The Spillover Effects of Environmental Lawsuits on Industry Peers

Xia Chen (SMU)

Qiang Cheng (SMU)

Xuefan Peng (SMU)

Ziliang Zhan (Tsinghua)

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Research Objective

➢ Examine the spillover effects of high-profile environmental lawsuits on industry peers

Motivations

➢ It's important to understand how to induce firms to cut pollutions.

  ▪ Litigation can be an effective deterrent

  ▪ The effect of litigations extends beyond the sued firm

    – No evidence on the spillover effects of environmental lawsuits

➢ The increasing awareness and public scrutiny of environmental issues has led to heightened litigation risk for public companies.

Research questions

➢ In response to industry leaders' high-profile environmental lawsuits, do industry peers

  ▪ Cut chemical releases?

  ▪ Increase pollution-related disclosures?

Identifying industry leaders' high profile environmental lawsuits

➢ Data source: the Federal Judicial Center (FJC) database, supplemented by Audit Analytics and the Climate Change Litigation database (Columbia Law School).

▪ 1,185 environmental lawsuits with public firms as the defendants in the period of 2003-2020.

➢ Industry leaders

▪ revenue ranked as top 5 in the 4-digit SIC industry

➢ High-profile lawsuits

▪ size-adjusted CAR in the [-10, +1] window surrounding the lawsuit filing date (day 0) is -5% or lower

Sample selection of environmental lawsuits (Table 1, Panel A)

Panel A: Environmental lawsuits selection

	Number of lawsuits	Number of sued firms
Environmental lawsuits filed against publicly listed companies from 2003 to 2020	1,185	588
Less: environmental lawsuits that are not high profile	(1,086)	(510)
Less: second high-profile environmental lawsuit if it is within two years after the first high-profile lawsuit in the same 4-digit SIC industry	(17)	(7)
Number of lawsuits used in the main tests	82	71

Descriptive Information of the Environmental Lawsuits (Appendix A)

Lawsuit Classification	Number
Type of alleged damage	
Release of pollutants to water, land, soil, or air	81
Contamination of environment	81
Harmful to human health	38
Total	81
Type of defendants	
Company only	76
Company and individuals	5
Total	81
Type of plaintiffs	
U.S. government agency	40
Individuals	14
Company	18
Non-profit organization	15
Total	81
Lawsuit duration in days (N = 81)	
Mean	431
Standard deviation	767
Q1	63
Median	188
Q3	353

Prior related research

➤ Prior research on environmental litigation

- Karpoff et al. (2005): firms that violate environmental laws suffer significant losses in market value

- Akey and Appel (2021): stronger liability protection (i.e., reduced liability) for parent firms leads to an increase in toxic emissions by subsidiaries.

- Freund et al. (2023): the adoption of universal demand laws (i.e., reduced litigation risk) is associated with decrease in ESG score.

- No evidence on the peer effect of environmental lawsuits.

Prior related research (cont'd)

➢ Prior research on peer effects in the ESG literature

- Cao et al. (2019): shareholder-sponsored CSR proposals has spillover effects on peer firms' ESG score.

- Johnson (2020): publicizing firms' violations of workplace safety and health laws improves peer firms' labor compliance

- Robinson et al. (2023): after a firm is sued for its environmental disclosures by shareholders, peer firms provide more forward-looking and less historical environmental disclosures in conference calls (no change in environmental practices).

Hypothesis Development

➢ When a firm is sued on environmental issues, such as pollution, its peer firms:

- ▪ revise estimate of the litigation risk upward (Gande and Lewis (2009) support the industry spillover effect of litigations)

- ▪ peer firms' stakeholders will re-evaluate peer firms' environmental performance

➢ Peer firms have incentives to improve environmental performance and disclosures to reduce litigation risk and address stakeholders' concerns.

H1: Ceteris paribus, after a firm is sued for environmental issues, its industry peers experience an improvement in environmental performance.

H2: Ceteris paribus, after a firm is sued for environmental issues, its industry peers experience an increase in environmental disclosures.

Research Design – peer firms and control firms

➢ Peer firms (treatment firms)

- Firms with the same 4-digit SIC codes as the sued firms.

➢ Control firms

- Firms in the same Fama-French 48 industry as the sued firms (but not in the same 4-digit SIC codes).

➢ Exclude the treatment or control firms that have environmental lawsuits in the pre- or post-lawsuit period (year -3~year-1, year +1~+3, relative to the litigation filing).

➢ Chemical release data: Toxic Release Inventory (TRI) program by the EPA, 2000-2022

➢ Environmental disclosure data: Bloomberg (sustainability reports, annual reports, corporate websites)

Sample selection for the chemical release and disclosure analyses (Table 2)

	Number of lawsuits	Number of lawsuit-firms	Number of lawsuit-firm-years
Number of observations within the [-3, 3] year window, excluding year 0	82	11,553	56,463
Retain: firms without environmental lawsuits	82	10,799	52,238
Panel A: Sample for the chemical release analysis			
Less: observations with missing control variables	(0)	(365)	(3,785)
Less: observations with missing data on chemical releases	(4)	(8,908)	(41,110)
Less: firms with observations only in the pre- or post-lawsuit period	(1)	(333)	(762)
Less: lawsuits without treatment or control firms	(22)	(186)	(1,027)
Final sample for the chemical release test	55	1,007	5,554
Treatment firms		172	940
Control firms		835	4,614
Panel B: Sample for the pollution-related disclosure analysis			
Less: observations with missing control variables	(0)	(3,044)	(17,668)
Less: observations with missing data on pollution-related disclosure	(0)	(4,832)	(21,995)
Less: firms with observations only in the pre- or post-lawsuit period	(21)	(913)	(2,062)
Less: lawsuits without treatment or control firms	(24)	(427)	(2,194)
Final sample for the pollution disclosure test	37	1,583	8,319
Treatment firms		114	606
Control firms		1,469	7,713

Research Design – DID regression

➢ Regression:

$$Chemical\_Release_{s,i,t}$$
$$= \beta_0 + \beta_1 Post_{s,t} + \beta_2 Treat_{s,i} \times Post_{s,t} + \gamma Controls_{i,t-1}$$
$$+ Lawsuit\_Firm\ FE + Year\ FE + \varepsilon_{s,i,t}$$

(1)

$$Pollution\_Disclosure_{s,i,t}$$
$$= \beta_0 + \beta_1 Post_{s,t} + \beta_2 Treat_{s,i} \times Post_{s,t} + \gamma Control_{i,t-1}$$
$$+ Lawsuit\_Firm\ FE + Year\ FE + \varepsilon_{s,i,t}$$

(2)

subscripts *s*, *i*, *t* represents the environmental lawsuit *s*, firm *i*, and year *t*.

Chemical release tests (Table 4)

Dependent Variable =	Total_Release	
	(1)	(2)
Post	0.163***	0.168***
	(3.60)	(3.70)
Treat × Post	**-0.137***	**-0.152****
	(-1.84)	**(-2.06)**
Size		0.166*
		(1.74)
Leverage		-0.140
		(-0.93)
ROA		0.336
		(1.49)
Cash		0.373
		(1.36)
PPE		0.427
		(1.40)
R&D		-1.238
		(-0.55)
CAPX		0.204
		(0.45)
Sales		0.213***
		(2.64)
HHI		-0.311
		(-1.26)
Age		-0.163
		(-1.40)
Lawsuit-Firm FE	Y	Y
Year FE	Y	Y
N	5,554	5,554
Adj. R²	0.929	0.930

➢ Industry peers have lower chemical releases in the post-lawsuit period.

➢ Economic significance

- peer firms experience a 14.1% decrease (= exp(-0.152) - 1) in chemical releases in the post-lawsuit period.

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Pollution-related disclosure tests (Table 5)

Dependent Variable =	Pollution_Disclosure	
	(1)	(2)
Post	0.141***	0.144***
	(3.61)	(3.60)
Treat × Post	**0.282****	**0.280****
	(2.31)	**(2.29)**
Size		0.010
		(0.31)
Leverage		0.113
		(0.96)
BM		0.074
		(0.98)
ROA		0.054
		(0.72)
Analyst		0.032
		(1.02)
IO		0.023
		(0.29)
Volatility		-0.223
		(-1.29)
Lawsuit-Firm FE	Y	Y
Year FE	Y	Y
N	8,319	8,319
Adj. R²	0.710	0.710

➤ Industry peers increase pollution-related disclosures in the post-lawsuit period.

➤ Economic significance:

- about 24% (= 0.280/1.167)of the standard deviation of the disclosure measure.

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Testing parallel trend assumption (Table 6)

Dependent Variable =	Total_Release	Pollution_Disclosure
	(1)	(2)
Pre_Y2	-0.040	0.509
	(-0.45)	(0.48)
Pre_Y1	-0.145	0.974
	(-0.80)	(0.45)
Post_Y1	-0.125	2.095
	(-0.34)	(0.49)
Post_Y2	-0.167	2.526
	(-0.36)	(0.47)
Post_Y3	-0.265	3.028
	(-0.48)	(0.47)
Treat × Pre_Y2	-0.109	-0.049
	(-1.61)	(-0.85)
Treat × Pre_Y1	-0.014	0.119
	(-0.18)	(1.61)
Treat × Post_Y1	-0.174*	0.268*
	(-1.68)	(1.89)
Treat × Post_Y2	-0.198*	0.407**
	(-1.81)	(2.54)
Treat × Post_Y3	-0.212*	0.262
	(-1.96)	(1.60)
Control Variables	Y	Y
Lawsuit-Firm FE	Y	Y
Year FE	Y	Y
N	5,554	8,319
Adj. R^2	0.930	0.710

Sensitivity Tests (Table 7, Panel A)

➤ Alternative measures of chemical releases

Panel A: Alternative measures of chemical releases

Dependent Variable =	Total_Release_ Intensity	Health_Effects_ Release	Health_Effects_ Release_Intensity
	(1)	(2)	(3)
Post	0.010	0.055**	0.001
	(1.22)	(2.00)	(1.39)
Treat × Post	**-0.031***	**-0.180***	**-0.004**
	(-1.87)	**(-2.73)**	**(-2.09)**
Control Variables	Y	Y	Y
Lawsuit-Firm FE	Y	Y	Y
Year FE	Y	Y	Y
N	5,554	5,554	5,554
Adj. R^2	0.928	0.905	0.819

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Sensitivity Tests (Table 7, Panel B)

➢ Alternative definitions of treatment firms

▪ 10 closest peers of the sued firm based on pairwise similarity scores in the TNIC

Panel B: Alternative definitions of treatment firms

Dependent Variable =	Total_Release (1)	Pollution_Disclosure (2)
Post	0.106***	0.093***
	(2.75)	(2.81)
Treat × Post	**-0.145***	**0.153***
	(-1.77)	**(1.82)**
Control Variables	Y	Y
Lawsuit-Firm FE	Y	Y
Year FE	Y	Y
N	6,409	10,231
Adj. R^2	0.936	0.720

Sensitivity Tests (Table 7, Panel C)

➢ Alternative definitions of control firms

▪ control firms that share the lawsuit firm's 2-digit SIC code

Panel C: Alternative definitions of control firms

Dependent Variable =	Total_Release (1)	Pollution_Disclosure (2)
Post	0.092**	0.020
	(2.37)	(0.64)
Treat × Post	**-0.147****	**0.318****
	(-2.15)	**(2.42)**
Control Variables	Y	Y
Lawsuit-Firm FE	Y	Y
Year FE	Y	Y
N	8,319	8,766
Adj. R^2	0.936	0.754

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Sensitivity Tests (Table 7, Panel D)

➢ Entropy balancing method

Panel D: Using entropy balancing approach

Dependent Variable =	Total_Release (1)	Pollution_Disclosure (2)
Post	0.202***	0.143**
	(3.64)	(1.99)
Treat × Post	**-0.161****	**0.282****
	(-2.01)	**(2.40)**
Control Variables	Y	Y
Lawsuit-Firm FE	Y	Y
Year FE	Y	Y
N	5,554	8,319
Adj. R^2	0.933	0.625

Financial performance tests (Table 8)

Panel A: Results for the full sample

Dependent Variable =	ROA	ROS	ATO
	(1)	(2)	(3)
Post	-0.006	-0.01	-0.012
	(-1.02)	(-1.37)	(-1.02)
Treat × Post	**-0.015****	**-0.020***	**-0.030***
	(-2.10)	**(-1.94)**	**(-1.70)**
Size	-0.085***	-0.088***	-0.277***
	(-8.53)	(-6.93)	(-11.95)
Leverage	-0.013	0.009	0.107*
	(-0.64)	(0.41)	(1.93)
Cash	0.066**	-0.038	0.406***
	(2.40)	(-0.92)	(4.81)
PPE	-0.012	0.073	-0.535***
	(-0.32)	(0.23)	(-6.82)
RD	0.070	0.199***	-0.127
	(0.26)	(2.59)	(-0.96)
CAPX	0.121**	0.077***	2.277***
	(2.37)	(5.32)	(3.30)
Sales	0.067***	-0.008	-0.157
	(6.43)	(-0.54)	(-0.85)
HHI	-0.003	0.015	-0.044
	(-0.18)	(1.21)	(-0.93)
Age	0.005	-0.01	0.133***
	(0.42)	(-1.37)	(3.82)
Lawsuit-Firm FE	Y	Y	Y
Year FE	Y	Y	Y
N	5,554	5,554	5,554
Adj. R^2	0.488	0.519	0.904

Industry peers experience a decrease in ROA, ROS, ATO consistent with increased abatement costs.

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Financial performance tests for subsamples (Table 8)

Panel B: Results for subsamples of treatment firms

Dependent Variable =	ROA		ROS		ATO	
	High chemical release reduction group (1)	Low chemical release reduction group (2)	High chemical release reduction group (3)	Low chemical release reduction group (4)	High chemical release reduction group (5)	Low chemical release reduction group (6)
Post	-0.011	0.002	-0.017**	0.007	-0.014	-0.003
	(-1.57)	(0.26)	(-1.99)	(1.01)	(-1.07)	(-0.24)
Treat × Post	**-0.027****	**-0.004**	**-0.029***	**-0.009**	**-0.058****	**-0.005**
	(-2.43)	**(-0.41)**	**(-1.91)**	**(-0.70)**	**(-2.24)**	**(-0.24)**
Control Variables	Y	Y	Y	Y	Y	Y
Lawsuit-Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
N	3,954	4,315	3,954	4,315	3,954	4,315
Adj. R^2	0.515	0.474	0.556	0.515	0.899	0.908
P-value for the difference in the coefficient on *Treat × Post*	0.035		0.105		0.020	

➤ Industry peers with higher reduction in chemical releases experience a greater decrease in ROA, ROS, and ATO.

Does peer firms' perceived environmental litigation risk increase in the post-lawsuit period? (Table 9, Panel A)

Dependent Variable =	Pollution_News (1)	Num_Pollution_News (2)
Post	-0.010	-0.026
	(-1.17)	(-1.61)
Treat × Post	**0.044***	**0.084***
	(3.36)	**(2.90)**
Size	0.001	0.004
	(0.15)	(0.29)
Leverage	0.017	0.003
	(0.72)	(0.10)
ROA	-0.048**	-0.047*
	(-2.53)	(-1.93)
Cash	0.020	0.023
	(0.84)	(0.69)
PPE	-0.053	-0.011
	(-1.55)	(-0.22)
RD	-0.128	-0.113
	(-1.15)	(-0.59)
CAPX	-0.006	-0.021
	(-0.22)	(-0.59)
Sales	0.009	0.008
	(1.31)	(0.91)
HHI	0.003	0.068
	(0.08)	(1.11)
Age	0.003	0.012
	(0.24)	(0.65)
Lawsuit-Firm FE	Y	Y
Year FE	Y	Y
N	14,644	14,644
Adj. R^2	0.438	0.606

We use pollution-related news in the Reprisk dataset to capture the litigation risk faced by firms.

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Does peer firms' actual environmental litigation risk increase in the post-lawsuit period? (Table 9, Panel B)

Dependent Variable =	D_Violation (1)	Num_Violation (2)
Post	0.009**	0.010
	(2.06)	(1.62)
Treat × Post	**0.004**	**0.010**
	(0.63)	**(1.20)**
Size	0.003	0.004*
	(1.34)	(1.67)
Leverage	0.001	0.001
	(0.66)	(0.70)
ROA	-0.001	-0.001
	(-1.07)	(-1.33)
Cash	0.005	0.007
	(0.93)	(0.99)
PPE	-0.001	0.001
	(-0.10)	(0.09)
RD	0.003	0.009
	(0.59)	(1.31)
CAPX	0.013	0.014
	(1.60)	(1.37)
Sales	0.005**	0.008***
	(2.52)	(3.08)
HHI	0.004	0.006
	(0.37)	(0.40)
Age	0.001	-0.001
	(0.16)	(-0.12)
Lawsuit-Firm FE	Y	Y
Year FE	Y	Y
N	42,396	42,396
Adj. R²	0.440	0.501

Treatment firms do not have a higher likelihood of environmental violations in the post-lawsuit period.

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Falsification tests using carbon emissions

➢ If, as argued, the results are due to environmental lawsuits related to chemical releases, then we would not observe similar results in peer firms' carbon emission levels.

➢ If the reduction in chemical releases is driven by other industry or firm factors, such as the pressure to improve environmental performance in general, we would observe a similar decrease in carbon emission levels for treatment firms.

Carbon emission results (Table 10)

Dependent Variable =	LnScope1 (1)	LnScope1_Int (2)	LnCarbon (3)	LnCarbon_Int (4)
Post	-0.036	-0.038	0.039	0.042
	(-0.83)	(-0.95)	(1.05)	(1.17)
Treat × Post	**0.237*****	**0.260*****	**0.153****	**0.191*****
	(3.34)	**(3.88)**	**(2.40)**	**(3.01)**
Size	0.403***	-0.238**	0.415***	-0.197**
	(3.59)	(-2.33)	(3.95)	(-2.14)
Leverage	0.026	0.139	-0.010	0.146
	(0.08)	(0.47)	(-0.05)	(0.69)
ROA	0.026	-0.126	0.061	-0.068
	(0.07)	(-0.48)	(0.22)	(-0.27)
Cash	0.452	0.179	0.218	0.080
	(1.44)	(0.61)	(0.85)	(0.31)
PPE	-0.085	-0.102	-0.095	-0.066
	(-0.24)	(-0.30)	(-0.29)	(-0.20)
RD	4.744*	3.692	5.636***	4.770**
	(1.92)	(1.57)	(2.69)	(2.50)
CAPX	-1.141**	-1.408**	-0.725	-1.102**
	(-2.00)	(-2.51)	(-1.54)	(-2.39)
Sales	0.183**	0.119	0.228***	0.152**
	(2.20)	(1.54)	(3.07)	(2.02)
HHI	0.184	0.147	-0.306	-0.272
	(0.67)	(0.62)	(-1.01)	(-0.86)
Age	0.414**	0.460***	0.414**	0.497***
	(2.37)	(2.62)	(2.60)	(2.97)
Lawsuit-Firm FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
N	1,880	1,880	1,535	1,535
Adj. R^2	0.981	0.972	0.982	0.964

- Industry peers experience an increase in carbon emissions in the post-lawsuit period.

- Industry peers might trade-off between chemical releases and carbon emissions to reduce the overall abatement costs.

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Effect on focal firms (Table 11)

Dependent Variable =	Total_Release	ROA	Pollution_Disclosure
	(1)	(2)	(3)
Post	0.147***	-0.009	0.162***
	(2.87)	(-1.4)	(3.39)
Focal × Post	**-0.419***	**-0.014***	**0.277***
	(-2.65)	**(-1.76)**	**(1.95)**

Focal firms – industry leaders sued for environmental issues – cut chemical releases, experience a decrease in financial performance likely due to the increased abatement costs, and increase pollution-related disclosures in the post-lawsuit period.

Summary of Results

1) High-profile environment lawsuits induce peer firms to cut chemical releases and increase pollution-related disclosures in the post-litigation period

   - Parallel trend assumption holds, results are robust to alternative measures of chemical releases and alternative definitions of treatment and control firms.

2) Peer firms experience poorer financial performance, consistent with increases in abatement costs

3) Confirmation tests

   - Peer firms have higher perceived litigation risks in the post-litigation period.

   - Peer firms have higher carbon emissions in the post-litigation period.

   - Focal firms have lower chemical releases, poorer performances, and more pollution-related disclosures in the post-litigation period.

Contributions and caveats

➤ This paper documents important spillover effects of environmental lawsuits.

- Litigation is an important means to induce firms and peers to internalize the externalities of their pollutions that are harmful to the environment and human health.

➤ Caveats

- We focus on the high-profile environmental lawsuits
- Environment activities (such as abatements) are not observable to researchers.

THANK YOU!

Descriptive statistics (Table 3)

Panel A: Descriptive statistics for variables used in the chemical release analyses

Variables	Mean	Std Dev	Q1	Median	Q3
Total_Release (000's of lbs.)	635.485	2,639.954	2.340	29.034	169.854
Total_Release	3.420	2.511	1.206	3.402	5.141
Treat	0.169	0.375	0	0	0
Post	0.494	0.500	0	0	1
Size	7.135	1.687	6.054	7.119	8.215
Leverage	0.269	0.201	0.125	0.244	0.375
ROA	0.036	0.093	0.011	0.048	0.083
Cash	0.102	0.106	0.026	0.068	0.140
PPE	0.282	0.167	0.156	0.243	0.379
R&D	0.019	0.029	0.000	0.010	0.024
CAPX	0.049	0.045	0.022	0.035	0.058
Sales	7.135	1.640	6.134	7.163	8.189
HHI	0.302	0.209	0.153	0.253	0.393
Age	3.090	0.813	2.565	3.219	3.784

Descriptive statistics (Table 3)

Panel B: Descriptive statistics for variables used in the pollution-related disclosure analyses

Variables	Mean	Std Dev	Q1	Median	Q3
Pollution_Disclosure	0.439	1.167	0	0	0.160
Treat	0.073	0.260	0	0	0
Post	0.489	0.500	0	0	1
Size	7.416	1.868	6.123	7.390	8.679
Leverage	0.242	0.200	0.063	0.224	0.370
BM	0.680	0.306	0.451	0.676	0.887
ROA	0.021	0.119	0.003	0.039	0.076
Analyst	1.798	1.153	0.693	1.946	2.708
IO	0.621	0.348	0.358	0.740	0.897
Volatility	0.111	0.068	0.064	0.093	0.136