"Impact of Environmental Disaster Movies on Corporate Environmental and Financial Performance"

KAIST

2020 JAIBS

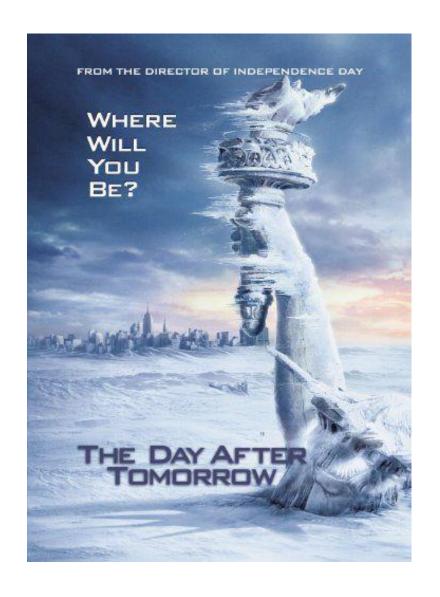KAIST Business School

Henry Hyun-Do Kim

Motivation

- Importance & Impact of *Mass Media* are studied extensively in the past.
  - Newspaper
  - Magazine
  - News Broadcast (TV)
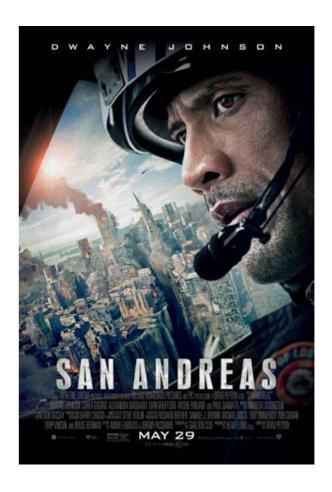 - Internet News

Then,

- What about Film (a.k.a. Movie) ?
  - Unlike other types of mass media, people across all ages and gender enjoy watching movies!
  - Yet, lack of evidence on the role of movies in investor and corporate perspective.

Environmental Disaster Movies

"Environmental Movies" in This Study

- This study **focuses** on movies about

    "**Man-made**" Environmental Disasters

    - ✓ Global Warming / Climate Change
    - ✓ Environmental Pollution
    - ✓ Contamination of Drinking Water
    - ✓ Explosion of Nuclear Power Plant

        Etc.

- This research **does not cover** movies about
    - Natural Disasters such as earthquake
    - Apocalyptic zombie stories, and etc.

Environmental Movies in the Sample

List of Environmental Disaster Movies in this Study

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

Prior Research Streams

1) **The Role of Mass Media in Investor and Corporate Perspective**

   - Klibanoff, Lamont, and Wizman (1998), Tetlock (2007), Tetlock et al. (2008), Griffin, Hirschey, and Kelly (2011), Solomon, Soltes, and Sosyura (2014), etc.

2) **Relationship between CEP and Financial Performance**

   A. **The Sign of Relationship:**

   Positive (+) or Negative (—) ?

   - Spicer (1978), Mahapatra (1984), Klassen and McLaughlin (1996), Xu et al. (2016), etc.

   B. **The Causality of Relationship:**

   Corporate Financial Performance ↔ Corporate Environmental Performance

   which direction?

   - Cohen, Fenn, Naimon (1995): Corporate Environmental & Financial Performance

3) **Impact of Disasters on People and Corporations**

   - Gao, Liu, and Shi (2020): People's risk awareness & Earthquakes in Japan

Research Questions

Like other types of *mass media*,

1) Does environmental disaster movie(s) affect the public and investor sentiment?

Environmental Movie	→	Public / Investor Sentiment

✓ *Event Study in the Stock Market*

KAIST
COLLEGE OF BUSINESS

Research Questions

Furthermore,

2) Does environmental movie(s) affect Corporate Environmental Performance (CEP)?

Environmental Movie → Corporate Policy on Environment

3) How does the movie influence the relationship between CEP and Financial Performance?

Environmental Movie → Environmental Performance ↕ Financial Performance

KAIST
COLLEGE OF BUSINESS

Contribution

- The role of mass media, especially **movies/films,** in society and corporations

- **The relationship between corporate environmental and financial performance**

Related Literature – The Role of Mass Media

- **Klibanoff, Lamont, and Wizman** (*JF*, 1998)
  - Closed-end country fund prices react more quickly when news appears on the front page of *New York Times*

- **Tetlock** (*JF*, 2007) and **Tetlock et al.** (*JF*, 2008)
  - High media pessimism puts downward pressure on stock prices and low future earnings

- **Hilgartner and Bosk** (1988), **Boykoff and Boykoff** (2007), and **Anderson** (2013)
  - The role of mass media on shaping public perceptions and policy agendas on climate changes

Related Literature – The Role of Mass Media

- **Solomon, Soltes, and Sosyura** (*JFE*, 2014)
  - Winner stocks covered by *Wall Street Journal*, *New York Times*, and *Washington Post* attracts more capital inflow than winner stocks w/out media coverage

- **Cahan et al.** (*JBF*, 2015)
  - More socially responsible firms receive more favorable news reportage and have more positive media image

and **Ahern and Sosyura** (JF, 2014), **Olsen, Carstensen, and Hoyen** (2003),

Xu et al. (*JBE*, 2012) and (2016), **Griffin, Hirschey and Kelly** (*RFS*, 2011), and etc.

Related Literature – CEP and Financial Performance

- **Spicer** (*TAR*, 1978) and **Mahapatra** (1984)
  - Relationship between corporate performance on pollution control and financial indicators (opposite results)

- **Klassen and McLaughlin** (*MS*, 1996) and **Xu et al.** (2016)
  - Media disclosure related to good (bad) CEP predicts better (worse) financial performance and stock returns

- **Dalhammar, Kogg, and Mont** (2003) and **Dummett** (2006)
  - Companies need other "stimuli" than just better financial outcomes for better environmental performance

and **Cohen, Fenn, and Naimon** (1995), **Cronqvist and Yu** (*JFE*, 2017), and etc.

Main Hypotheses

- H_1: *Environmental Sentiment, measured by the box office performance of anthropogenic environmental disaster movie(s), is likely to increase CEP.*

(The extent of the impact will depend on movie performance at the box office).

$$H_1: Corporate\ Environmental\ Performance_{i,t} = \alpha_{i,t} + \beta\ Environmental\ Movie\ Variable_{i,t-1} + \gamma\ Control\ Variables_{i,t} + \epsilon_{i,t}$$

- H_2: *With a high level of environmental sentiment in the public,*
Firms with better environmental performance have better financial performance in the subsequent year.

   + **Also. on the relationship between CEP and Firm Risk**

$$H_2: Corporate\ Financial\ Performance_{i,t} = \alpha_{i,t} + \beta\ High\ CER\ Dummy \times Environmental\ Movie\ Dummy_{i,t-1} + \gamma\ Control\ Variables_{i,t} + \epsilon_{i,t}$$

Databases

- *IMDBPro, Box Office Mojo*, and *The Numbers* Websites

: Dates and detailed information on Environmental Movies (hand-collected)

- MSCI KLD STATS

: CER rating (environmental performance) data

- CRSP Database

: Daily stock market data (Stock price, Return, Market value, Realized Volatility, etc.)

- Compustat Database

: Financial data (Cash Holding Ratio, Tobin's Q, ROA, OCF, etc.)

- TruCost Plc. Database

: Alternative environmental performance (CO_2 & GHG emissions, Environmental Costs)

- WorldBank, NCEI

: Other environmental data such as average U.S. temperature and natural disasters

Summary Statistics

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

Independent Variables	Obs.	Mean	SD	P25	Median	P75
Raw CER Score	23,880	0.096	0.971	0	0	0
Adjusted CER 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
Institutional Ownership	23,880	0.747	0.183	0.633	0.770	0.891
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 ($ millions)	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
Environmental Costs	8,692	483.22	1,511.3	19.02	68.25	300.74
CO_2 Emissions (in million tons)	8,692	4.579	16.2	0.094	0.420	1.984
GHG Emissions (in tons)	8,692	207.09	647.24	7.82	29.475	125.13

KAIST
COLLEGE OF BUSINESS

Event Study on Premiere of ENV. Movie

Table 2-1. Cumulative Abnormal Returns around the Movie Release Date

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

All negative abnormal returns

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

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

KAIST
COLLEGE OF BUSINESS

Univariate Tests for ENV. Movies vs. ENV. Conditions

Table 3. Univariate Test for Premiere of Environmental Disaster Movies and Environmental Problems

	Years w/ Environmental Movies		Years w/out 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 $ Billions)	43.67	28.6	44.94	23.5	-1.26 (-0.067)	5.1 (0.192)
Number of Years	11		14			
	Months w/ Env. Movies		Months w/out 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			

No significant difference

KAIST
COLLEGE OF BUSINESS

Main Results (*Hypothesis 1* Test)

Table 4. The Effect of Environmental Disaster Movies on Corporate Environmental Performance (CEP)

VARIABLES	(1) ENV. Score	(2) ENV. Score	(3) ENV. Score	(4) Adj. ENV. Score	(5) Adj. ENV. Score	(6) Adj. ENV. Score
Annual Top 20$_{t-1}$	0.056*** (6.93)			0.009*** (7.28)		
ENV. Movie Number$_{t-1}$		0.020*** (4.51)			0.001** (2.33)	
ENV. Movie Performance$_{t-1}$			6.330*** (12.37)			1.057*** (14.64)
ln (Total Assets)$_{i, t-1}$	0.016 (0.43)	0.013 (0.37)	0.013 (0.37)			
Leverage Ratio$_{i, t-1}$	0.170 (1.63)	0.173* (1.66)	0.152 (1.46)			
Tobin's Q$_{i, t-1}$	-0.018 (-1.14)	-0.018 (-1.14)	-0.017 (-1.08)			
Cash Flow / Total Assets$_{i, t-1}$	0.107 (1.11)	0.100 (1.04)	0.132 (1.37)			
CAPEX / Total Assets$_{i, t-1}$	-0.885** (-2.48)	-0.925** (-2.58)	-0.860** (-2.41)	(-3.42)	(-3.47)	(-3.34)
Cash Holding Ratio$_{i, t-1}$	0.714*** (5.89)	0.714*** (5.89)	0.714*** (5.89)	0.074*** (5.17)	0.075*** (5.20)	0.074*** (5.16)
Institutional Ownership$_{i, t-1}$	0.279*** (2.84)	0.291*** (2.93)	0.197** (2.02)	0.079*** (5.57)	0.080*** (5.56)	0.065*** (4.70)
CEO Equity Ownership$_{i, t-1}$	1.319*** (3.86)	1.331*** (3.89)	1.282*** (3.78)	0.127*** (3.24)	0.130*** (3.31)	0.121*** (3.10)
CEO Duality$_{i, t-1}$	-0.025 (-0.93)	-0.024 (-0.88)	-0.023 (-0.83)	0.000 (0.08)	0.000 (0.09)	0.001 (0.21)
Annual Natural Disaster Costs$_{t-1}$	-0.000*** (-3.73)	-0.000*** (-3.98)	-0.000** (-2.08)	-0.000*** (-7.71)	-0.000*** (-8.04)	-0.000*** (-5.73)
CO_2 Emissions / Capita$_{t-1}$	-0.262*** (-18.49)	-0.260*** (-18.44)	-0.258*** (-18.31)	-0.023*** (-13.86)	-0.022*** (-13.77)	-0.022*** (-13.51)
Annual Abnormal Temperature$_{t-1}$	-0.013** (-2.05)	-0.029*** (-4.22)	0.000 (0.00)	-0.005*** (-5.94)	-0.007*** (-7.77)	-0.003*** (-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

All positive & significant!

Remember,
Sample mean of Raw ENV. Score = 0.096
Sample mean of Adj. ENV. Score = 0.008

KAIST
COLLEGE OF BUSINESS

Alternative Environmental Performance

Table 5. Environmental Movies and Alternative Environmental Performance Measures

VARIABLES	(1) ln (Total CO$_2$ Emissions)	(2) ln (Total CO$_2$ Emissions)	(3) ln (GHG Emissions)	(4) ln (GHG Emissions)	(5) ln (Total ENV. Costs)	(6) ln (Total ENV. Costs)
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***		
	(15.97)	(16.22)	(17.30)	(17.57)		
Leverage Ratio$_{i, t-1}$	0.156	0.170	0.121	0.134		
	(0.94)	(1.02)	(0.88)	(0.96)		
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 Natural Disaster Costs$_{i, t-1}$	-0.000**	-0.000***	-0.000*	-0.000**	0.000	0.000
	(-2.47)	(-2.83)	(-1.93)	(-2.30)	(1.06)	(0.62)
CO$_2$ Emissions / Capita$_{t-1}$	0.043***	0.040***	0.022**	0.019*	0.048***	0.044***
	(3.57)	(3.32)	(2.15)	(1.88)	(4.57)	(4.24)
Annual Natural Disaster Costs$_{t-1}$	0.000	0.014**	-0.008*	0.005	0.018***	0.029***
	(0.01)	(2.29)	(-1.71)	(1.07)	(3.69)	(5.75)
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	5,035	5,035	5,035	5,035	5,035	5,035

Environmental Disaster Movies
→ Lower Emissions and ENV. Costs

KAIST
COLLEGE OF BUSINESS

Main Results (*Hypothesis 2 Test*)

Table 6. The Effect of Environmental Movies on the relation between CEP and Financial Performance

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ROA				Operating Cash Flow / Total Assets			
High CER Firm Dummy $_{i, t-1}$	0.009***	0.010***			0.011***	0.012***		
	(5.01)	(5.14)			(5.62)	(5.75)		
Annual Top 20 $_{t-1}$	-0.008***	-0.008***	-0.007***		-0.004***	-0.003***	-0.002	
	(-7.25)	(-7.56)	(-7.85)		(-2.78)	(-2.77)	(-1.52)	
High CER Firm x Annual Top 20 $_{i, t-1}$	0.005**	0.005**	0.006***	0.006***	0.004	0.004	0.003*	0.003*
	(2.10)	(2.40)	(3.67)	(3.29)	(1.46)	(1.56)	(1.70)	(1.67)
ln (Total Assets) $_{i, t-1}$	0.002***	0.003***	0.000	0.000	0.001**	0.002**		
	(5.35)	(2.97)	(0.19)	(0.10)	(2.19)	(2.44)		
Leverage Ratio $_{i, t-1}$	-0.097***	-0.100***	-0.168***	-0.160***	-0.098***	-0.103***		
	(-34.01)	(-13.37)	(-17.06)	(-16.44)	(-31.38)	(-13.52)	(-17.79)	(-17.90)
CAPEX / Total Assets $_{i, t-1}$	0.117***	0.180***	0.208***	0.180***	0.441***	0.431***	0.157***	0.153***
	(10.82)	(6.96)	(7.37)	(6.38)	(37.26)	(16.56)	(5.14)	(4.86)
Institutional Ownership $_{i, t-1}$	0.024***	0.026***	0.044***	0.058***	0.016***	0.017***	0.034***	0.040***
	(8.12)	(4.25)	(6.73)	(7.22)	(4.96)	(2.84)	(5.32)	(5.05)
CEO Equity Ownership $_{i, t-1}$	0.076***	0.056**	0.006	0.005	0.065***	0.041	0.017	0.032
	(6.53)	(2.38)	(0.27)	(0.21)	(5.04)	(1.62)	(0.64)	(1.18)
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

*Mean Value of ROA = 0.045
*Mean Value of OCF = 0.081

KAIST
COLLEGE OF BUSINESS

Polluting vs. Non-polluting Industries

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

VARIABLES	Industries not related to Environment				Industries related to Environment			
	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**	**0.059**	**0.038**	**0.028**	**0.035**	**0.076****	**0.080****	**0.066***	**0.068***
High CER Firm Dummy $_{i, t-1}$	**(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

→ The coefficients are significant for industries related to environment (a.k.a. polluting industries), implying that environmental sentiment works strongly on firms related to the environment!

KAIST COLLEGE OF BUSINESS

Main Results (Relationship w/ *Firm Risk*)

Table 7. The Effect of Environmental Movies on the relation between CEP and Firm Risk

VARIABLES	(1) *SVOL*	(2)	(3) *IVOL*$_{CAPM}$	(4)	(5) *IVOL*$_{FF3}$	(6)
Annual Top 20 $_{t-1}$	-0.002***		-0.002***		-0.002***	
	(-17.74)		(-14.99)		(-14.79)	
High CER Firm x Annual Top 20 $_{i,t-1}$	-0.000	-0.001***	-0.000*	-0.001***	-0.000	-0.001**
	(-1.21)	(-2.74)	(-1.73)	(-3.13)	(-1.39)	(-2.42)
ln (Total Assets) $_{i,t-1}$	-0.002***	-0.001**	-0.002***	-0.001**	-0.002***	-0.001***
	(-11.11)	(-2.39)	(-10.77)	(-2.40)	(-11.98)	(-2.71)
Leverage Ratio $_{i,t-1}$	0.008***	0.005***	0.007***	0.004***	0.006***	0.004***
	(7.54)	(5.52)	(7.44)	(5.20)	(7.33)	(5.22)
CAPEX / Total Assets $_{i,t-1}$	0.030***	0.005	0.028***	0.004	0.024***	0.003
	(8.29)	(1.42)	(8.43)	(1.44)	(8.22)	(1.20)
Institutional Ownership $_{i,t-1}$	0.002**	-0.002**	0.001	-0.002**	0.001	-0.002**
	(2.52)	(-2.22)	(1.60)	(-2.10)	(0.96)	(-2.51)
CEO Equity Ownership $_{i,t-1}$	0.019***	0.006**	0.016***	0.005**	0.015***	0.005**
	(5.37)	(2.29)	(5.09)	(2.11)	(5.28)	(2.35)
Year Fixed Effects	No	Yes	No	Yes	No	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.233	0.521	0.256	0.510	0.262	0.505
Observations	20,509	20,509	20,509	20,509	20,509	20,509

KAIST
COLLEGE OF BUSINESS

Conclusion

- Indeed, movie(s) affect the investor sentiment in the stock market.

→ Release of env. disaster movie on a firm causes negative abnormal return in the stock market.

- As expected, environmental disaster movie(s) encourages CEP.

→ Corporate Environmental Performance (CEP) increases following release of env. disaster movie(s).

→ Impact is stronger when the movie is more successful.

- More importantly, the relationship between CEP and financial performance is <u>stronger</u> if environmental disaster movie(s) is released.

  - Firms w/ good CEP experience lower risk if environmental movie(s) is released.

KAIST
COLLEGE OF BUSINESS

Thank you so much for your attention!

Appendix. Additional Tests

Addressing Endogeneity Concerns (2SLS)

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

VARIABLES	*Annual Top 20* 2SLS (1st Stage) (1)	*Adj. CER Score* 2SLS (2nd Stage) (2)	*ENV. Movie Performance* 2SLS (1st Stage) (3)	*Adj. CER Score* 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

KAIST

COLLEGE OF BUSINESS

Institutional Ownership

Table 8-2. Institutional Ownership Change after Environmental Movies

VARIABLES	(1)	(2)	(3)
	Institutional Ownership		
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

KAIST
COLLEGE OF BUSINESS

Additional Movie Characteristics

Table 8. Additional Movie Characteristics and CEP

VARIABLES	(1)	(2) ENV Score	(3)	(4)	(5) Adj. ENV 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 Screening) $_{t-1}$			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

KAIST
COLLEGE OF BUSINESS

Additional Movie Characteristics

Table 9. More Environmental Movie Characteristics and CEP

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
				Raw Environmental Score					
$\ln$ (ENV Gross Profit) $_{t-1}$	0.019***								
	(10.20)								
ENV Movie Profit Ratio $_{t-1}$		7.754***							
		(15.57)							
Major 10 Dist. Company $_{t-1}$			0.023***						
			(3.87)						
Major 6 Dist. Company $_{t-1}$				0.038***					
				(6.14)					
Award Dummy $_{t-1}$					0.246***				
					(19.74)				
$\ln$ (Award Nominations) $_{t-1}$						0.080***			
						(18.74)			
$\ln$ (Movie Impact Ratio) $_{t-1}$							0.015***		
							(10.94)		
$\ln$ (Movie Related Articles) $_{t-1}$								0.030***	
								(16.33)	
$\ln$ (Movie Rating) $_{t-1}$									0.295***
									(15.06)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.416	0.420	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	17,946

KAIST

COLLEGE OF BUSINESS