WORKING paper

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Jus naturale: The Impact of Nature-Related Litigation on Corporate Valuation

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ABSTRACT

This paper investigates the financial materiality of nature-related legal disputes, focusing on biodiversity loss, pollution, and ecosystem degradation. We analyze whether firms targeted by nature litigation experience statistically significant declines in market valuation using a dataset of 48 litigation (123 event dates) against 22 major companies in North America and Europe (1996–2025). Employing an event study methodology with the Fama-French three-factor model, we calculate Cumulative Abnormal Returns (CAR) over a [-5, +5] day window. Our results demonstrate that markets price in the impact of these events, leading to significant valuation declines following litigation decisions. In Europe, stock corrections occur immediately upon the filing of a complaint, suggesting a 'reputational premium' driven by investor ESG sensitivity. In North America, however, ruling/settlement dates yield larger market shocks, reflecting heavier financial penalties. Furthermore, we find evidence of sectoral spillover effects, where litigation against a single firm triggers negative contagion across the industry. The findings emphasize the necessity for financial institutions to integrate nature-related legal liabilities into their risk management frameworks.

Keywords: Nature-Related Risks, Litigation Risks, Corporate Valuation, Environmental Complaints

JEL: G12, K32, K41, Q54

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NON-TECHNICAL SUMMARY

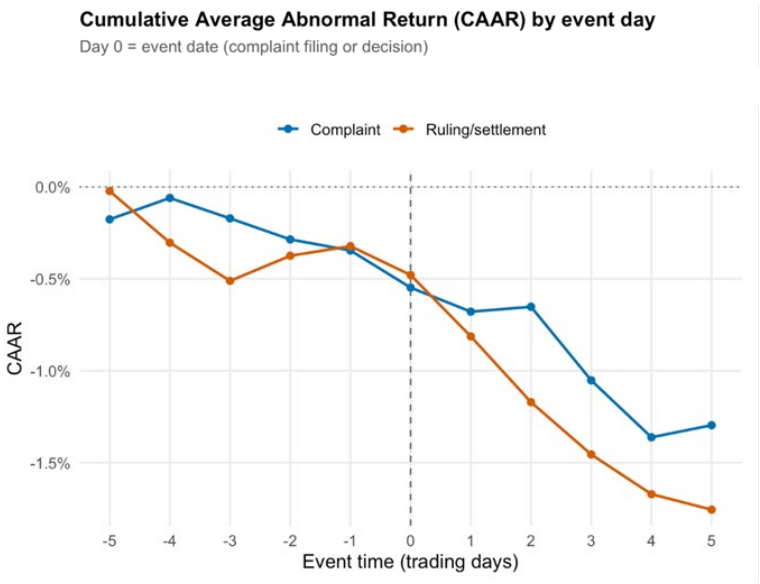
Corporate environmental accountability has emerged as a key driver of financial risk, with a rise in high-profile nature and environmental lawsuits targeting major corporations across key sectors, from chemicals and energy to banking and retail trade. While existing research focuses heavily on recent climate cases, the financial impacts of nature-related disputes remain far less understood, despite a much longer legal history dating back to the 19th century. This study addresses this gap by constructing a novel, structured nature-litigation database specifically dedicated to environmental degradation, biodiversity loss, and pollution. Covering the period 1996–2025, our dataset comprises 48 litigation cases representing 123 distinct event dates, including complaint filings and court decision or settlement dates, against 22 major publicly traded companies across North America (US and Canada) and Europe. To evaluate market impacts, we use an event study methodology using the Fama-French three-factor model to calculate Cumulative Abnormal Returns (CAR) over an event window of [-5;+5] days, complemented by sector-specific benchmarks to analyze market spillovers.

Our empirical findings document a statistically significant decline in corporate valuations following both complaint filings (CAAR of -1.30%) and ruling/settlement dates (CAAR of -1.76%) over the [-5;+5] event window, confirming that financial markets rapidly and actively price in these emerging nature-related legal risks. Our analysis also reveals a clear regional divergence between Europe and North America, underscoring investor sensitivity to distinct market drivers. In European jurisdictions, complaint filing dates trigger more negative and statistically pronounced stock price reactions (-2.06%) than decision dates (-1.67%), pointing toward a short-term "reputational penalty" driven by heightened local investor sensitivity to ESG and sustainability issues. Conversely, decision and settlement dates generate far more severe negative price adjustments for North American litigation (-2.00%, compared to an insignificant -0.48% for initial complaints), reflecting market expectations of significantly larger financial penalties imposed by US courts.

Beyond direct firm-level impacts, our analysis also provides evidence sectoral spillover effects. Financial markets do not perceive environmental litigation as an isolated, idiosyncratic firm-level shock; rather, legal proceedings against a single firm are treated as revelatory of broader sectoral vulnerabilities to legal and reputational risks. Consequently, nature litigation against a targeted company triggers negative contagion across the entire industry, leading to sector-wide valuation adjustments as investors re-evaluate systemic risk exposures across peer firms.

Our study's contributions are three-fold. First, we structure a novel nature-litigation database that complement climate-focused repositories. Second, we capture the effects of the recent wave of nature-related litigation on the market valuation of the companies involved as well as the spillovers to their sectors. Finally, our dataset covering North America and Europe allows us to identify geographic variations in the mechanisms of the reputational premium.

Together, these empirical findings demonstrate that nature-related litigation is not only an idiosyncratic legal issue for individual firms, but a growing source of market-wide contagion and sectoral repricing. This trajectory highlights the urgent need for investors, financial institutions, and central banks to systematically integrate nature-related legal liabilities into their risk management frameworks and macro-prudential assessments.



Note: This chart plots the average trajectory of stock price returns over an 11-trading-day window surrounding a major legal event (Day 0). It compares the market adjustment following initial complaint filings (blue line) against final rulings or settlements (orange line).

Jus naturale : L'impact des litiges liés à la nature sur la valorisation des entreprises

RÉSUMÉ

Cet article étudie la matérialité financière des litiges juridiques liés à la nature, en se concentrant sur la perte de biodiversité, la pollution et la dégradation des écosystèmes. À partir d'un jeu de données comprenant 48 litiges (123 dates d'événements) visant 22 grandes entreprises en Amérique du Nord et en Europe (1996–2025), nous analysons si les entreprises ciblées subissent une baisse statistiquement significative de leur valorisation boursière. En appliquant une méthodologie *event study* basée sur le modèle à trois facteurs de Fama-French, nous calculons les rendements anormaux cumulés (CAR) sur une fenêtre de [-5, +5] jours. Nos résultats démontrent que les marchés intègrent les conséquences des décisions de justice, entraînant d'importantes baisses de valorisation à la suite des décisions de justice. En Europe, les corrections boursières interviennent dès le dépôt de la plainte, suggérant l'existence d'une « prime de réputation » alimentée par la sensibilité ESG des investisseurs. En Amérique du Nord, en revanche, ce sont les dates de jugement ou de règlement (*settlement*) qui provoquent les chocs de marché les plus importants, reflétant des sanctions financières plus lourdes. De plus, nous mettons en évidence des effets de contagion sectorielle, où un litige contre une seule entreprise déclenche des retombées négatives sur l'ensemble du secteur. Ces conclusions soulignent la nécessité pour les institutions financières d'intégrer les responsabilités juridiques liées à la nature dans leurs cadres de gestion des risques.

Mots-clés : Risques liés à la nature, risques de contentieux, valorisation des entreprises, plaintes environnementales

1 Introduction

Environmental litigation risks are currently mostly associated with climate-related cases, which are far more widespread, with nearly 3,000 cases filed between 1986 and 2024. This field has seen a sharp increase following the Paris Agreement, with the number of annual filings rising from 120 in 2015 to 320 in 2021 (Setzer and Higham, 2025). Significant research now exists regarding the market impacts of climate litigation (Sato et al., 2024; Setzer and Higham, 2025). By contrast, the financial consequences arising from litigation concerning biodiversity loss, pollution, and ecosystem degradation are often obscured by heterogeneous international legal frameworks and remain significantly underexplored. This observation is paradoxical, as environmental disputes related to nature are both older and more diverse than those related to climate change. Climate disputes began in 1986[1], following growing awareness of the contribution of businesses and governments to global warming. In contrast, nature-related legal disputes—including oil spills and industrial pollution of soil and waterways—date back at least to the early 19th century, with U.S. litigation regarding water quality or quantity recorded as early as 1827[2] (Davis, 1971).

However, a shift is occurring as plaintiffs increasingly draw inspiration from climate-case strategies to bring complaints related to biodiversity or the broader climate–nature nexus. As with climate litigation, nature-related lawsuits can result in criminal penalties when they fall under criminal law, or in compensation for environmental damage when pursued under civil law. Modern anecdotal evidence suggests that these nature-related litigation can trigger severe and distinct market corrections. For instance, the case of 3M, illustrated in Figure 4 (Chart a - Annex), provides a stark example of a long-term growth trajectory interrupted by the sudden resolution of environmental risks related to "forever chemicals" (PFAS). While the stock maintained a consistent rising trend from the initial filing in 2011 through early 2018, the market value experienced a sharp and sustained downward correction, following the major *decision date* in 2018. In this instance, years of accumulated nature-related risks were priced in almost overnight, erasing a decade of valuation gains and halting the previous growth trajectory.

In contrast, the market performance of Bayer, illustrated in Figure 4 (Chart b - Annex), reflects a state of persistent legal uncertainty and volatility following its acquisition of Monsanto in 2016. This acquisition exposed the firm to intense and recurring litigation regarding glyphosate (Roundup) and its perceived impacts on biodiversity and human health. Between 2018 and 2022, the company's valuation was characterized by frequent fluctuations, with the stock price undergoing a negative adjustment following almost every decision date. This pattern highlights how a series of nature-related legal events (complaints or lawsuits) can trap a firm in a bearish cycle, as the market continuously struggles to price in the evolving scale of environmental liabilities.

Beyond these specific cases, a more exhaustive empirical analysis is required to determine whether such market reactions are a general phenomenon or isolated to high-profile cases. This paper investigates how financial markets incorporate the risk of environmental litigation by moving beyond individual anecdotes to a systematic study of more numerous cases. Specifically, it

[1]The first climate case record in the Sabin Center's Climate Change Litigation Databases is City of Los Angeles v. National Highway Traffic Safety Administration, which was decided in 1990. 912 F.2d 478 (D.C. Cir. 1990) (United States of America)

[2]Tyler v. Wilkinson, United States Court of Appeals, First Circuit, 1827, cited Davis, 1971

examines whether firms targeted by environmental complaints and decisions consistently experience statistically significant declines in their market valuation, checking if the patterns observed in 3M and Bayer hold across a broader dataset.

In its Conceptual Framework, designed to guide the actions of central banks and financial supervisors, the Network for Greening the Financial System (NGFS) distinguishes between two types of nature-related financial risks: *physical risks* and *transition risks* (NGFS, 2024). Physical risks stem from the degradation of nature. They can be *acute* when linked to extreme events, such as floods, droughts, or oil spills, or *chronic* when driven by slow but persistent trends like soil degradation or deforestation. Transition risks, on the other hand, arise from changes in regulations, consumer preferences, technology, or markets that accompany the shift of economic activities toward more sustainable practices. These impacts are difficult to assess, as they are shaped by considerable uncertainty regarding future policy developments and the responses of economic agents.

The NGFS identifies *litigation risk*[3] as a subcategory of both physical and transition risks. This work represents a first step in assessing the financial materiality of these risks: it allows us to determine whether investors are incorporating nature-litigation risks into their portfolios, which has significant implications for banks in terms of risk management, profitability, and financial stability. If companies exposed to nature-related litigation risks see their valuations fall sharply when litigation arises, the profitability of banks' investment portfolios is directly affected. Furthermore, as governments and regulators implement stricter sustainability policies, these risks are likely to increase. Banks will therefore need to better assess their exposure to current and future regulations that could affect the profitability of the sectors in which they invest. In this respect, nature-related litigation risks represent a significant source of financial risk for the economy, with potential implications for the financial stability of firms and markets.

Drawing on this framework, we constructed a dataset comprising 48 litigation and 123 distinct event dates (including complaint filing and decision dates) against 22 major publicly traded companies across North America and Europe over the period 1996–2025. Our empirical strategy utilizes a market model approach, specifically the Fama-French three-factor model, to calculate Cumulative Abnormal Returns (CAR) over an event window of $[-5, +5]$, complemented by sector-specific benchmarks (e.g., STOXX Europe 600 indices) for spillover analysis.

Our results demonstrate a statistically significant decline in corporate valuation following litigation decisions, confirming that markets rapidly price in these emerging risks. We also observe a divergence between regions: we identify a distinct "reputational premium" in Europe, where stock corrections occur as soon as a complaint is filed - likely driven by heightened investor sensitivity to ESG issues. Conversely, decision dates lead to larger effects in North America, which aligns with the higher financial penalties imposed there. Furthermore, we document robust evidence of sectoral spillover effects, where litigation against a single firm triggers negative contagion across the entire industry.

Our study's contributions are three-fold. First, we structure a novel nature-litigation database that fills the gap left by climate-centric repositories, providing a structured dataset specifically dedicated to litigation related to environmental degradation. Second, we capture the effects of

[3]Also referred to as legal risk in this paper, without distinction.

the recent wave of nature-related litigation on the market valuation of the companies involved as well as the spillovers to their sectors. Finally, our transatlantic comparative scope covering the US, Canada, and Europe allows us to identify geographic variations in market efficiency and the mechanisms of the reputational premium.

The remainder of this paper is organized as follows. Section 2 provides a short literature review. Section 3 describes the construction of the nature-litigation dataset. Section 4 details the event study methodology and presents the benchmark results as well as some robustness checks. Section 5 analyzes sectoral spillover effects. Section 6 offers a discussion on the limitations and provides concluding remarks.

2 Literature Review

The relevant literature is at the intersection between financial and legal academic literature, including initiatives such as the climate litigation database developed by the Sabin Center for Climate Change Law, or the article of Fenn (2025) which created a database of 214 biodiversity litigation cases to study different litigation strategies. Our research is situated within a context of heightened investor sensitivity toward climate and nature-related litigation. Surveys conducted by Giglio et al. (2023) among finance professionals, regulators, and scientists reveal a substantial degree of concern; over two-thirds of respondents believe that physical and transition risks related to biodiversity are financially material, while nearly half suspect these risks are currently undervalued by the market. Nature litigation operates within a dual framework: it may stem from physical risks, such as ecological disasters, or transition risks, such as a firm's failure to align with environmental regulation. In this framework, nature litigation acts as a negative reputational shock that the market internalizes, similar to other forms of corporate misconduct like financial fraud (Deng et al., 2012).

2.1 Empirical Evidence: Disasters vs. Litigation

The materiality of these risks remains relatively underexplored, as most existing literature focuses on climate litigation (Sato et al., 2024; Wu and Zhong, 2024). These studies consistently report negative impacts, with cumulative returns decreasing between -0.35% and -2.7% in the days following a litigation announcement. Regarding nature-related risks, research has historically prioritized specific environmental disasters. Capelle-Blancard and Laguna (2010) analyzed 64 explosions at chemical plants and refineries, while others have examined pollution incidents (Rao, 2011; NGFS, 2024) or high-profile events like the Deepwater Horizon oil spill. While a consensus exists that environmental catastrophes lead to significant stock value losses, these studies primarily measure the reaction to the physical event rather than the subsequent legal proceedings.

A major study by Karpoff et al. (2005) investigated 478 instances of environmental violations to disentangle legal sanctions (fines and cleanup costs) from reputational penalties (investor reaction). They found average abnormal returns of -1.69% following lawsuits and -1.58% following charges. Notably, they concluded that these losses were almost entirely explained by anticipated legal penalties rather than long-term reputational damage. This finding, based

on U.S. data where fines are substantial, raises central questions for our analysis: does the "reputational effect" play a more significant role in jurisdictions like Europe, where monetary sanctions are historically lower?

2.2 Methodological Framework

The reference method for measuring these impacts is the event study, initially developed by Fama and French (1993) and formalized by MacKinlay (1997). This approach relies on the *semi-strong* version of the Efficient Market Hypothesis (EMH), which posits that asset prices immediately incorporate all new public information. The process involves estimating an "abnormal return", understood as the difference between the observed return and the "normal" return predicted by a benchmark such as the CAPM or the Fama and French (1993) three-factor model.

By comparing returns within a specific event window (centered on the announcement date) against an earlier estimation window, researchers can isolate the market's immediate causal reaction to the information (Corrado, 2010; Binder, 1998). One limitation of this method is that it assumes market liquidity and the absence of confounding events. To address these limitations, recent literature (Giglio et al., 2023; Deng et al., 2012) increasingly supplements event studies with panel data or difference-in-differences (DiD) models to assess the long-term consequences on the cost of capital and sustained firm performance.

3 Data

Despite its relevance, empirical analysis of nature-related litigation remains limited. One key reason is the absence of a comprehensive and harmonized database of nature-related legal cases involving firms, in contrast to the growing availability of climate litigation datasets. To answer this gap, we construct a novel dataset of nature-related litigation cases involving publicly listed firms in North America and Europe and combine it with firm-level financial market data. We then analyze stock market reactions to litigation events using standard asset pricing frameworks.

We define nature-related litigations as legal disputes and actions that arise from the actual or potential impacts of human activity on nature and biodiversity. The dataset comprises cases where courts, tribunals, or regulators issue decisions on matters involving pollution and contamination, land use and resource extraction, or compliance and accountability, for example. Purely climate-related cases are excluded from this definition.

We build a database gathering the relevant cases identified using multiple sources to ensure broad coverage. These sources include reports on nature-related litigation published by BloombergNEF and the Taskforce on Nature-related Financial Disclosures (TNFD, 2023), as well as the NGFS report on nature litigation (NGFS, 2024). We complemented these reports with public sources such as Reuters, Bloomberg, non-governmental organization websites, and official court documents. To be included, cases must satisfy three conditions:

1. Complaints must be initiated before judicial authorities.

2. Nature must be a central issue of law or fact. Cases in which nature is only briefly mentioned, without substantial engagement with nature-relevant norms, policies, or measures,

are excluded. In this regard, litigations over pesticides or chemicals known as per-and polyfluoroalkyl substances (PFAS) represent special cases as health concerns are often the primary driver of the complaint. Nevertheless, given the intrinsic connection between these components and nature, as the environmental persistence of PFAS and pesticides results in their accumulation in natural ecosystems, including water and soil, we have chosen to include such cases in our sample.

3. The companies accused must be listed on a stock exchange.

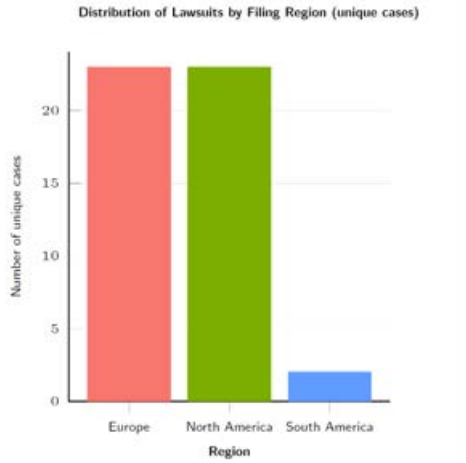
For each case, we record the complaint filing date (the date on which the plaintiffs formally initiated proceedings), the decision date (the date on which the court issued its ruling or, in the case of a settlement, the date on which the company announced the settlement), as well as any intermediary rulings in the course of the proceedings, including appeal and supreme court decisions where applicable. In the case of class actions, we use the day on which the proceedings are consolidated into a class action as the filing date. In addition, we systematically consider case-level characteristics, including (i) the firm's primary sector of activity, (ii) follow-up information on the outcome of the ruling, including the legal issue at stake and the magnitude of penalties imposed, (iii) the geographic region in which the event occurred, (iv) whether the complaint originated from a government entity, and (v) the thematic classification of the event.

Our litigation database covers **48 unique firm-level cases** across **22 publicly listed companies**, spanning North America and Europe. These 48 cases generate **123 market events** (53 filing dates and 70 decision/settlement dates) used in the event study. The sample covers the period 1996–2025[4].

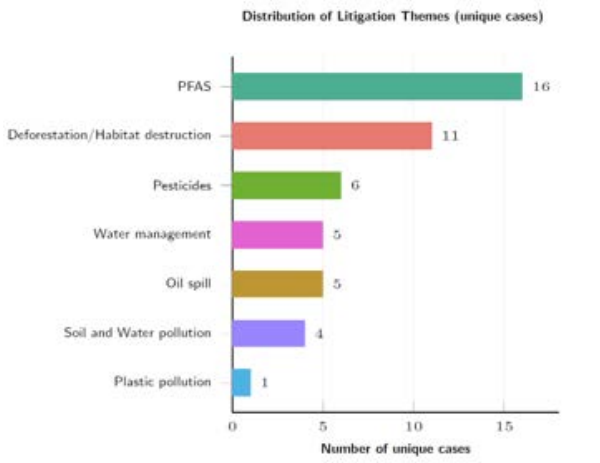
As shown in Figure 1, the sample is balanced between North America (23 cases, 60 events) and Europe (23 cases, 57 events), with a small number of cases filed in South America (2 cases, 6 events). South American events are excluded from the regional analysis due to insufficient sample size. PFAS contamination (16 cases, 36 events), Deforestation/Habitat destruction (11 cases, 24 events), and Pesticides (6 cases, 23 events) -related litigations are dominant in the sample.

Unlike the Sabin Center database for cases related to climate change, this sample is not exhaustive, and was designed in accordance with the methodological choices underlying our analysis.

[4]See Table 1 in annex to see the complete sample of environmental litigation cases we included in our analysis



(a) Regional distribution of unique cases



(b) Litigation Themes

Figure 1: Regional and thematic distribution of cases

Among the selected cases, we can distinguish *class actions*[5], *multidistrict litigation*[6], and traditional proceedings involving a single plaintiff. Cases in which the outcome is a settlement (*settlement*), as is often the case for *multidistrict litigation* in the United States, also represent a particular category with respect to data collection.

To assess the financial consequences of these events, we construct a dataset of daily firm-level stock returns over the period from January 1990 to July 2025. Companies in the sample are listed on stock exchanges in the US, Germany, the UK, France, and Switzerland. For each firm, we retrieve from Yahoo Finance daily adjusted closing prices - which account for dividends and stock splits - and compute arithmetic daily returns. Following Sato et al. (2024), returns are winsorized at the 0.5% level to mitigate the influence of extreme values. Historical stock price data for Monsanto, which was delisted following its acquisition by Bayer[7], and Total Energies, whose data are not available on Yahoo Finance for our time range, are incorporated separately and processed to ensure consistency with the remainder of the sample.

Daily excess returns for each firm are then calculated as the stock's winsorized return minus the corresponding risk-free rate. The final merged panel contains, for every firm-day, the excess return and the Fama-French factors.

[5]A class action, or collective action, is a judicial procedure that allows a group of individuals who have suffered similar harm caused by the same entity to join together to bring a common legal action. The first class action took place in the United States in 1950, following the explosion of a cargo ship that killed nearly 600 people. This type of procedure is very common in the United States. In France, a similar procedure was introduced by Law No. 2014-344 of 17 March 2014, allowing consumer associations to bring collective legal actions.

[6]Multidistrict litigation (MDL) exists in the United States and consists of a temporary procedural consolidation of several individual complaints (often filed in different federal courts) involving similar facts.

[7]In May 2016, Bayer announced the launch of a $62 billion acquisition offer for Monsanto. On 14 September 2016, Bayer officially announced that the offer had been accepted by Monsanto's shareholders. Monsanto ceased to be publicly listed on 7 June 2018, upon completion of the acquisition by Bayer. As a result, complaints targeting Monsanto prior to June 2018 are recorded as targeting Monsanto, while cases for which the ruling was issued after June 2018 are recorded as targeting Bayer in the database. The same methodological issue applies for Bayer, solved following the same approach

4 Empirical Method and Results

We first describe the empirical method used and the results of the Fama-French 3 factors regression for the listed companies' stock prices. We then compute the benchmark results for abnormal returns and cumulative abnormal returns, before running some robustness checks.

4.1 Fama-French 3-factors Regression

Our empirical analysis follows the standard event-study approach used in finance to measure the stock-market's reaction to firm-level environmental litigation.

Finance theory suggests that capital markets reflect all available information about firms in the firms' stock prices. Following this premise, one can study how a particular event changes a firm's prospects by quantifying the impact of the event on the firm's stock value. Finance scholars have developed the event study methodology to perform this type of analysis - in its most common form, with a focus on stock returns, and in less used forms, with a focus on trading volumes and volatility.

Return event studies quantify an event's economic impact in so-called abnormal returns. Abnormal returns are calculated by deducting the returns that would have been realized if the analyzed event had not taken place (normal returns) from the actual returns of the stocks. While the actual returns can be empirically observed, the normal returns need to be estimated. For this, the event study methodology makes use of expected return models, which are also common to other areas of finance research.

The market model is the most frequently used expected return model in event studies. It builds on the actual returns of a reference market and the correlation of the firm's stock with the reference market.

We build on the analysis led by Sato et al. (2024) and adjust it to our sample.

For each firm, we identify its earliest event date t_{first} and estimate the following regression using an estimation window going from trading day -770 to trading day -20 relative to that first event. This long pre-event period provides stable coefficient estimates and reduces contamination from prior complaints or decision dates. We estimate the following 3-factor Fama-French model in an estimation window of $t \in [-770, -20]$ to predict the expected returns:

$$\underbrace{R_{it} - R_{ft}}_{\text{Excess return}} = \underbrace{\hat{\alpha}_i + \hat{\beta}_{iM} MKT_t + \hat{\beta}_{iS} SMB_t + \hat{\beta}_{iH} HML_t}_{\text{Expected return}} + \underbrace{\epsilon_{it}}_{\text{Abnormal return}}$$

where R_{it} is the stock return of firm i on day t, R_{ft} is the risk-free rate, and MKT, SMB and HML are the Fama-French factors.

The results of the regressions are reported in Table 1. A few remarks can be made. First, most of the β_{MKT} values are highly significant, which is expected as the market factor usually carries the most weight. Most of them are also less than 1, meaning that the stocks we consider are more "defensive" or stable than the market. Only Chemours and Freeport MacMoRan are more volatile than the market. Second, the β_{SMB} that are statistically significant are negative (except Chemours), which confirms that the firms' stocks considered behave like a "Mega-cap" giant. Third, the β_{HML} is significant and positive for 9 companies and can therefore be con-

sidered as "cheap", which is indeed usually the case for banks (BNP Paribas in our sample) or energy and manufacturing corporates (Shell, ExxonMobil or Anglo American in our sample). By contrast, β_{HML} is negative for three companies only (BP, Bayer and Nestlé), marking it as a "Growth/Defensive" play. Finally, the R^2 values reveal a significant divide between "systemic" companies, whose prices move in sync with broad economic factors, and "idiosyncratic" companies, whose performance is dictated by specific industry forces like commodity prices. While the model explains a majority of the variance for diversified industrials and banks, it is less performing for energy and mining firms, suggesting that for those stocks, the Fama-French factors are missing the "primary engine" of their price movement. These results are largely expected when applying the Fama-French 3-factor model to individual stocks rather than diversified portfolios, as individual firms—especially those in the basic materials and energy sectors—are dominated by idiosyncratic risk (firm-specific events) and commodity price fluctuations that no broad market model is designed to capture. Nevertheless, while the model may be less precise for these specific sectors, it remains a robust and valid framework for our analysis, providing a standardized benchmark from which to derive the abnormal returns of companies involved in nature-related litigation.

Table 1: Fama-French Three-Factor Regression Results (per firm)

Firm	**Alpha**	β_{MKT}	β_{SMB}	β_{HML}	R^2
3M	1e-04	0.72***	0.08	0.03	0.63
Anglo American	7e-04	0.99***	-0.51*	3.01***	0.34
Arkema	-3e-04	1.00***	-0.10	0.36***	0.46
AXA	3e-04	0.81***	-0.51***	0.72***	0.55
Bayer	-2e-04	0.64***	-1.41***	-0.46***	0.49
BNP Paribas	4e-04	1.04***	-0.45***	1.25***	0.68
Bolloré SA	2e-04	0.75***	-0.14	0.08	0.24
BP	-4e-04	0.53***	-0.75***	-0.52***	0.46
Carrefour	-6e-04	0.36***	-0.10	0.63***	0.12
Casino	0	0.39***	-0.64***	0.71***	0.15
Chemours	0.0021*	1.73***	1.36***	0.68***	0.23
Crédit Agricole	1e-04	1.02***	-0.08	0.97***	0.57
Danone	-4e-04	0.37***	-0.84***	-0.06	0.27
DuPont	1e-04	1.00***	-0.32***	1.04***	0.18
ExxonMobil	-4e-04	0.69***	-0.02	0.46***	0.52
Freeport McMoRan	6e-04	1.17***	0.61	0.51	0.09
Monsanto	-4e-04	0.88***	-0.18**	0.08	0.34
Nestlé	1e-04	0.39***	-0.91***	-0.83***	0.44
Rio Tinto	-1e-04	0.92***	0.07	0.59***	0.29
Royal Dutch Shell plc	-1e-04	0.15**	0.02	0.22***	0.01
Saint-Gobain	4e-04	0.95***	-0.87***	0.18*	0.54
TotalEnergies	8e-04	0.21*	-1.16***	0.04	0.22

$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

4.2 Abnormal Returns and Cumulative Abnormal Returns

Next, we define an event window from -5 to $+5$ trading days around the complaint date and decision date (rulings/settlements) t_0. If an event date falls on a non-trading day, it is adjusted to the next available trading day to ensure the use of observed market data. For each day t in the event window, we compute the *abnormal return* (AR) as the difference between the realized excess return and the model-implied expected return:

$$AR_{it} = (R_{it} - R_{ft}) - \big(\hat{\alpha}_i + \hat{\beta}_{iM} MKT_t + \hat{\beta}_{iS} SMB_t + \hat{\beta}_{iH} HML_t\big).$$

To summarize the market reaction over the entire event period, we calculate the *cumulative abnormal return* (CAR) as

$$CAR_i = \sum_{-5}^{+5} AR_{it},$$

The CAR aggregates the abnormal performance across the event window and serves as our primary measure of the stock price response to the event date.

We also compute the average abnormal return (AAR) and cumulative average abnormal return (CAAR) across events of the same type (complaint filing vs. ruling/settlement date).

$$AAR_t = \frac{1}{N_t} \sum_{i=1}^{N_t} AR_{it},$$

where N_t is the number of firms with available data on day t.

$$CAAR = \sum_{t=-5}^{+5} AAR_t.$$

To assess the statistical significance of AR, we compute a t-statistic using the standard deviation of residuals from the firm-specific regression. We assume homoscedasticity and serial independence within the event window:

$$t_{AR_{it}} = \frac{AR_{it}}{\hat{\sigma}_i},$$

where $\hat{\sigma}_i$ is the standard deviation of the residuals from the estimation window. The associated p-value is obtained from the Student t distribution with degrees of freedom equal to the number of observations in the estimation window minus the number of estimated parameters.

We also test the CARs' significance using a z-statistic assuming normality and independence of residuals:

$$z_{CAR_i} = \frac{CAR_i}{\hat{\sigma}_i \sqrt{n}},$$

where n is the number of days in the event window.

Finally we test AAR and CAAR with a t-test:

$$t_{AAR_t} = \frac{AAR_t}{\frac{SD(AR_{it})}{\sqrt{N_t}}},$$

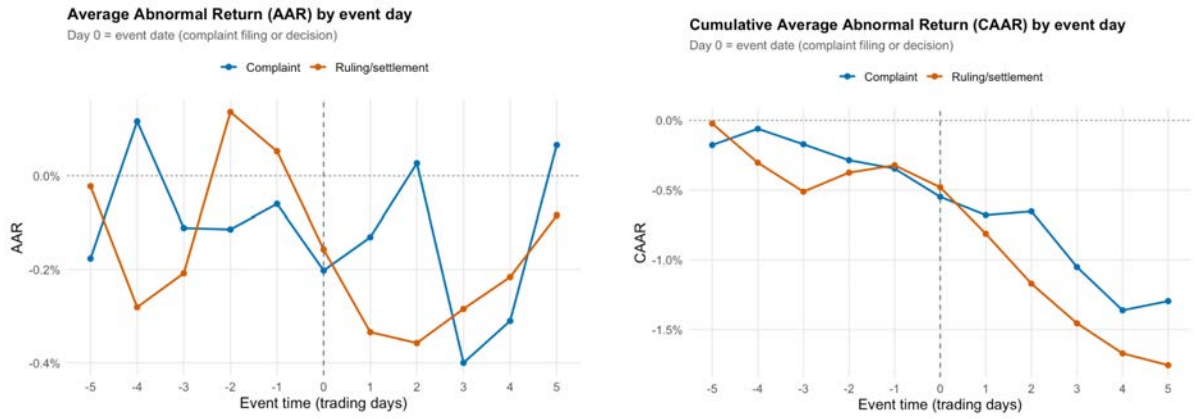
$$t_{CAAR} = \frac{CAAR}{\sqrt{\sum_{t=-5}^{+5} \left(\frac{SD(AR_{it})}{\sqrt{N_t}}\right)^2}}.$$

Table 2 reports the Cumulative Average Abnormal Returns (CAAR) and their corresponding t-statistics. To evaluate the market's reaction, we analyze the CAAR across different windows:

- Window $[0; +5]$: This interval isolates the post-event market reaction from the announcement date onward, evaluating immediate price adjustments and post-announcement drift while excluding pre-event anticipation effects.
- Window $[-5; -1]$: This interval assesses whether the market anticipated the event prior to the official complaint date or decision date (ruling/settlement).
- Window $[-5; +1]$: This window captures the immediate impact of the event on cumulative returns following its occurrence.
- Windows $[-5; +2]$ to $[-5; +5]$: These intervals measure the dynamics of the effect and the sustained significance of the event on cumulative abnormal returns by the end of the observation period.

The empirical analysis reveals distinct dynamic patterns between the filing of a legal action (*complaint*) and its resolution (*ruling/settlement*). As illustrated in Figure 2, tracking daily average abnormal returns (Panel A) and cumulative returns (Panel B) across event time $t \in [-5; +5]$ highlights two main findings. First, both event types show a moderate pre-event negative trend, with CAAR reaching approximately -0.5% by Day 0. Second, their post-event trajectories diverge in timing and magnitude: while rulings/settlements trigger an immediate and steady post-event decline driven by negative AARs on Days +1 and +2, complaints display a delayed reaction. This lag could be due to the fact that court rulings receive more media coverage than complaint filings which therefore come to the attention of the markets at a later stage.

Table 2 presents detailed results across various event windows, broken down by region and verdict outcome. Focusing first on the post-event window $[0; +5]$, financial markets price in litigation events rapidly upon disclosure, yielding a statistically significant post-announcement CAAR of -0.95% for complaints and -1.43% for rulings and settlements. When expanding the window to account for pre-event dynamics, this market impact tends to intensify over time. In the immediate days surrounding the event, the overall benchmark CAAR for rulings and settlements moves from an anticipation effect of -0.32% in the $[-5; -1]$ window to -0.81% in the $[-5; +1]$ window. As the observation window extends, the negative impact becomes statistically significant, reaching -1.17% in the $[-5; +2]$ window and deepening to -1.76% by the full $[-5; +5]$ window. Interestingly, overall complaints also accumulate a statistically significant negative return in the wider windows, reaching -1.30% in the $[-5; +5]$ window,



(a) Average Abnormal Return (AAR) (b) Cumulative Average Abnormal Return (CAAR)

Figure 2: Abnormal return dynamics surrounding environmental litigation events across event time $t \in [-5; +5]$.

although the reaction remains less pronounced and less statistically robust than that of decision dates (rulings/settlements).

These findings suggest that the initiation of a litigation may initially be treated with some caution by investors but a final ruling or settlement acts as a signal of financial and reputational liability. This resolution triggers a significant downward adjustment in market capitalization as the market prices in the materialized costs of the litigation. Regarding the magnitude of the impact, our results are larger than those identified by Sato et al. (2024) for climate-related litigation. This discrepancy likely stems from the more direct causality of environmental damages as well as their quantifiable nature, compared to the often systemic and indirect responsibilities in broader climate cases.

The regional decomposition presented in Table 2 reveals a clear divergence in how markets process litigation across geographies. Specifically, we identify a "reputational premium" in Europe, where stock corrections occur as soon as a complaint is filed, likely driven by heightened investor sensitivity to ESG issues. This is evidenced by a statistically significant CAAR of -1.44% as early as the $[-5; +3]$ window, which deepens to a significant -2.06% in the $[-5; +5]$ window, while European rulings yield a slightly lower, yet statistically significant, drop of -1.67%. Conversely, decision dates (rulings/settlements) lead to larger effects in North America, aligning with the higher financial penalties typically imposed there. In North America, complaints do not trigger statistically significant reactions (-0.48% in the $[-5; +5]$ window), whereas rulings and settlements lead to a sharper, statistically significant decline of -2.00%. However, this regional divergence should be interpreted with caution, as the statistical test for the difference between North America and Europe in the $[-5; +5]$ window does not reach conventional significance levels (a difference of -0.30% with a t-stat of -0.19). This indicates that while the temporal dynamics and transmission channels vary across borders, the downward re-evaluation of polluting firms following legal exposure remains a consistent, global phenomenon.

Finally, the analysis by type of outcome strikingly shows that both favorable decisions (dismissals or wins) and unfavorable decisions lead to negative abnormal returns by the end of the observation period. Unfavorable outcomes result in a steady and statistically significant decline,

reaching a CAAR of -1.73% in the $[-5;+5]$ window and -1.42% in the $[0;+5]$. Favorable outcomes also see negative returns throughout the event windows, peaking at a significant -2.21% in the $[-5;+3]$ window before landing at a non-significant -1.83% in the widest window. The negligible and statistically insignificant difference between these two categories in the $[-5;+5]$ window (0.05%, $t = 0.37$) indicates that the market is not merely reacting to the specific legal penalty or fine. Instead, investors appear to price in the broader "costs of litigation," which include non-recoverable legal fees, the diversion of management's attention, and a persistent reputational stigma that adheres to the firm regardless of the final legal victory. Consequently, the mere association with environmental harm through a finalized litigation serves as a sufficient signal for a reduction in market capitalization.

Table 2: Impact of nature-related litigation on corporate market values (CAAR, in %)

Window	[0;+5]	[-5;-1]	[-5;+1]	[-5;+2]	[-5;+3]	[-5;+4]	[-5;+5]
Overall results							
Complaint	-0.95*	-0.35	-0.68	-0.65	-1.05	-1.36**	-1.30*
Ruling/settlement	-1.43***	-0.32	-0.81	-1.17*	-1.46**	-1.67**	-1.76**
By region							
Europe							
Complaint	-1.61**	-0.46	-1.07	-0.93	-1.44*	-1.78**	-2.06**
Ruling/settlement	-1.58**	-0.09	-0.51	-0.75	-1.10	-1.67*	-1.67*
North America							
Complaint	-0.23	-0.25	-0.38	-0.42	-0.67	-0.92	-0.48
Ruling/settlement	-1.27	-0.73	-1.14	-1.71*	-2.03**	-1.90*	-2.00*
Diff. N.-America − Eur.	—	—	—	—	—	—	-0.30
(t-stat)	—	—	—	—	—	—	(-0.19)
By verdict outcome							
Favorable	-1.47*	-0.36	-1.30	-2.12*	-2.21*	-2.10*	-1.83
Unfavorable	-1.42**	-0.31	-0.67	-0.89	-1.23	-1.55**	-1.73**
Diff. Unfav. − Fav.	—	—	—	—	—	—	0.05
(t-stat)	—	—	—	—	—	—	(0.37)

$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

4.3 Robustness Checks

We perform a number of robustness checks to ensure the validity of our main findings.

First, while our main asset price model relies on the market model benchmark, we test whether using a standard CAPM model (as in Sato et al., 2024) yields similar results. Table 3 shows that the CAPM specification yields qualitatively similar and highly consistent results. For both complaints and rulings/settlements, the coefficients remain negative and increase in magnitude as the event window widens. Looking at the post-event window $[0;+5]$, we find a statistically significant CAAR of -1.01% for complaints and -1.18% for rulings and settlements. When evaluating cumulative windows that incorporate pre-event days to capture potential market anticipation, the negative impact of rulings/settlements becomes statistically significant

starting from the $[-5;+3]$ window (-1.13%) and deepens to -1.48% by the $[-5;+5]$ window. Similarly, the effect of complaints is statistically significant in $[-5;+1]$ (-1.02%) and reaches a significant -1.77% in the $[-5;+5]$ window.

The second robustness check concerns the model estimation approach. In the benchmark results, the computation of AR and CAR for each firm is based on a single estimation of the market model prior to the first environmental litigation event. Alternatively, following Sato et al. (2024), we re-estimate the firm-specific asset price model for each individual court case.

Since the underlying model changes for each litigation date considered, t-statistics based on single-period variances are not optimal for assessing statistical significance across cases. We therefore rely on the Patell standardized prediction error test (Patell, 1976).

The Patell regression is a parametric test commonly used in event studies to assess the statistical significance of observed AR or CAR. This test standardizes abnormal returns using the estimated standard deviation from the estimation period, which helps reduce the impact of outliers or high volatility characteristic of certain stocks. The null hypothesis of the test states that the mean of the abnormal returns is equal to zero; if rejected, it indicates that the event had a statistically significant impact on stock returns.

$$Z_V = \frac{\sum_{i=1}^{N} V_{it}}{\sqrt{\sum_{i=1}^{N} \frac{T_i-2}{T_i-4}}}$$

The use of event-specific models does not materially alter the findings. As shown in the third panel of Table 3, the estimated CAARs across observation windows remain stable. The reaction to initial complaints remains statistically insignificant prior to the event, with a pre-event CAAR of -0.30% in the $[-5;-1]$ window, but drops to a statistically significant -0.98% in the post-announcement $[0;+5]$ window and reaches a significant -1.28% in the full $[-5;+5]$ window. In contrast, the impact of rulings and settlements is immediately negative and statistically significant, displaying a post-event $[0;+5]$ CAAR of -1.17%, turning significant from $[-5;+2]$ onward (-1.18%), and reaching -1.56% by the $[-5;+5]$ window.

Third, we examine whether geographic distinctions in market listings alter the dynamics of market reactions. While our primary analysis segments cases by court jurisdiction, Table 3 categorizes firms by the region of their primary equity listing (Europe vs. United States). When sorting by equity listing, European-listed firms show a statistically significant post-announcement $[0;+5]$ reaction of -1.37% for complaints and -1.39% for rulings/settlements, with the cumulative impact for rulings deepening to a significant -1.68% in the $[-5;+5]$ window. For US-listed firms, rulings and settlements also show a substantial post-announcement drop (-1.52% in $[0;+5]$) and cumulative decline (-1.91% in $[-5;+5]$), though with higher cross-sectional variance. As sorting by equity listing reflects the primary investor base, these patterns suggest that market pricing of nature-related litigation is sensitive to the risk perceptions and environmental awareness of local equity market participants.

Finally, we test the sensitivity of our findings to alternative outlier treatments: (i) estimating CAARs without winsorizing daily returns, and (ii) winsorizing firm-event CARs directly rather than daily returns. As presented in the bottom two panels of Table 3, neither specification alters our main conclusions. Without daily return winsorization, rulings and settlements yield a

statistically significant post-announcement $[0;+5]$ CAAR of -1.44% and a cumulative $[-5;+5]$ CAAR of -1.84%. Similarly, winsorizing firm-event CARs directly confirms a statistically significant post-event drop in $[0;+5]$ of -1.44% for rulings/settlements and -1.05% for complaints, reaching a significant -1.82% and -1.46% respectively in the $[-5;+5]$ window.

Table 3: Robustness results

Window	[0;+5]	[-5;-1]	[-5;+1]	[-5;+2]	[-5;+3]	[-5;+4]	[-5;+5]
p.m. Benchmark results							
Complaint	-0.95*	-0.35	-0.68	-0.65	-1.05	-1.36**	-1.30*
Ruling/settlement	-1.43***	-0.32	-0.81	-1.17*	-1.46**	-1.67**	-1.76**
Results with CAPM							
Complaint	-1.01*	-0.76	-1.02*	-0.95	-1.29*	-1.73**	-1.77**
Ruling/settlement	-1.18**	-0.30	-0.70	-1.02	-1.13*	-1.39**	-1.48**
Case-by-case estimation							
Complaint	-0.98*	-0.30	-0.59	-0.60	-1.08*	-1.35**	-1.28*
Ruling/settlement	-1.17**	-0.39	-0.84	-1.18**	-1.30**	-1.48**	-1.56**
Breakdown by region of equity listing							
Europe							
Complaint	-1.37**	-0.02	-0.21	-0.20	-0.65	-1.16	-1.39*
Ruling/settlement	-1.39**	-0.29	-0.81	-1.08	-1.19	-1.69**	-1.68**
United States							
Complaint	-0.45	-0.74	-1.24	-1.19	-1.54	-1.60	-1.19
Ruling/settlement	-1.52	-0.39	-0.82	-1.36	-1.99	-1.63	-1.91
Without winsorization of daily returns							
Complaint	-1.03*	-0.41	-0.77	-0.77	-1.20*	-1.54**	-1.44**
Ruling/settlement	-1.44**	-0.40	-0.84	-1.21*	-1.52**	-1.75**	-1.84**
Winsorized firm-event CAR							
Complaint	-1.05**	-0.40	-0.78	-0.78	-1.22**	-1.54***	-1.46**
Ruling/settlement	-1.44**	-0.38	-0.86	-1.21*	-1.50**	-1.74**	-1.82**

$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

5 Spillover Effects: Sector-wide Contagion and Competitive Dynamics

Our final empirical exercise investigates the potential spillover effects originating from a litigated firm and propagating to its broader industry or its primary competitors. Beyond the direct impact on the litigated firm, nature litigation may indeed generate significant externalities that propagate through the financial markets. In this section, we extend our analysis to examine the spillover effects of nature litigation, distinguishing between broader industry-wide movements and the specific reactions of a firm's closest peers.

The study of these spillover effects is justified by two distinct market mechanisms. First, analyzing the overall sector allows us to identify potential "contagion effects", where a litigation against one company leads investors to reassess the systemic regulatory and litigation risks for all firms operating under similar environmental frameworks. This is often driven by a reputational stigma that affects the entire industry's social license to operate, potentially triggering a sectoral reallocation of portfolios as investors seek to reduce exposure to industry-wide legal vulnerabilities (Lanoie et al., 1997).

Second, focusing on main competitors allows us to test for a "competitive advantage" or "reallocation" effect. While a sector may suffer collectively, specific rivals might experience positive abnormal returns if the market anticipates a shift in market share or a "flight to quality" toward firms perceived to have superior environmental governance and lower legal exposure (Capelle-Blancard and Laguna, 2010). By comparing these two levels of spillovers, we can determine whether the market penalizes industry-wide practices or rewards firm-specific differentiation in the face of nature-related litigation risks.

To test for these effects, we first compute daily excess returns at the sector level. For North American firms, we match each company's SIC code to the 17 Industry Portfolios provided by the Ken French data library, which aggregates daily returns by industry. For European firms, we construct comparable sector-level benchmarks using the STOXX Europe 600 sector indices that categorize companies according to their primary source of revenue based on Industry Classification Benchmark (ICB) nomenclature. Each firm studied is assigned to a sectoral index[8]. The allocation of the various firms to their sector is detailed in Table 4.

Table 4: Target Firms, Sectors, and Main Competitors

Target Firm	**Sector**	**Main Competitors**
3M	Chemical[9]	DuPont, Dow
Anglo American	Mines	Glencore, Rio Tinto
Arkema	Chemical	Evonik Industries, Lanxess
Axa	Insurance	Allianz, Generali
Bayer	Chemicals[10]	BASF, Yara International
BNP Paribas	Bank	BBVA, Unicredit
Bolloré	Agro-industrial	Spief, Unilever
BP	Petroleum	Total, Shell
Carrefour	Retail trade	Casino, Tesco
Casino	Retail trade	Carrefour, Tesco
Chemours	Chemical	Eastman Chemical, DuPont
Crédit Agricole	Bank	BBVA, Unicredit
Danone	Agro-industrial	Netslé, Unilever
DuPont	Chemical	Air Prod. and Chem., Ecolab
ExxonMobil	Petroleum	Chevron, ConocoPhillips
Freeport McMoRan	Mines	Newmont Corp., Nucor Corp.
Monsanto	Chemicals	Corteva, Chemours
Nestlé	Food	AB InBev, Danone

[8]The STOXX Europe 600 Retail, Insurance and Industrial Goods & Services supersector indices were not available when constructing the data. The corresponding firms (Casino, Carrefour, Bolloré, and Axa, representing 6 event dates) are removed from the sector-contagion analysis. These firms remain in the firm-level analysis and competitor analysis.

[9]3M is listed by the SEC as "surgical & medical instruments & apparatus", but we have classified it under "Chems" as the business segment involved in the complaints is the chemicals sector

[10]Although Bayer is now part of the "HealthCare" supersector, we assigned it to the Europe 600 Chemicals which is more relevant for the market segment involved in the litigation

Target Firm	Sector	Main Competitors
Rio Tinto	Mines	Anglo American, Glencore
Royal Dutch Shell	Petroleum	BP, Total
Saint-Gobain	Chemical	Heidelberg Materials, Holcim
Total	Petroleum	BP, Shell

In a second step, we identify the two primary competitors for each target firm, selecting them based on their respective market capitalization weights within the sectoral index. It is important to note that the composition of our sample allows certain firms to appear in dual roles; for instance, DuPont and Bayer serve as target firms in their own litigation cases while also acting as main competitors for peers such as 3M. In such instances, these firms are treated strictly as competitors of the target firm during the specific 11-day observation period centered on the litigation event. Furthermore, we verify that there is no temporal overlap within our sample; no two litigation cases in our dataset occur on the same date or within the same $[-5;+5]$ window, ensuring that the abnormal returns captured are uniquely attributable to the specific event under study.

Table 5: Spillover effects to sectors and competitors

Specification	[0;+5]	[-5;-1]	[-5;+1]	[-5;+2]	[-5;+3]	[-5;+4]	[-5;+5]
Spillovers to overall sector							
Complaint	-0.03	-0.20	0.18	0.13	-0.13	-0.35	-0.24
Ruling/settlement	-0.27	-0.59**	-0.53*	-0.56*	-0.52*	-0.61*	-0.86**
Spillovers to 2 main competitors							
Complaint	0.42	-0.25	-0.13	-0.00	-0.03	-0.15	0.17
Ruling/settlement	-0.50	0.04	0.12	-0.32	-0.39	-0.32	-0.46

$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

The empirical results for the spillover effects, presented in Table 5, show a significant "contagion" effect across the broader industry following the resolution of environmental litigation. While initial complaints do not generate statistically significant external reactions (yielding a CAAR of -0.03% in the post-event $[0;+5]$ window and -0.24% in $[-5;+5]$), rulings or settlements trigger a widespread market decline. Specifically, the overall sector experiences a statistically significant negative CAAR of -0.59% in the anticipation window ($[-5;-1]$). This negative spillover remains statistically significant across all cumulative event windows, deepening to -0.86% by the end of the full $[-5;+5]$ period (with an immediate post-event $[0;+5]$ drop of -0.27%). Notably, this sectoral impact is roughly half the magnitude of the direct loss observed for target firms (-0.86% versus -1.76% in $[-5;+5]$), indicating that while the broader sector is penalized, the primary brunt of the valuation loss remains concentrated on the litigated firm. This suggests that a ruling or settlement acts as an industry-wide signal, causing investors to devalue sector peers as they reassess regulatory and reputational risks.

In contrast, the impact on the two main competitors is less severe and lacks statistical significance across all event windows. For rulings and settlements, immediate rivals display a post-event $[0;+5]$ CAAR of -0.50% and a cumulative $[-5;+5]$ reaction of -0.46%, though

neither estimate reaches statistical significance. Similarly, complaints yield statistically insignificant reactions for direct competitors (+0.42% in $[0; +5]$ and +0.17% in $[-5; +5]$). This absence of positive price movement indicates that the market does not perceive a direct "competitive advantage" or a significant portfolio reallocation toward a firm's closest peers. Instead, the negative sentiment appears to be diffused throughout the broader sectoral index, pointing toward a generalized "stigma" effect where the resolution of high-profile nature cases leads to a broad reassessment of the industry's social license to operate rather than a simple shift in market share.

6 Discussion and Conclusion

This study provides empirical evidence that nature litigation, though comparatively understudied in the finance literature, constitutes a material financial risk for corporate equity holders. Figure 3 provides a visual synthesis of our main findings, summarizing Cumulative Average Abnormal Return (CAAR) estimates across event windows ($[-5; +5]$ and $[0; +5]$) and key empirical specifications.

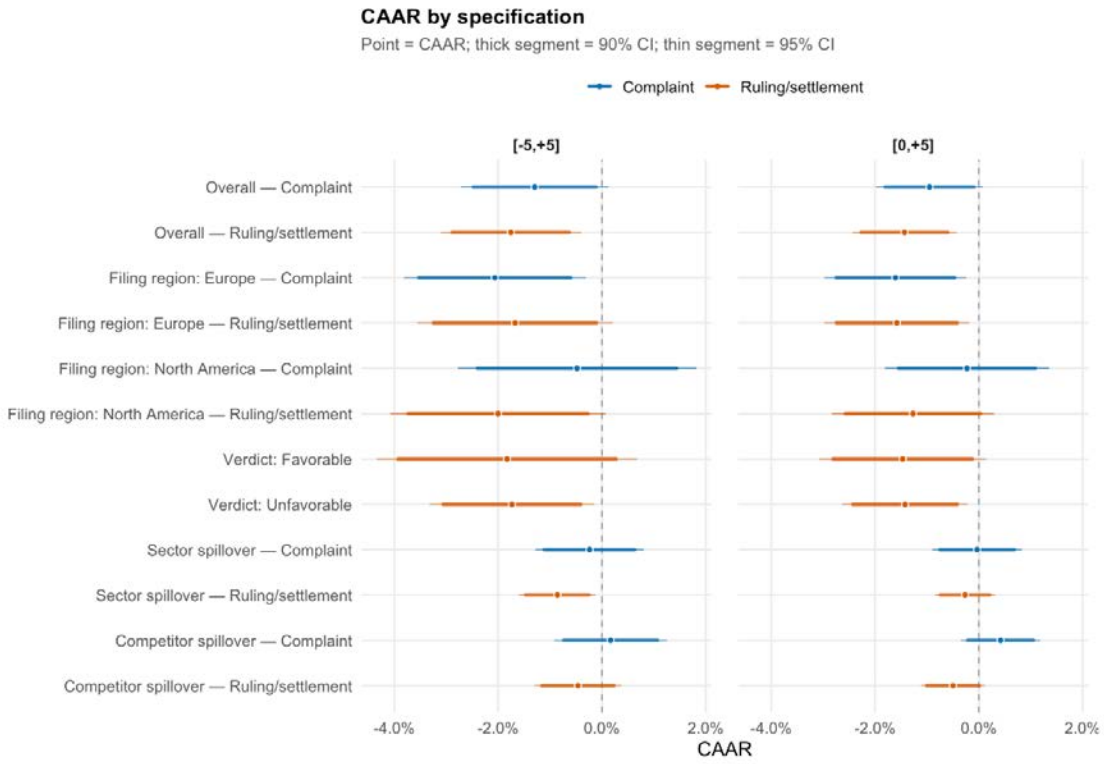


Figure 3: Synthesis of CAAR estimates and confidence intervals (90% and 95%) across subsamples, regions, and spillover specifications for $[-5; +5]$ and $[0; +5]$ event windows.

Our results document a statistically significant decline in corporate valuations following both complaint filings and ruling/settlement dates, confirming that financial markets actively price in these nature-related legal risks. Furthermore, our analysis reveals significant sectoral spillover effects, demonstrating that environmental litigation is not perceived by the market as an idiosyncratic firm-level shock, but rather as revelatory of broader sectoral vulnerabili-

ties to environmentally damaging practices, thereby triggering negative contagion across entire industries.

Finally, our findings highlight a regional divergence between Europe and North America, underscoring investor sensitivity to distinct market drivers. Complaint dates trigger more negative and statistically pronounced reactions for cases litigated in European jurisdictions compared to US cases, pointing toward a short-term "reputational penalty" in Europe. Conversely, decision dates generate more severe negative adjustments for US litigation, reflecting market expectations of larger financial penalties in US courts. Re-evaluating these patterns by equity listing region further confirms that statistically significant market reactions are concentrated among European-listed firms, suggesting that market pricing of nature-related litigation is heavily influenced by local investor sensitivity to ESG and sustainability risks.

While these results are robust, several limitations should be discussed in their interpretation. We compare market reactions across litigation events classified as favorable or unfavorable for the defendant, however, this comparison presents two methodological shortcomings. First, 14 events in our sample involve settlements, which do not fall under binary classification: unlike adversarial rulings, settlements do not produce a clear verdict regarding the firms' responsibility. Second, even where an outcome can be classified in absolute terms, the more economically relevant question is whether it constituted a positive or negative *surprise* relative to prior investor expectations. Reconstructing pre-decision expectations at the individual event level is particularly challenging given the heterogeneity of our sample across jurisdictions and time periods spanning nearly three decades. A textual analysis using a database such as Factiva could help reflect investor sentiment before each decision date, providing a more precise measure of whether outcomes were perceived as better or worse than anticipated.

A related limitation is the difficulty to decompose the reputational from purely financial components in the observed abnormal returns with market data alone. Future research could assess media coverage intensity sourced from relevant textual dataset to proxy for reputational exposure: cases attracting broad press attention would plausibly generate larger reputational costs, while those receiving limited coverage would predominantly reflect expected financial penalties.

These limitations open several avenues for future research. First, at the data level, the current fragmentation of litigation records across jurisdictions is one of the main constraints to the present analysis: we inventoried decisions by 39 jurisdictions from 9 different countries, mostly from English-speaking countries (US, UK, Canada), in French-speaking countries (France, Switzerland) or in the EU (decisions by the EUCJ). Due to language constraints in the manual search for nature-related litigation cases, only ten events are related to countries speaking different languages (Nicaragua, Brazil, Netherlands). As the most mediatised cases were available in English (e.g. Milieudefensie and Nigerian farmers v. Shell in Dutch courts), the language constraint did not prevent the construction of a sample with the most important nature-litigation cases; this was further confirmed by ensuring the sample includes cases from the literature, in particular in the large database by Fenn (2025). However, the development of standardized, cross-jurisdictional databases would substantially advance research in this area.

Another potential effect captured in the present results is the friction in the pricing of litiga-

tion cases, due to the fact that investors do not always learn of a ruling/settlement immediately, particularly depending on its media coverage. We therefore use relatively long event windows to reflect the fact that the decision is not known immediately. This is even more relevant for confidential settlements for which the exact decision date is not publicly accessible. In these cases, the date was approximated using the earliest media report or official financial statement. This can introduce temporal uncertainty, especially if investors anticipated the event or reacted progressively. Future research investigating into how informational frictions influence the speed of information circulation in the correct pricing of litigation risks would constitute a valuable contribution to behavioral finance. In addition, our study focuses on the immediate market signaling effect of complaints and ruling and settlement decisions; future work could track whether initial litigation shocks translate into permanent shifts in capital cost or measurable changes in long-term operational performance. Finally, further research could also identify further how the difference in US' and EU's legal environment - the latter having stricter environmental regulation while the former has more severe financial penalties in court – influence markets' sentiment regarding environmental litigation.

Overall, the present results confirm that as legal standards for environmental accountability continue to tighten, the financial consequences of litigation are likely to grow in both frequency and magnitude. This research contributes to understanding the dynamics at the intersection of environmental law and financial stability, and reinforces the urgency for financial institutions to integrate nature-related litigation into their risk management frameworks.

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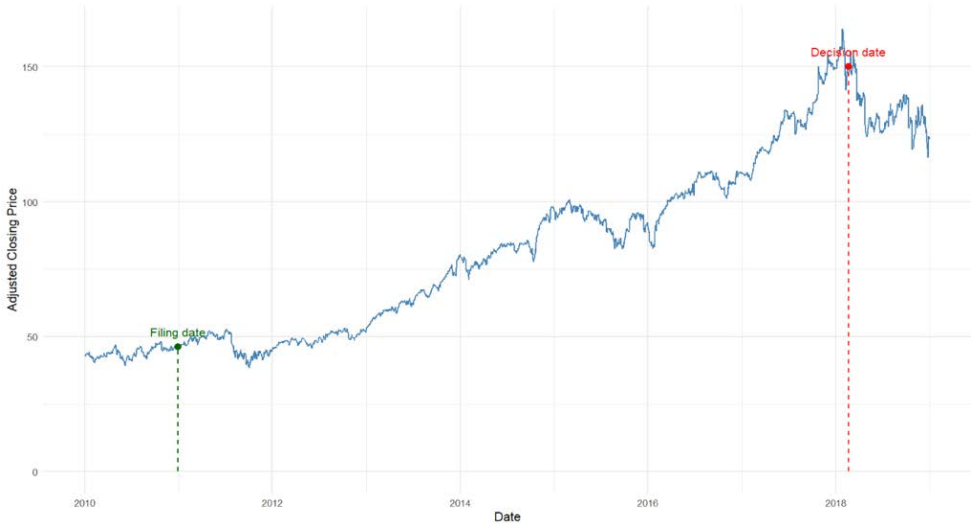
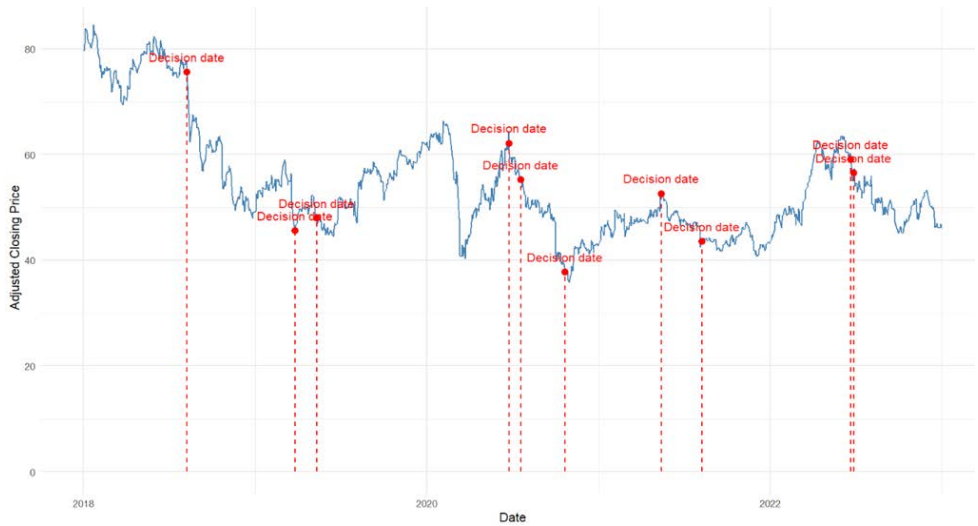
Annex



(a) Adjusted closing prices for 3M



(b) Adjusted closing prices for Bayer

Figure 4: Adjusted closing prices for two specific companies

Details on the litigation case sample

Table 6: Environmental litigations sample

Company	**Stock exchange**	**Case**	**Court**	**Filing**	**Decision**	**Theme**
3M	NYSE	State of Minnesota v. 3M Company	Minnesota District Court, Hennepin County	2010-12-30	2018-02-20	PFAS
3M	NYSE	Chambers Works Complaint - NJ DEP v. 3M et al.	Superior Court of New Jersey, Salem County	2019-03-27	2025-05-12	PFAS
3M	NYSE	Parlin Complaint - NJ DEP v. 3M et al.	Superior Court of New Jersey, Middlesex County	2019-03-27	2025-05-12	PFAS
3M	NYSE	AFFF Complaint - NJ DEP v. 3M et al.	Superior Court of New Jersey, Mercer County	2019-05-14	N/A	PFAS
3M	NYSE	AFFF MDL - Public Water Systems v. 3M et al.	US District Court of South Carolina	2018-12-07	2023-06-22	PFAS
Freeport McMoRan	NYSE	Tom BEANAL v. Freeport McMoRan	US District Court for the Eastern District of Louisiana	1996-04-29	1997-04-10	Deforestation/ Habitat destruction
Freeport McMoRan	NYSE	Appeal - Tom BEANAL v. Freeport McMoRan	US Court of Appeals, Fifth Circuit	1998-06-08	1999-11-29	Deforestation/ Habitat destruction
Freeport McMoRan	NYSE	Yosefa ALOMANG v. Freeport McMoRan	Orleans Civil District Court	1996-06-19	1996-06-24	Deforestation/ Habitat destruction

Company	Stock exchange	Case	Court	Filing	Decision	Theme
Freeport McMoRan	NYSE	Appeal - Yosefa ALOMANG v. Freeport McMoRan	US Louisiana Court of Appeals, 4th Circuit	2000-03-24	2002-02-20	Deforestation/ Habitat destruction
Monsanto	NYSE	Dewayne JOHNSON v. Monsanto (Bayer)	Superior Court of California	2016-01-28	N/A	Pesticides
Monsanto	NYSE	Edwin HARDEMAN v. Monsanto (Bayer)	US District Court of Northern California	2016-02-12	2016-03-12	Pesticides
Monsanto	NYSE	Alva et Alberta PILLIOD v. Monsanto (Bayer)	Superior Court of California, Alameda County	2017-06-02	N/A	Pesticides
Bayer	Xetra	Dewayne JOHNSON v. Monsanto (Bayer)	Superior Court of California	N/A	2018-08-10	Pesticides
Bayer	Xetra	Appeal - Dewayne JOHNSON v. Monsanto (Bayer)	Court of Appeal of California	N/A	2020-07-20	Pesticides
Bayer	Xetra	Appeal - Dewayne JOHNSON v. Monsanto (Bayer)	US Supreme Court	N/A	2020-10-21	Pesticides
Bayer	Xetra	Edwin HARDEMAN v. Monsanto (Bayer)	US District Court of Northern California	N/A	2019-03-27	Pesticides
Bayer	Xetra	Appeal - Edwin HARDEMAN v. Monsanto (Bayer)	US Court of Appeals, 9th Circuit	N/A	2021-05-14	Pesticides
Bayer	Xetra	Appeal - Edwin HARDEMAN v. Monsanto (Bayer)	US Supreme Court	N/A	2022-06-21	Pesticides
Bayer	Xetra	Alva et Alberta PILLIOD v. Monsanto (Bayer)	Superior Court of California, Alameda County	N/A	2019-05-13	Pesticides

Company	Stock exchange	Case	Court	Filing	Decision	Theme
Bayer	Xetra	Appeal - Alva et Alberta PILLIOD v. Monsanto (Bayer)	Court of Appeal of California	N/A	2021-08-09	Pesticides
Bayer	Xetra	Appeal - Alva et Alberta PILLIOD v. Monsanto (Bayer)	US Supreme Court	N/A	2022-06-27	Pesticides
Bayer	Xetra	Roundup Products Liability Litigation (MDL)	US District Court of Northern California	N/A	2020-06-24	Pesticides
Monsanto	NYSE	Roundup Products Liability Litigation (MDL)	US District Court of Northern California	2016-10-06	N/A	Pesticides
BP	LSE	Deepwater Horizon Federal Litigation	US District Court for the Eastern District of Louisiana	2010-08-10	2012-12-21	Oil spill
BP	LSE	Deepwater Horizon Federal Litigation	US District Court for the Eastern District of Louisiana	2010-12-15	2012-11-15	Oil spill
BP	LSE	Deepwater Horizon Federal Litigation	US District Court for the Eastern District of Louisiana	N/A	2014-09-04	Oil spill
BP	LSE	Deepwater Horizon Federal Litigation	US District Court for the Eastern District of Louisiana	N/A	2015-10-05	Oil spill
Shell	LSE	Billie and others v. Shell and another	High Court of Justice of England and Wales - Technology and Construction Court	2015-12-22	2017-01-26	Oil spill
Shell	LSE	Appeal - Billie and others v. Shell and another	Court of Appeal (Civil Division)	N/A	2018-02-14	Oil spill
Shell	LSE	Appeal - Billie and others v. Shell and another	Supreme Court of the United Kingdom	N/A	2021-02-12	Oil spill

Company	Stock exchange	Case	Court	Filing	Decision	Theme
Shell	LSE	Ogale Community v. Shell and another	High Court of Justice of England and Wales - Technology and Construction Court	2015-10-14	2017-01-26	Oil spill
Shell	LSE	Appeal - Ogale Community v. Shell and another	Court of Appeal (Civil Division)	N/A	2018-02-14	Oil spill
Shell	LSE	Appeal - Ogale Community v. Shell and another	Supreme Court of the United Kingdom	N/A	2021-02-12	Oil spill
Shell	LSE	Milieudefensie and Nigerian farmers v. Shell	Court of The Hague	2008-05-09	2013-01-30	Oil spill
Shell	LSE	Appeal - Milieudefensie and Nigerian farmers v. Shell	Court of The Hague	N/A	2021-01-29	Oil spill
BNP Paribas	Paris	Comissao Pastoral da Terra (CPT) and Notre Affaire à Tous v. BNP Paribas	Tribunal judiciaire de Paris	2023-02-27	pending	Deforestation/ Habitat destruction
Nestlé	Swiss	Foodwatch v. Nestlé Waters Supply Est	Tribunal judiciaire de Paris	2024-02-21	2024-09-10	Water management
Nestlé	Swiss	Collectif Eau 88 & Vosges Nature Environnement v. Nestlé Waters	Tribunal judiciaire d'Epinal	2020-06-19	2024-09-10	Water management
Nestlé	Swiss	Foodwatch v. Nestlé Waters	Tribunal judiciaire de Paris	2024-09-25	pending	Water management
Nestlé	Swiss	UFC Que Choisir v. Nestlé Waters	Tribunal judiciaire de Nanterre	2025-06-03	pending	Water management
Nestlé	Swiss	OFCO v. Nestlé Waters	Ministère public vaudois	2024-04-02	2025-06-25	Water management

Company	Stock exchange	Case	Court	Filing	Decision	Theme
Nestlé	Swiss	Vosges Nature Environnement v. Nestlé Waters	Tribunal judiciaire de Nancy	2025-01-30	pending	Soil and Water pollution
Arkema	Paris	NGO and inhabitants of "Vallée de la chimie" v. Arkema	Tribunal judiciaire de Lyon	2023-05-25	2023-11-16	PFAS
Arkema	Paris	Appeal - NGO and inhabitants of "Vallée de la chimie" v. Arkema	Cour d'appel de Lyon	N/A	2024-01-15	PFAS
Arkema	Paris	Appeal - NGO and inhabitants of "Vallée de la chimie" v. Arkema	Tribunal judiciaire de Lyon	N/A	2025-03-18	PFAS
Anglo American	LSE	Minas Gerais (Brazilian State) v. Anglo American	Brazil's environmental regulator Ibama	2018-03-13	2018-03-16	Soil and Water pollution
DuPont	NYSE	Leach v. E.I. Du Pont de Nemours & Co., No. 01-C-608	Court of Wood County West Virginia	2001-08-30	2005-02-28	PFAS
DuPont	NYSE	US Environmental Protection Agency v. DuPont	US EPA – Environmental Appeals Board	2004-07-08	2005-12-14	PFAS
DuPont	NYSE	Freeman v. E.I. Du Pont de Nemours and Company	US Southern District of Ohio	2013-10-22	2016-07-06	PFAS
DuPont	NYSE	Vigneron v. E.I. du Pont de Nemours & Co.	US Southern District of Ohio	2013-02-12	2016-12-21	PFAS
DuPont	NYSE	Ohio Valley inhabitants V. DuPont and Chemours	US Southern District of Ohio	2013-04-09	2017-02-13	PFAS
DuPont	NYSE	MDL 2873	US District Court of South Carolina	2018-12-07	2023-06-02	PFAS
Chemours	NYSE	MDL 2873	US District Court of South Carolina	2018-12-07	2023-06-02	PFAS
DuPont	NYSE	Hoosick Falls NY Residents v. DuPont-Chemours	NY Federal Court	2018-12-10	2025-07-10	PFAS

Company	Stock exchange	Case	Court	Filing	Decision	Theme
Saint-Gobain	Paris	Baker v. Saint-Gobain Performance Plastic Corp., et al.	NY Federal Court	2016-08-26	2021-05-05	PFAS
Chemours	NYSE	Dordrecht municipality v. Chemours	Court of Rotterdam	2021-04-22	2022-09-21	PFAS
Chemours	NYSE	Chemours Netherlands v ECHA	Court of Justice of the EU	2019-09-24	2022-02-23	PFAS
Chemours	NYSE	Appeal - Chemours Netherlands BV v European Chemicals Agency	Court of Justice of the EU	N/A	2023-11-09	PFAS
Shell	LSE	Herrera Rios et al. V. Dow Chemical et al.	Chinandega Court (Nicaragua)	2001-12-17	2006-12-01	Pesticides
Shell	LSE	Appeal - Herrera Rios et al. V. Dow Chemical et al.	Chinandega Court (Nicaragua)	N/A	2010-08-05	Pesticides
Shell	LSE	Appeal - Herrera Rios et al. V. Dow Chemical et al.	Chinandega Court (Nicaragua)	N/A	2013-11-19	Pesticides
ExxonMobil	NYSE	Gill v. Exxon Mobil	Court of Common Pleas of Philadelphia	2020-05-29	2024-05-10	Soil and Water pollution
Total	Paris	Erika	Tribunal de Grande Instance de Paris	1999-12-15	N/A	Oil spill
Total	Paris	Erika	Tribunal de Grande Instance de Paris	2000-06-09	N/A	Oil spill
Total	Paris	Erika	Tribunal de Grande Instance de Paris	2007-02-12	2008-01-16	Oil spill
Total	Paris	Appeal - Erika	Cour d'appel de Paris	N/A	2010-03-30	Oil spill
Total	Paris	Appeal - Erika	Cour de Cassation	N/A	2012-09-25	Oil spill
Total	Paris	Les Amis de la Terre France, Survie et al. v. TotalEnergies — EACOP/Tilenga	Tribunal judiciaire de Nanterre	2019-10-23	2020-01-30	Deforestation/ Habitat destruction

Company	Stock exchange	Case	Court	Filing	Decision	Theme
Total	Paris	Appeal - Les Amis de la Terre France, Survie et al. v. TotalEnergies — EACOP/Tilenga	Cour d'appel de Versailles	N/A	2020-12-10	Deforestation/ Habitat destruction
Total	Paris	Appeal - Les Amis de la Terre France, Survie et al. v. TotalEnergies — EACOP/Tilenga	Cour de Cassation	N/A	2021-12-15	Deforestation/ Habitat destruction
Total	Paris	Appeal - Les Amis de la Terre France, Survie et al. v. TotalEnergies — EACOP/Tilenga	Tribunal judiciaire de Paris	N/A	2023-02-28	Deforestation/ Habitat destruction
Rio Tinto	NYSE	Quebec administration v. Rio Tinto	Court of Quebec	N/A	2023-09-25	Soil and Water pollution
Rio Tinto	NYSE	Quebec administration v. Rio Tinto	Court of Quebec	N/A	2025-01-13	Soil and Water pollution
Casino	Paris	Envol Vert et al. v. Casino	Tribunal judiciaire de Saint-Etienne	2021-03-02	pending	Deforestation/ Habitat destruction
Bolloré SA	Paris	Sherpa et al. v Bolloré S.A	Tribunal judiciaire de Nanterre	2019-05-27	2021-03-25	Deforestation/ Habitat destruction
Bolloré SA	Paris	Appeal - Sherpa et al. v Bolloré S.A	Cour d'appel de Versailles	N/A	2022-06-09	Deforestation/ Habitat destruction
Carrefour	Paris	Bloom v. Carrefour	Tribunal judiciaire de Paris	2025-03-17	pending	Deforestation/ Habitat destruction

Company	Stock exchange	Case	Court	Filing	Decision	Theme
Danone	Paris	ClientEarth, Surfrider Foundation, and Zero Waste France v Danone	Tribunal judiciaire de Paris	2023-01-09	2025-02-21	Plastic pollution
Total	Paris	Bloom v. Total Energies	Tribunal judiciaire de Paris (pôle santé publique et environnement)	2024-05-21	2025-02-07	Deforestation/ Habitat destruction
BNP Paribas	Paris	Sherpa vs BNP Paribas	Tribunal judiciaire de Paris	2023-11-08	N/A	Deforestation/ Habitat destruction
Crédit Agricole	Paris	Sherpa vs BNP Paribas	Tribunal judiciaire de Paris	2023-11-08	N/A	Deforestation/ Habitat destruction
AXA	Paris	Sherpa vs BNP Paribas	Tribunal judiciaire de Paris	2023-11-08	N/A	Deforestation/ Habitat destruction
Bayer	Xetra	LPO v. Nufarm et al.	Tribunal judiciaire de Lyon	2021-05-21	2022-05-17	Pesticides
Bayer	Xetra	Appeal - LPO v. Nufarm et al.	Cour d'appel de Lyon	N/A	2023-12-21	Pesticides
Bayer	Xetra	Appeal - LPO v. Nufarm et al.	Cour de Cassation	N/A	2025-11-13	Pesticides