First Street

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GLOBAL RISK ASSESSMENT

THE 16TH RISK ASSESSMENT

The New Cost of Doing Business

How Climate Risk Impacts Operations, Earnings, and Enterprise Value

The New Cost of Doing Business

The 16th Risk Assessment

First Street

2026

Inside This Report

NEW COST OF DOING BUSINESS

Executive Summary

Physical climate risk has become a material financial risk to companies and investors alike. More frequent and severe weather events are already disrupting business operations and reducing revenues, as traditional risk-transfer mechanisms like commercial insurance often fall short. Prior research has found that companies' ability to secure cost-effective and comprehensive insurance coverage is limited, driving many companies to internalize physical climate risk.

Analysis of corporate disclosures, balance sheets, and profit warnings further reveals that companies are increasingly absorbing climate shocks through higher self-insurance, larger financial buffers, and greater revenue and earnings volatility. Just as references to climate risk now appear in roughly two-thirds of corporate annual disclosures, profit warnings triggered by extreme weather events have accelerated, growing over 6.5 times in the last two decades. These warnings indicate that the financial repercussions of severe weather go beyond simple physical damage. Our analysis shows operational interruptions lead to sustained revenue losses in the year following the event, ultimately triggering a wider market repricing.

These outcomes vary widely across companies and sectors. The range of impacts reveals the limits of traditional materiality frameworks that focus primarily on surface-level exposure, and the need for a more holistic approach that captures the complex ways physical climate risk affects company vulnerability.

Image: Hurricane Ian, January 2022

First Street identifies impacts to company owned-and-operated assets as a direct pathway through which physical climate risk affects financial performance, and quantifies these impacts through its newly launched Company Module. By translating asset-level damage and downtime of a business's core revenue producing facilities into operational and revenue disruption, the tool surfaces adaptation needs for companies and resilience risks for investors. Applying this approach across the Dow Jones Industrial Average Index reveals both the scale of cash losses due to climate risks today as well as contrasts across companies' exposure to climate-driven financial risk.

As climate extremes intensify, companies that can measure and manage physical climate risk will be better positioned to protect performance and operational continuity. Similarly, investors who can distinguish diversified exposure from concentrated operational fragility will be better equipped to price risk and allocate capital effectively.

KEY STATISTICS

6.5X

PROFIT WARNINGS

INCREASED LIKELIHOOD SINCE 2005 AFTERMATH

65%

10-K DISCLOSURES

PUBLIC COMPANIES IDENTIFYING CLIMATE RISK IN 2024

CRITICAL INSIGHTS

Key Takeaways

01

Corporate perceptions of physical climate risk are catching up to physical reality.

Climate losses have grown by 6.75 times over the last four decades; the share of public companies identifying physical climate risk as a material risk factor in 10-K filings rose from 32% in 2001 to 65% in 2024. Financial decision-makers are increasingly viewing extreme weather as a core material threat, not just an episodic disruption.

02

Coverage and cost limits in commercial insurance are pushing companies to internalize climate risk.

Nearly 44% of firms cite commercial insurance as too costly to fully cover their exposed assets, and about one in four now explicitly disclose self-insurance as an alternative. Patterns of self-insurance are most common in asset-intensive sectors, including segments of Consumer Cyclical like autos, homebuilders, and physical retail, Utilities, and Industrials, where climate exposure is tied to fixed physical assets.

03

Internalized climate risk increasingly appears through weather-driven profit warnings.

Hurricane Katrina marked a turning point in 2005; since then, companies have become more than 6.5 times as likely to issue profit warnings following extreme weather events, reflecting both rising disruption frequency and greater financial materiality.

04

Weather-driven profit warnings often signal prolonged financial underperformance.

Following disclosure of an extreme weather impact, over half of companies miss revenue growth expectations within a year, and more than a quarter continue to see revenue declines. Investors respond through valuation repricing, with stocks underperforming baseline valuations by an average of 2.7% within 30 days of disclosure.

05

Impacts and recovery trajectories vary sharply by sector.

Consumer-facing and asset-intensive sectors experience the highest rates of climate-affected revenue underperformance, while sectors with pricing flexibility or commodity-linked revenues fare better. Market reactions also differ: Technology, Real Estate, and Utilities often recover valuations mid-term, while Energy and Industrials exhibit more persistent losses, indicating limited capacity for adaptation.

06

Physical climate risk most directly affects companies through disruptions to owned-and-operated assets.

Historical events suggest that extreme weather damages critical, immobile assets that underpin revenue generation, triggering operational downtime and cascading revenue losses. Disruptions at even a single critical facility can ripple through a company's value chain, amplifying financial impact.

07

First Street built the first tool to assess the impact of climate-induced damage and downtime to a company's internal processes at scale.

By measuring damage and downtime across owned-and-operated assets and translating operational disruption into cascading revenue loss, the First Street Company Module quantifies how physical climate risk propagates through operations and financial performance.

08

Large-cap multinationals exhibit material yet modest average risk that accumulates at scale.

Results from running all 30 companies in the Dow Jones Industrial Average through the Company Module reveals that, on average, large-cap operating companies show lower risk due to their diversification. However, in a 100-year severe climate scenario, the average DJIA company faces cash losses of 1.9% of revenue. In aggregate, losses across the index approach $90 billion, equivalent to more than 39 basis points of index market capitalization.

09

Losses to companies will continue to rise without adaptation or operational relocation.

Absent targeted adaptation of critical assets or strategic relocation away from high-risk locations, expected climate-driven losses are projected to increase by roughly 10% across constituents of the DJIA, compounding operational disruption and financial volatility for exposed companies.

10

Over the long run, markets reward companies with lower exposure to physical climate risk.

Companies in the DJIA with insignificant rates of physical climate risk (amounting to less than 1% in a 100-year severe weather year) have historically traded at valuations approximately 1.7 times higher than peers with even moderate exposure over the last ten years, indicating that markets have been pricing climate risk into long-term performance.

CURRENT TRENDS

Why Is Physical Climate Risk Relevant to Companies?

Over the last few decades, the global economy has been learning–expensively–that weather-related natural disasters are not rare, isolated shocks. They are recurring, material events that can rewrite balance sheets, disrupt operations, and change where assets remain economically viable.

Since 1980, total annual damages from major weather-related hazards, including extreme weather events, flooding, wildfire, extreme temperatures, and drought, have risen sharply, increasing from $23.1 billion in 1980 to $155.9 billion in 2023 (Our World in Data, 2026). This represents a 6.75 times increase over four decades and a 4.5% compound annual growth rate, underscoring a sustained upward trend in the economic toll of climate-driven hazards (**Figure 1**).

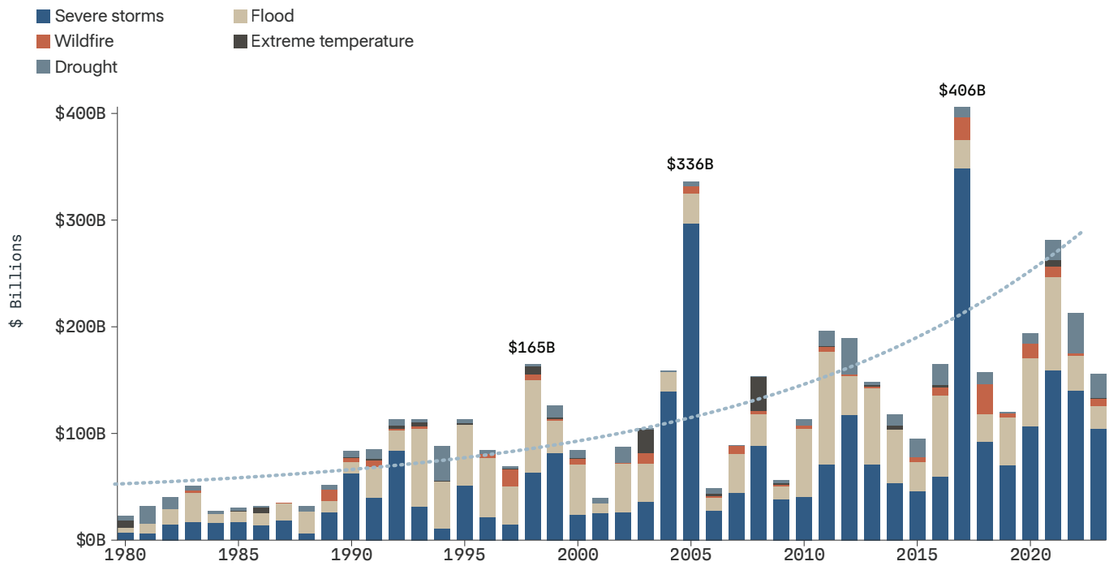


Figure 1. Trend in global natural disaster damages by peril, 1980 - 2023
Source: EM-DAT, CRED / UCLouvain (2024) with major processing by Our World in Data
Note: All figures are inflation-adjusted to 2024 dollars.

At the same time, the expansion of human settlement and property development in disaster-prone areas, alongside rising asset values, has amplified the cost of weather-related damages. Globally, the number of people living in flood-prone areas increased by an estimated 34.1% between 2000 and 2015, while the total world population grew by about 18.6% over the same period (Crownhart, 2021). First Street's 15th Risk Assessment finds that today, one in four people globally is exposed to significant levels of flood risk, while over 16% are exposed to almost certain flooding over the next ten years (First Street, 2026). In parallel, human settlement in wildland-urban interface (WUI) zones—where buildings and vegetation intermingle, elevating wildfire exposure—has expanded substantially. Global WUI areas grew by about 12.6% from 1985 to 2020, placing more structures and infrastructure adjacent to flammable areas (Chen et al., 2024). Combined, these trends underscore the rapid growth in weather-related damages and their increasingly important connection to people and property.

As hazard intensity rises alongside development in disaster-prone areas, losses are becoming more frequent, severe, and costly. For companies, this means physical climate risk is no longer an isolated or infrequent concern, but a recurring source of operational and financial exposure, affecting assets, disrupting operations, increasing costs, and constraining long-term growth.

KEY STATISTICS

$155.9B
DAMAGES
DRIVEN BY EXTREME WEATHER EVENTS IN 2023

4.5%
CAGR
COMPOUND ANNUAL GROWTH IN DAMAGES SINCE 1980

34.1%
EXPANSION
OF GLOBAL POPULATION IN FLOOD PRONE AREAS SINCE 2000

12.6%
GROWTH
IN GLOBAL WILD URBAN INTERFACE SINCE 1980S

> As hazard intensity rises alongside development in disaster-prone areas, losses are becoming more frequent, severe, and costly.

CURRENT TRENDS

Climate Losses Are Growing While Insurance Protection Gaps Persist

Despite the escalating economic toll of weather-related natural disasters, insurance coverage remains uneven and incomplete. Estimating the insurance protection gap is one way to quantify the limitations of insurance as the share of losses that remain uninsured because coverage is absent or insufficient. Globally, the gap averages 67%, meaning that over two-thirds of disaster-related losses are not covered by insurance (Munich Re, 2025). While this gap has narrowed from roughly 81.5% in the 1980s, the absolute scale of uninsured losses has grown substantially as disasters have become larger and more costly. Over the past five years alone, uninsured losses have averaged $180.3 billion annually, compared to $36.2 billion in the early 1980s, contributing to $4.23 trillion in uninsured losses accumulated over the past five decades (**Figure 2**).

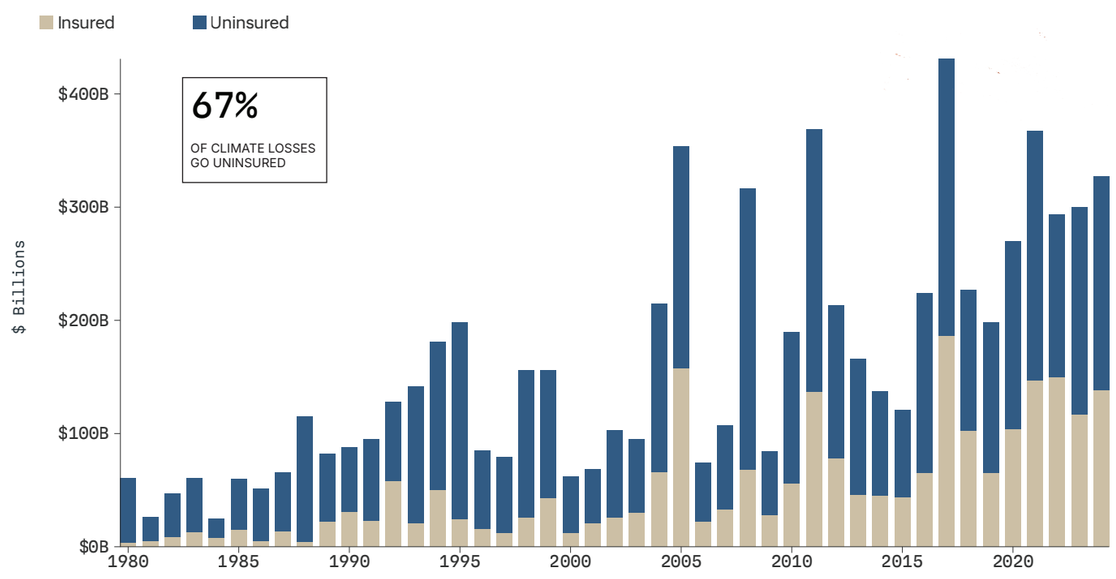


Figure 2. Global Insured vs. Uninsured Losses from Natural Disasters, 1980 - 2024
Source: Munich Re, NatCatSERVICE, May 2025

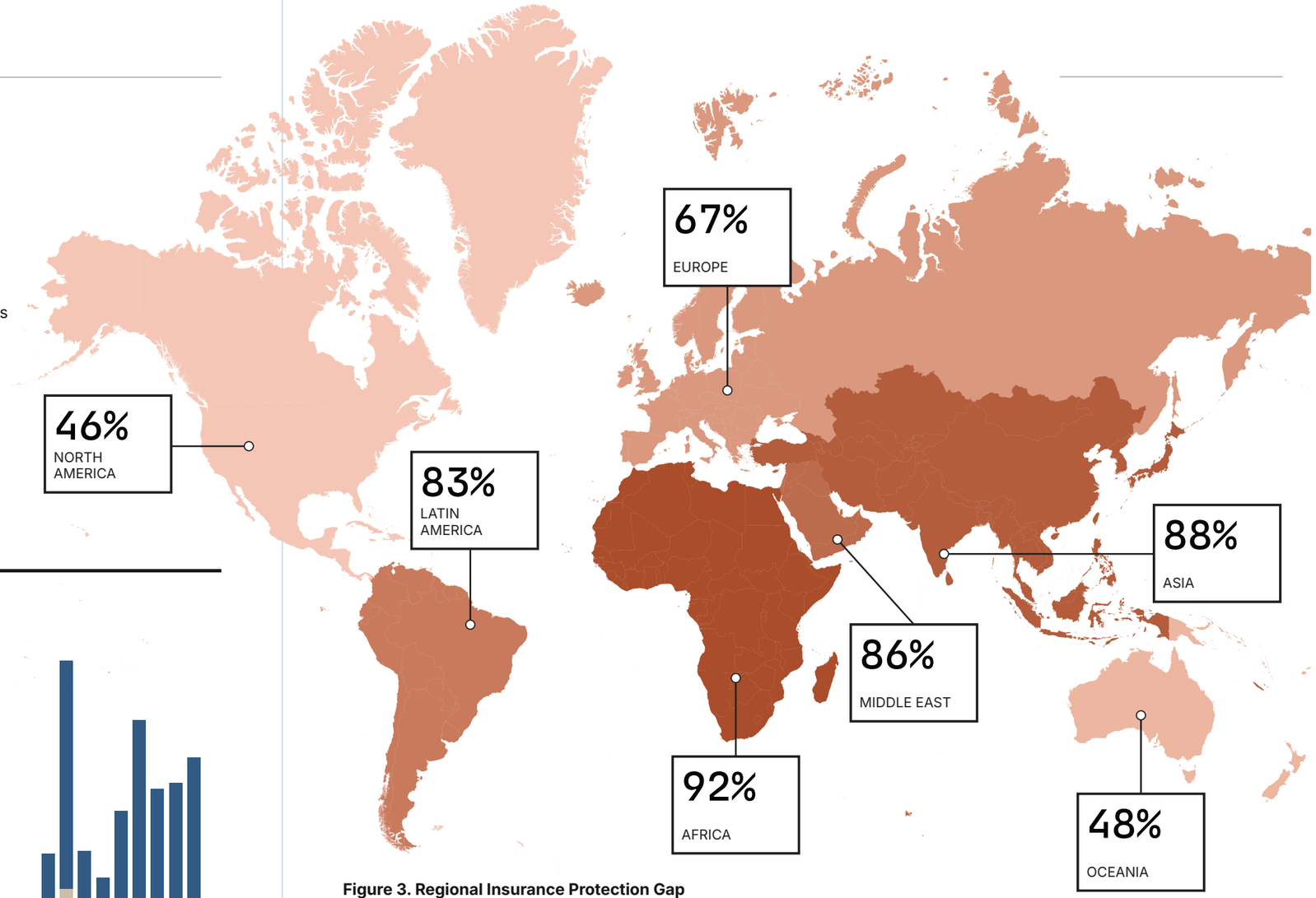


Figure 3. Regional Insurance Protection Gap (Percent Uninsured Climate Losses)
Source: Gallagher Re, Natural Catastrophe and Climate Report 2024

The protection gap is also highly uneven across regions, shaping where financial risk to assets and operations may be most concentrated. In North America and Oceania, relatively mature insurance markets help limit the gap to approximately 46-48%, allowing a larger share of losses to be absorbed by insurers (Gallagher Re, 2025). In contrast, regions such as Asia and Europe, with protection gaps of 88% and 67%, experience the majority of losses without insurance coverage (**Figure 3**). For companies operating or investing in these regions, underinsurance magnifies vulnerability, resulting in extended recovery timelines, increased business interruption, elevated credit risk, and the propagation of localized physical shocks across global supply chains.

CURRENT TRENDS

Companies Tend to Internalize Physical Climate Risk

For the private sector, this insurance protection gap does not imply the absence of risk but the internalization of risk. Corporate insurance programs typically combine commercial policies with self-insured retention layers, allowing firms to transfer only a portion of potential losses while retaining the remainder on their balance sheets through deductibles, loss reserves, or explicit self-insurance structures. As physical climate risk intensifies and commercial insurance becomes more costly, constrained, or unavailable for certain regions and asset types, weather-related losses may no longer be transferred to insurers but instead absorbed directly by firms.

This dynamic has driven increased reliance on alternative risk-transfer approaches, particularly captive insurance arrangements—wholly owned insurance subsidiaries established by a firm to underwrite its own risks. Demand for captives continues to grow, with new formations in recent years as companies seek greater control over coverage terms and more cost-efficient ways to manage perceived risks (Marsh, 2025).

Aspects of a company's insurance structure are typically disclosed in annual financial filings. Publicly traded companies that operate at least in part in the United States are required to file Form 10-K reports with the Securities and Exchange Commission (SEC), detailing financial performance, material risks to operations or profitability, and the mechanisms used to manage those risks, including insurance and risk-retention strategies. Because these filings are standardized, annually recurring, and focused on material risks, they provide a consistent and comparable source for assessing whether firms explicitly rely on self-insurance.

To evaluate corporate insurance practices, a systematic keyword search was conducted across 5,646 2024 10-K filings, identifying references to "self-insurance," "captive insurance," "risk retention," and related terms. The analysis also captured disclosures that referenced commercial insurance without self-insurance, as well as filings that made no mention of insurance at all. This approach distinguishes among firms that explicitly retain risk, firms that emphasize risk transfer, and firms that provide limited or no public disclosure of their insurance practices. The results reveal not only the prevalence of self-insurance among companies, but also significant variation in how insurance and risk retention are discussed in corporate disclosures. Approximately one in four companies explicitly reports relying on internal reserves or retained risk to cover disaster-related or operational losses (**Figure 4**). At the same time, nearly 30% of companies make no reference to insurance in their annual filings, suggesting that some firms may not yet understand physical climate risk or insurance coverage as financially material. Amid rapidly escalating disaster losses, the absence of disclosure suggests an implicit retention of risk. This means firms may be bearing a larger share of physical risk by default rather than through clearly defined insurance or self-insurance strategies.

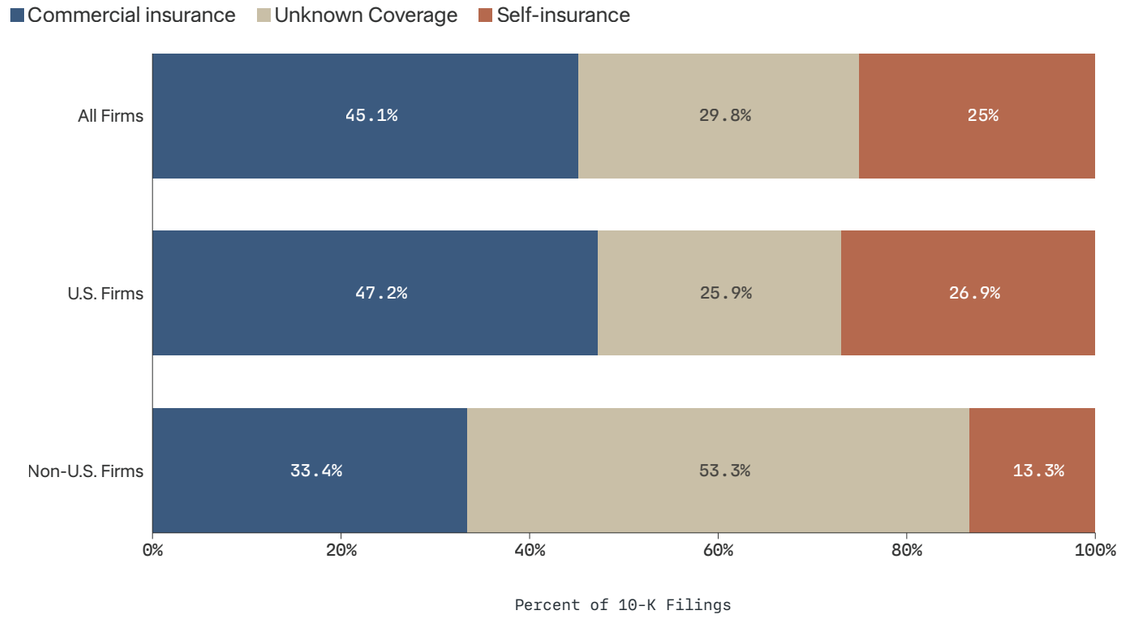


Figure 4. Prevalence of Self-Insurance in Corporate Disclosures, 2024
Source: First Street analysis of SEC 10-K filings using sec-api.io
Note: Keyword matches in filings include "self-insurance," "captive insurance," "risk retention," and related terms. U.S. versus non-U.S. firms are defined by company headquarters location.

KEY STATISTICS

1-IN-4
COMPANIES
EXPLICITLY REPORT RELYING ON FORMS OF SELF INSURANCE

30%
COMPANIES
DON'T DISCLOSE THEIR FORM(S) OF INSURANCE

Importantly, these aggregate figures are driven by U.S.-headquartered firms, which account for 89% of the 5,646 companies that disclosed annual filings with the SEC in 2024. When disaggregated, self-insurance is far less frequently disclosed among non-U.S.-headquartered firms: only 13.3% explicitly reference some form of self-insurance. Conversely, more than 53% of non-U.S. firms filing with the SEC make no mention of insurance at all, reflecting regional constraints on insurance availability or further suggesting potential materiality blind spots and implicit risk retention.

Disaggregating the results of self-insurance disclosures by sector using classifications defined by the Global Industry Classification Standard (GICS) reveals pronounced differences in how firms manage and disclose retained risk. Self-insurance is most prevalent in asset-intensive sectors, including Consumer Cyclical, Utilities, and Industrials, where roughly 40% of firms report some degree of risk retention (**Figure 5**).

Within Consumer Cyclical industries, elevated levels of self-insurance are driven in part by auto manufacturing, specialty retail, and travel and accommodation, where large physical footprints and high-value inventories increase exposure to physical hazards and make comprehensive commercial coverage costly or difficult to secure.

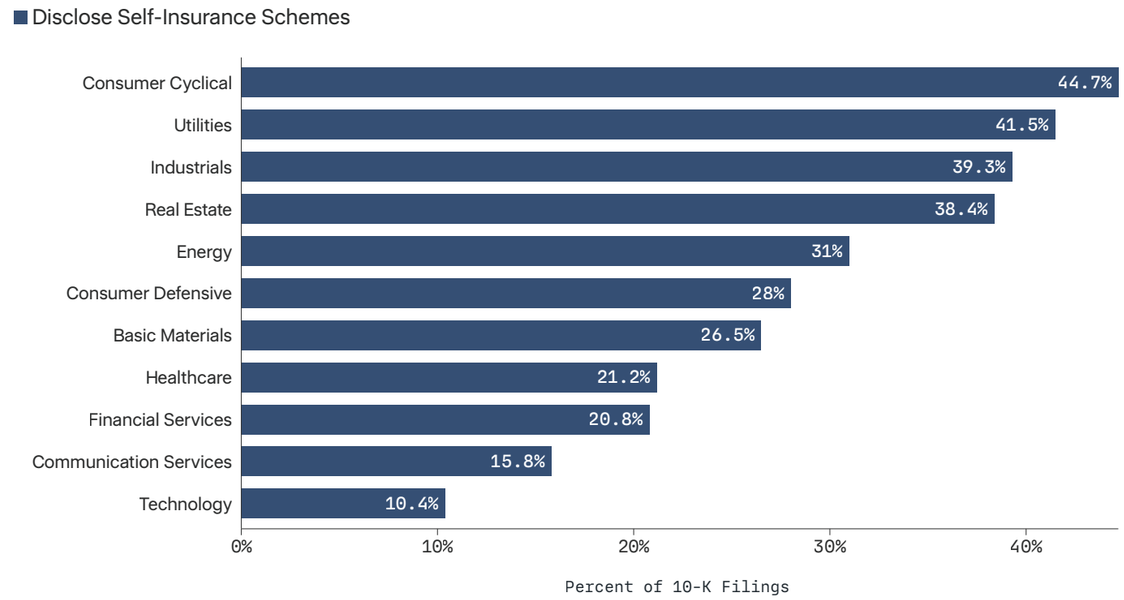


Figure 5. Prevalence of Self-Insurance Disclosures Across Sectors, 2024
Source: First Street analysis of SEC 10-K filings using sec-api.io
Note: Company sectors are classified using GICS.

A similar pattern emerges in Utilities and Industrials, where firms operate extensive, long-lived infrastructure that is both capital-intensive and geographically fixed. In these sectors, exposure to operational disruptions and limits on insurability incentivize companies to retain a portion of risk internally through higher deductibles, self-funded reserves, or captive insurance arrangements. Taken together, these sector patterns suggest that retained physical risk is highest in industries with significant fixed, location-dependent assets. With extreme weather events increasing and the insurance protection gap widening, this exposure is becoming more likely to materially affect corporate balance sheets.

Research shows rising commercial insurance costs are a key driver of these trends. A 2025 study by FM Global, based on a survey of 800 risk decision-makers in industrial, manufacturing, and technology firms, found that 44 percent of companies consider commercial insurance too costly to obtain full coverage, reinforcing the concept of self-insurance (FM, 2025). As a result, many firms intentionally underinsure and retain a substantial portion of their hazard exposure, absorbing losses directly when disasters occur. This indicates that a large share of climate-related losses in the private sector remains gross rather than insured, leaving companies to bear the financial consequences of rising disaster severity, more frequent disruptions, and increasingly volatile operating conditions.

KEY STATISTICS

44%

SURVEYED COMPANIES

STATE INSURANCE IS TOO COSTLY TO SECURE FULL COVERAGE

> Due to cost and coverage constraints, many firms intentionally underinsure and retain a substantial portion of their hazard exposure, absorbing losses directly when disasters occur.

Self-Insurance Example:

Kinder Morgan, Inc. (KMI), one of North America's largest energy infrastructure companies operating pipelines, terminals, and storage facilities for natural gas, crude oil, and refined products, disclosed in its 2024 filings that its insurance program does not fully cover all potential losses due to cost constraints. The company notes that operational risks, catastrophic events, and other liabilities may exceed existing coverage, leaving it directly exposed to uninsured or underinsured losses.

Specifically:

Our insurance program may not cover all operational risks and costs and may not provide sufficient coverage in the event of a claim. We do not maintain insurance coverage against all potential losses and could suffer losses for uninsurable or uninsured risks or in amounts in excess of existing insurance coverage. Losses in excess of our insurance coverage could have a material adverse effect on our business, financial condition and results of operations.

Changes in the insurance markets subsequent to certain hurricanes and other natural disasters have made it more difficult and more expensive to obtain certain types of coverage. The occurrence of an event that is not fully covered by insurance, or failure by one or more of our insurers to honor its coverage commitments for an insured event, could cause us to incur significant losses. Insurance companies may reduce or eliminate the insurance capacity they are willing to offer or may demand significantly higher premiums or deductibles to cover our assets. If significant changes in the number or financial solvency of insurance underwriters for the energy industry occur, we may be unable to obtain and maintain adequate insurance at a reasonable cost. The unavailability of adequate insurance coverage to cover events in which we suffer significant losses could have a material adverse effect on our business, financial condition and results of operations.

(SEC Form 10-K, 2023)

Self-Insurance Example:

Amcor PLC (AMCR), a global packaging manufacturer headquartered in Switzerland, disclosed in its 2024 filings that it manages operational and disaster-related risks through a combination of commercial insurance and a wholly owned captive insurer. While the company purchases third-party coverage for property damage, business interruption, and other exposures, it notes that this coverage does not fully eliminate risk, with a portion of potential losses retained internally.

Specifically:

We seek protection from a number of our key operational risk exposures through the purchase of insurance. A significant portion of our insurance is placed in the insurance market with third-party reinsurers. Our policies with such third-party reinsurers cover a variety of risk exposures, including property damage and business interruption. Although we believe the coverage provided by such policies is consistent with industry practice, the insurance coverage does not insure us against all risks in our operations or all claims we may receive and there is no guarantee that any claims made under such policies will ultimately be paid or that we will be able to maintain such insurance at acceptable premium cost levels in the future.

Additionally, we retain a portion of our insurable risk through a captive insurance company, Amcor Insurances Pte. Ltd., which is located in Singapore. Our captive insurance company collects annual premiums from our business groups and assumes specific risks relating to various risk exposures, including property damage. The captive insurance company may be required to make payments for insurance claims that exceed the captive's reserves, which could have a material adverse effect on our business, financial condition, results of operations, or cash flows.

(SEC Form 10-K, 2023)

HISTORICAL ANALYSIS

Physical Climate Risk Is Increasingly Recognized as a Material Business Threat

As extreme weather events become more frequent and severe, companies are increasingly acknowledging the potential impact of these events on their financial performance in their public disclosures. Using a similar keyword-search methodology applied in the self-insurance analysis, First Street examined Form 10-K filings submitted to the SEC between 2001 and 2024 to assess how public companies' recognition of physical climate risk has evolved.

Within the *Risk Factors* section of Form 10-K filings, companies describe material threats to their operations and financial performance, including risks arising from physical climate hazards. To systematically evaluate the extent to which firms communicate these threats, First Street conducted a structured keyword search of physical risk terminology, including references to specific hazards, such as floods, hurricanes, and wildfires, as well as broader mentions of extreme weather and climate-driven disruption.

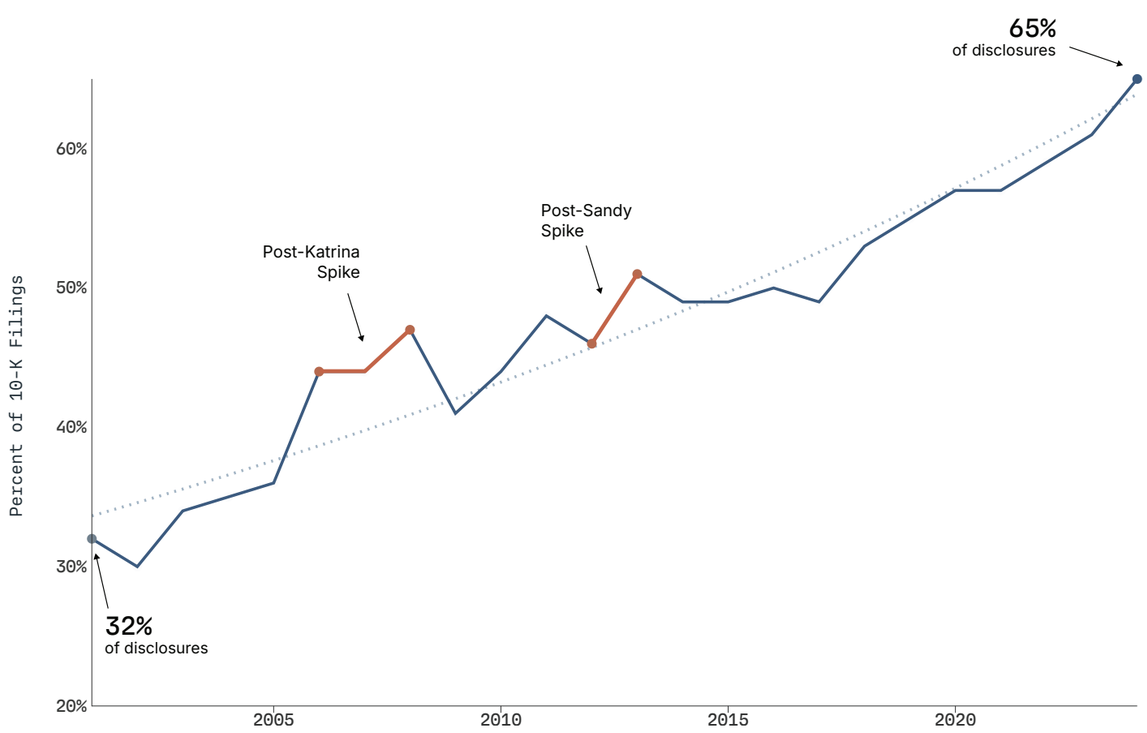


Figure 6. Percent of Annual Disclosures Citing Physical Climate Risk as a Risk Factor, 2001 - 2024
Source: First Street analysis of SEC 10-K filings using sec-api.io
Note: Physical climate risk keywords include general "extreme weather" synonyms and specific event terms, such as "flood," "hurricane," "wildfire," etc.

The results show that references to physical climate risk in corporate disclosures have more than doubled since 2001. By 2024, 65% of public companies explicitly referenced physical climate risks in their 10-K filings, compared to 32% in 2001 (**Figure 6**). This steady increase indicates that physical climate risk is increasingly viewed as a material factor with direct implications for business continuity, performance, and financial outcomes.

Beyond disclosure frequency, differences also emerge in how companies recognizing physical climate risk allocate capital and maintain financial buffers. By pairing disclosure status with firm-level financial data from Financial Modeling Prep (FMP), a historical data platform that compiles standardized financial statements alongside security-level pricing information for publicly traded companies, First Street finds that companies acknowledging physical climate risk have more capital-intensive financial profiles and maintain larger buffers to absorb shocks or unexpected expenses.

As shown in **Table 1**, firms disclosing physical climate risk generate slightly larger median revenues than non-disclosing firms, but invest significantly more in capital and maintain larger balance-sheet reserves. In absolute terms, capital expenditures are more than double among disclosing firms ($42.5 million vs. $16 million), and they are also nearly double when measured as a share of revenue (2.9% vs. 1.8%). Retained earnings are also double those of non-disclosing firms ($189.2 million versus $94.5 million), and reserves relative to revenue differ by 2.3 percentage points (10.4% to 12.7%).

Table 1. Financial Characteristics of Publicly Traded Firms by Physical Climate Risk Disclosure Status

Variable	No Physical Climate Risk Disclosed	Physical Climate Risk Disclosed
Median Revenue	$908.7M	$1.49B
Median CapEx	$16M	$42.5M
CapEx Percent of Revenue	1.8%	2.9%
Median Retained Earnings (Reserves)	$94.5M	$189.2M
Reserves Percent of Revenue	10.4%	12.7%

Note: Values in millions (M) and billions (B). Filtered for companies with $100 million or more in revenue in 2024.

These differences suggest that companies acknowledging physical climate risk are more likely to operate in asset-heavy environments that require sustained capital investment and greater financial capacity to absorb potential losses from physical disruption.

This relationship becomes more pronounced when financial reserves are analyzed jointly with firms' insurance strategies. Using insurance disclosures from the same 10-K filings, **Table 2** shows how retained earnings (financial reserves) vary by both physical climate risk disclosure and disclosed insurance approach. Across all firms, average reserves equal 4.6% of annual revenues. However, this masks substantial variation.

Firms that do not disclose physical climate risk hold negative reserves on average (-5.9% of revenues), while disclosing firms maintain positive reserves equivalent to 6.9% of revenues. Insurance strategy further differentiates these patterns. Firms that self-insure hold reserves equivalent to 17.5% of revenues, compared with -1.5% for firms relying on commercial insurance. The contrast is most pronounced at the extremes: physical climate risk-disclosing firms that self-insure hold the highest reserves (17.8% of revenues), while non-disclosing firms that outsource insurance hold the lowest (-12.8%).

Together, these patterns suggest that companies recognizing physical climate risk not only face greater exposure to physical damage and operational disruption but also proactively maintain larger financial buffers, particularly when retaining risk through self-insurance, to manage potential climate-related losses.

Sector-level analysis of 2024 disclosures further reinforces this interpretation (**Figure 7**). Asset-intensive industries exhibit the highest rates of physical climate risk disclosure. For example, 81% of Real Estate companies identified physical climate risk in their Risk Factors, compared to 56% of firms in the Technology sector. This distribution aligns with findings from Allianz's 2024 Risk Barometer, which identified natural disasters as a leading business risk, particularly for sectors with substantial physical asset exposure (Allianz, 2025).

Table 2. Matrix of Average Reserves as a Percent of Revenue by Physical Climate Risk Disclosure Status and Insurance Status

Disclosure Status	Relying on Self-Insurance	Relying on Commercial Insurance	Average
No Physical Climate Risk Disclosed	15.0%	-12.8%	-5.9%
Physical Climate Risk Disclosed	17.8%	0.8%	6.9%
Average	17.5%	-1.5%	4.6%

Note: Filtered for SEC filing companies with $100 million or more in revenue in 2024.

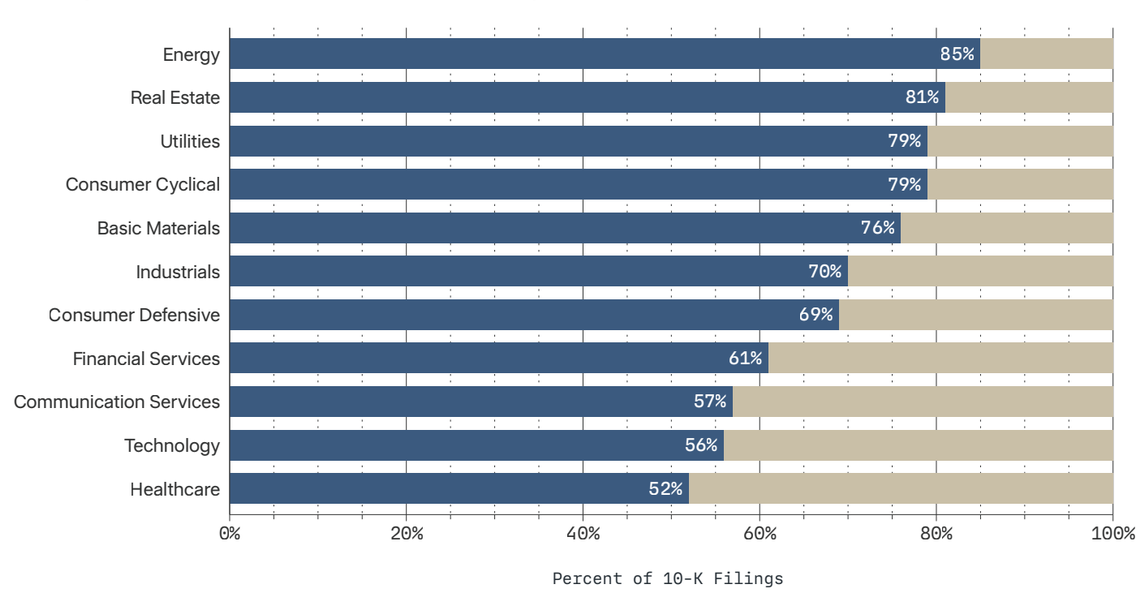


Figure 7. Percent of Annual Disclosures Citing Physical Climate Risk as a Risk Factor by Sector, 2024
Source: First Street analysis of SEC 10-K filings using sec-api.io
Note: Physical climate risk keywords include general "extreme weather" synonyms and specific event terms, such as "flood," "hurricane," "wildfire," etc. Company sectors are classified using GICS.

Sectors including real estate, utilities, financial services (especially insurers), energy, industrials, and consumer cyclical companies all show above-average disclosure rates. Collectively, these findings indicate that physical climate risk disclosure is not evenly distributed across the economy but is concentrated in sectors where extreme weather is most likely to affect assets, supply chains, and revenue. As a result, disclosure patterns provide insight not only into corporate awareness but also into the underlying economic exposure and financial strategies shaping companies' resilience to a changing climate.

Image: Lahaina Wildfires, 2023

10-K Risk Factor Example:

Cushman & Wakefield Ltd. (CWK), a global provider of commercial real estate brokerage and property management services, disclosed in its 2024 filings that its role overseeing large, high-occupancy properties and critical facilities exposes it to heightened risks from extreme weather events.

Specifically:

> *The buildings we manage for clients, which include some of the world's largest office properties, logistics facilities and retail centers, are used by numerous people daily. We also manage certain critical facilities (including data centers) that our clients rely on to serve the public and their customers, where unplanned downtime could potentially impact general public safety and disrupt other parts of their businesses. Events like fires, earthquakes, tornadoes, hurricanes, floods, other natural disasters, global health crises (including new or resurging pandemics), building defects, terrorist attacks or mass shootings could result in significant damage to property and infrastructure as well as personal injury or loss of life, which could disrupt our ability to effectively manage client properties. Further, to the extent we are held to have been negligent in connection with our management of such affected properties, we could incur significant financial liabilities and reputational harm.*

(SEC Form 10-K, 2023)

HISTORICAL ANALYSIS

Severe Weather Events Have Materially Impacted Companies In The Past

Physical climate impacts are already financially material for companies and investors alike. According to Marsh's 2024 Corporate Climate Adaptation Survey, half of all business respondents reported experiencing losses or disruptions from extreme weather events within the past three years (Marsh McLennan, 2024).

Building on this finding, First Street conducted an analysis to quantify the scale of these impacts on publicly traded companies listed in the United States, demonstrating that climate-related events are no longer theoretical concerns but active drivers of financial loss. When severe weather damages assets, disrupts operations, or forces facility closures, these companies may submit SEC current reports that disclose such material impacts. These filings provide a consistent, timely source of information for directly evaluating the financial effects of natural disasters.

To narrow the current report filings to those addressing natural disasters, a list of over 1,000 extreme weather events related to floods, severe storms, and wildfires occurring globally from 2000 to 2023 was sourced from the EM-DAT CRED dataset for this historical analysis. EM-DAT serves as a global reference database maintained by the Centre for Research on the Epidemiology of Disasters and includes standardized information on the location, severity, timing, and human impacts of major natural hazard events. Additional events occurring in the U.S. in 2024 were included in the analysis for more recent examples in the case studies later in the report, but were excluded from the aggregated results presented below. Using the name of each event if it was a declared disaster and the names of the regions, countries, or municipalities impacted, a comprehensive set of keywords pertaining to each event was constructed to identify particular events within corporate public disclosures.

These event-specific terms were then used to search all SEC current reports from 2001 to 2024, specifically Form 8-K filings for domestic companies and Form 6-K filings for foreign companies. Both filing types are mandatory disclosures that notify investors of material events that could affect a company's financial condition, operations, or risk profile, and they provide timely, standardized documentation of the company's reported impacts. Searches were conducted through the sec-api.io FullTextSearch system, and resulting filing matches were further filtered to those submitted between each event's start date and thirty days after its end date to ensure relevance. While the SEC generally requires that reportable events be disclosed on Form 8-K within four business days of occurrence, this analysis used a broader 30-day window to allow sufficient time for companies to assess, internalize, and report impacts that may not be immediately apparent (SEC, 2026). Duplicate filings for the same company and event were removed to produce a dataset of unique firm-event disclosures.

This analysis identified 4,137 unique firm-event filings over the 23-year study period, associated with 392 distinct extreme weather events. Over the past two decades, the number of filings shows a clear upward trend, with pronounced spikes in years marked by major extreme weather events, such as Hurricane Sandy in 2012 and severe floods in Europe in 2021 (**Figure 8**).

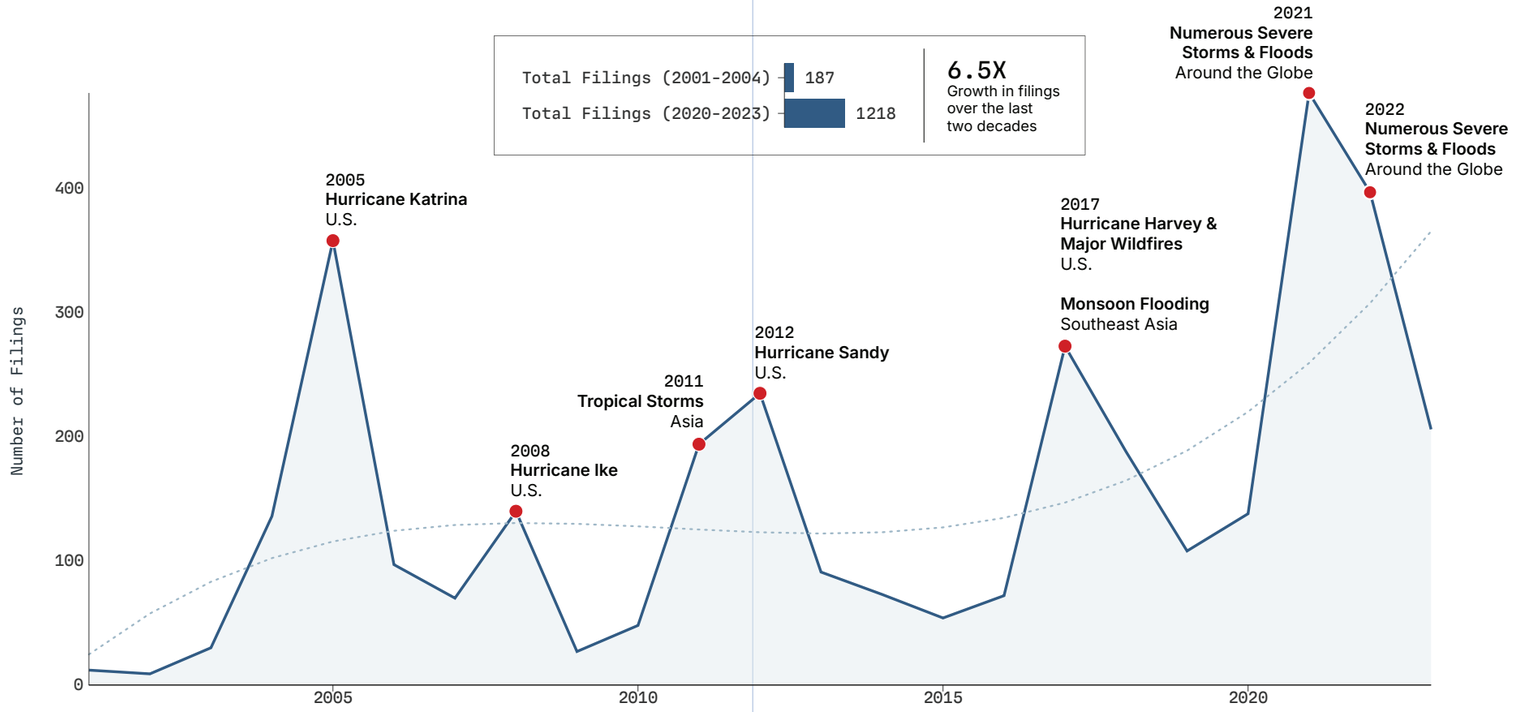


Figure 8. Count of Current Report Disclosures Related to Extreme Weather Events, 2001 - 2023
Source: First Street analysis of SEC 8-K and 6-K filings using sec-api.io

From 2001 to 2004, only 187 filings were linked to extreme weather events, reflecting both lower event frequency and more limited corporate awareness. Hurricane Katrina marked a turning point in corporate awareness of how extreme weather can affect operations and financial performance, triggering 358 filings across companies within 30 days of the hurricane's aftermath. Disclosure activity has accelerated sharply since then: between 2020 and 2023, companies filed 1,218 unique current reports related to extreme weather events, with 2021 accounting for 477 filings driven by a confluence of high-impact events, including Winter Storm Uri, Hurricane Ida, and widespread flooding across Western and Central Europe. Taken together, patterns across time indicate a more than sixfold increase in extreme weather-related current report filings over the past two decades, highlighting how extreme weather-related filings are becoming more frequent and triggered by everyday storms rather than rare, significant events, together with the growing financial relevance of physical climate risk for publicly traded companies.

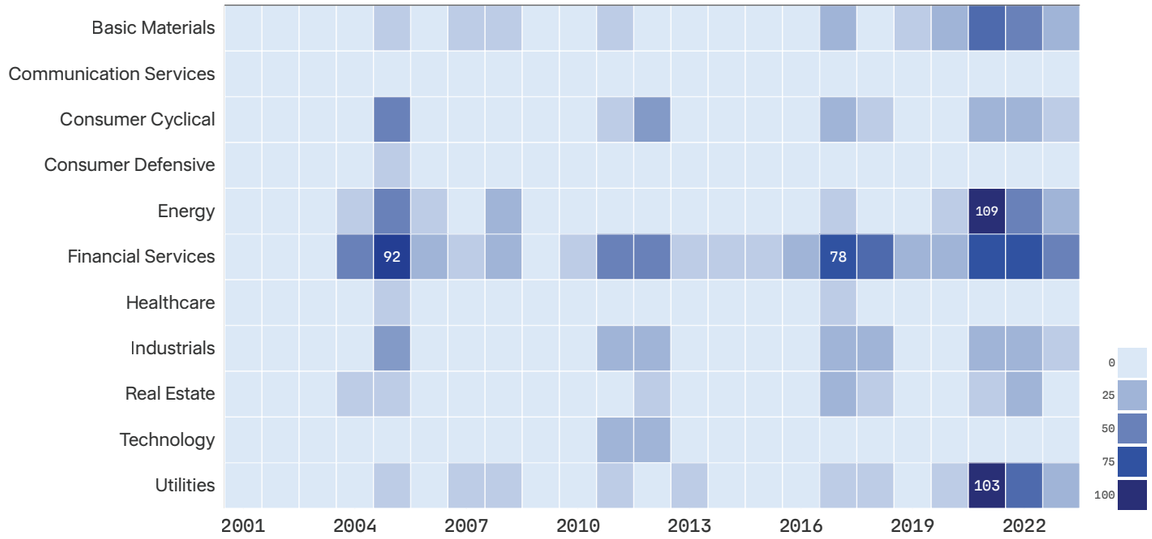


Figure 9. Heatmap of Current Report Extreme Weather Event Disclosures by Sector, 2001 - 2023

Note: Company sectors are classified using GICS.

Beyond the frequency of current report filings, these disclosures often function as profit warnings, signaling potential financial impacts stemming from asset damage, business interruption, or broader operational disruptions. First Street quantified these effects by examining both deviations from anticipated revenue projections and equity market behavior. Financial impacts were assessed using firm-level revenue and equity market data from FMP.

***Methodology Note**:*

Revenue impacts were estimated by comparing realized revenues to projected baseline levels derived from pre-event year-over-year growth trends. For each event, First Street used eight quarters of revenue data surrounding the event date to estimate expected performance, fitting a simple linear regression to pre-event revenues and measuring deviations from this projected trend following the event.

Investor responses were assessed using a Cumulative Abnormal Return approach, which measures deviations between a company's realized stock returns and expected returns based on its historical relationship with the broader market. Expected performance was estimated relative to the Russell 3000 Index, selected for its comprehensive coverage of large-, mid-, and small-cap United States equities representing the firms included in the disclosure sample. Abnormal returns were calculated using an estimation window (200 to 30 days prior to the filing date), an event window (the day of the filing to 30 days after the filing date), and a post-event window (31 to 120 days after the filing date). In certain case studies, the start date of the event itself is used in the CAR calculations for illustrative purposes, but aggregate figures present CAR values using the filing date.

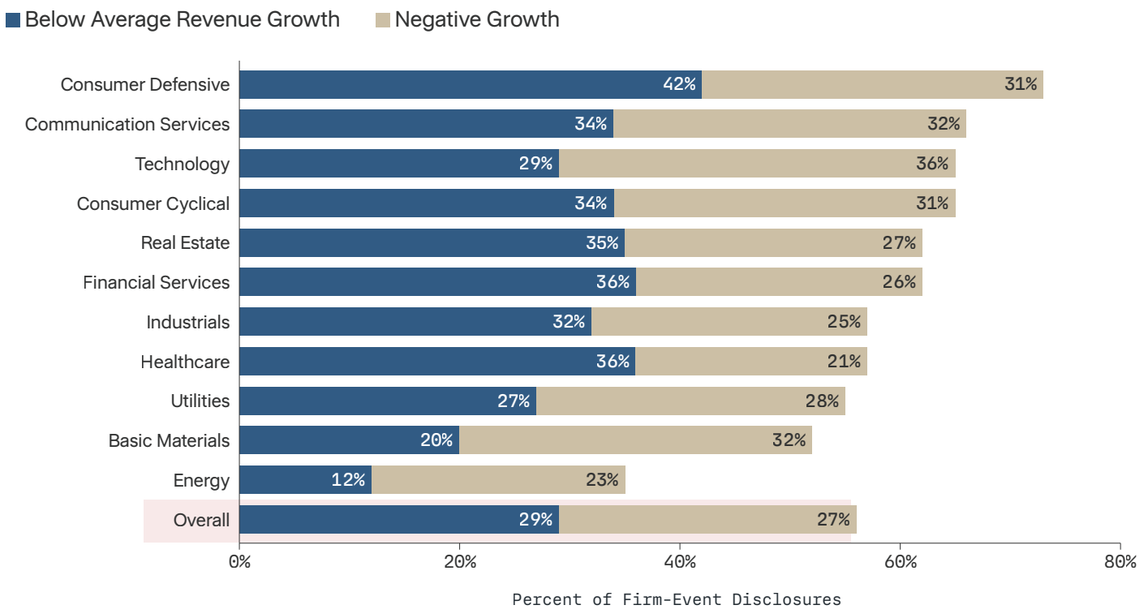


Figure 10. Revenue Growth Performance Post-Extreme Weather Event Disclosures
Source: First Street analysis of SEC 8-K and 6-K filings using sec-api.io and financial data from FMP
Note: Company sectors are classified using GICS.

Across the 4,137 firm-weather event filings analyzed for revenue deviations using FMP financial statement data, companies experienced revenue performance below projected levels in 56.4% of cases, with 27.3% exhibiting an outright year-over-year revenue decline. These results indicate that extreme weather-related disruptions are more often associated with underperformance relative to expected growth trajectories than with stable or accelerated revenue outcomes.

The magnitude of these impacts varies meaningfully across sectors, classified using GICS sector definitions (**Figure 10**). Consumer-facing and asset-intensive industries exhibit the highest rates of revenue underperformance following disclosures referencing extreme weather events. Nearly three-quarters of Consumer Defensive firms (72.9%) experienced revenue growth below anticipated levels, driven by both slower-than-expected growth (41.5%) and outright declines (31.4%). Similarly elevated shares of underperformance are observed across the Communication Services, Technology, Consumer Cyclical, and Real Estate sectors, with roughly two-thirds of firms reporting revenues below projected levels.

In contrast, sectors with greater pricing flexibility or commodity-linked revenues show comparatively lower rates of revenue underperformance. Energy firms, in particular, stand out: only 34.2% experienced revenues below projected levels, reflecting sustained demand even amid disruptions and, in some cases, revenue tailwinds from weather-driven price volatility. Basic Materials and Utilities occupy an intermediate position, with roughly half of firms experiencing revenue outcomes below expectations, though Basic Materials show a higher incidence of revenue declines relative to slower growth.

While disclosure does not imply causality, the consistency of below-trend revenue outcomes following current report filings suggests that physical disruptions represent a meaningful headwind to financial performance, particularly for sectors reliant on continuous operations or stable demand.

Because current report filings are designed to communicate material, non-routine developments in a timely manner, they also serve as a key mechanism through which investors receive and process new information about emerging risks and financial impacts. When such disclosures signal unexpected disruptions, losses, or changes in business conditions, investors often reassess the firm's fundamentals, updating expectations for earnings, costs, and operational continuity. This can lead investors to adjust firm valuations and can be observed as abnormal returns in an event-study framework. A number of recent studies have explored the reaction of investors to extreme weather events impacting companies, finding evidence that such shocks impact valuations and are systematically priced by financial markets, with stock prices responding to both direct physical damages and indirect disruptions transmitted through supply chains, demand shifts, and heightened uncertainty (e.g., Kruttli et al., 2024; Liu et al., 2025; Schimanski et al., 2026).

To assess how equity markets respond to disclosures related to severe weather impacts such as asset damage, operational disruption, or temporary closures, First Street analyzed total shareholder returns, defined as closing stock prices plus dividends compiled by FMP, following these filings. Returns were evaluated relative to expected performance trends to identify deviations associated with these disclosure events.

Across the 4,137 firm-event filings analyzed, total returns declined by an average of 2.7% relative to expectations within 30 days of disclosure. While the average effect is negative, outcomes vary widely across firms and sectors, with the most severe cases driving declines of up to 50.6% (**Figure 11**).

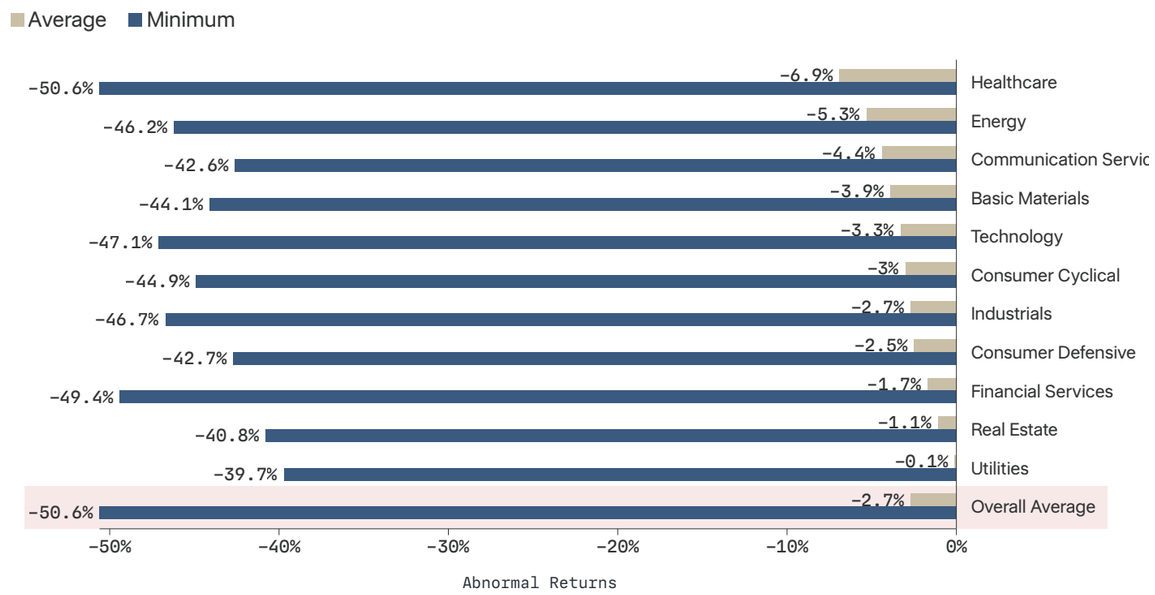


Figure 11. Cumulative Abnormal Returns 30 Days Post Extreme Weather Event Current Report
Source: First Street analysis of SEC 8-K and 6-K filings using sec-api.io and financial data from FMP
Note: Company sectors are classified using GICS.

The breadth of these outcomes is reflected in the wide typical CAR ranges observed across sectors (**Table 3**), indicating that investor responses differ substantially depending on both the nature of the event and firm-specific characteristics.

Table 3. Sector-Level Market Response to Extreme Weather Disclosures, Cumulative Abnormal Returns (CARs) in the 30 Trading Days Following Disclosure

Sector	Mean CAR (%)	Typical CAR Range (%)
Healthcare	-6.93	-20.4 to +6.5
Energy	-5.32	-17.6 to +6.9
Communication Services	-4.39	-14.8 to +6.0
Basic Materials	-3.91	-14.5 to +6.7
Technology	-3.35	-14.3 to +7.6
Consumer Cyclical	-2.95	-13.9 to +8.0
Industrials	-2.74	-13.2 to +7.7
Consumer Defensive	-2.46	-12.4 to +7.5
Financial Services	-1.66	-10.6 to +7.3
Real Estate	-1.10	-8.6 to +6.4
Utilities	-0.08	-7.0 to +6.9
All Sectors	-2.69	-12.8 to +7.5

Note: Typical CAR ranges reflect one standard deviation above and below the mean, capturing the range within which approximately two-thirds of observed event-firm outcomes fall.

Over longer horizons, dispersion in outcomes becomes even more pronounced. Although some firms experience partial or full recovery, others face compounding losses as the negative operational and financial consequences of extreme weather become clearer (**Figure 12**; **Table 4**). On average, returns remain 1.6% below expected levels 120 days after disclosure, suggesting that physical climate disruptions are not always perceived as transitory shocks. Instead, investors appear to incorporate longer-term considerations around asset vulnerability, operational resilience, and exposure to recurring physical risk.

Table 4. Sector-Level Market Response to Extreme Weather Disclosures, Cumulative Abnormal Returns (CARs) in the 120 Trading Days Following Disclosure

Sector	Mean CAR (%)	Typical CAR Range (%)
Energy	-7.05	-34.5 to +20.4
Industrials	-3.57	-27.4 to +20.2
Basic Materials	-2.78	-18.0 to +12.4
Financial Services	-1.19	-20.2 to +17.8
Consumer Defensive	-1.02	-19.1 to +17.1
Healthcare	-1.00	-18.4 to +16.4
Communication Services	-0.80	-15.1 to +13.5
Consumer Cyclical	0.49	-13.5 to +14.5
Real Estate	0.72	-16.1 to +17.5
Utilities	1.47	-16.4 to +19.4
Technology	1.63	-13.1 to +16.3
All Sectors	-1.57	-19.9 to +16.7

Note: Typical CAR ranges reflect one standard deviation above and below the mean, capturing the range within which approximately two-thirds of observed event-firm outcomes fall.

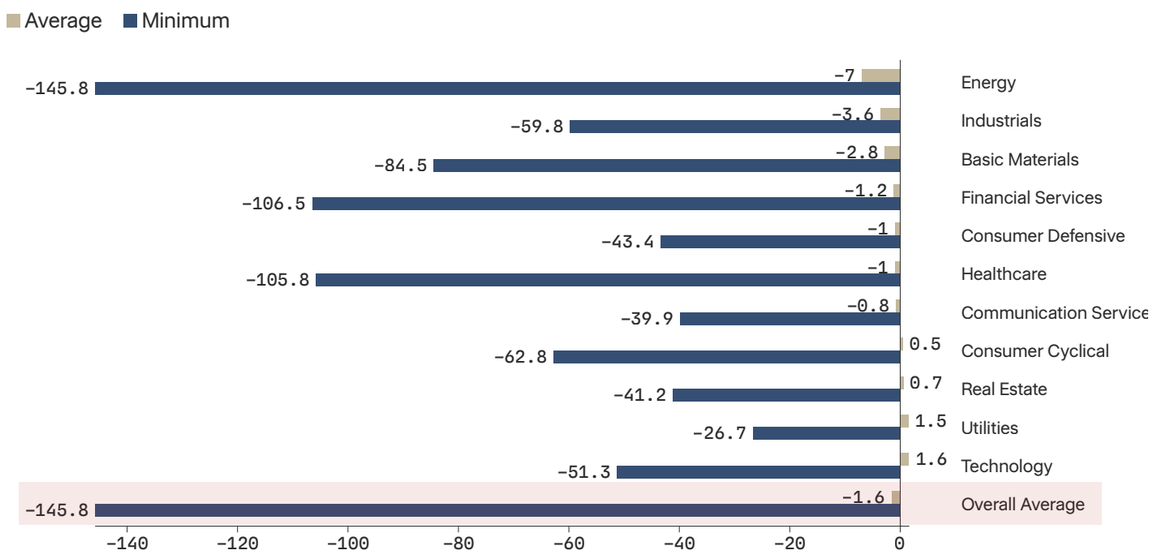


Figure 12. Cumulative Abnormal Returns 120 Days Post Extreme Weather Event Current Report
Source: First Street analysis of SEC 8-K and 6-K filings using sec-api.io and financial data from FMP
Note: Company sectors are classified using GICS.

Sector-level results further highlight the importance of heterogeneity in market responses. In the immediate aftermath of disclosure, sectors with concentrated physical assets, regulatory constraints, or limited operational flexibility experience the largest average declines. Healthcare firms exhibit the sharpest short-term response, with mean CARs of -6.9% within 30 days, reflecting investor sensitivity to disruptions affecting facilities, staffing, and service continuity. Energy firms similarly show pronounced short-term losses (-5.3%), driven by concerns over infrastructure damage, production outages, and elevated repair and compliance costs.

At the same time, the wide CAR ranges within these sectors, spanning both substantial losses and positive outcomes, underscore meaningful differences in firm-level resilience (**Table 3**). Even among asset-intensive sectors, some firms experience muted declines or positive abnormal returns, suggesting that redundancy, geographic diversification, contingency planning, or rapid restoration capabilities can materially shape investor perceptions following disclosure.

Other sectors, including Communication Services, Basic Materials, and Technology, experience moderate average declines in the 30-day window, ranging from -3.3% to -4.4%. These sectors also exhibit wide distributions of outcomes, reflecting variation in network redundancy, supply chain exposure, and the speed at which operations can be stabilized. By contrast, Financial Services and Real Estate show smaller initial declines on average, consistent with business models that are less directly tied to physical assets and more buffered by diversified portfolios, contractual cash flows, and insurance mechanisms.

Differences across sectors become clearer when examining post-event dynamics over the 120-day horizon, with higher variance among firms within sectors. On average, however, several sectors, including Technology, Consumer Cyclical, Real Estate, and Utilities, exhibit average CARs that turn positive relative to expected trends. This recovery suggests that initial market reactions may reverse as more information becomes available, allowing firms to restore operations, adjust pricing, or shift demand in response to disruptions. Utilities, in particular, display near-zero short-term impacts and positive longer-term performance, consistent with regulated revenue structures, cost-recovery mechanisms, and prioritized infrastructure restoration.

In contrast, Energy and Industrials experience persistent negative abnormal returns well beyond the initial disclosure period, with mean CARs of -7.0% and -3.6%, respectively, over 120 days. The continued underperformance of these sectors, combined with especially wide CAR ranges (**Table 4**), suggests that investors increasingly differentiate between firms facing one-time disruptions and those exposed to structurally higher physical risk, recurring outages, or rising adaptation costs. Basic Materials and Healthcare similarly show incomplete recoveries on average, reinforcing the challenges faced by sectors dependent on continuous production, specialized assets, or constrained supply chains.

Taken together, these results indicate that equity markets respond not only to the severity of immediate physical impacts but also to signals about firms' capacity to absorb, adapt to, and recover from extreme weather events. While short-term losses largely reflect uncertainty around near-term earnings and operational continuity, longer-term abnormal returns appear to incorporate investor assessments of resilience, operational flexibility, capital intensity, and structural exposure to physical climate risk. As extreme weather events become more frequent, these differentiated market responses are likely to play an increasingly central role in how physical climate risk is priced across sectors and firms.

> The following pages cover a handful of notable case studies from recent report filings that illustrate the impact of extreme weather events on company operations and valuations.

A. UTILITIES SECTOR CASE STUDY

The Lahaina wildfires began on August 8, 2023, on the island of Maui, Hawaii, fueled by high winds from Hurricane Dora, low humidity, and severe drought. The fires rapidly engulfed the historic town of Lahaina, causing catastrophic loss of life, property, and infrastructure and ranking among the deadliest wildfires in U.S. history.

Hawaiian Electric Industries, Inc., the parent company of Hawaiian Electric Company (HE), Hawaii's largest utility provider, was directly impacted as the fires damaged portions of its transmission and distribution network. Beyond physical damage, the company faced intense scrutiny over whether its power lines and equipment may have contributed to the disaster.

An analysis of Hawaiian Electric's quarterly income statements indicates that the financial impacts extended well beyond asset losses. Beginning in 2023 Q3, revenues fell below the expected trend by an average of 30% (approximately $315 million per quarter) over the subsequent two years. This decline intensified in the second year, averaging 42% (about $470 million per quarter), reflecting ongoing operational disruption and mounting legal and regulatory uncertainty.

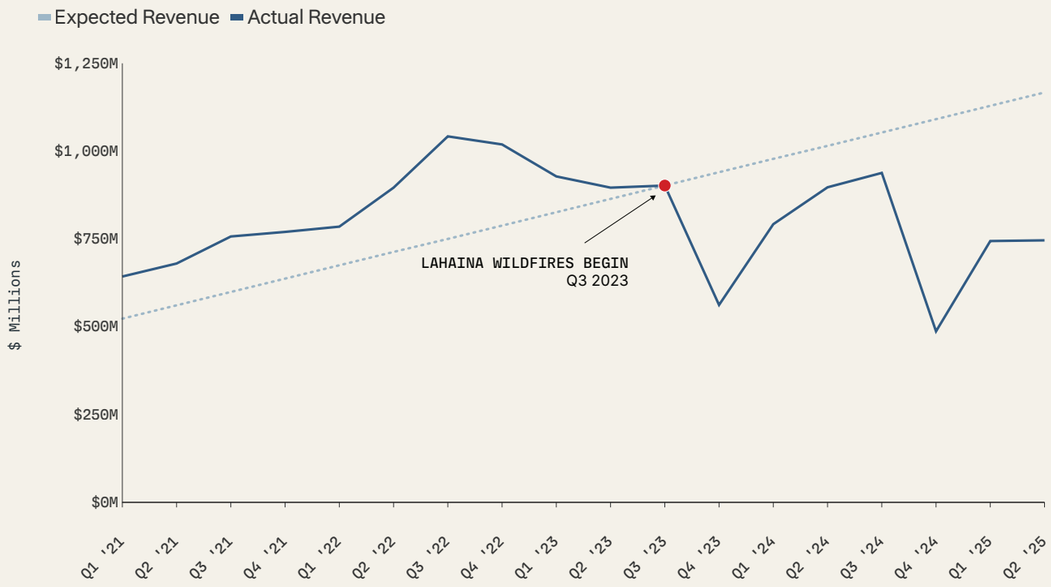


Figure A.1. Hawaiian Electric Industries Inc. Revenue Impact Following Lahaina Wildfire

In a Form 8-K filed several weeks later, Hawaiian Electric issued its first official disclosure addressing rapidly escalating liability allegations that had already resulted in litigation (SEC Exhibit 99.2). While the company emphasized cooperation with state investigations and denied operational negligence, investor confidence had already sharply deteriorated.

An analysis of the firm's dividend-adjusted stock price relative to the Russell 3000 shows cumulative abnormal returns (CAR) of −74.4% within 30 days of August 8, 2023, indicating that investors quickly priced in anticipated financial and legal fallout ahead of formal disclosures. Although losses partially recovered, the company's valuation remained deeply depressed, with a CAR of −57.1% after 120 days, reflecting persistent market concern over litigation exposure, insurance recovery limits, and long-term reputational damage.

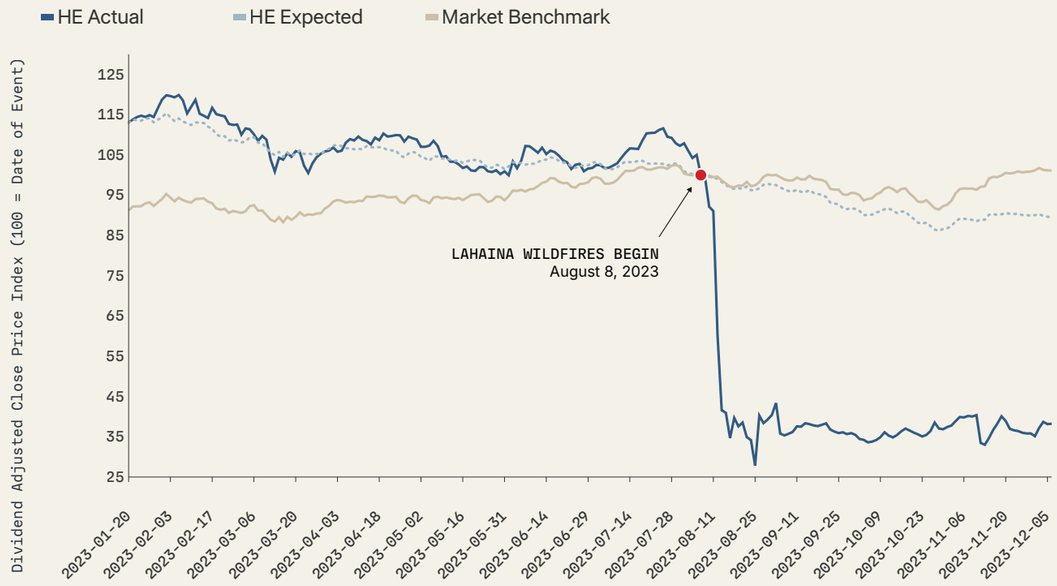


Figure A.2. Hawaiian Electric Industries Inc. Returns Around Lahaina Wildfire

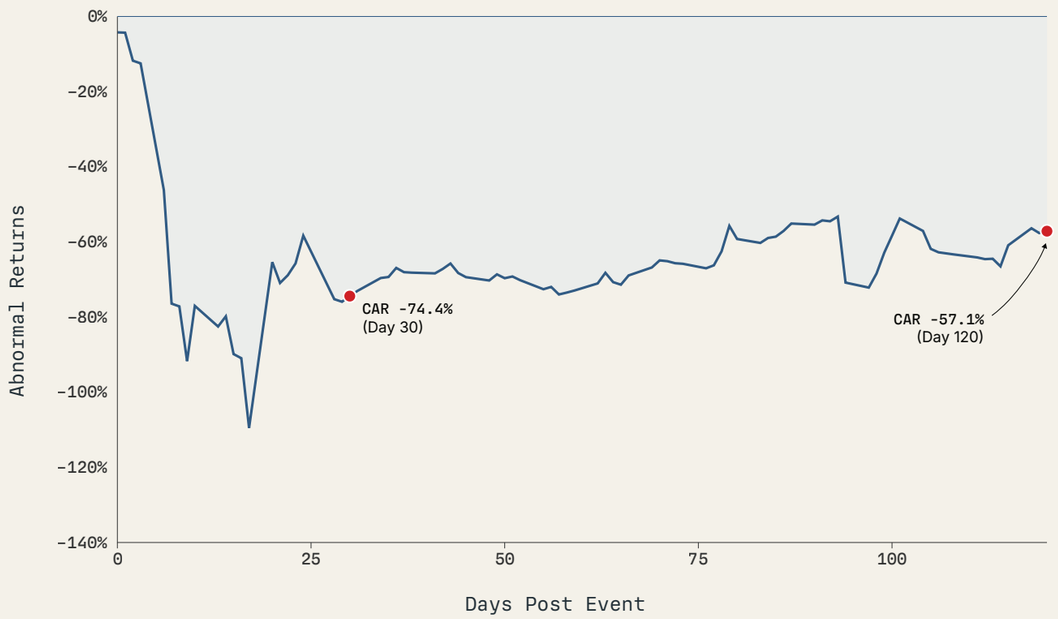


Figure A.3. Hawaiian Electric Industries Inc. CAR Following Lahaina Wildfire

B. TECHNOLOGY SECTOR CASE STUDY

The 2011 Thailand floods, among the most severe in the country's history, began in mid-2011 after intense monsoon rains and tropical storms. Lasting over six months, they inundated central Thailand, damaging industrial parks, manufacturing facilities, and transport infrastructure. The disaster severely disrupted Thailand's manufacturing sector, particularly automotive and electronics industries central to global supply chains.

Sensata Technologies Holding N.V. (ST), a global supplier of sensors and control systems for automotive, industrial, and aerospace applications, was directly affected. Several manufacturing and assembly facilities in Thailand were damaged or shut down, halting production and delaying shipments to key customers worldwide. On December 12, 2011, Sensata filed a Form 8-K disclosing the impact of the floods on its Thai operations, warning of near-term revenue shortfalls and outlining an expected recovery timeline (SEC Exhibit 99.1).

Analysis of Sensata's quarterly income statements confirms the scale and persistence of the disruption. Over the two years following the floods, revenues averaged 12% below the pre-flood trend (roughly $69 million per quarter), with the shortfall widening to 18% (about $109 million per quarter) in the second year as flood-related supply chain effects persisted into 2012 and 2013.

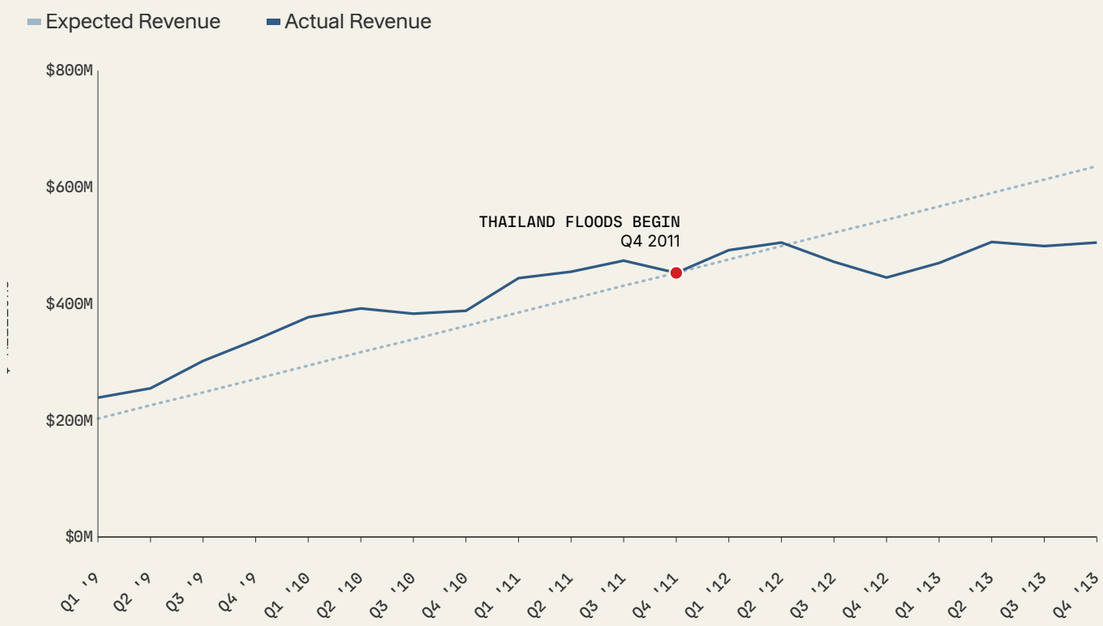


Figure B.1. Sensata Technologies Holding Revenue Impact Following Thailand Floods

A parallel analysis of the firm's dividend-adjusted stock price relative to the Russell 3000 shows cumulative abnormal returns (CAR) of −13.6% in the 30 days following December 12, 2011. Although the market partially recovered, a persistent CAR of −7.3% after 120 days indicates continued investor concern over operational resilience and supply chain vulnerability.

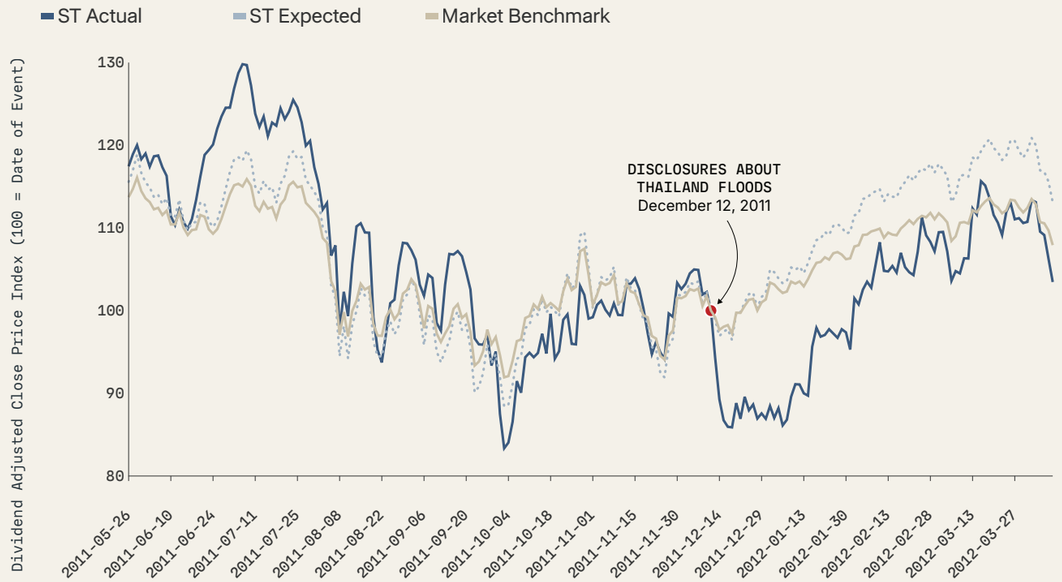


Figure B.2. Sensata Technologies Holding Returns Around Thailand Floods

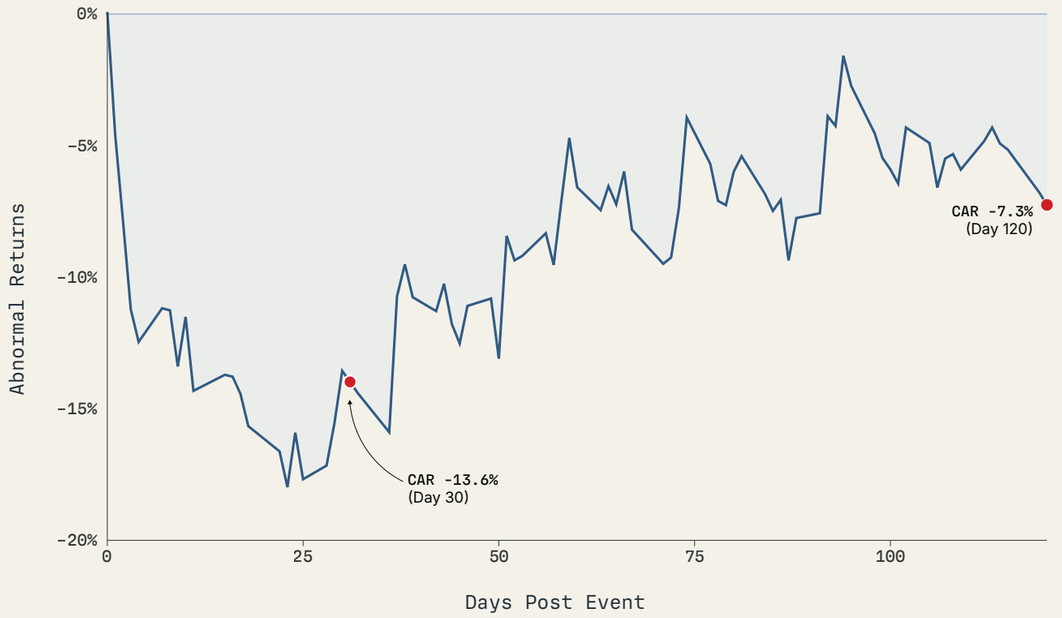


Figure B.3. Sensata Technologies Holding CAR Following Thailand Floods

C. HEALTHCARE SECTOR CASE STUDY

In late summer and early fall of 2024, Hurricanes Helene and Milton made successive landfalls across the southeastern United States, causing widespread flooding, wind damage, and prolonged power outages. The closely timed storms compounded operational disruptions across multiple sectors, particularly for healthcare providers with geographically concentrated facilities.

Community Health Systems, Inc. (CYH), a major publicly traded hospital operator with a network of acute care facilities in the Southeast, was directly affected. Several hospitals and outpatient facilities in Florida, Georgia, and Tennessee experienced service interruptions and added costs, straining already thin operating margins in a sector with high fixed costs and limited short-term flexibility.

On October 23, 2024, Community Health Systems filed a Form 8-K disclosing the financial impacts of the compound hurricane events (SEC Exhibit 99.1). In this filing, the company estimated that Hurricane Helene alone resulted in approximately $7 million in lost revenues, with additional costs and disruptions from both hurricanes anticipated in the following quarters.

An analysis of Community Health Systems' quarterly income statements confirms the magnitude of the disruption. Over the year following the hurricanes (the only year of post-event revenue data available), revenues consistently underperformed the pre-hurricane trend. On average, quarterly revenues were about 5% lower than expected (roughly $159 million per quarter) as total revenues declined from $3.27 billion to $3.09 billion between the end of 2024 and the end of 2025.

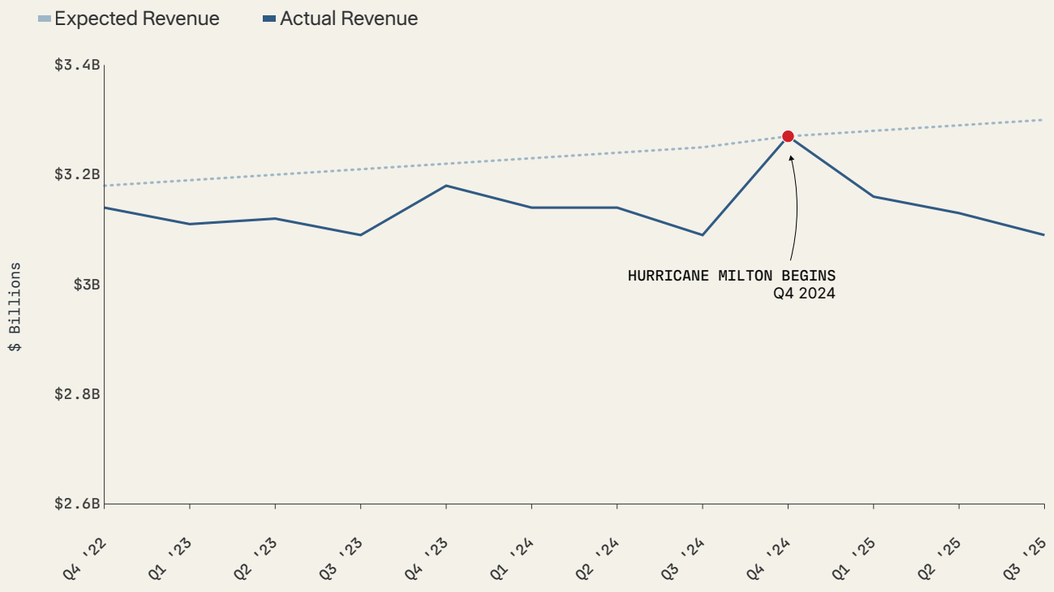


Figure C.1. Community Health Systems Inc. Revenue Impact Following Hurricanes Milton & Helene

Market reaction was swift and severe. Analysis of the firm's dividend-adjusted stock price relative to the Russell 3000 shows cumulative abnormal returns (CAR) of −50.6% in the 30 days following the October 23, 2024, Form 8-K filing. The company's valuation continued to deteriorate, reaching a CAR of −83.6% after 120 days, reflecting persistent investor concern over sustained revenue pressure, elevated costs, and geographic exposure to increasingly severe weather risks.

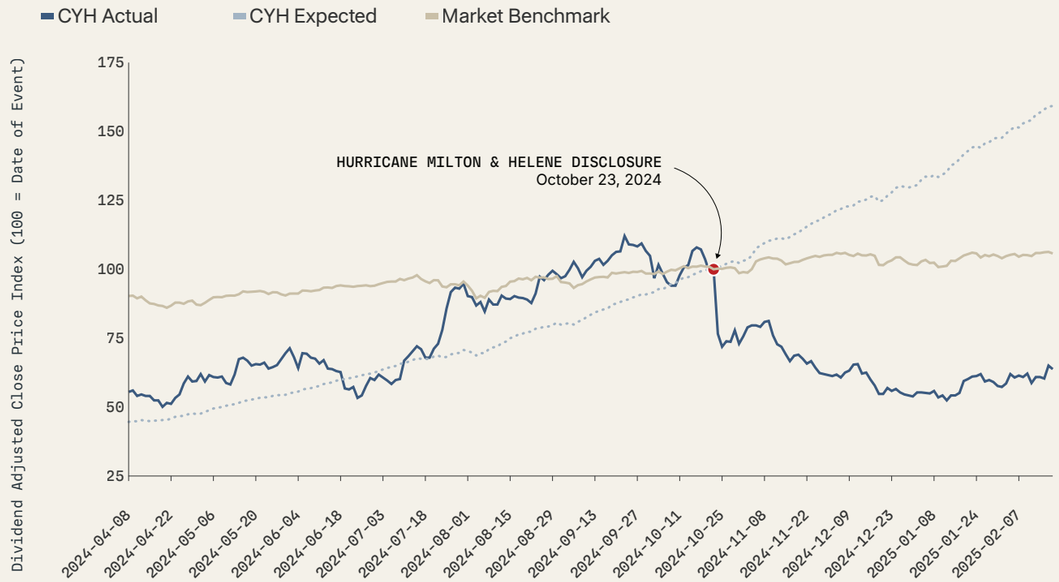


Figure C.2. Community Health Systems Inc. Returns Around Hurricanes Milton & Helene

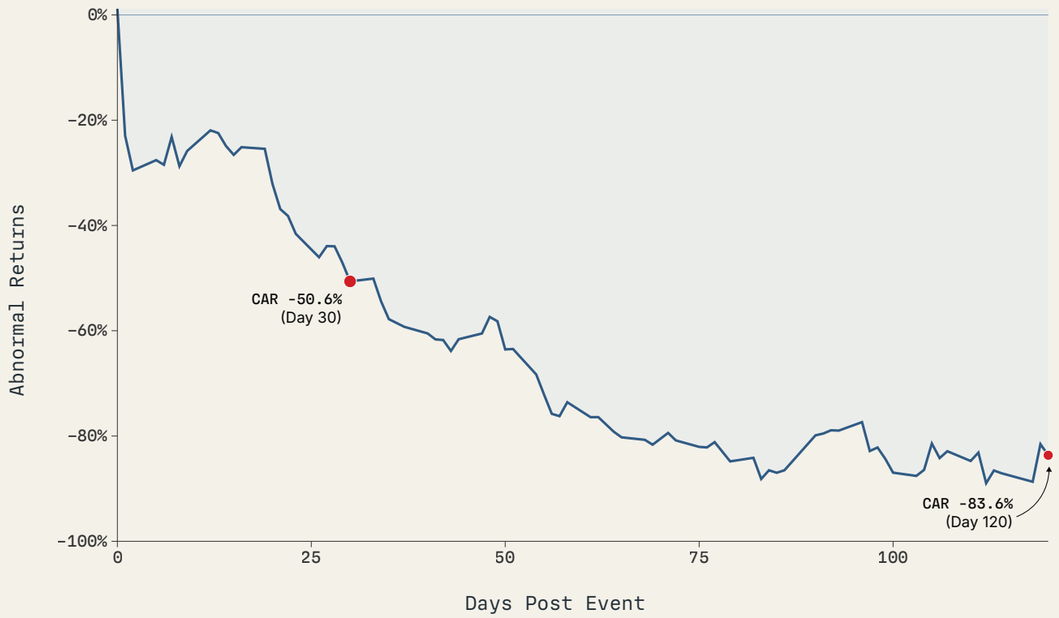


Figure C.3. Community Health Systems Inc. CAR Following Hurricanes Milton & Helene

MARKET NEED

Understanding Physical Climate Risk To Companies Requires A Holistic Approach

As shown above, companies are increasingly acknowledging physical climate risk as both a factor that can affect financial performance in their public disclosures, as well as implicitly in the way they allocate financing. Alongside this growth in awareness among companies, materiality frameworks have become more prevalent among investors and other market participants as tools for identifying, categorizing, and prioritizing sustainability-related risks, including physical climate change, that may be financially material, affecting cash flow stability, asset performance, and long-term valuation.

Frameworks such as the Sustainability Accounting Standards Board (SASB), the Climate Risk Financial Impact Assessment Methodology (CRIF), and the Physical Climate Risk Assessment Methodology (PCRAM) are designed to identify exposure to climate hazards across sectors and asset classes and to map that exposure to potential financial relevance. These approaches have advanced market understanding by embedding physical climate risk into investment analysis and disclosure practices, particularly by emphasizing standardized metrics, sectoral relevance, and asset-level sensitivity.

However, these frameworks generally stop short of providing a holistic analysis of how physical climate risk interacts with other operational and financial risk factors within the firm. Climate-driven disruptions rarely affect firms through a single channel; instead, they cascade across internal operations and external networks, amplifying exposure across sourcing strategies, production processes, logistics systems, and customer relationships. By focusing primarily on exposure identification and high-level financial relevance, these frameworks can underrepresent second- and third-order effects, as well as the compounding nature of risks that arise when multiple dependencies, such as suppliers, transportation infrastructure, and critical inputs, are simultaneously stressed.

First Street has identified that a company's vulnerability to physical climate risk manifests through multiple, well-defined channels. Some impacts are direct and immediate, such as facility damage or business interruption at owned-and-operated sites. Others are indirect and emerge as climate shocks ripple through supply chains, input markets, customer bases, and distribution networks. In this way, severe weather events can convert an otherwise stable operating footprint into contingent liabilities, including near-term repair and replacement costs and longer-term structural pressures related to resource constraints, disrupted logistics, and shifts in customer demand.

First Street captures these dynamics through a systematic framework that assesses both direct and indirect pathways of physical climate risk. Under this framework, physical risk affects companies through five distinct but interconnected channels:

01
Owned-and-operated assets
Direct damage to facilities, equipment, and supporting infrastructure from physical hazards.

02
Upstream suppliers
Upstream disruptions that constrain inputs and interrupt production, particularly when exposure is concentrated among high-revenue or single-source suppliers.

03
Commodities
Dependence on climate-sensitive inputs exposes firms to price volatility and supply shortages.

04
Downstream customers
Disruptions to customers' operations that reduce demand, delay purchases, or alter consumption patterns.

05
Transport and distribution
Vulnerabilities across inter- and intra-company logistics networks due to extreme weather and infrastructure damage.

Together, these channels provide a structured lens for understanding how physical climate risk can extend beyond isolated events to influence company performance, operational resilience, and long-term enterprise value (**Figure 13**).

A. REAL ESTATE SECTOR CASE

Hurricane Ian formed on September 23, 2022, and made landfall in Florida five days later, causing extensive physical and economic damage across the region. Sun Communities, Inc. (SUI), a publicly traded residential REIT specializing in manufactured housing and RV communities, was directly affected by the storm's path.

In a Form 8-K filing one month lat[illegible] financial updates that included a dedicated section on Hurri[illegible] ed that four of its properties sustained dama[illegible]

However, an a[illegible] erly income state[illegible] al repercussions extend[illegible] losses. Following the hurricane [illegible] quarterly revenues [illegible] by an averag[illegible] 400 million. [illegible] here was a gradu[illegible] revenues still tra[illegible] trajectory through[illegible] sister [illegible] demand-side disrupti[illegible]

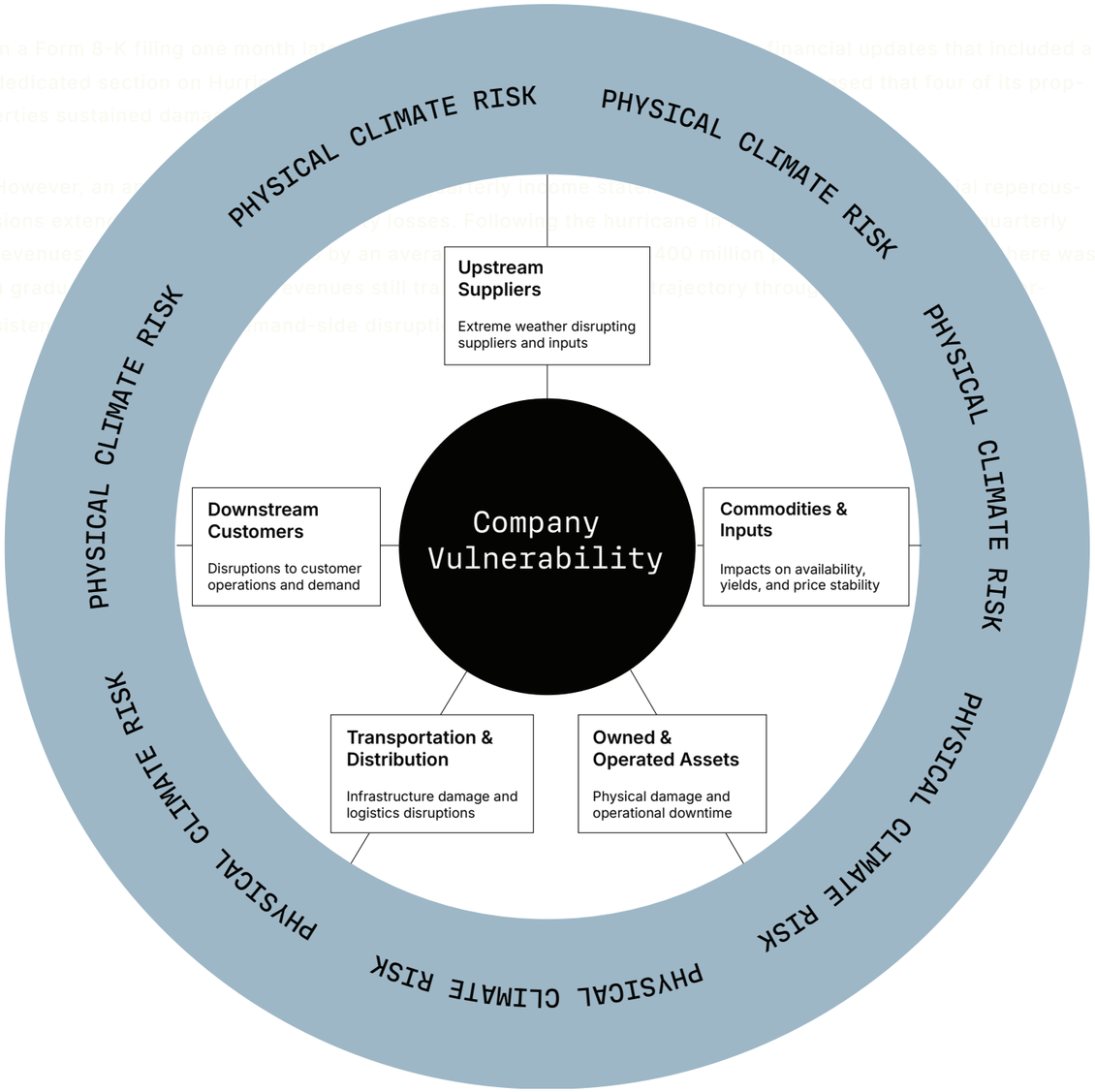


Figure 13. First Street's Framework for Assessing Company Vulnerability to Physical Climate Risk

These five pathways govern a company's vulnerability to physical climate risk and will be explored in subsequent research conducted at First Street. The first installment of this effort starts with the first pathway–owned-and-operated assets–the most direct risk to a company, and the easiest to attribute and quantify how physical climate risk materializes.

As such, owned-and-operated assets function as the "front door" through which physical risk impacts a company. A company's owned footprint (plants, warehouses, offices, data centers, retail locations, utility interconnects, and supporting infrastructure) anchors revenue generation across processes of production, distribution and sales. When an extreme weather event strikes an asset, particularly when it has downstream dependencies based on its physical processes, the impact of any disruptions may cascade through a company, amplifying the downtime experienced at that asset alone.

Taken together across a company's entire owned-and-operated asset base, their interconnectedness means physical climate risk at large becomes an operational and financial variable. Companies with geographically concentrated assets, tight capacity utilization, specialized equipment, or limited redundancy can see outsized impacts from single events. Conversely, firms that understand site-level hazard exposure and account for redundancy and resilience across assets can often reduce the transfer of downstream losses and protect long-run enterprise value.

In the sections that follow, First Street introduces its novel solution to capturing the way physical climate risk may propagate through the internal value chain dependencies within companies, quantifying the footprint of a company's owned asset exposure, how that exposure maps to not only damage but also operational downtime, and what it implies for longer-term financial performance that can be used by companies and investors alike.

Image: Hurricane Milton, 2024

Image: Thailand Floods, 2011

METHODOLOGY

Our Solution

The foundational component of the First Street Company Module evaluates how physical climate risks could affect a company's owned-and-operated assets in two main ways:

Damage to physical assets and repair downtime

This captures the physical and financial costs of repairing or replacing assets damaged by climate-driven hazards, as well as the number of days required to complete those repairs.

Operational downtime and business interruption

This reflects the revenue lost while assets are offline for repairs, along with the broader disruptions that ripple through the company's interconnected operations and internal value chain.

These estimates are derived by linking multiple data sources and models: First Street's physical climate risk models to quantify hazard likelihood and severity; company asset location data to identify site-level exposures; building types and operational functions of assets to determine how disruptions translate to production or service loss; sector and industry classifications to guide assumptions about sensitivity and recovery; and company financial data to translate physical impacts into measurable financial outcomes (**Figure 14**).

Together, the components of direct damage/downtime and business interruption estimate a company's potential cash losses from physical climate risks. Beyond immediate financial impacts, these estimates signal potential shareholder risks, as physical damage and operational disruption may lead to further balance sheet write-downs and market devaluations, which could diminish earnings potential.

Thus, the First Street Company Module is not only useful to corporate stakeholders in identifying assets that pose the greatest threat to business continuity and profitability, but also to investors in these companies, as it provides a means to evaluate and safeguard their holdings by pinpointing which companies are most exposed to climate-driven impacts on long-term returns.

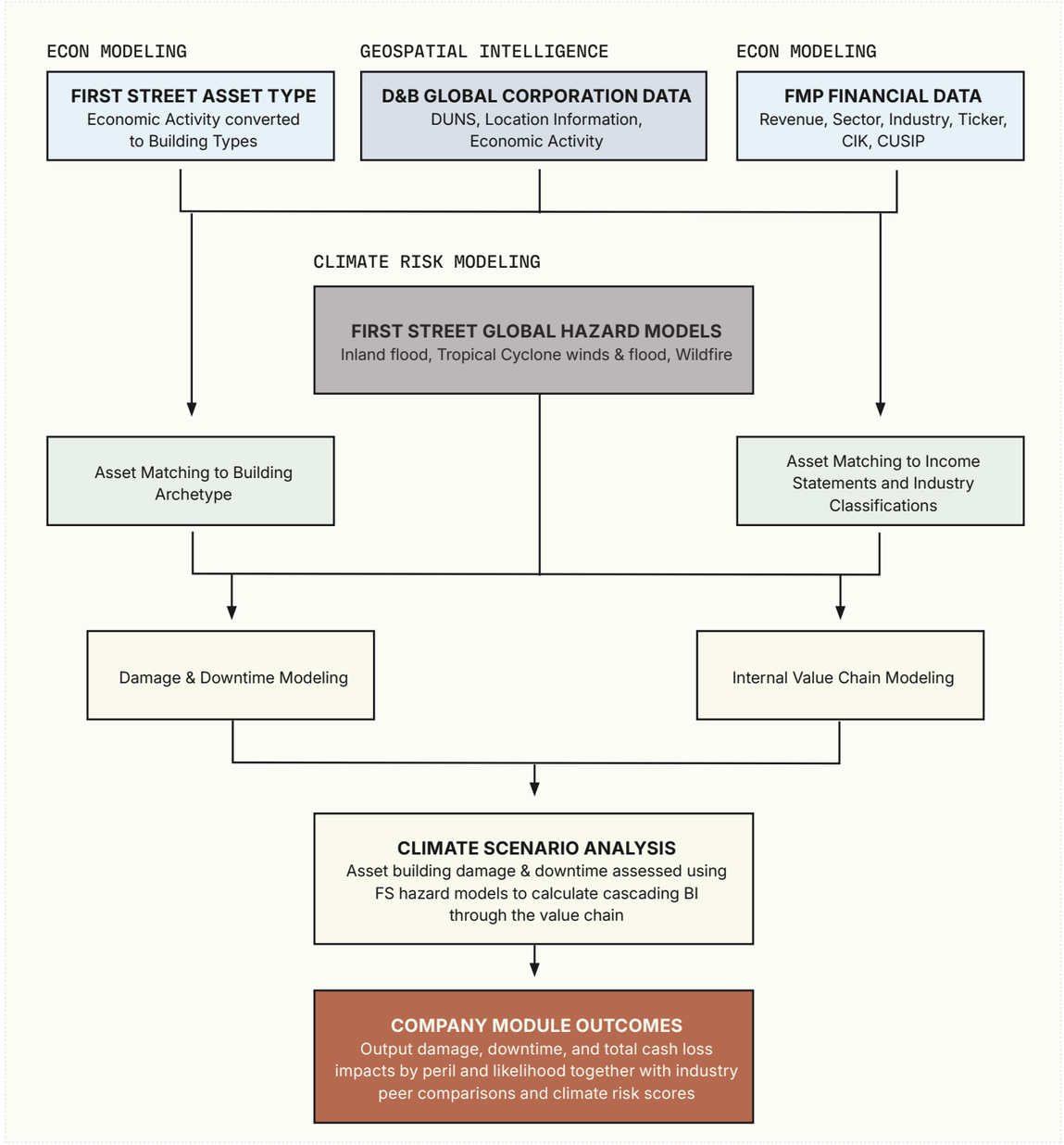


Figure 14. First Street Company Module Framework

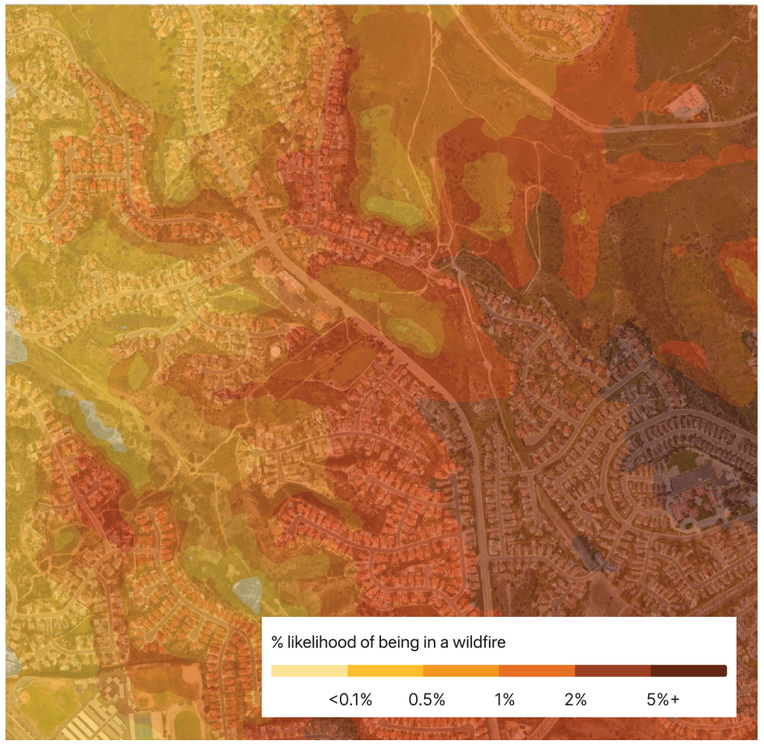
METHODOLOGY

Asset-Level Direct Damage and Downtime

To quantify how climate-driven hazards directly damage company assets and the resulting downtime days, the First Street Company Module integrates hazard exposure, fragility functions, and asset-level characteristics into a unified modeling framework.

Hazard exposure is derived by mapping First Street's Global Hazard Model outputs, including elements like flood depth, wind speed, and wildfire burn probability, onto the precise locations of company assets. These hazard metrics are evaluated across a full probability distribution of event severities, represented through standard return periods (e.g., 1-in-20, 1-in-100-year events). Return periods indicate the expected frequency of events of a given magnitude, enabling estimation of impacts from more frequent but less severe events to low-likelihood but high-severity events.

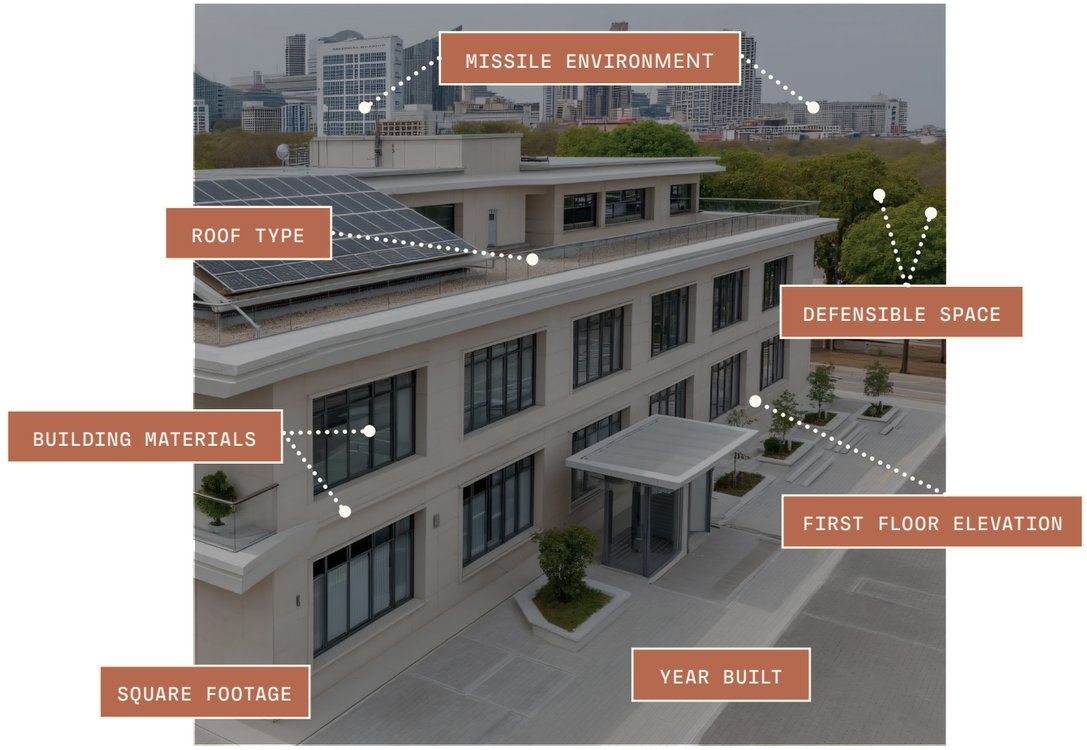
Similarly, hazard exposures are modeled across multiple climate scenarios using Shared Socioeconomic Pathways (SSPs), which describe alternative global trajectories of socioeconomic development, emissions, and resulting warming levels. The Company Module incorporates SSP1 (a low-emissions, sustainability-oriented pathway), SSP2 (a medium-emissions, intermediate growth pathway), and SSP5 (a high-emissions, fossil-fuel-driven pathway), capturing a representative range of plausible future hazard conditions. Together, the use of these three climate scenarios and the focus on the three primary perils – flood, wind, and wildfire – provide a basis for estimating structural risk under both current and evolving climate conditions.



Exposure values for each asset and event severity are linked to fragility curves developed with First Street's engineering partner, Arup, a global engineering and risk consultancy known for advanced structural analysis and infrastructure resilience modeling. Arup's fragility functions translate hazard intensity, such as depth of flooding or wind speed, into expected physical damage and repair duration, providing estimates of both the percentage of replacement value lost and the number of offline days associated with a given hazard level. Various archetype-specific curves account for differences in construction type, building materials, and operational use, ensuring that damage and downtime estimates align with observed engineering performance across building classes. The resulting outputs are asset-level estimates of direct dollar damage and downtime days for each hazard, return period, and climate scenario.

To produce realistic annualized loss estimates, the model applies a cross-peril correlated simulation approach. Because hazard types exhibit non-independent behavior, such as shared meteorological drivers or climate conditions, the simulation generates thousands of event-year combinations that reflect correlations across perils and changes in hazard frequency under each SSP. Each simulated year aggregates sampled damage and downtime outcomes across all assets and perils, generating an annual loss distribution that captures both typical weather years and infrequent but severe loss years without overstating risk through simple additive methods.

Final outputs estimate both the structural and operational vulnerability of assets across standard return periods for each climate scenario, supporting downstream assessments of revenue disruptions that may cascade through a company's operations, driving total cash loss.



METHODOLOGY

Business Interruption Through a Company's Internal Value Chain

Using the value of a given asset's net operating income (NOI) and the anticipated number of repair days of downtime, the Company Module evaluates how business interruption propagates through a firm's internal value chain, creating downstream revenue impacts. The internal value chain represents the full sequence of activities, facilities, and processes that enable a company to transform external inputs into finished products or services delivered to external customers (**Figure 15**). It spans five operational stages—Management, R&D, Production, Distribution, and Sales—each playing a distinct role in coordinating, designing, producing, moving, and delivering the company's offerings.

This approach is informed by the Porter Value Chain framework (Porter, 1985), which emphasizes how each primary and support activity within a firm contributes to its overall value creation. Specifically, the Porter Value Chain framework provides a conceptual basis for understanding how disruptions to any one business activity can propagate through subsequent activities, ultimately affecting a company's ability to generate revenue.

Viewed together, these internal stages sit within a broader external supply chain, which begins with upstream suppliers providing input materials and ends with downstream buyers, wholesalers, retailers, or end consumers receiving final goods or services. Disruptions at internal value-chain stages therefore affect not only internal operations but also how effectively a firm can draw on its suppliers or serve its customers.

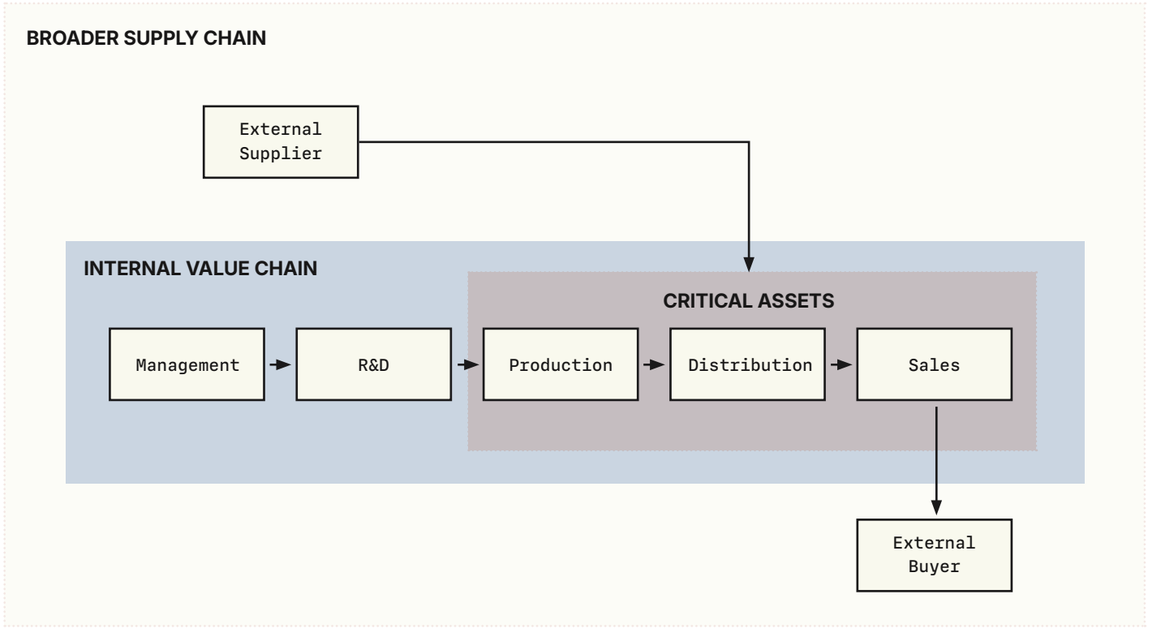


Figure 15. Internal Value Chain Framework

Capturing the movement of inputs and outputs within a company's internal processes is critical because damage to any single asset can create operational downtime that affects far more than the asset itself. The extent to which impacts propagate depends on both the asset's functional role within the value chain and the degree to which its operations can be substituted by other facilities.

Assets supporting Management or R&D activities are often informational in nature and, in many cases, can be substituted through remote work arrangements with little impact on broader operations. Even where R&D activities are physical and location-dependent at certain sites, potential revenue losses when such assets go offline tend to materialize not through immediate operational disruption but through longer-term implications for a firm's competitiveness in the market.

In contrast, assets involved in Production, Distribution, and certain Sales functions typically rely on location-specific, physical processes that cannot easily be replicated elsewhere, making them inherently more susceptible to site-specific incidents.

As a result, major production facilities, specialized processing plants, key distribution centers, or high-volume retail sites often act as physical bottlenecks within a company's revenue-generating operations. When such assets experience downtime, their output cannot readily shift to alternative locations, creating significant downstream disruptions.

To operationalize the value-chain analysis and estimate revenue cascade losses, First Street's Company Module links company sector and industry information, corporate structure, operational activities, financial information, and physical risk modeling into a single integrated workflow. Firms and their facilities are first identified using Dun & Bradstreet (D&B) data, which assigns each asset a D-U-N-S Number and links it to its parent company via Global Ultimate Identifiers. Asset locations are further validated through a combination of automated and human verification processes to ensure an accurate representation of each firm's physical footprint.

Each asset's operational function is then mapped to its D&B industry classification code, spanning more than 1,000 industry-specific activities. Using this classification, each facility is classified as contributing to a specific stage within a company's internal value chain, thereby establishing how it contributes to the firm's end-to-end operations.

Asset-level operational classifications based on industry codes are also mapped to First Street's standardized building types, grounding each facility to a physical archetype. This enables the application of building-specific fragility curves that estimate the associated number of days of downtime, as well as the dollars of damage, given varying severities of flooding, wildfire, or extreme wind exposure.

To translate days of downtime into monetary impact, the Company Module incorporates asset-level NOI data. Specifically, revenue information for each company is pulled from its most recent balance sheet via Financial Modeling Prep (FMP) and added to its profile. This financial information is then distributed across company assets as an asset-level NOI metric, weighted by each asset's operational role, industry classification, and assumptions about how the company generates income across its facilities.

While all assets are mapped to fragility curves to estimate expected damage, modeling of the days and dollar impacts of downtime is limited to assets with no immediate substitutes and those with clear dependencies on other asset functions along a company's internal value chain—namely, assets categorized as "core" to revenue generation. In most cases, core asset designations apply to assets contributing to Production and Distribution activities, with some allowances for Sales locations. However, each company maintains a unique mix of assets, and the rationale for distributing its core assets is determined through a combination of public disclosures, web scraping, and human verification.

Based on each firm's distribution of core assets, the model estimates the portion of company-wide revenue that is "eligible for climate risk disruption," reflecting the company's reliance on physical assets that are difficult to substitute. In parallel, industry-specific weights are applied to capture how much revenue attributed to each stage of the value chain is uniquely exposed to climate-driven disruptions. Given the revenue pool attributed to each value chain position and its exposure assumptions, weights are distributed across assets within each stage, providing asset-level weighting of downtime exposure that can propagate through a given firm.

The propagation of revenue disruptions is modeled by establishing interdependencies among assets based on their operational sequence for each firm, such as linkages from Production to Distribution to Sales. Connections between assets in their operational sequence are weighted by geographic proximity to approximate likely internal supply relationships. Through this structure, downtime at upstream facilities is allowed to contribute to downstream operational disruptions, given this weighting structure.

The result is a comprehensive accounting of revenue generation for each company, reflecting its unique mix of assets and operational dependencies. Climate impacts are assessed at every stage of revenue generation and tailored to each company's operations and asset types, capturing how downtime at an individual asset can cascade across the firm.

Figure 16 illustrates how revenue disruptions may cascade through a firm's internal value chain in a conceptual company with $40 million in revenue that relies heavily on location-dependent production, distribution, and sales assets. This example company maintains a mix of assets and characteristics consistent with companies in the Consumer Cyclical sector. In this illustrative example, 75% of total revenue is considered eligible for climate-driven disruption, while the remaining 25% is generated by activities not tied to physical asset locations, such as corporate management, financial services, or marketing, and is therefore assumed to be largely insulated from physical climate risk.

The remaining share of revenue eligible for disruption (75%) is assumed to pass through Production and is progressively filtered as it moves through Distribution and Sales stages. To reflect this cascading structure, disruption exposure is calculated relative to the total revenue eligible for disruption, rather than as the sum of additive contributions. For example, if 40% of output is sold through wholesale channels, only 60% of revenue eligible for disruption remains exposed at the Distribution stage. If a further 20% of total revenue is generated through direct-to-consumer sales, only 40% of total revenue remains exposed at Sales locations. This stepwise filtering illustrates how exposure to disruption diminishes as revenue moves downstream through the value chain.

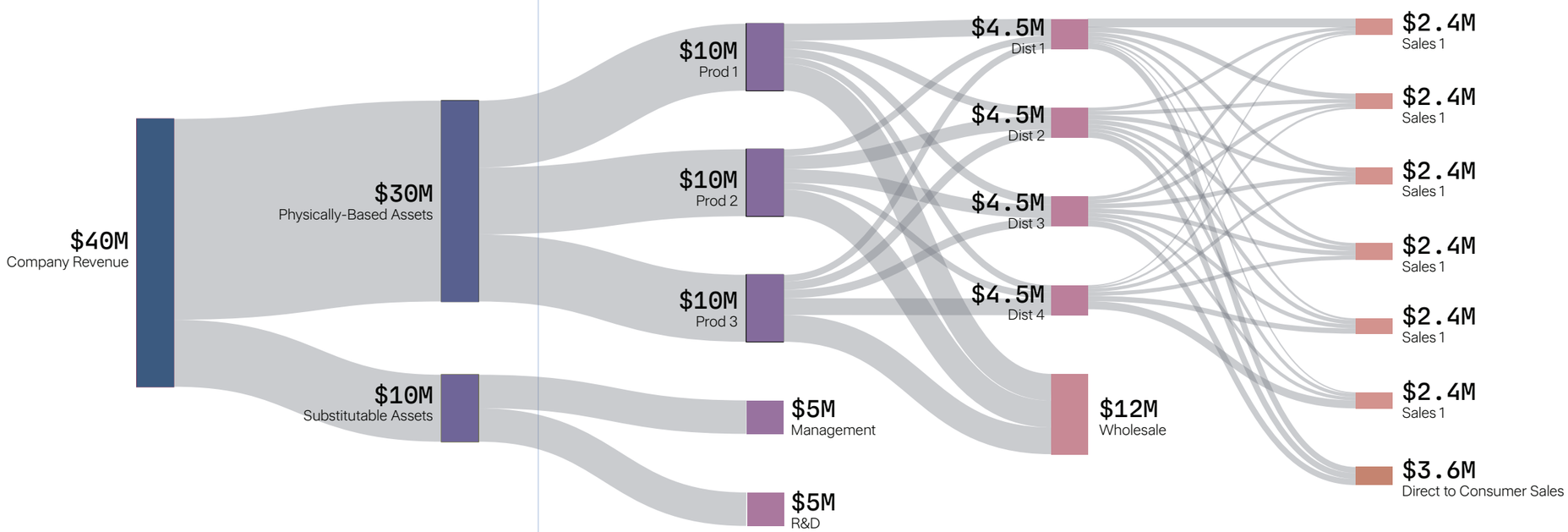


Figure 16. Conceptual Diagram of Revenue Generation and Dependencies Through a Theoretical Company's Internal Value Chain

By linking asset-level damage to operational downtime and revenue, the Company Module identifies which facilities are genuine bottlenecks in a firm's operations and where disruptions are most likely to affect overall business performance. This value chain mapping clarifies how downtime at specific assets can be absorbed or propagate through production, distribution, and sales processes. These relationships provide the basis for translating physical outages into measurable business interruption and total firm-level cash loss, accounting for both damage and downtime effects.

FORWARD-LOOKING ANALYSIS

Equity Risk Quantified

While the above analyses have demonstrated that extreme weather events have already affected companies' financial performance by disrupting revenues and weakening short- and medium-term investor confidence, these historical signals capture only part of the risk landscape. The First Street Company Module extends this analysis by quantifying the long-term financial risks associated with ongoing exposure of company assets to physical climate hazards, including the potential for repeated asset damage, downtime, and business interruption over time.

To illustrate the application of the Company Module in practice, First Street applied it to an equity index. The sections below present results for the Dow Jones Industrial Average (DJIA), which captures exposure across the largest and most systemically important publicly traded companies in the United States, spanning a broad range of industries that collectively define core global equity markets.

Image: Hurricane Helene, 2024

Image: Thailand Flood, 2011

CRITICAL INSIGHTS

Broad Equity Market Exposure: Dow Jones Industrial Average

The Dow Jones Industrial Average (DJIA) is one of the most widely followed equity indices globally and serves as a bellwether for large-cap corporate activity in the United States and globally. Comprising 30 multinational companies across manufacturing, technology, consumer goods, healthcare, energy, and industrial services, the DJIA represents firms whose operations underpin critical segments of the global economy. While these companies differ substantially from real estate-focused firms in their business models, they remain fundamentally dependent on extensive networks of physical assets and operational infrastructure, including production facilities, logistics hubs, data centers, and retail locations.

Physical climate risk to the DJIA therefore arises through damage to and disruption of these assets, affecting production, distribution, and product and service delivery, yet their size largely means physical climate risk may be less pronounced at the average company level. However, due to the scale and interconnectedness of DJIA constituents, localized operational disruptions can have implications that extend beyond individual firms, influencing broader economic activity as a secondary consequence of asset-level impacts.

For this analysis, First Street relied on its global database of corporate asset locations sourced from Dun & Bradstreet (D&B), identifying more than 59,000 physical assets across DJIA constituents. These assets represent the operational infrastructure through which companies generate revenue and deliver goods and services.

Mapping these assets reveals a global footprint spanning 680 sub-national administrative regions across 142 countries (**Figure 17**). While geographically diverse, the asset distribution shows meaningful concentration in major economic regions. Within the United States, particularly in climate-exposed states such as Florida, California, and Texas, DJIA companies maintain dense clusters of operational assets. Additional concentrations appear across Europe, including Great Britain, France, Spain, and Germany, and across the Asia-Pacific region, notably India, China, and Japan.

At the country level, the top ten countries account for over 94% of total asset locations, with the United States alone representing 75.5% (**Table 5**). As a result, aggregate climate risk across the index may be concentrated in a limited number of geographies, many of which face elevated exposure to acute hazards such as hurricanes, flooding, and wildfires. Operational disruptions in these regions, therefore, exert outsized influence on index-level outcomes.

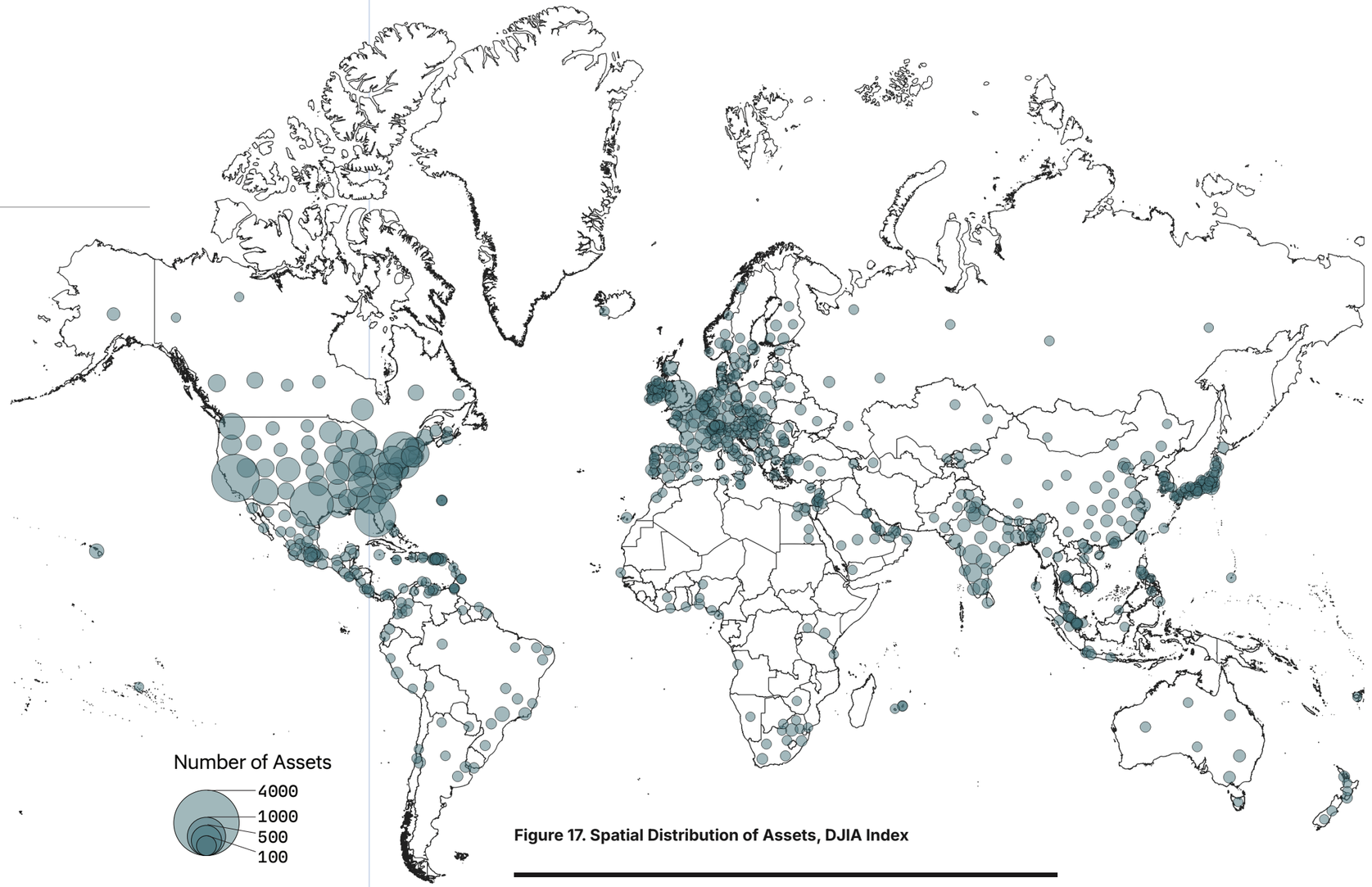


Figure 17. Spatial Distribution of Assets, DJIA Index

Table 5. Percent of Assets Across Top 10 Countries, DJIA Index

Country	Percent of Total Assets
United States	75.5%
India	4.0%
Great Britain	3.6%
France	2.9%
Canada	2.7%
China	1.7%
Mexico	1.4%
Spain	0.8%
Japan	0.8%
Germany	0.7%

Running all DJIA constituents and their underlying assets through First Street's Company Module provides a direct measure of climate-driven damage, downtime, and cash losses tied to physical operations. The model integrates flood, wind, and wildfire risk in a cross-correlated framework, producing a single, comparable risk score across companies.

Under a SSP2-4.5 scenario for today, DJIA companies score an average of 12 on a 1-100 scale of climate-related financial risk. This relatively low average reflects the ability of many DJIA companies to manage localized asset disruptions through geographic diversification, operational redundancy, and access to capital for recovery. The distribution of risk scores across the 30 constituents is right-skewed (**Figure 18**). While most firms face minimal exposure, a subset exhibits materially higher risk due to concentrated operational footprints, reliance on climate-sensitive infrastructure, or dependence on assets located in hazard-prone regions. For these firms, disruptions at a small number of critical facilities can have disproportionate effects on operations and revenue.

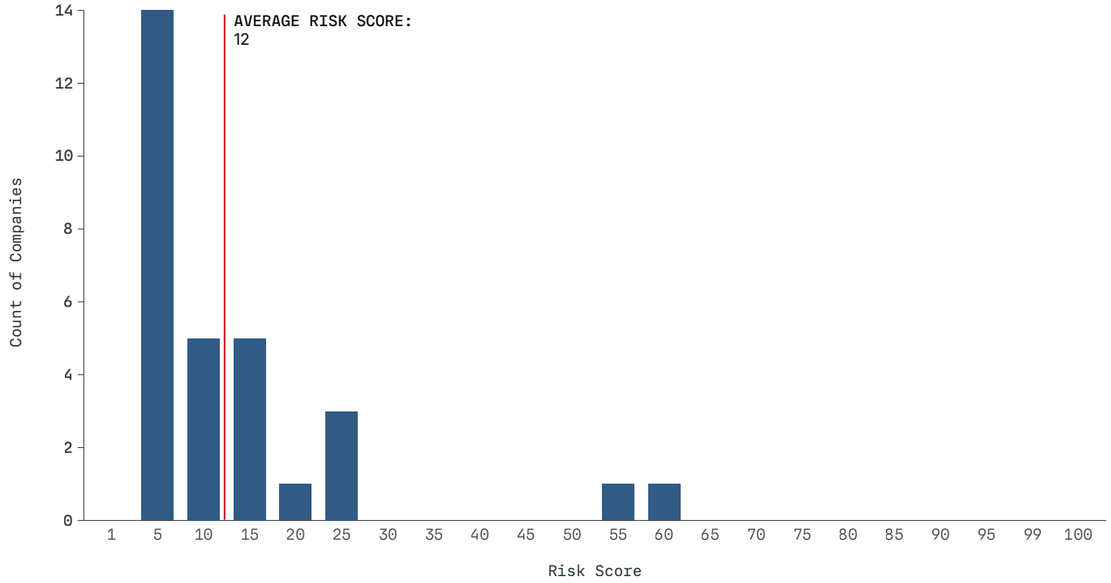


Figure 18. Distribution of Risk Scores Across Constituents in the DJIA Index, 2026

Image: Lahaina Wildfires, 2023

Revenue loss thresholds in a 1-in-100 severe weather year today illustrate how physical impacts on assets translate into financial outcomes (**Table 6**). All DJIA constituents face some level of cash loss. More than half experience losses of 1% or greater, nearly one-third exceed 2%, and 10% face losses of 5% or more. These losses are typically driven not by permanent asset destruction but by business interruption due to temporary shutdowns, reduced capacity, delayed production, and logistical constraints. While modest in percentage terms compared to real estate, these impacts remain operationally and financially significant given the scale of DJIA firms.

Table 6. Percent of Constituents by Revenue Loss Thresholds, DJIA Index

Revenue Loss Threshold	Percent of Constituents in DJIA Index
Any Risk of Losses (>0%)	100%
1% Revenue Loss	57%
2% Revenue Loss	30%
5% Revenue Loss	10%

Probability exceedance analysis captures the full range of potential outcomes across return periods (**Figure 19**). In a relatively frequent 1-in-5 mild-weather year, the average DJIA company faces a 0.4% cash loss, reflecting short-term operational disruptions across affected assets. At rarer extremes, losses rise sharply, reaching nearly 3% of annual revenue in a 1-in-500 extreme weather year (**Table 7**).

Notably, in a 1-in-100 severe weather year, DJIA companies face average cash losses of 1.9% of revenue, totaling nearly $90 billion across the index. This impact accounts for roughly 39 basis points of the index's $22.9 trillion market cap.

Tail outcomes from 1-in-500 and 1-in-100 weather years correspond to scenarios in which multiple operationally important assets are affected simultaneously, or where recovery is prolonged due to severe cases of asset damage, such as total losses in cases of wildfires. While infrequent, such events represent material operational stress tests for even the most diversified firms.

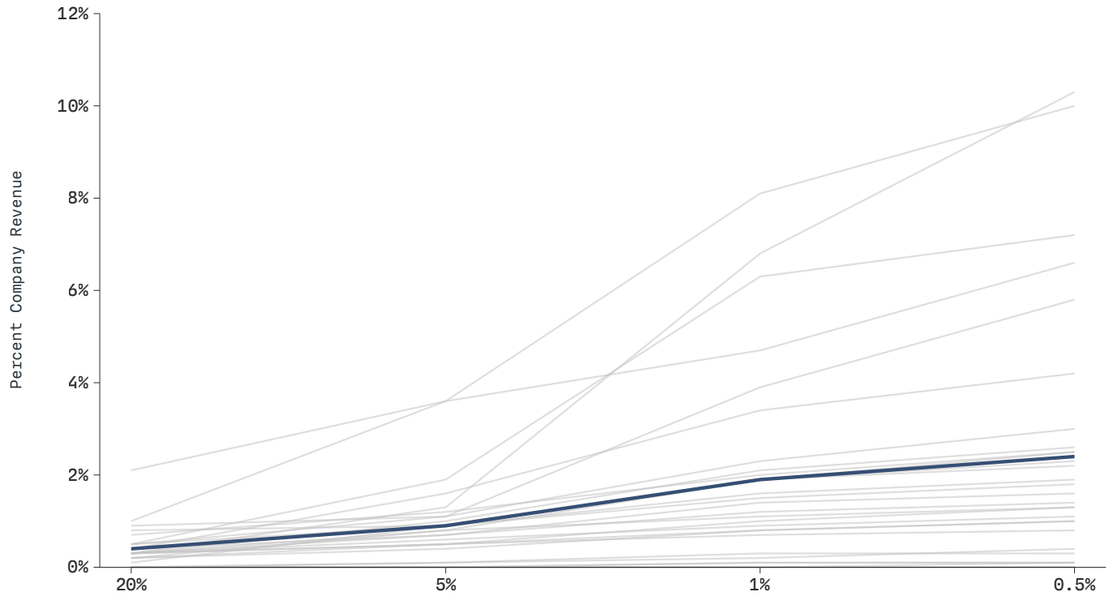


Figure 19. Exceedance Probability Curve of Cash Losses in 2026, DJIA Index

Image: Hurricane Helene, 2024

Table 7. Cash Losses Across Scenarios in 2026, DJIA Index

Weather Year Likelihood	Avg. Cash Loss per Company (% of Revenue)	Total Index Cash Loss ($)	Index Cash Loss (bps of Market Cap)
20%	0.4%	$12.6B	5.5 bps
5%	0.9%	$35.2B	15.4 bps
1%	1.9%	$89.5B	39.1 bps
0.5%	2.4%	$113.3B	49.5 bps
0.2%	3.0%	$134.9B	58.9 bps
Annual Expected	0.15%	$6B	2.6 bps

Note: Values in billions (B) and basis points (bps). Assuming a DJIA market cap of $22.9 trillion.

When weighted by likelihood, these scenarios imply an average annual expected loss of 0.15% of revenue per company today. This amounts to $6 billion in annual losses across the index. By 2056, this figure increases to 0.17% of revenue, reflecting intensifying physical climate hazards if asset locations and operational configurations remain unchanged (**Figure 20**; **Table 8**).

While the First Street Company Module quantifies cash losses to company balance sheets, these operational losses also appear to be reflected in market valuations over time. An analysis of dividend-adjusted total returns for DJIA constituents from January 2016 to January 2026, segmented by physical climate risk level, shows a clear divergence in long-run performance. Assuming climate risks and asset concentrations have remained constant over time, companies classified as having moderate physical climate risk (risk scores ≥40 on a 100

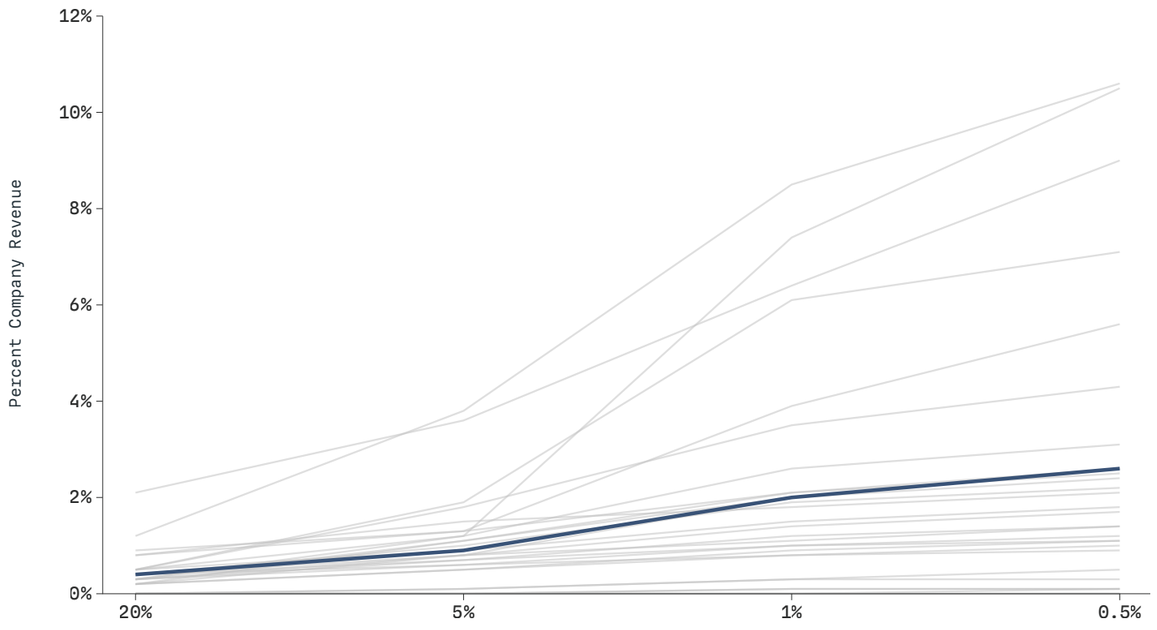


Figure 20. Exceedance Probability Curve of Cash Losses in 2056, DJIA Index

point scale) generated total returns of 228% over the period, corresponding to a compound annual growth rate (CAGR) of roughly 4%. In contrast, companies with minimal risk (scores of 3-39) grew 362% (12% CAGR), while companies with insignificant risk (score of 2, implying less than 1% revenue impact in a severe weather year) grew 393% (16% CAGR).

These performance differentials suggest markets reward lower physical climate risk over time. The analysis shows that firms with insignificant physical climate risk delivered returns approximately 1.7 times higher than peers with moderate exposure over the past decade (**Figure 21**). This pattern indicates that markets are not only reacting to discrete weather-driven disruptions but are increasingly pricing persistent differences in operational resilience, asset exposure, and adaptability into long-term performance.

Table 8. Cash Losses Across Scenarios in 2056, DJIA Index

Weather Year Likelihood	Avg. Cash Loss per Company (% of Revenue)	Total Index Cash Loss ($)	Index Cash Loss (bps of Market Cap)
20%	0.4%	$14.3B	6.2 bps
5%	0.9%	$39.2B	17.1 bps
1%	2.0%	$93.3B	40.7 bps
0.5%	2.6%	$116B	50.7 bps
0.2%	4.2%	$145.4B	63.5 bps
Annual Expected	0.17%	$6.6B	2.9 bps

Note: Values in billions (B) and basis points (bps). Assuming constant company revenues, asset valuations, and DJIA market cap through time.

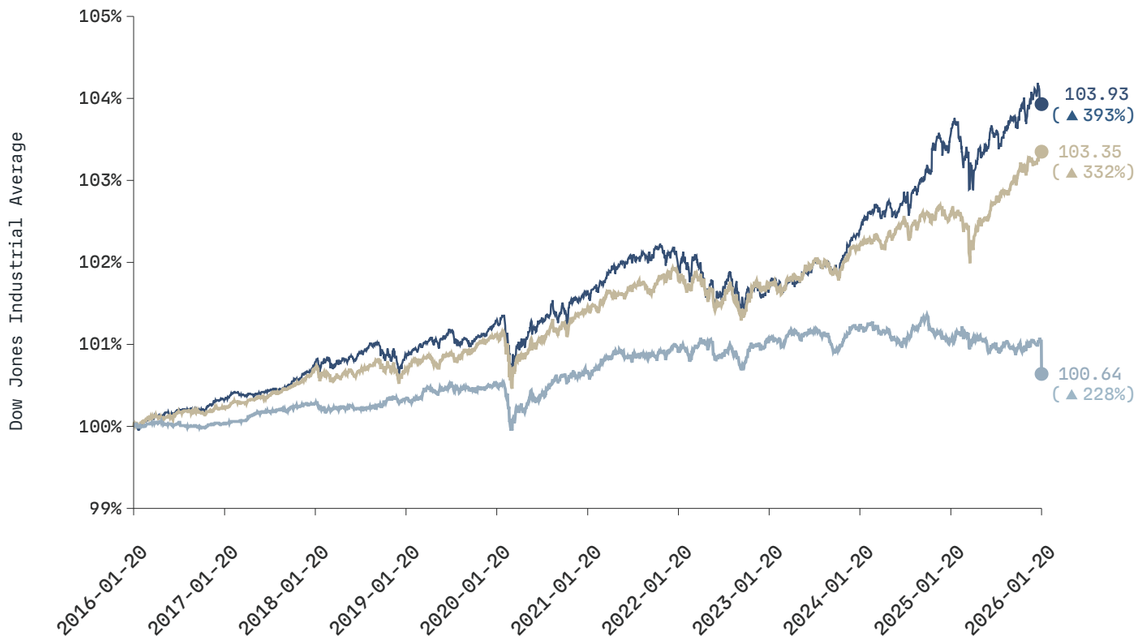


Figure 21. Total Returns Across Companies in DJIA by Climate Risk Level

Taken together, these results indicate that physical climate risk to DJIA constituents is primarily operational in nature, driven by damage to and disruption of critical physical assets rather than widespread asset impairment. On average, large-cap firms demonstrate resilience to localized shocks, but risk is highly concentrated in extreme events and in companies with geographic clustering, operational bottlenecks, or reliance on climate-sensitive infrastructure.

Importantly, these operational disruptions appear to have persistent financial and market consequences. The observed divergence in long-run equity returns suggests that markets increasingly differentiate between companies with resilient, diversified operational footprints and those with more concentrated or exposed assets. While average annual losses may appear modest, repeated disruptions and tail risk exposure compound over time, influencing valuations, cost of capital, and long-term shareholder returns. Given the scale and interconnectedness of DJIA firms, asset-level disruptions can also propagate through internal operations, supply chains, and downstream markets, amplifying their effects beyond the directly affected assets. As climate hazards intensify and correlated disruptions across regions become more likely, asset-level climate intelligence will be essential not only for assessing company-specific resilience but for understanding broader market stability and the systemic implications of physical climate risk.

CONCLUSION

Climate Disruption Is Financially Material

The evidence in this report points to a simple conclusion: physical climate risk is now a recurring, financially material determinant of corporate performance. Losses are rising, people and property are increasingly concentrated in hazard-prone areas, and insurance is not keeping pace. The result is a growing share of climate-driven disruption that lands directly on corporate balance sheets through self-insurance and retained risk. Public annual disclosures increasingly reflect this shift, and profit warning filings show that the financial impacts of severe weather are already visible in revenues and market valuations.

But the most important lesson is not just that hazards are worsening; it is that disruption spreads. A flood at a single facility can become a multi-quarter revenue shock when the affected site is a bottleneck in production, distribution, or high-volume sales. That is why understanding physical climate risk requires more than high-level materiality screens. It requires tracing how climate exposure impacts a firm through multiple pathways across owned assets, suppliers, commodities, customers, and transport networks. Importantly, physical risk to a company's owned-and-operated assets is more than property damage and is largely realized through business interruption that propagates through a firm's internal value chain.

First Street's Company Module is purpose-built to assess the multi-faceted risks to companies. In its first iteration, the product links asset-level climate exposure to damage, repair time, and operational dependencies, translating physical risk into comparable financial outcomes that decision-makers can act on. The application to the DJIA indices illustrates the broader pattern: risk is widespread but uneven, concentrated in certain geographies, sectors, and firms, and magnified where operations lack redundancy.

Moving forward, resilience will be defined by precision. Companies that identify their critical assets with high exposure and invest in adaptation will reduce downside volatility and protect their long-term financial performance. Similarly, investors who can distinguish between diversified exposure and concentrated operational fragility across companies and sectors will be better positioned to price risk and allocate their investments for better long-run returns. As climate extremes become more frequent, the market will increasingly reward those who can measure physical risk clearly and manage it early.