



Financial Risks Related to Extreme Weather Events

2026 Franco-Japanese Green Finance Forum
Embassy of France in Japan

Tokyo, 9 April 2026

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THE DIRECT COST OF EXTREME WEATHER EVENTS

Direct costs : destruction of assets

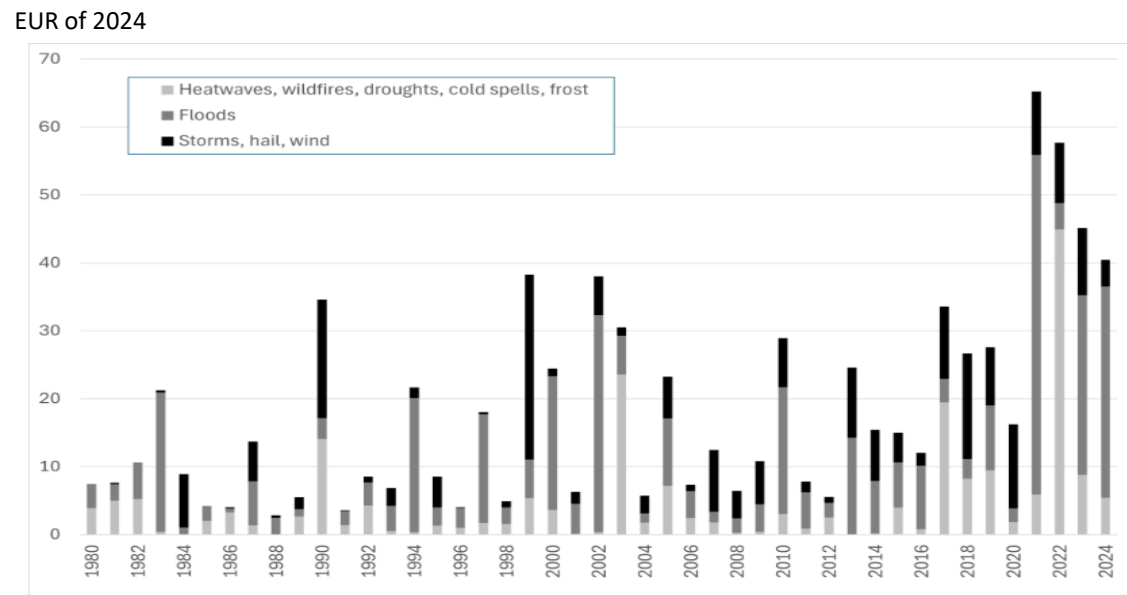
- **World: USD 318 bn in 2024**, 57 % uninsured (Source: *Swiss Re, including tsunamis and earthquakes*)
 - Doubled between 2001 and 2020, reaching USD 180- 200 bn/year (*UNDRR, excluding tsunamis and earthquakes*).
 - Insured losses grow at real rate of 5-7 % annually (*Swiss Re*)
- **EU27: EUR 40 bn in 2024** (≈ 0.2 % of GDP) ([Economic losses from weather- and climate-related extremes in Europe | Indicators | European Environment Agency \(EEA\), excluding tsunamis and earthquakes](#))

Total costs: include income losses

- **OECD:** annual GDP losses based on 114 severe disasters* in 1,600 regions of 31 countries from 2000 to 2018:
 - **-2.2 % at regional level after 3 years** (-1.7% after 5 years)
 - **Large spillovers** across regions (Source: *Costa and Hooley, 2025, excluding tsunamis and earthquakes*)
 - **Aggregate impact at national level: -0.3 % on average** over 2006-2018, half of which due to spillover effects.

* Severe disaster: affected people > 0.1% of regional population. EM-DAT database.

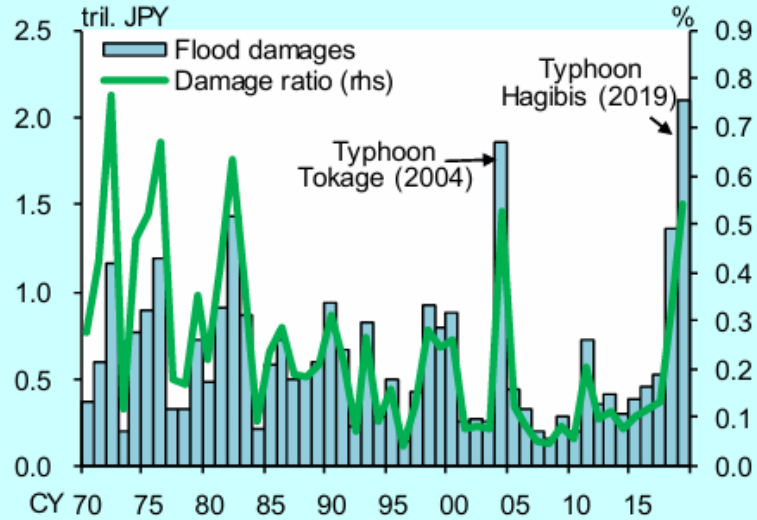
Chart 2: Annual economic losses associated with extreme weather events in the European Union (EUR billions)



Source: European Environment Agency, 2025

ZOOM ON JAPAN

[Chart 3] Flood Damages

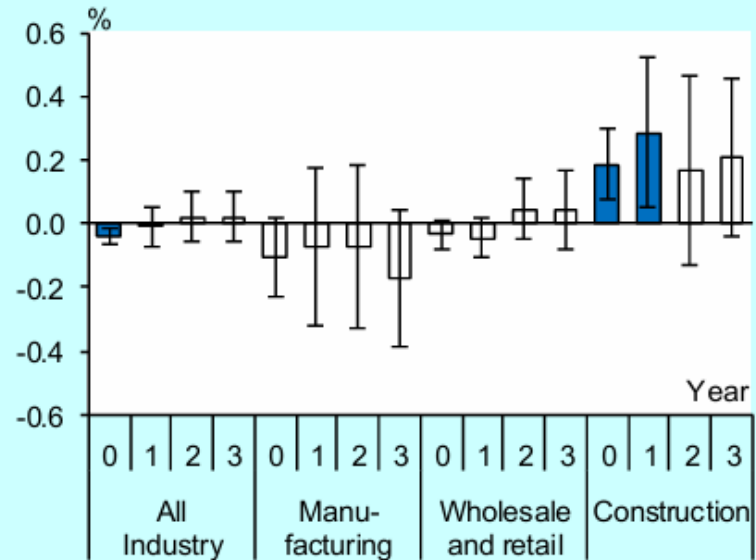


Note: 1. "Flood damages" and "Damage ratio" show flood damages measured in the 2011 price and the ratio of damages to real national income.

2. Latest data as of 2019.

Source: Ministry of Land, Infrastructure, Transport, and Tourism "Flood Statistics"

[Chart 7] Response of Real GDP to Flood Damage: Prefecture-level Panel Analysis



Note: 1. Illustrates the response when flood damage amounts to 2% of real GDP (average damage of the sample).

2. The dark blue bar indicates 95% statistical significance. The error band shows the 90% confidence interval.

Source: Ashizawa, Sudo and Yamamoto (2022)

International spillovers

Thailand floods 2011, disrupting local production of hard disk drives (41% of global production), cars and car parts, with most of car makers being Japanese.

→ Severe impact on Japanese car industry.

Source: Ashizawa et al. (2022).

OTHER EVENTS (NGFS, 2026)

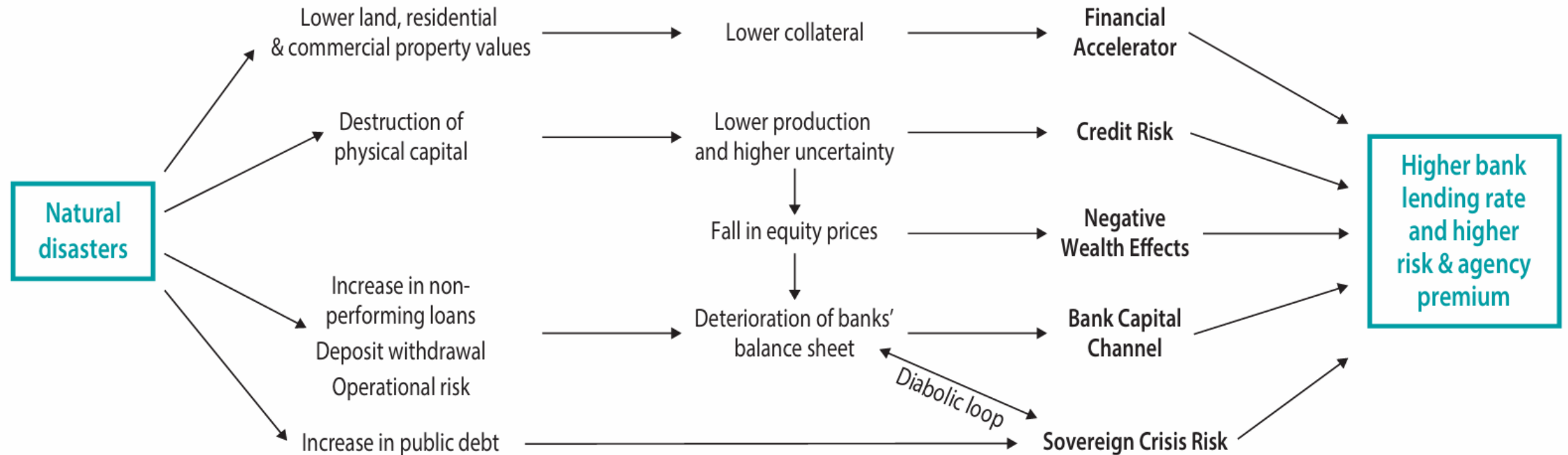
| | Country | Type of event | Date of occurrence |
|----|----------------|---------------|--------------------|
| 1 | Australia | Flood | 2022 |
| 2 | Australia | Wildfires | 2019 |
| 3 | Brazil | Flood | 2024 |
| 4 | Ecuador | Drought | 2024 |
| 5 | Canada | Wildfires | 2016 |
| 6 | Eswatini | Cyclone | 2021 |
| 7 | Fiji | Cyclone | 2016 |
| 8 | France | Flood | 2016 |
| 9 | France | Drought | 2022 |
| 10 | Germany | Flood | 2021 |
| 11 | Greece | Storm | 2023 |
| 12 | Greece | Wildfires | 2023 |
| 13 | Hong Kong | Storm | 2023 |
| 14 | India | Storm | 2020 |
| 15 | Ireland | Storm | 2025 |
| 16 | Italy | Flood | 2023 |
| 17 | Mauritius | Cyclone | 2024 |
| 18 | Mozambique | Cyclone | 2019 |
| 19 | Namibia | Drought | 2019 |
| 20 | Netherlands | Flood | 2021 |
| 21 | Pakistan | Flood | 2022 |
| 22 | Poland | Flood | 2024 |
| 23 | Portugal | Wildfires | 2017 |
| 24 | South Africa | Flood | 2022 |
| 25 | Spain | Flood | 2024 |
| 26 | Tanzania | Flood | 2023 |
| 27 | United Kingdom | Drought | 2022 |
| 28 | Zambia | Drought | 2023 |

Flood in Germany (2021)

| EVENT | DIRECT COST | FINANCIAL IMPACTS |
|---|--|---|
| <p>Massive flood struck Western Europe causing widespread devastation in Germany</p> <p>Up to 94.5 liters of rainfall per square meter were recorded within 24 hours.</p> | <p>Overall damages from to households, businesses, and public infrastructure estimated at €33 billion (1% of Germany's 2021 GDP).</p> | <p>Non-performing loans in affected areas increased by €120 million.</p> <p>€8.75 billion of the losses were insured.</p> <p>Federal and state governments created a special €30 billion relief fund.</p> |

FINANCIAL TRANSMISSION CHANNELS

Figure 3 Representation of the financial transmission channels of natural disasters



Source: Avril et al. (2022).

Source: NGFS (2024), [Acute physical impacts from climate change and monetary policy | Network for Greening the Financial System](#)

THE TOTAL COST OF EXTREME WEATHER EVENTS

Total cost includes income losses due to destruction of capital and interruption of critical infrastructure (electricity, water, transport, telco...)

Nguyen et al. (*IMF Economic Review 2025*): International Disaster Database (EM-DAT), covering 179 countries, single-year disasters with total damages exceeding 1 percent of GDP, 1980-2019, local-projection estimations:

- **GDP growth drops by -1.3pp** in the year of the disaster relative to the control group. Recovers the next year by +0.8pp; **permanent impact on GDP level.**

For the US, Kim et al (*AER 2025, non-linear VAR*) find that +1 std in Actuaries Climate Index lowers **industrial production** by -**0.15 %** after 1990 (insignificant before); **inflation** increases by after **0.04pp**, then falling rapidly but with no reversal of level.

At state level, Colacito et al. (*JMCB 2025, panel*) find that +1°F in the average summer temperature reduces annual output growth by 0.15 to 0.25 pp. over 1957-2012.

Key mitigation/amplification factors

- **Geography:**
 - **Portugal** wildfires 2017: limited macro impact (timber, paper pulp ind.); **Spain flood 2024** severe for Valencia (20 % of GDP).
 - **Germany:** 30 days of disruption to the Rhine's inland waterways reduce industrial production by 1%, and German GDP by 0.3%.
- **Insurance gap:**
 - **Germany** flood 2021: 33% of damage covered
 - **Pakistan** flood 2022: <1% of damage covered
- **Share of food in the consumption basket:**
 - **Pakistan** floods 2022: inflation increased from 12.2% in 2022 to 29.2% in 2023
- **Fiscal space** to cushion the shock: AEs ≠ EMDEs
 - **Germany** flood 2021: EUR 33 bn special government relief fund ≈ 0.9% of GDP
 - **Pakistan** flood 2023: GDP growth dropped from +6.1% in 2022 to -0.6% in 2023; over 25 000 schools destroyed; loss of collateral (cattle).
- **Spillovers** through value chains, food prices, LT interest rates.