition to the univariate tests, I implement the 2SLS regression method to further address the endogeneity issue. As an instrumental variable for the 2SLS regression analysis, I use a logarithmic value of the annual box office total profits, which would be related to the two main movie variables, *Annual Top 20* and *ENV. Movie Performance*, but is unlikely to be associated with CEP. The performance of the environmental movie depends on the current status of the movie industry or box office, and the movie industry or box office has no relation with CEP. In the first stage, I regress the main environmental movie variable, either *Annual Top 20* or *ENV. Movie Performance*, on the instrument variable, the logarithm of the annual total profits of the box office, and all the exogenous variables in the second-stage regression, in which, I regress CEP on the predicted values of environmental movie variables from the first stage regression and other control variables in the regression model. In both the first and second-stage regressions, I control for the firm fixed effects and cluster the standard errors at the firm level. Columns (1) and (3) in Table 5-3 show the first-stage regression results and high *F*-statistic values, 228.51 and 617.44. They test the statistical significance of the instrument and indicate that it rejects the null hypothesis that the logarithm of the annual total profits of the box office is a weak instrument. Columns (2) and (4) document the main and second-stage regression results, which still support the first hypothesis. Even after controlling for the possible endogeneity concern using the 2SLS method, the level of the environmental sentiment is positively associated with CEP.

[Insert Table 5-3 here]

Additionally, I use alternative measures of CEP. As shown in Table 1, the raw and adjusted CER scores do not vary substantially during the sample period, and thus, corporate environmental costs and emission variables from Trucost are used. Table 6 shows that a high level of environmental sentiment significantly reduces the total CO_2 and GHG emissions and the total environmental costs, which is still consistent with the first hypothesis and previous results.

4.4 Environmental Sentiment on Environmental and Financial Performance

I now examine the impact of environmental sentiment on the relationship between CEP and financial performance as in the previous literature. First, I divide the sample firms into two groups, namely, environmentally responsible and irresponsible firms. Environmentally responsible firms are those with either the raw environmental scores or the adjusted environmental scores above the industry median scores in a given year, and irresponsible firms are those below the industry median values. Next, I create a binary variable, *High CER Firm Dummy*, which takes a value of one for environmentally responsible firms and zero for irresponsible firms. To analyze the impact of environmental sentiment on the relationship between corporate environmental and financial performance, I multiply *Environmental Movie Performance*, which is the proxy for the level of environmental sentiment, and *High CER Firm Dummy* to create the interaction term, which is the main variable of interest. As *High CER Firm Dummy* has perfect-collinearity problems with firm fixed effects and *Environmental Movie Performance* has the same issues with year fixed effects, I switch those variables with firm or year fixed effects back and forth when performing the analysis in Table 7-1, and include industry fixed effects when I cannot control for firm fixed effects. The results of testing the second hypothesis are reported in Table 7-1. Columns (1) and (5) in Table 7-1 document the regression results without any fixed effect and clustering, while columns (2) and (6) report the results with industry fixed effects and cluster the standard errors at the firm level. Highly significant and positive coefficients of *High CER Firm Dummy* in columns (1), (2), (5), and (6) indicate that environmentally responsible firms exhibit better financial performance, measured by higher ROA and operating cash flow ratio, in the subsequent year compared to irresponsible firms. This is consistent with prior research (e.g., Spicer, 1978; Klassen and McLaughlin, 1996; Cohen, Fenn, and Naimon, 1995; Xu et al., 2016; Jo, Kim, and Park, 2014), which shows a positive association between CEP and financial performance. In columns (4) and (8), both firm fixed and year fixed effects are included instead of dummy variables related to firms and environmental movies, and thus, the results in these columns are the most conservative. Most importantly, the coefficient estimates of the interaction term between *Environmental Movie Performance* and *High CER Firm Dummy* in all the columns are significantly positive (weakly significant only in the first column), at least at the 5% level. This implies that a higher level of environmental sentiment intensifies the positive relationship between CEP and financial performance, supporting the second hypothesis. Examining the economic significance of the coefficient estimates, a 1% increase in the US population that watched the environmental movie is associated with 0.048% (0.047%) growth in ROA (operating cash flow ratio), which is about 1% (0.5%) of the mean values.

[Insert Table 7-1 here]

Moreover, I subdivide the sample and analyze the same regression model to validate environmental movie performance as a measure of the environmental sentiment and verify the impact of the environmental sentiment. If environmental movie performance indeed measures the environmental sentiment and this influences the corporate environmental–financial performance link, then the environmental sentiment should have a greater impact on firms related to the environment than those that are unrelated. Therefore, I select industries closely related to the environment (e.g., polluting industries) and those that seem unrelated (e.g., non-polluting industries) following Becker and Henderson (2000) and employing the Trucost data. Becker and Henderson (2000) divide polluting industries—which emit volatile organic compounds and nitrogen oxides, resulting in Ozone depletion—and non-polluting industries based on the publications and documents of the US Environmental Protection Agency. In addition, I rank Fama and French's 48 industries in order of direct environmental costs using the Trucost database and select the top (bottom) five industries that have the highest (lowest) direct first-tier environmental costs[5]. I check if any of the top (bottom) five industries are listed among the non-polluting (polluting) industries from Becker and Henderson (2000), and as expected, find no such case. Finally, I define environment-related (non-related) industries as polluting (non-polluting) industries from Becker and Henderson (2000) or industries with high (low) direct environmental costs in this study. Environment-related industries (i.e., polluting industries) include the chemical industry (14th in Fama-French industry classification), rubber and plastic product industry (15th in the classification), construction material industry (17th in the classification), other industries related to metal mining and works (19th, 27th, and 28th in the classification, respectively), coal and petroleum and natural gas (29th and 30th in the classification, respectively), and utilities (31st in the classification)[6]. I also include polluting industries from Becker and Henderson (2000) that have not been included using the environmental costs data. By contrast, non-polluting industries are recreation, entertainment, printing and publishing, medical equipment, personal services, measuring and control

5 The results were the same when using top (bottom) ten industries with the highest (lowest) direct environmental costs.

6 Industrial organic chemical companies (SIC from 2860 to 2869), miscellaneous plastic companies (SIC from 3080 to 3089), and forestry companies (SIC from 0800 to 0899) from Becker and Henderson (2000) are included in the chemical, rubber and plastic product, and construction material industries, respectively.

equipment, computers, and insurance (6th, 7th, 8th, 12th, 33rd, 35th, 37th, and 45th in the classification, respectively) plus the apparel industry, mattresses, and certain leather products (specifically SIC from 231 to 236, 2515, and 315 to 317, respectively).

Table 7-2 reports the results of the subsample analysis based on the two industry groups. The first four columns are about the sample firms in the industries that are non-polluting and unrelated to the environment, while the last four are about the firms in polluting industries. I again use two measures of corporate financial performance, ROA and operating cash flow ratio. The coefficients of the interaction terms of firms in industries unrelated to the environment are not significant at all, whereas those of firms in polluting industries are significantly positive at the 5% level for ROA and 10% level for operating cash flow ratio. These results indicate that the environmental sentiment has no or at most a weak impact on firms that seem unrelated to the environment but works strongly for firms in polluting industries. Therefore, the results in Table 7-2 confirm that the performance of environmental disaster movie(s) acts as a good proxy for the environmental sentiment and also that the environmental sentiment works as an amplifier in the CEP and financial performance relationship.

[Insert Table 7-2 here]

4.5 Environmental Sentiment and Firm Risk

In addition to the financial performance of environmentally responsible firms, I also investigate whether environmental sentiment exerts an influence on the stock market. More specifically, I examine the effect of environmental sentiment on the volatility of daily stock returns, which is often used as a proxy for risk associated with a firm. With regard to the regression model, firm risk, measured by the realized (idiosyncratic) stock return volatility in the stock market, becomes the main dependent variable instead of corporate financial performance. I adjust stock returns with either CAPM or the Fama-French 3-factor model and present the firm risk result in Table 8-1. The main variable of interest is the interaction term between *ENV. Movie Performance* and *High CER Firm Dummy*. The dependent variable, *SVOL*, in columns (1) and (2) is the standard deviation of daily stock returns without any factor-adjustment over the fiscal year. In columns (3), (4), (5), and (6), I use standard deviations of daily "excess" stock returns, $IDVOL_{CAPM}$ or $IDVOL_{FF3}$, which are the residuals from regressing daily stock returns with CAPM or the Fama-French 3-factor model, respectively. Besides, I include and control for *ENV. Movie Performance* instead of year fixed effects in columns (1), (3), and (5); therefore, the results in columns (2), (4), and (6) are more conservative. The coefficient estimates of the interaction terms are still statistically significant at the 1% level and are negative in all columns, implying the higher the environmental sentiment, the lower the risk of environmentally responsible firms in the market.

[Insert Table 8-1 here]

To check whether investors recognize and value the reduced risk of environmentally responsible firms, I analyze the changes in institutional stock ownership according to the level of environmental sentiment and present the results in Table 8-2. Here, I use various measures of environmental sentiment and include the lagged term of institutional ownership. Given that I examine the change in institutional ownership and that institutional stockholdings cannot increase or decrease rapidly immediately, I include the lagged term in the model.

As expected, institutional stock ownership in the previous year is positively associated with the current ownership. Moreover, all the interaction terms in Table 8-2 report significantly positive coefficient estimates, indicating that institutional ownership for environmentally responsible firms significantly increases with the level of environmental sentiment. More specifically, if there is an environmental movie in a given year, the subsequent year's institutional ownership increases by 0.5%, and if the movie ranks among the top 20 movies of the year, the ownership increases even more, by 1.1%. Further, if one more percent of the US population watches the environmental movie, the ownership increases by 0.033%. Indeed, institutional investors respond to the reduced risk of environmentally responsible firms with respect to the level of the environmental sentiment and consequently increase their stock ownership of those firms.

4.6 Robustness Tests

For the robustness tests of the relationship between environmental sentiment and CEP, I implement other interesting movie variables, including the production budget, time screened, and theater number, which may also be the proxy for the movie performance. For example, it is expected that the higher is the production budget, the larger is the scale of the movie and the higher is the probability of its success. Further, as the movie is shown longer, more people are likely to watch it, and therefore, it has a stronger influence on the public sentiment. In the same vein, as more theaters screen the movie, people in more regions are likely to watch it, implying better performance and higher environmental sentiment. The other movie variables are described in the table on the variable description in the Appendix. The results of these variables are presented in Tables 9-1 and 9-2, which show that coefficient estimates of all the variables are significantly positive, supporting the first hypothesis, similar to those derived from Tables 5 and 6. The magnitudes of the coefficient estimates of these movie variables in Tables 9-1 and 9-2 are also substantial compared to the mean values in the summary statistics.

[Insert Tables 9-1 and 9-2 here]

5. Summary and Conclusion

In this study, I examined the role of environmental movies in CEP and financial performance after controlling for other firm-specific factors. The effects of mass media, including television news, newspapers, and magazines, have been studied extensively across various research subjects. Although a movie is also an important type of mass media, it has been rarely examined in-depth and its economic and social impacts are unknown. Therefore, I focused on the specific genre of movies, anthropogenic environmental disasters, implying environmental disasters triggered by humans. As it is widely accepted that mass media shapes the public sentiment, I argued that environmental movies form environmental sentiment, whose level depends on the performance of those movies. I analyzed the impacts of those movies on corporate environmental and financial performance, and risk.

Using the multivariable regression analysis, I found that environmental sentiment, measured by environmental movie performance, indeed impacts corporate environmental behavior. More specifically, if at least one environmental movie in a given year is released and the movie ranks among the top 20 movies of the year, then CEP is more likely to improve in the subsequent year. In addition, as an environmental movie performs better at the box office (i.e., more people watch the movie), the positive impact on CEP becomes stronger. The positive association is still robust after controlling for the possible endogeneity issue with the 2SLS regression method. For other robustness checks, I used alternative measures of CEP, such as the total environmental costs, CO_2 emissions, and GHG emissions, for the dependent variable, and various movie variables for the main independent variable. The results were robust and consistent with the main hypothesis. Therefore, this study contributes to the existing literature on CEP by presenting a new driver of CEP.

More importantly, I documented that environmental sentiment intensifies the positive effect of CEP on financial performance, supporting the prior research on the positive association between corporate environmental and financial performance. Further, environmental sentiment significantly reduces the risks associated with environmentally responsible firms in the stock market. Using a subsample analysis based on the industries and examining the change in institutional stock ownership, I verified the second and third hypotheses.

Although the effects of various media types have been extensively examined in the finance literature, to the best of my knowledge, this study is the first to examine the role of a special type of mass media, movies. Therefore, this study also adds to the existing literature on mass media. For future research, if the state-level data on movie profits and the box office or the data on movie profits from other sources such as video home system (VHS) and digital versatile disc (DVD) VHS and DVD can be obtained, a more elaborate and comprehensive analysis of the role of movies can be conducted. Lastly, Netflix, an American technology and media services provider, has rapidly expanded, producing and offering various types of movies through its platform. Therefore, if movie data can be gathered from Netflix, an additional analysis such as a comparison between the movies on the online platform and the movies at the box office can be conducted.

References

Abdelhédi-Zouch, M., Abbes, M. B., and Boujelbène, Y. 2015, “Volatility spillover and investor sentiment: subprime crisis,” *Asian Academy of Management Journal of Accounting & Finance*, vol. 11, issue 2, pp. 83–101.

Ahern, K. R. and Sosyura, D. 2014, “Who writes the news? Corporate press releases during merger negotiations,” *Journal of Finance*, vol. 69, issue 1, pp. 241–291.

Anderson, A. 2009, “Media, politics and climate change: Towards a new research agenda,” *Sociology Compass*, vol. 3, issue 2, pp. 166–182.

Andreyenkov, V., Robinson, J. P. and Popov, N. 1989, “News media use and adolescents' information about nuclear issues: A Soviet-American comparison,” *Journal of Communication,* vol. 39, issue 2, pp. 95–104.

Almeida, H. and Campello, M. 2007, “Financial Constraints, Asset Tangibility, and Corporate Investment.” *Review of Financial Studies*, vol. 20, pp. 1429–1460.

Aparaschivei, P. A. 2011, "The use of new media in electoral campaigns: Analysis on the use of blogs, Facebook, Twitter and YouTube in the 2009 Romanian presidential campaign." *Journal of Media Research*, vol. 2, issue 10, pp. 39–60.

Becker, R., and Henderson, V. 2000, “Effects of air quality regulations on polluting industries.” *Journal of Political Economy*, vol. 108, issue 2, pp. 379–421.

Berger, P. G., Ofek, E. and Swary, I. 1996, “Investor Valuation and Abandonment Option.” *Journal of Financial Economics*, vol. 42, pp. 257–287.

Berkman, H., Jacobsen, B. and Lee, J. B. 2011, “Time-varying rare disaster risk and stock returns,” *Journal of Financial Economics*, vol. 101, issue 2, pp. 313–332.

Boykoff, M. T. and Boykoff, J. M. 2007, “Climate change and journalistic norms: A case-study of US mass-media coverage,” *Geoforum*, vol. 38, issue 6, pp. 1190–1204.

Brown, P. H. and Minty, J. H. 2008, “Media coverage and charitable giving after the 2004 tsunami,” *Southern Economic Journal*, pp. 9–25.

Buckingham, D. 1997, “News media, political socialization and popular citizenship: Towards a new agenda,” *Critical Studies in Media Communication*, vol. 14, issue 4, pp. 344–366.

Cahan, S. F., Chen, C., Chen, L., and Nguyen, N. H. 2015, “Corporate social responsibility and media coverage,” *Journal of Banking and Finance*, vol. 59, pp. 409–422.

Chen T., Dong, H., and Lin, C. 2020, “Institutional shareholders and corporate social responsibility,” *Journal of Financial Economics*, vol. 135, issue 2, pp. 483–504.

Chiu, J., Chung, H., Ho, K. Y., and Wu, C. C. 2018, “Investor sentiment and evaporating liquidity during the financial crisis,” *International Review of Economics & Finance*, vol. 55, pp. 21–36.

Chung, K. H., and Zhang, H. 2011, “Corporate governance and institutional ownership,” *Journal of Financial and Quantitative Analysis*, vol. 46, issue 1, pp. 247–273.

Cohen, B. C. 1963, “The press and foreigh policy,” Princeton, NJ: Princeton University Press

Cohen, M. A., Fenn, S., and Naimon, J. S. 1995, “Environmental and financial performance: are they related?” Investor Responsibility Research Center (IRRC), USA

Cronqvist, H. and Yu, F. 2017, “Shaped by their daughters: Executives, female socialization, and corporate social responsibility,” *Journal of Financial Economics*, vol. 126, issue 3, pp. 543–562.

Dalhammar, C., Kogg, B., and Mont, O. 2003, “Who creates the market for green products?” *Proceedings for Sustainable Innovation,* pp. 27–28.

Deng, X., Kang, J. K., and Low, B. S. 2013, “Corporate social responsibility and stakeholder value maximization: Evidence from mergers” *Journal of Financial Economics*, vol. 110, issue 1, pp. 87-109.

Ding, W., Levine, R., Lin, C. and Xie, W., 2020, "Corporate immunity to the COVID-19 pandemic," *Journal of Financial Economics,* forthcoming.

Dougal, C., Engelberg, J., Garcia, D., and Parsons, C. A. 2012, "Journalists and the stock market," *Review of Financial Studies*, vol. 25, issue 3, pp. 639–679.

Du, X., Jian, W., Zeng, Q., and Du, Y. 2014, "Corporate environmental responsibility in polluting industries: Does religion matter?" *Journal of Business Ethics*, vol. 124, issue 3, pp. 485–507.

Dummett, K. 2006, "Drivers for corporate environmental responsibility (CER)," *Environment, Development and Sustainability*, vol. *8*, issue 3, pp. 375–389.

Eggermont, S. 2006, "The impact of television viewing on adolescents' sexual socialization," Leuven, Belgium: Doctoral Dissertation, Katholieke Universiteit Leuven.

Engelberg, J. E. and Parsons, C. A. 2011, "The causal impact of media in financial markets" *Journal of Finance*, vol. 66, issue 1, pp. 67–97.

Fang, L. and Peress, J. 2009, "Media coverage and the cross-section of stock returns," *Journal of Finance*, vol. 62, issue 5, pp. 2023–2052.

Gao, M., Liu, Y. J., and Shi, Y. 2020, "Do people feel less at risk? Evidence from disaster experience," *Journal of Financial Economics*, forthcoming.

Gil de Zúñiga, H., Molyneux, L., and Zheng, P. 2014, "Social media, political expression, and political participation: Panel analysis of lagged and concurrent relationships," *Journal of Communication*, vol. 64, issue 4, pp. 612–634.

Gourio, F., 2012. "Disaster risk and business cycles," *American Economic Review*, vol. 102, issue 6, pp. 2734–2766.

Graves, S. B., and Waddock, S. A. 1994, "Institutional owners and corporate social performance," *Academy of Management Journal*, vol. 37, issue 4, pp. 1034–1046.

Griffin, J. M., Hirschey, N. H., and Kelly, P. J. 2011, "How important is the financial media in global markets?" *Review of Financial Studies*, vol. 24, issue 12, pp. 3941–3992.

Harford, J., Mansi, S., and Maxwell, W. 2008, "Corporate governance and firm cash holdings in the US," *Journal of Financial Economics*, vol. 87, issue 3, pp. 535–555.

Hilgartner, S. and Bosk, C. L. 1988, "The rise and fall of social problems: A public arenas model," *American Journal of Sociology*, vol. 94, issue 1, pp. 53–78.

Iyengar, S., and Reeves, R. 1997, "Do the media govern? Politicians, voters and reporters in America," *Electoral Studies*, vol. 3, issue 16, pp. 429.

Jo, H., Kim, H., and Park, K. 2015. "Corporate environmental responsibility and firm performance in the financial services sector," *Journal of Business Ethics*, vol. 131, issue 2, pp. 257-284.

Klassen, R. D. and McLaughlin, C. P. 1996, "The impact of environmental management on firm performance," *Management Science*, vol. 42, issue 8 pp. 1199–1214.

Klibanoff, P., Lamont, O., and Wizman, T. A. 1998, "Investor reaction to salient news in closed-end country funds," *Journal of Finance*, vol. 53, issue 2, pp. 673–699.

Kruikemeier, S., and Shehata, A. 2017, "News media use and political engagement among adolescents: An analysis of virtuous circles using panel data," *Political Communication*, vol. 34, issue 2, pp. 221–242.

Lin, Y. R., and Fu, X. M. 2017, "Does institutional ownership influence firm performance? Evidence from China," *International Review of Economics & Finance*, vol. 49, pp. 17–57.

Mahapatra, S. 1984, "Investor reaction to a corporate social accounting," *Journal of Business Finance & Accounting*, vol. 11, issue 1, pp. 29–40.

Manescu, C. 2009, "Is corporate social responsibility viewed as a risk factor? Evidence from an asset pricing analysis," *Unpublished Working Paper*, University of Gothenburg, Gothenburg, Sweden.

McCombs, M. E., and Shaw, D. 1972, “The agenda-setting function of the mass media,” *Public Opinion Quarterly*, vol. 36, issue 2, pp. 176–187.

Mikami, S., Takeshita, T., Nakada, M., and Kawabata, M. 1995, “The media coverage and public awareness of environmental issues in Japan,” *Gazette (Leiden, Netherlands)*, vol. 54, issue. 3, pp. 209–226.

Motion Picture Association of America (MPAA). 2017, “Theatrical Market Statistics 2016,” Washington, DC: MPAA. Retrieved from www.mpaa.org/wp-content/uploads/2017/03/MPAA-Theatrical-Market-Statistics-2016_Final.pdf.

Murray, J. L. 2017, “Mass media reporting and enabling of mass shootings,” *Cultural Studies ↔ Critical Methodologies*, vol. 17, issue 2, pp. 114–124.

Olsen, G. R., Carstensen, N., and Høyen, K. 2003, “Humanitarian crises: what determines the level of emergency assistance? Media coverage, donor interests and the aid business,” *Disasters*, vol. 27, issue 2, pp. 109–126.

Parliament. House of Commons. 2003, “Culture, Media and Sport – Sixth Report,” HL 2002–2003, Section 22. London: The Stationery Office.

Robinson, J., Chivian, E., and Tudge, J. 1989, “News media use and adolescents' attitudes about nuclear issues: An American-Soviet comparison,” *Journal of Communication,* vol. 39, issue 2, pp. 105–113.

Rubin, A., and Smith, D. R. 2009, “Institutional ownership, volatility and dividends,” *Journal of Banking & Finance*, vol. 33, issue 4, pp. 627–639.

Ryu, D., Ryu, D., and Yang, H. 2020, “Investor Sentiment, Market Competition, and Financial Crisis: Evidence from the Korean Stock Market,” *Emerging Markets Finance and Trade*, vol. 56, issue 8, pp. 1804–1816.

Solomon, D. H. 2012, “Selective publicity and stock prices,” *Journal of Finance*, vol. 67, issue 2, pp. 599–638.

Solomon, D. H., Soltes, E., and Sosyura, D. 2014, "Winners in the spotlight: Media coverage of fund holdings as a driver of flows," *Journal of Financial Economics*, vol. 113, issue 1, pp. 53–72.

Spicer, B. H. 1978, "Investors, corporate social performance and information disclosure: An empirical study," *The Accounting Review*, vol. 53, issue 1, pp. 94–111.

Tetlock, P. C. 2007, "Giving content to investor sentiment: The role of media in the stock market," *Journal of Finance*, vol. 62, issue 3, pp. 1139–1168.

Tetlock, P. C., Saar-Tsechansky, M., and Macskassy, S. 2008, "More than words: Quantifying language to measure firms' fundamentals," *Journal of Finance*, vol. 63, issue 3, pp. 1437–1467.

Vandenbosch, L., and Eggermont, S. 2012, "Understanding sexual objectification: A comprehensive approach toward media exposure and girls' internalization of beauty ideals, self-objectification, and body surveillance," *Journal of Communication*, vol. 62, issue 3, pp. 869–887.

Vandenbosch, L., and Eggermont, S. 2014, "The role of television in adolescents' sexual attitudes: Exploring the explanatory value of the three-step self-objectification process," *Poetics*, vol. 45, pp. 19–35.

Wakefield, M. A., Loken, B., and Hornik, R. C. 2010, "Use of mass media campaigns to change health behavior," *The Lancet*, vol. 376, issue 9748, pp. 1261–1271.

Xu, X. D., Zeng, S. X., Zou, L. H., and Shi, J. J. 2016, "The Impact of Corporate Environmental Violation on Shareholders' Wealth: a Perspective Taken from Media Coverage," *Business Strategy and the Environment*, vol. 25, pp. 73–91.

Xu, X. D., Zeng, S. X., and Tam, C. M. 2012. "Stock market's reaction to disclosure of environmental violation: evidence from China," *Journal of Business Ethics* vol. 107, issue 2, pp. 227–237.

Appendix. Variable Description

Variable	Definition
Variables related to CER (MSCI KLD Stats, or Trucost)	
Environmental Score	Difference between the total number of environmental strengths and environmental concerns
Adj. Environmental Score	Difference between adjusted environmental strengths and adjusted environmental concerns (normalized by the total number of categories)
Total Environmental Costs	The sum of direct and indirect environmental costs
Total CO_2 Emissions	The total amount of CO_2 emissions, generated by a firm
Total GHG Emissions	The total amount of GHG emissions by a firm
Variables related to Firm Risk (CRSP)	
SVOL	Realized stock return volatility, which is the standard deviation of daily stock returns over the fiscal year
$IDVOL_{CAPM}$ / $IDVOL_{FF3}$	Idiosyncratic stock return volatility, which is the standard deviation of daily "excess" stock returns over the fiscal year. Daily excess stock returns are the residuals obtained from regressing daily stock returns with CAPM or Fama-French 3-factor model
Firm level characteristics (CRSP, Compustat, or ExecuComp)	
Cash / Total Assets	Cash holding ratio, which is calculated as the sum of cash and short-term equivalents (*che*) divided by total assets (*at*)
Capital Expenditure / Total Assets	Capital expenditure ratio, the ratio of capital expenditures (*capx*) to total assets (*at*)
Cash Flow / Total Assets	Cash flow ratio, calculated as the sum of income before extraordinary items (*ibc*) and depreciation and amortization (*dp*) divided by total assets (*at*) of the previous period
CEO Equity Ownership	The stock equity ownership of the CEO
CEO Duality	Dummy variable, taking a value of 1 if the CEO is also a chairperson of the board of directors, otherwise 0
Total Assets (*at*)	The total value of a firm's assets (in $ million)
Market Value of Firm	The market value of a firm is calculated by adding the total market value (*mkvalt*) and total assets (*at*) and subtracting common/ordinary equity (*ceq*) and deferred taxes (*txdb*)
Tobin's Q	Tobin's Q, calculated as the ratio of the market value of assets to the replacement value of assets (book value of total assets), following Fama and French (1992)
Leverage Ratio	The book leverage ratio, calculated as the sum of long-term debt (*dltt*) and current liabilities (*dlc*) divided by total assets (*at*)
ROA	Return on assets, calculated as the ratio of operating income before depreciation (*ni*) to total assets (*at*)
Operating Cash Flow	Operating cash flow, calculated by subtracting total accruals from net income (total accruals = change in current assets − change in cash equivalent − change in current liabilities + change in debt in current liabilities − depreciation and amortization)
Institutional Ownership	The stock equity ownership of financial institutions

Variable	Definition
Variables related to Environmental Disaster Movie (*IMDB Pro* or *The Numbers*)	
Annual Top 20	Dummy variable, taking a value of 1 if the environmental movie is ranked among the top 20 at the box office in a given year
ENV. Movie Dummy	Dummy variable, taking a value of 1 if at least one environmental movie is released in a given year
ENV. Movie Performance	The ratio of the number of tickets sold for the movie to the total population in the US in a given year
ENV. Movie Number	Total number of environmental disaster movies in a given year
ENV. Gross Profit	Total box office profits of all the environmental movie(s) in a given year. For example, if a movie is released in a certain year and shown in theaters until the next year, box office profits of the movie should be divided into two years, and each belongs to the current and next year's *ENV. Gross Profit*. Further, if there are two environmental movies in a certain year, *ENV. Gross Profit* in that year is the sum of box office profits of those two movies
Major10 / 6 Dist. Company	Dummy variable, taking a value of 1 if the distribution company of the environmental movie is among 10 or 6 major film distribution companies, otherwise, it equals zero
Award Dummy	Dummy variable, taking a value of 1 if the environmental movie won any famous award, otherwise, it equals zero
Award Nominations	The number of award nominations from Oscars, Cannes, Venice, Berlin, British Academy of Film and Television Arts (BAFTA), etc.
Movie Impact Ratio	MOVIEmeter score in IMDbPro, which measure the popularity of the environmental movie
Movie Related Articles	Number of articles about the environmental movie by journalists
Movie Rating	Movie rating by experts, divided by 10 for scores to be between 0 and 1
Variables related to Annual Climate Conditions (*NCEI, The World Bank*)	
Natural Disaster Costs (in $ billion)	Total costs of weather and climate disaster events across the US in a given year
CO_2 Emissions per Capita (in metric tons)	The average amount of CO_2 emissions by a person in a given year
Abnormal Temperature (℉)	The annual average value of monthly abnormal temperatures (departure from the mean) in Fahrenheit

Movie Title	Premiere Date	Highest Rank	Annual Rank	Gross Profit ($ million)	Number of Tickets Sold (in million)
Waterworld	07/28/1995	#1	#10	88.2	20.3
Erin Brockovich	03/17/2000	#1	#10	125.6	23.3
The Day After Tomorrow	05/28/2004	#1	#6	186.7	30.1
An Inconvenient Truth	05/24/2006	#9	#112	24.1	3.7
The 11th Hour	08/17/2007	#33	#306	0.71	0.1
The Happening	06/13/2008	#2	#47	64.5	9
Wall-E	06/27/2008	#1	#5	223.8	32.2
2012	11/13/2009	#1	#14	163.4	21.8
Beasts of the Southern Wild	06/27/2012	#12	#146	12.8	1.4
Chasing Ice	11/16/2012	#32	#271	1.33	0.17
Interstellar	11/07/2014	#1	#15	182.8	22.4
Deepwater Horizon	09/30/2016	#1	#52	61.4	7.1

List of Environmental Disaster Movies Considered in this Study

This is the list of environmental disaster movies for the sample period from 1992 to 2016. Environmental disaster movies are the movies or films that show man-made environmental disasters or have messages about environmental problems caused by humans. The premiere date is a release date of a movie at the US box office. The highest rank is the best rank of the movie during the release period at the US box office, and annual rank is the rank based on the number of tickets sold at the US box office in the release year. Gross profit is the movie profit (in dollar million) generated from the box office tickets sold.

Table 1. Descriptive Statistics for Firm-year Observations in the US from 1992 to 2016

Independent Variables	Obs.	Mean	SD	P25	Median	P75
Raw ENV. Score	23,880	0.096	0.971	0	0	0
Adjusted ENV. Score	23,880	0.008	0.131	0	0	0
ROA	23,880	0.045	0.109	0.019	0.048	0.086
Operating Cash Flow / Total Assets	23,880	0.081	0.117	0.040	0.084	0.131
Env. Movie Dummy	23,880	0.526	0.499	0	1	1
Annual Top 20 Dummy	23,880	0.276	0.447	0	0	1
Env. Movie Performance	23,880	0.045	0.055	0	0.012	0.083
Env. Movie Number	23,880	0.834	0.936	0	1	1
Institutional Ownership	23,880	0.647	0.183	0.433	0.570	0.791
CEO Ownership	23,880	0.025	0.070	0.003	0.007	0.019
CEO Duality	23,880	0.553	0.497	0	1	1
Total Assets	23,880	14,817	71,643	875.91	2,510.2	7,837.5
Leverage Ratio	23,880	0.242	0.208	0.077	0.223	0.354
Tobin's Q	23,880	1.924	1.312	1.156	1.521	2.202
Cash Flow / Total Assets	23,880	0.100	0.111	0.057	0.097	0.146
Capital Expenditure / Total Assets	23,880	0.048	0.052	0.016	0.034	0.063
Cash Holding Ratio	23,880	0.140	0.160	0.026	0.080	0.197
Total Environmental Costs	6,498	497.36	1,668.5	29.12	88.23	320.56
Total CO_2 Emissions	6,498	3.523	14.4	0.172	0.547	2.018
Total GHG Emissions	6,498	3.227	10.7	0.227	0.718	2.190

This table shows summary statistics of the main dependent and independent variables used in the study with the mean, median, standard deviation, and 25% and 75% percentile values for the entire firm-year observations over the 1992–2016 period in the US. The main dependent variables, CEP (ENV. score and adjusted ENV. score), are created using the environmental ratings from the MSCI ESG KLD database. Alternative measures of environmental performance, environmental costs, CO_2 emissions, and GHG emissions are from Trucost, and the sample period for these variables are from 2002 to 2015. The units for environmental costs are in dollar million, while those for CO_2 and GHG emissions are in million tons. All the variables are winsorized at the 1% level on either tail.

Table 2. Correlation Matrix of Main Regression Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Raw Environmental Score	1												
2. Adj. Environmental Score	0.9365	1											
3. ROA	0.0716	0.0647	1										
4. Operating Cash Flow / Total Assets	0.0505	0.0427	0.7903	1									
5. Idiosyncratic Volatility $_{\text{FF3-Factors}}$	−0.1006	−0.0694	−0.2830	−0.1970	1								
6. Institutional Ownership	0.0532	0.0482	0.0245	0.0041	−0.0420	1							
7. Annual Top 20	−0.0635	−0.0672	−0.0559	−0.0388	0.1982	−0.0260	1						
8. ENV. Movie Performance	−0.0101	−0.0161	−0.0860	−0.0518	0.1860	0.0914	0.8530	1					
9. ln (Total Assets)	0.0548	0.0051	−0.0298	−0.0453	−0.2334	−0.0896	−0.0462	−0.0618	1				
10. Leverage Ratio	−0.0021	−0.0216	−0.2181	−0.1964	0.0092	0.0087	−0.0104	−0.0040	0.2857	1			
11. Tobin's Q	0.0915	0.0799	0.4436	0.3768	−0.0614	0.0079	−0.0420	−0.0612	−0.2419	−0.2147	1		
12. Cash Holding Ratio	0.0829	0.0819	0.0818	0.0939	0.1064	0.1033	0.0259	0.0538	−0.3312	−0.3801	0.3853	1	
13. CEO Stock Ownership	−0.0342	−0.0197	0.0536	0.0502	0.0727	−0.1453	0.0250	0.0144	−0.2417	−0.1451	0.0900	0.1346	1

This table shows the correlation matrix for the main dependent and independent variables in this study. Raw Environmental Score, Adj. Environmental Score, ROA, Operating Cash Flow / Total Assets, and Idiosyncratic Stock Return Volatility adjusted by the Fama-French 3-factor model are the main dependent variables used in this study. Other variables are the main independent or control variables used in the study. Institutional Ownership is also used as a dependent variable in the regression analysis to check the channels of the environmental movie(s) that affect the relationship between corporate environmental and financial performance.

Table 3-1. Cumulative Abnormal Returns around the Movie Release Date

	Erin Brockovich								
Return Adj. Model	R_f	**CAPM**	**FF3 Factors**	R_f	**CAPM**	**FF3 Factors**	R_f	**CAPM**	**FF3 Factors**
CAR	−0.040** (−2.49)	−0.034** (−2.14)	−0.049*** (−3.26)	−0.062*** (−3.93)	−0.060*** (−3.75)	−0.079*** (−5.25)	−0.037** (−2.35)	−0.044*** (−2.80)	−0.082*** (−5.48)
Day Windows	0			(−1, +1)			(−2, +2)		

This table shows the results of the event study of PG&E Corporation around the release of the movie, Erin Brockovich. The stock return of PG&E Corporation is adjusted with the risk-free rate, CAPM, or Fama-French 3 (FF3)-factor model. The movie was premiered on Friday, March 17, 2000, and the event day is set to Monday, March 20, 2000, as it would take some time for the movie to influence investor sentiment and for the stock market to reflect information content of the movie. The estimation window for the analysis is from a year to a month before the event day. The numbers in parentheses are t-values, and *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 3-2. Buy-Hold Abnormal Returns after the Movie Release Date

	Erin Brockovich					
Return Adj. Model	R_f	**FF3 Factors**	R_f	**FF3 Factors**	R_f	**FF3 Factors**
BHR	−0.499*** (−11.21)	−0.597*** (−13.74)	−0.061* (−1.73)	−0.223*** (−5.08)	0.437*** (12.72)	0.354*** (10.84)
Period	1 Year		2 Years		5 Years	

This table shows the long-term (1, 2, and 5 years) buy-and-hold abnormal returns of PG&E stock after the release of the movie, Erin Brockovich. The stock return of PG&E Corporation is adjusted with the risk-free rate or FF3-factor model. The numbers in parentheses are t-values, and *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 4. Univariate Test for Premiere of Environmental Disaster Movies and Environmental Problems

	Years with Environmental Movies		Years without Environmental Movies		Differences	
	Mean	Median	Mean	Median	Mean	Median
CO_2 Emissions / Capita	18.24	19.09	18.71	19.43	−0.47 (−0.745)	−0.34 (−0.985)
Annual Temperature (°F)	53.51	53.27	52.96	53.08	0.54 (1.408)	0.19 (1.095)
Number of Natural Disasters	8.27	8	6.57	6	1.70 (1.235)	2.0 (1.323)
Total Cost of Natural Disasters (in $ billion)	43.67	28.6	44.94	23.5	−1.26 (−0.067)	5.1 (0.192)
Number of Years	11		14			

	Months with Env. Movies		Months without Env. Movies		Differences	
	Mean	Median	Mean	Median	Mean	Median
Abnormal Temperature (°F)	1.54	1.89	1.17	0.96	0.37 (0.751)	0.93 (1.030)
Number of Months	14		286			

This table shows the univariate test results for the relationship between the release of environmental disaster movies and environmental problems in the US. This table reports t-test statistics for differences in means and Wilcoxon rank-sum (Mann-Whitney) test statistics for differences in medians between sample years (months) with environmental disaster movies and sample years (months) without environmental disaster movies. The values in the parentheses are t-statistics for means and Wilcoxon z-values for medians. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 5-1. The Effect of Environmental Movies on CEP

VARIABLES	(1)	(2) CER Score	(3)	(4)	(5) Adj. CER Score	(6)
Annual Top 20$_{t-1}$	0.056***			0.012***		
	(6.93)			(8.75)		
ENV. Movie Number$_{t-1}$		0.020***			0.001**	
		(4.51)			(2.33)	
ENV. Movie Performance$_{t-1}$			6.330***			1.057***
			(12.37)			(14.64)
ln (Total Assets) $_{i,\,t-1}$	0.016	0.013	0.013	−0.004	−0.004	−0.004
	(0.43)	(0.37)	(0.37)	(−0.82)	(−0.84)	(−0.91)
Leverage Ratio $_{i,\,t-1}$	0.170	0.173*	0.152	0.002	0.003	−0.001
	(1.63)	(1.66)	(1.46)	(0.18)	(0.20)	(−0.07)
Tobin's Q $_{i,\,t-1}$	−0.018	−0.018	−0.017	−0.006***	−0.006***	−0.005***
	(−1.14)	(−1.14)	(−1.08)	(−3.11)	(−3.17)	(−3.01)
Cash Flow / Total Assets $_{i,\,t-1}$	0.107	0.100	0.132	0.016	0.014	0.021*
	(1.11)	(1.04)	(1.37)	(1.29)	(1.11)	(1.65)
CAPEX / Total Assets $_{i,\,t-1}$	−0.885**	−0.925**	−0.860**	−0.172***	−0.175***	−0.168***
	(−2.48)	(−2.58)	(−2.41)	(−3.42)	(−3.47)	(−3.34)
Cash Holding Ratio $_{i,\,t-1}$	0.714***	0.714***	0.714***	0.074***	0.075***	0.074***
	(5.89)	(5.89)	(5.89)	(5.17)	(5.20)	(5.16)
Institutional Ownership $_{i,\,t-1}$	0.279***	0.291***	0.197**	0.079***	0.080***	0.065***
	(2.84)	(2.93)	(2.02)	(5.57)	(5.56)	(4.70)
CEO Equity Ownership $_{i,\,t-1}$	1.319***	1.331***	1.282***	0.127***	0.130***	0.121***
	(3.86)	(3.89)	(3.78)	(3.24)	(3.31)	(3.10)
CEO Duality $_{i,\,t-1}$	−0.025	−0.024	−0.023	0.000	0.000	0.001
	(−0.93)	(−0.88)	(−0.83)	(0.08)	(0.09)	(0.21)
Annual Natural Disaster Costs $_{t-1}$	−0.000***	−0.000***	−0.000**	−0.000***	−0.000***	−0.000***
	(−3.73)	(−3.98)	(−2.08)	(−7.71)	(−8.04)	(−5.73)
CO_2 Emissions / Capita $_{t-1}$	−0.262***	−0.260***	−0.258***	−0.023***	−0.022***	−0.022***
	(−18.49)	(−18.44)	(−18.31)	(−13.86)	(−13.77)	(−13.51)
Annual Abnormal Temperature $_{t-1}$	−0.013**	−0.029***	0.000	−0.005***	−0.007***	−0.003***
	(−2.05)	(−4.22)	(0.00)	(−5.94)	(−7.77)	(−3.20)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.483	0.482	0.485	0.446	0.445	0.450
Observations	17,946	17,946	17,946	17,946	17,946	17,946

This table shows multivariable regression results of the raw and adjusted CER scores on the independent variables. Lagged terms of *Annual Top 20*, *Environmental Movie Number*, and *Environmental Movie Performance* are the main independent variables. *Ranked Top 20* takes a value of 1 if the movie is ranked in the top 20 in the previous year. *Environmental Movie Number* is the total number of environmental movies in a given year. *Environmental Movie Performance* is proxied by the number of tickets sold for the environmental movie divided by the total number of tickets sold for all movies at the box office. Other variables are the control variables. For the regression analysis, I control for the firm fixed effects and cluster standard errors at a firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. The numbers in parentheses are t-values.

Table 5-2. Environmental Movies and Corporate Environmental Strengths or Concerns

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES		**Adj. CER Strengths**			**Adj. CER Concerns**	
Annual Top 20$_{t-1}$	0.014***			0.005***		
	(13.97)			(5.66)		
ENV. Movie Number$_{t-1}$		0.005***			0.004***	
		(10.37)			(8.11)	
ENV. Movie Performance$_{t-1}$			0.311***			0.077***
			(19.64)			(8.78)
ln (Total Assets) $_{i, t-1}$	0.016***	0.015***	0.018***	0.020***	0.019***	0.020***
	(4.16)	(4.01)	(4.74)	(6.48)	(6.35)	(6.63)
Leverage Ratio $_{i, t-1}$	−0.008	−0.008	−0.007	−0.010	−0.010	−0.010
	(−0.69)	(−0.64)	(−0.61)	(−1.24)	(−1.21)	(−1.21)
Tobin's Q $_{i, t-1}$	−0.008***	−0.008***	−0.006***	−0.001	−0.001	−0.001
	(−4.26)	(−4.27)	(−3.47)	(−1.47)	(−1.35)	(−1.15)
Cash Flow / Total Assets $_{i, t-1}$	0.025**	0.024**	0.042***	0.009	0.010	0.013
	(2.24)	(2.11)	(3.64)	(1.05)	(1.15)	(1.45)
CAPEX / Total Assets $_{i, t-1}$	−0.186***	−0.196***	−0.160***	−0.006	−0.013	0.000
	(−4.60)	(−4.82)	(−3.98)	(−0.20)	(−0.39)	(0.00)
Cash Holding Ratio $_{i, t-1}$	0.082***	0.082***	0.077***	0.001	0.001	−0.000
	(5.98)	(5.98)	(5.63)	(0.13)	(0.08)	(−0.01)
Institutional Ownership $_{i, t-1}$	0.078***	0.081***	0.053***	−0.005	−0.003	−0.011
	(7.09)	(7.26)	(5.03)	(−0.56)	(−0.32)	(−1.31)
CEO Equity Ownership $_{i, t-1}$	0.086***	0.088***	0.069**	−0.057**	−0.058**	−0.060**
	(2.66)	(2.74)	(2.21)	(−2.41)	(−2.45)	(−2.56)
CEO Duality $_{i, t-1}$	0.000	0.001	0.000	−0.000	0.000	−0.000
	(0.10)	(0.20)	(0.12)	(−0.09)	(0.04)	(−0.09)
Annual Natural Disaster Costs $_{t-1}$	−0.000***	−0.000***	−0.000***	0.000	0.000	0.000***
	(−8.70)	(−9.16)	(−4.01)	(0.97)	(0.84)	(2.72)
CO_2 Emissions / Capita $_{t-1}$	−0.010***	−0.010***	−0.008***	0.014***	0.014***	0.014***
	(−8.34)	(−7.91)	(−6.81)	(11.05)	(11.27)	(11.30)
Annual Abnormal Temperature $_{t-1}$	−0.008***	−0.012***	−0.003***	−0.002***	−0.004***	−0.001**
	(−10.82)	(−14.08)	(−4.89)	(−4.05)	(−6.58)	(−2.55)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.431	0.429	0.448	0.706	0.706	0.706
Observations	17,946	17,946	17,946	17,946	17,946	17,946

This table shows multivariable regression results of adjusted CER strengths and concerns on the independent variables. Adj. CER strength (concern) is the number of good (bad) environmental indicators divided by the total number of indicators. Lagged terms of *Annual Top 20*, *Environmental Movie Number*, and *Environmental Movie Performance* are the main independent variables, and other variables are the control variables. For the regression analysis, I control for the firm fixed effects and cluster standard errors at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. The numbers in parentheses are t-values.

Table 5-3. Two-Stage Least Squares (2SLS) Regression Analysis for CEP

	Annual Top 20	*Adj. CER Score*	*ENV. Movie Performance*	*Adj. CER Score*
VARIABLES	**2SLS (1st Stage) (1)**	**2SLS (2nd Stage) (2)**	**2SLS (1st Stage) (3)**	**2SLS (2nd Stage) (4)**
Annual Top 20$_{t-1}$		**0.196*** (6.01)**		
ENV. Movie Performance$_{t-1}$				**0.887*** (6.26)**
ln (Total Box Office Profit)$_{t-1}$	**0.803*** (15.12)**		**0.178*** (25.19)**	
ln (Total Assets)$_{i,\ t-1}$	−0.013* (−1.94)	−0.006 (−1.24)	−0.012*** (−11.37)	0.002 (0.38)
Leverage Ratio$_{i,\ t-1}$	0.029 (0.95)	−0.003 (−0.24)	−0.002 (−0.47)	0.004 (0.33)
Tobin's Q$_{i,\ t-1}$	−0.027*** (−5.28)	−0.001 (−0.57)	−0.006*** (−9.26)	−0.001 (−0.40)
Cash Flow / Total Assets$_{i,\ t-1}$	−0.325*** (−5.92)	0.089*** (4.38)	−0.057*** (−7.84)	0.076*** (4.60)
CAPEX / Total Assets$_{i,\ t-1}$	0.106 (0.94)	−0.149*** (−2.76)	−0.039** (−2.51)	−0.093* (−1.82)
Cash Holding Ratio$_{i,\ t-1}$	0.035 (0.87)	0.057*** (3.53)	0.008 (1.42)	0.057*** (3.82)
Institutional Ownership$_{i,\ t-1}$	−0.004 (−0.13)	0.069*** (4.77)	0.078*** (18.11)	0.001 (0.09)
CEO Equity Ownership$_{i,\ t-1}$	0.444*** (4.22)	0.037 (0.85)	0.066*** (4.35)	0.065* (1.67)
CEO Duality$_{i,\ t-1}$	−0.017** (−2.09)	0.003 (0.67)	−0.002 (−1.61)	0.001 (0.24)
Annual N.D. Costs$_{t-1}$	−0.000*** (−18.91)	0.000 (0.39)	−0.000*** (−55.63)	0.000** (2.29)
CO_2 Emissions / Capita$_{t-1}$	−0.022*** (−8.73)	−0.023*** (−13.98)	−0.012*** (−33.49)	−0.017*** (−9.52)
Annual Abnormal Temp.$_{t-1}$	−0.251*** (−68.48)	0.038*** (5.08)	−0.029*** (−60.51)	0.015*** (4.15)
Firm Fixed Effects	Yes	Yes	Yes	Yes
F-statistic	228.51		617.44	
[*p*-value]	[< 0.001]		[< 0.001]	
Adjusted R-squared	0.063	0.576	0.174	0.106
Observations	17,946	17,946	17,946	17,946

This table shows two-stage least squares (2SLS) regression results on the adjusted CER score. In the 1st stage, I regress the main environmental movie variable, either *Annual Top 20* or *ENV. Movie Performance*, on the instrument variable, the logarithm of annual box office's total profits, and all the exogenous variables in the 2nd stage regression. In the 2nd stage, I regress the adjusted CER score on the predicted value of the environmental movie variable from the 1st stage regression and other control variables in the regression model. In both the 1st and 2nd stage regressions, I control for the firm fixed effects and cluster standard errors at the firm level. For the 1st stage, the *F*-statistic and its *p*-value for testing the statistical significance of the instrumental variable are reported. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. The numbers in parentheses are t-values. All the variables are winsorized at the 1% level on either tail.

Table 6. Environmental Movies and Alternative Environmental Performance Measures

VARIABLES	(1) ln (Total CO_2 Emissions)	(2)	(3) ln (GHG Emissions)	(4)	(5) ln (Total ENV. Costs)	(6)
Annual Top 20$_{t-1}$	−0.029***		−0.030***		−0.018**	
	(−3.38)		(−4.03)		(−2.35)	
ENV. Movie Number$_{t-1}$		−0.024***		−0.022***		−0.025***
		(−5.00)		(−5.29)		(−5.75)
ln (Total Assets) $_{i, t-1}$	0.540***	0.546***	0.520***	0.525***	0.529***	0.534***
	(15.97)	(16.22)	(17.30)	(17.57)	(17.05)	(17.25)
Leverage Ratio $_{i, t-1}$	0.156	0.170	0.121	0.134	0.122	0.138
	(0.94)	(1.02)	(0.88)	(0.96)	(0.78)	(0.88)
Tobin's Q $_{i, t-1}$	0.018	0.018	0.021	0.021	0.014	0.013
	(1.09)	(1.10)	(1.46)	(1.48)	(0.91)	(0.89)
Cash Flow / Total Assets $_{i, t-1}$	0.539***	0.530***	0.485***	0.478***	0.518***	0.503***
	(4.25)	(4.21)	(4.83)	(4.79)	(4.56)	(4.45)
CAPEX / Total Assets $_{i, t-1}$	−0.337	−0.269	−0.387*	−0.325	−0.455*	−0.381
	(−1.12)	(−0.90)	(−1.71)	(−1.43)	(−1.83)	(−1.53)
Cash Holding Ratio $_{i, t-1}$	−0.402***	−0.407***	−0.305***	−0.310***	−0.274**	−0.279**
	(−2.93)	(−2.98)	(−2.71)	(−2.76)	(−2.31)	(−2.36)
Institutional Ownership $_{i, t-1}$	0.149*	0.146*	0.063	0.060	0.119	0.118
	(1.76)	(1.73)	(0.86)	(0.83)	(1.43)	(1.42)
CEO Equity Ownership $_{i, t-1}$	−0.152	−0.142	−0.077	−0.068	−0.124	−0.109
	(−0.48)	(−0.45)	(−0.27)	(−0.24)	(−0.39)	(−0.34)
CEO Duality $_{i, t-1}$	0.003	−0.000	−0.000	−0.003	0.005	0.001
	(0.12)	(−0.02)	(−0.00)	(−0.15)	(0.24)	(0.05)
Annual Environmental Variables	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.959	0.959	0.962	0.962	0.963	0.963
Observations	6,791	6,791	6,791	6,791	6,791	6,791

This table shows multivariable regression results of environmental costs, CO_2 emissions, and GHG emissions on the independent variables. *Annual Top 20* is a dummy variable that takes a value of 1 if the movie is ranked among the top 20 in a given year. *ENV. Movie Number* is the total number of environmental movies at the box office in a given year. The rest of the variables are the control variables. For the regression analysis, I control for the firm fixed effects and cluster standard errors at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. The numbers in parentheses are t-values. All the variables are winsorized at the 1% level on either tail.

Table 7-1. The Effect of Environmental Movies on the relationship between CEP and Financial Performance

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Return on Assets (ROA)				Operating Cash Flow / Total Assets			
High CER Firm Dummy $_{i, t-1}$	0.010***	0.011***			0.010***	0.011***		
	(5.32)	(4.95)			(4.92)	(4.76)		
ENV. Movie Performance $_{t-1}$	−0.043***	−0.035***	−0.022***		−0.003	0.004	0.018*	
	(−3.92)	(−3.45)	(−2.59)		(−0.29)	(0.37)	(1.80)	
ENV. Movie Performance $_{t-1}$ **x**	**0.042**	**0.035***	**0.063*****	**0.048*****	**0.070****	**0.060*****	**0.057*****	**0.047****
High CER Firm Dummy $_{i, t-1}$	**(1.61)**	**(1.66)**	**(3.58)**	**(2.63)**	**(2.52)**	**(2.59)**	**(2.98)**	**(2.38)**
ln (Total Assets) $_{i, t-1}$	−0.001***	−0.000	−0.022***	−0.029***	−0.002***	−0.000	−0.017***	−0.023***
	(−3.39)	(−0.29)	(−12.17)	(−12.04)	(−5.19)	(−0.23)	(−8.57)	(−9.25)
Leverage Ratio $_{i, t-1}$	−0.063***	−0.063***	−0.047***	−0.035***	−0.052***	−0.049***	0.011	0.013
	(−20.45)	(−8.70)	(−5.71)	(−4.24)	(−15.23)	(−6.57)	(1.18)	(1.39)
CAPEX / Total Assets $_{i, t-1}$	0.044***	0.079***	−0.025	0.037	0.393***	0.373***	0.084***	0.101***
	(3.88)	(2.98)	(−0.92)	(1.31)	(31.27)	(13.69)	(2.75)	(3.23)
Institutional Ownership $_{i, t-1}$	−0.001	−0.002	0.026***	0.022***	−0.008**	−0.009	0.006	0.003
	(−0.42)	(−0.25)	(4.00)	(2.73)	(−2.25)	(−1.50)	(0.91)	(0.36)
CEO Equity Ownership $_{i, t-1}$	0.051***	0.030	−0.057**	−0.036*	0.046***	0.021	−0.037	−0.022
	(4.03)	(1.19)	(−2.55)	(−1.67)	(3.33)	(0.77)	(−1.39)	(−0.83)
Year Fixed Effects	No	No	No	Yes	No	No	No	Yes
Industry Fixed Effects	No	Yes	No	No	No	Yes	No	No
Firm Fixed Effects	No	No	Yes	Yes	No	No	Yes	Yes
Clusters	No	Firm	Firm	Firm	No	Firm	Firm	Firm
Adj. R^2	0.029	0.061	0.411	0.434	0.065	0.100	0.374	0.381
Observations	20,657	20,331	20,509	20,509	20,657	20,331	20,509	20,509

This table shows the multivariable regression results of the effect of environmental disaster movies on the relationship between CER and financial performance. The interaction term of *Environmental Movie Performance* and *High CER Firm Dummy* is the main variable used in the study. *Environmental Movie Performance* is proxied by the number of tickets sold for the environmental movie divided by the total number of tickets sold for all movies at the box office. *High CER Firm Dummy* takes a value of 1 if a firm's raw environmental score or adjusted environmental score in the previous year is above the previous year's median value across the year and industry, and 0 otherwise. ln(Total Assets), leverage ratio, Capital Expenditure / Total Assets, and CEO Stock Ownership are the control variables. I include year, industry, or firm fixed effects, and cluster standard errors at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. The numbers in parentheses are t-values. All the variables are winsorized at the 1% level on either tail.

Table 7-2. The Effect of Environmental Movies based on Industry Types

	Industries not related to Environment				**Industries related to Environment**			
VARIABLES	ROA		OCF / Total Assets		ROA		OCF / Total Assets	
ENV. Movie Performance $_{t-1}$	−0.004		0.023		−0.096***		−0.032	
	(−0.23)		(1.20)		(−4.00)		(−1.35)	
ENV. Movie Performance $_{t-1}$ **x** ***High CER Firm Dummy*** $_{i,\,t-1}$	**0.059**	**0.038**	**0.028**	**0.035**	**0.076****	**0.080****	**0.066***	**0.068***
	(0.75)	**(0.86)**	**(0.67)**	**(0.78)**	**(2.17)**	**(2.19)**	**(1.86)**	**(1.89)**
ln (Total Assets) $_{i,\,t-1}$	−0.025***	−0.029***	−0.014***	−0.017***	−0.033***	−0.038***	−0.026***	−0.031***
	(−7.65)	(−7.34)	(−4.17)	(−4.02)	(−7.98)	(−7.56)	(−6.45)	(−5.95)
Leverage Ratio $_{i,\,t-1}$	−0.029*	−0.022	0.018	0.018	−0.075***	−0.043**	−0.005	0.014
	(−1.86)	(−1.38)	(1.05)	(1.07)	(−3.49)	(−2.00)	(−0.22)	(0.62)
CAPEX / Total Assets $_{i,\,t-1}$	−0.092	−0.035	0.099	0.100	0.067	0.144***	0.077	0.116**
	(−1.19)	(−0.45)	(1.16)	(1.14)	(1.28)	(2.84)	(1.47)	(2.24)
Institutional Ownership $_{i,\,t-1}$	0.017	0.026	0.001	0.009	0.044***	0.012	0.013	−0.012
	(1.19)	(1.47)	(0.09)	(0.47)	(3.05)	(0.65)	(0.95)	(−0.70)
CEO Equity Ownership $_{i,\,t-1}$	−0.051	−0.038	0.025	0.027	−0.020	−0.021	−0.049	−0.066
	(−1.38)	(−1.05)	(0.61)	(0.64)	(−0.17)	(−0.17)	(−0.46)	(−0.61)
Year Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clusters	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Adjusted R-squared	0.425	0.442	0.380	0.386	0.263	0.316	0.211	0.239
Observations	4,491	4,491	4,491	4,491	4,028	4,028	4,028	4,028

This table shows the multivariable regression results of the effect of environmental disaster movies on the relationship between CER and financial performance based on industry groups. The interaction term of *Environmental Movie Performance* and *High CER Firm Dummy* is the main variable used in the study. *Environmental Movie Performance* is proxied by the number of tickets sold for the environmental movie divided by the total number of tickets sold for all movies at the box office. *High CER Firm Dummy* takes a value of 1 if a firm's raw environmental score or adjusted environmental score in the previous year is above the previous year's median value across the year and industry, and 0 otherwise. ln(Total Assets), leverage ratio, Capital Expenditure / Total Assets, and CEO Stock Ownership are the control variables. I include either year fixed effects or both year and firm fixed effects, and cluster standard errors at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. The numbers in parentheses are t-values. All the variables are winsorized at the 1% level on either tail.

Table 8-1. The Effect of Environmental Movies on the relationship between CEP and Firm Risk

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	SVOL		***$IDVOL_{CAPM}$***		***$IDVOL_{FF3}$***	
ENV. Movie Performance $_{t-1}$	−0.022***		−0.018***		−0.016***	
	(−19.16)		(−17.12)		(−16.75)	
***ENV. Movie Performance $_{t-1}$* x**	**−0.007*** **	**−0.007*** **	**−0.008*** **	**−0.008*** **	**−0.006*** **	**−0.006*** **
High CER Firm Dummy $_{i,t-1}$	**(−3.32)**	**(−3.65)**	**(−4.13)**	**(−4.07)**	**(−3.76)**	**(−3.32)**
ln (Total Assets) $_{i,t-1}$	−0.002***	−0.001**	−0.002***	−0.001**	−0.002***	−0.001***
	(−10.62)	(−2.38)	(−10.32)	(−2.39)	(−11.56)	(−2.71)
Leverage Ratio $_{i,t-1}$	0.008***	0.005***	0.007***	0.004***	0.007***	0.004***
	(7.67)	(5.53)	(7.58)	(5.21)	(7.46)	(5.23)
CAPEX / Total Assets $_{i,t-1}$	0.027***	0.005	0.026***	0.004	0.022***	0.003
	(7.58)	(1.43)	(7.77)	(1.45)	(7.58)	(1.21)
Institutional Ownership $_{i,t-1}$	0.004***	−0.002**	0.002***	−0.002**	0.002**	−0.002**
	(4.23)	(−2.31)	(3.16)	(−2.14)	(2.49)	(−2.53)
CEO Equity Ownership $_{i,t-1}$	0.018***	0.006**	0.015***	0.005**	0.014***	0.005**
	(5.16)	(2.30)	(4.89)	(2.11)	(5.08)	(2.31)
Year Fixed Effects	No	Yes	No	Yes	No	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.238	0.521	0.261	0.510	0.266	0.505
Observations	20,509	20,509	20,509	20,509	20,509	20,509

This table shows the multivariable regression results of the effect of environmental disaster movies on the relationship between CER and stock return volatility. The interaction term of *Environmental Movie Performance* and *High CER Firm Dummy* is the main variable used in the study. *Environmental Movie Performance* is proxied by the number of tickets sold for the environmental movie divided by the total number of tickets sold for all movies at the box office. *High CER Firm Dummy* takes a value of 1 if a firm's raw environmental score or adjusted environmental score in the previous year is above the previous year's median value across the year and industry, and 0 otherwise. ln(Total Assets), leverage ratio, Capital Expenditure / Total Assets, and CEO Stock Ownership are the control variables. I control either the year or firm fixed effects, or both and cluster standard errors at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. The numbers in parentheses are t-values. All the variables are winsorized at the 1% level on either tail.

Table 8-2. Institutional Ownership Change after Environmental Movies

VARIABLES	**(1)**	**(2)** *Institutional Ownership*	**(3)**
Institutional Ownership $_{i,\ t-1}$	0.461***	0.479***	0.457***
	(31.97)	(33.36)	(31.34)
ENV. Movie Dummy $_{t-1}$	0.015***		
	(11.51)		
Annual Top 20 $_{t-1}$		0.036***	
		(22.64)	
ENV. Movie Performance $_{t-1}$			0.255***
			(20.61)
ENV. Movie Dummy * High CER Firm $_{i,\ t-1}$	**0.005***		
	(1.67)		
Annual Top 20 * High CER Firm $_{i,\ t-1}$		**0.011*****	
		(2.65)	
ENV. Movie Performance * High CER Firm $_{i,\ t-1}$			**0.033****
			(2.24)
Corporate Governance $_{i,\ t-1}$	0.029***	0.029***	0.015***
	(6.18)	(6.38)	(3.28)
ln (Market Value of Equity) $_{i,\ t-1}$	0.007**	0.007**	0.007**
	(2.15)	(1.99)	(2.19)
Stock Volatility $_{i,\ t-1}$	−0.725***	−0.362***	−0.387***
	(−7.64)	(−3.80)	(−4.01)
Stock Turnover $_{i,\ t-1}$	0.011***	0.010***	0.011***
	(8.02)	(7.38)	(7.60)
ln (Stock Price) $_{i,\ t-1}$	0.019***	0.025***	0.026***
	(6.18)	(7.93)	(7.92)
Stock Return $_{i,\ t-1}$	0.006***	0.004*	0.003
	(2.68)	(1.91)	(1.20)
Bid-ask Spread $_{i,\ t-1}$	−0.708***	−0.840***	−0.807***
	(−6.54)	(−7.86)	(−7.40)
Firm Age $_{i,\ t-1}$	0.002***	0.002***	0.002***
	(9.01)	(8.65)	(7.10)
Tobin's Q $_{i,\ t-1}$	−0.005***	−0.006***	−0.006***
	(−3.15)	(−3.70)	(−3.55)
Tangibility Ratio $_{i,\ t-1}$	−0.059***	−0.051**	−0.062***
	(−2.85)	(−2.51)	(−2.95)
Leverage Ratio $_{i,\ t-1}$	0.018*	0.023**	0.020**
	(1.86)	(2.43)	(2.12)
Dividend Yield $_{i,\ t-1}$	−0.000*	−0.000	−0.000
	(−1.71)	(−1.46)	(−1.22)
ROA $_{i,\ t-1}$	0.033**	0.040***	0.029*
	(2.08)	(2.59)	(1.87)
S&P 500 Dummy $_{i,\ t-1}$	−0.002	−0.003	−0.005
	(−0.39)	(−0.45)	(−0.73)
Firm Fixed Effects	Yes	Yes	Yes
Adj. R^2	0.779	0.786	0.783
Observations	17,640	17,640	17,640

This table shows the multivariable regression results of institutional ownership on the independent variables. Lagged terms of *Institutional Ownership* and interaction terms are the main independent variables. Variables of corporate governance from the S&P 500 are the control variables. Corporate Governance is measured by the adjusted corporate governance rating from MSCI KLD Stats. Other control variables are created following Berger et al. (1996), Almedia and Campello (2007), and Chung and Zhang (2011). For the regression analysis, I control for the firm fixed effects and cluster standard errors at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. The numbers in parentheses are t-values. All the variables are winsorized at the 1% level on either tail.

Table 9-1. Additional Movie Characteristics and CEP

VARIABLES	(1)	(2) CER Score	(3)	(4)	(5) Adj. CER Score	(6)
ln (Production Budget) $_{t-1}$	**0.028*** **			**0.005*** **		
	(13.60)			**(16.82)**		
ln (Movie Released Period) $_{t-1}$		**0.046*** **			**0.005*** **	
		(10.02)			**(8.42)**	
ln (Number of Theaters) $_{t-1}$			**0.022*** **			**0.003*** **
			(12.01)			**(10.90)**
ln (Total Assets) $_{i, t-1}$	0.017	−0.001	−0.003	−0.004	−0.006	−0.006
	(0.47)	(−0.02)	(−0.08)	(−0.78)	(−1.22)	(−1.32)
Leverage Ratio $_{i, t-1}$	0.158	0.181*	0.173*	−0.000	0.004	0.003
	(1.52)	(1.75)	(1.67)	(−0.01)	(0.28)	(0.21)
Tobin's Q $_{i, t-1}$	−0.017	−0.020	−0.019	−0.005***	−0.006***	−0.006***
	(−1.11)	(−1.33)	(−1.24)	(−3.05)	(−3.35)	(−3.26)
Cash Flow / Total Assets $_{i, t-1}$	0.138	0.129	0.139	0.023*	0.018	0.020
	(1.43)	(1.35)	(1.44)	(1.79)	(1.45)	(1.59)
CAPEX / Total Assets $_{i, t-1}$	−0.813**	−0.902**	−0.916**	−0.158***	−0.174***	−0.176***
	(−2.28)	(−2.53)	(−2.56)	(−3.16)	(−3.46)	(−3.49)
Cash Holding Ratio $_{i, t-1}$	0.711***	0.693***	0.696***	0.074***	0.072***	0.072***
	(5.86)	(5.77)	(5.79)	(5.11)	(5.06)	(5.05)
Institutional Ownership $_{i, t-1}$	0.192**	0.215**	0.177*	0.063***	0.071***	0.066***
	(1.96)	(2.23)	(1.85)	(4.53)	(5.19)	(4.81)
CEO Equity Ownership $_{i, t-1}$	1.281***	1.251***	1.232***	0.119***	0.120***	0.116***
	(3.78)	(3.70)	(3.66)	(3.08)	(3.09)	(3.01)
CEO Duality $_{i, t-1}$	−0.025	−0.018	−0.016	0.000	0.001	0.002
	(−0.92)	(−0.66)	(−0.58)	(0.11)	(0.32)	(0.42)
Annual Natural Disaster Costs $_{t-1}$	−0.000	0.000	0.000	−0.000***	−0.000***	−0.000**
	(−0.88)	(0.06)	(1.15)	(−3.99)	(−3.90)	(−2.55)
CO_2 Emissions / Capita $_{t-1}$	−0.250***	−0.251***	−0.257***	−0.020***	−0.021***	−0.022***
	(−17.84)	(−18.12)	(−18.43)	(−12.66)	(−13.15)	(−13.61)
Annual Abnormal Temperature $_{t-1}$	−0.004	−0.037***	−0.034***	−0.003***	−0.008***	−0.008***
	(−0.60)	(−5.33)	(−4.98)	(−3.57)	(−8.65)	(−8.56)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.419	0.420	0.415	0.427	0.419	0.418
Observations	17,946	17,946	17,946	17,946	17,946	17,946

This table shows the multivariable regression results of the raw and adjusted CER scores on the independent variables. Lagged terms of *ln (Production Budget), ln (Movie Released Period),* and *ln (Number of Theaters Screening)* are the main independent variables. Control variables include ln (Total Assets), leverage ratio, Tobin's Q, Cash Flow / Total Assets, Capital Expenditure / Total Assets, ROA, Cash Holding Ratio, Institutional Ownership, CEO Equity Ownership, CEO Duality, and variables related to annual environmental conditions such as annual natural disaster costs, CO_2 emissions per capita, and average abnormal temperature. For the regression analysis, I control for the firm fixed effects and cluster standard errors at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. The numbers in parentheses are t-values. All the variables are winsorized at the 1% level on either tail.

Table 9-2. More Environmental Movie Characteristics

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Adjusted CER Score				
ln (ENV Gross Profit) $_{t-1}$	0.003***							
	(9.86)							
Major 10 Dist. Company $_{t-1}$		0.008***						
		(7.90)						
Major 6 Dist. Company $_{t-1}$			0.010***					
			(8.60)					
Award Dummy $_{t-1}$				0.032***				
				(17.54)				
ln (Award Nominations) $_{t-1}$					0.007***			
					(12.89)			
ln (Movie Impact Ratio) $_{t-1}$						0.002***		
						(10.01)		
ln (Movie Related Articles) $_{t-1}$							0.002***	
							(8.45)	
Movie Rating $_{t-1}$								0.030***
								(10.52)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.416	0.414	0.415	0.430	0.437	0.418	0.426	0.425
Observations	17,946	17,946	17,946	17,946	17,946	17,946	17,946	17,946

This table shows the multivariable regression results of the adjusted environmental score (adj. CER Score) on more detailed movie variables. *ln (ENV Gross Profit)* is a logarithm of total box office profits of all the environmental movie(s) in a given year. *Major 10* and *Major 6 Dist. Company* are dummy variables, taking a value of 1 if the distributing company of the environmental movie is among the 10 and 6 major distributing companies, respectively. *Award Dummy* is a dummy variable taking a value of 1 if the movie won any famous award. *ln (Award Nominations)*, *ln (Movie Impact Ratio)*, and *ln (Movie Related Articles)* are the natural logarithms of the number of award nominations, movie-meter score, and the number of articles about the movie, respectively. Lastly, *Movie Rating* is a rating score between 0 and 1 by movie experts. These variables are collected from IMDbPro, a subscription-based movie database. Control variables include ln (Total Assets), leverage ratio, Tobin's Q, Cash Flow / Total Assets, Capital Expenditure / Total Assets, ROA, Cash Holding Ratio, Institutional Ownership, CEO Equity Ownership, CEO Duality, and annual environmental conditions. For the regression analysis, I control for the firm fixed effects and cluster standard errors at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. The numbers in parentheses are t-values. All the variables are winsorized at the 1% level on either tail.