

Pricing Climate Risk: Science, Data & Fintech in Action

Scientific Foundations:

From Climate Modelling to Investment Intelligence: Two Advances in Applied Research



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Background: the Problem



Our shifting climate highlights a public good problem

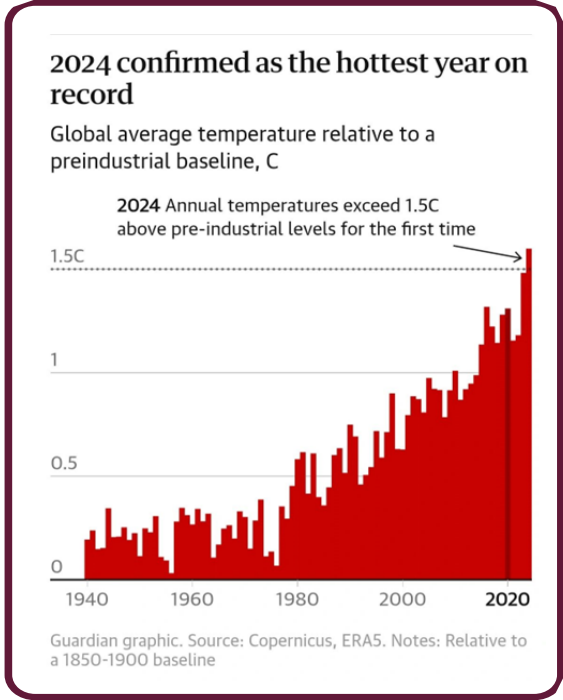


Fig. 1. Globally averaged indicators of climate change are less reliable.

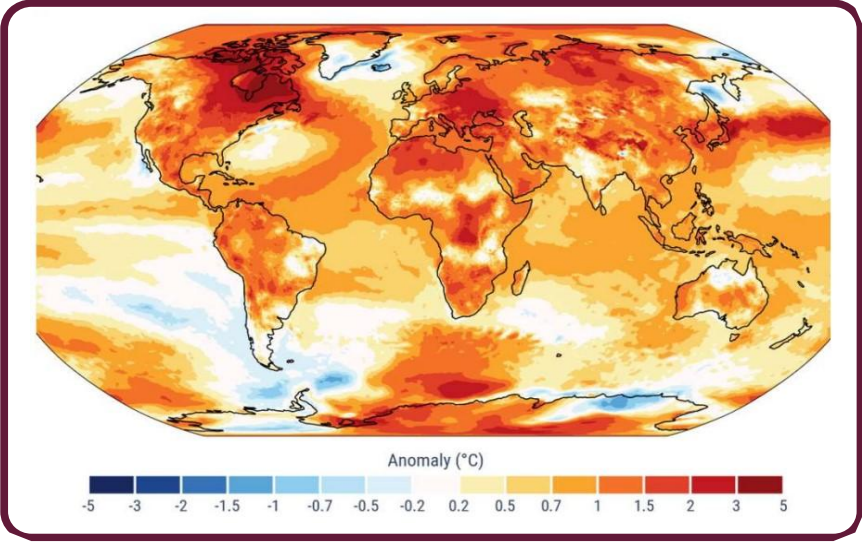


Fig. 2. Spatially distributed surface air temperature anomalies in 2024. Source: ERA5 – reference period is 1991-2020. C3S/ECMWF

“It’s cold outside where I live, what happened to global warming?” The world is big, and weather still exists.

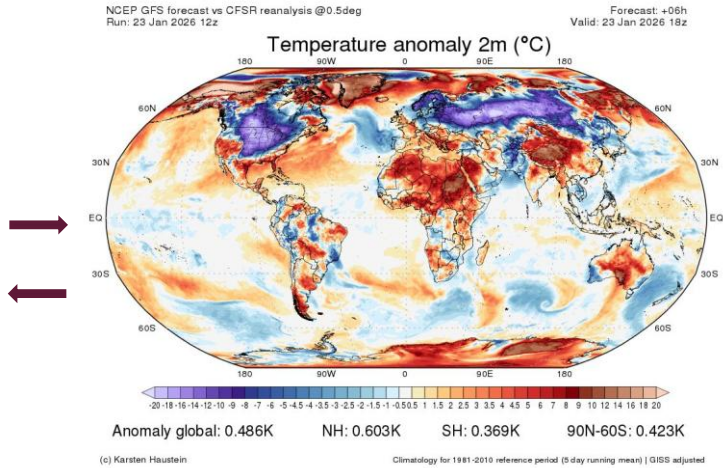


Fig. 3. Spatially distributed surface air temperature anomalies in June 23rd 2026. Source: Zeke Hausfather – 1981-2010.

- Rising global surface average temperatures: EXCITE (EDHEC Cross-Model Climate Institute Temperature Emulator) ;
- Shifts in the frequency and intensity of extreme events ;
- Global public good problem, U.S. withdrawal from transition targets mechanically increases the likelihood of physical risk events for us.

Background: economic problem

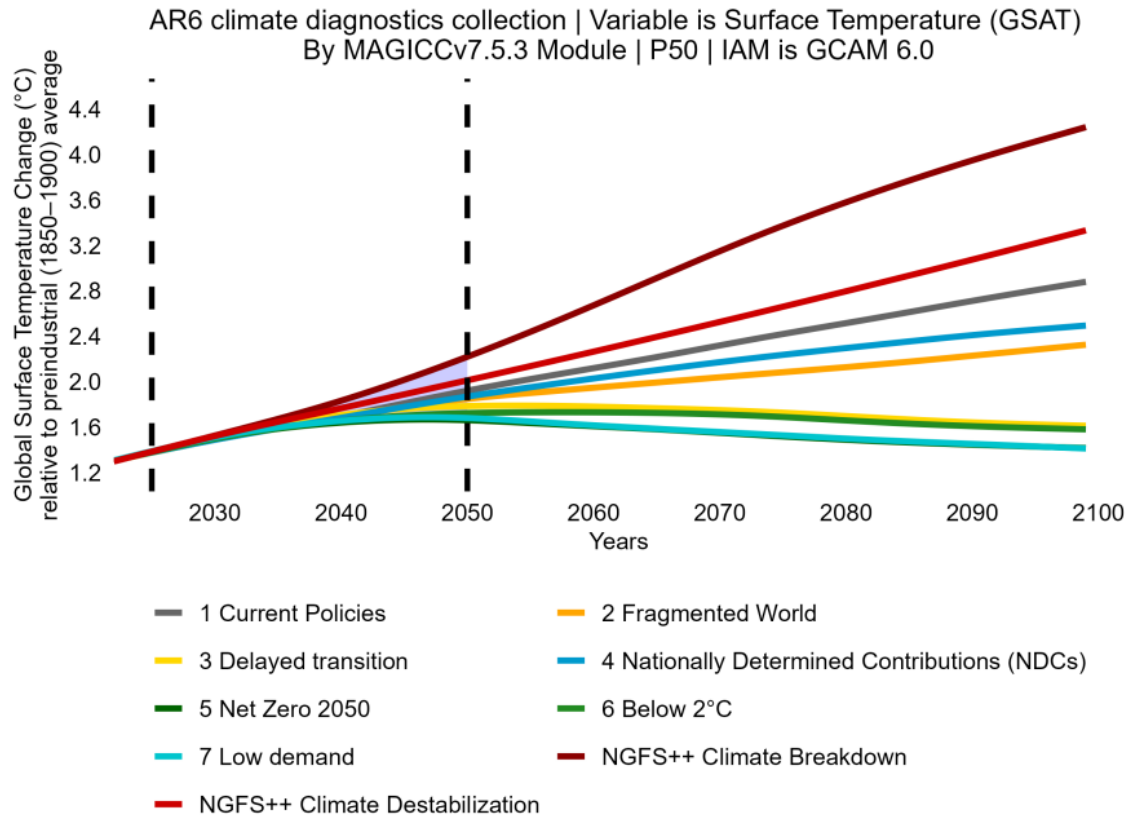


Fig. 4. Global temperature anomaly trajectories across NGFS scenarios + ECI-emulated extreme scenario realizations (shown later).

Beyond 2040, no more narrow range of inter-scenario outcomes.

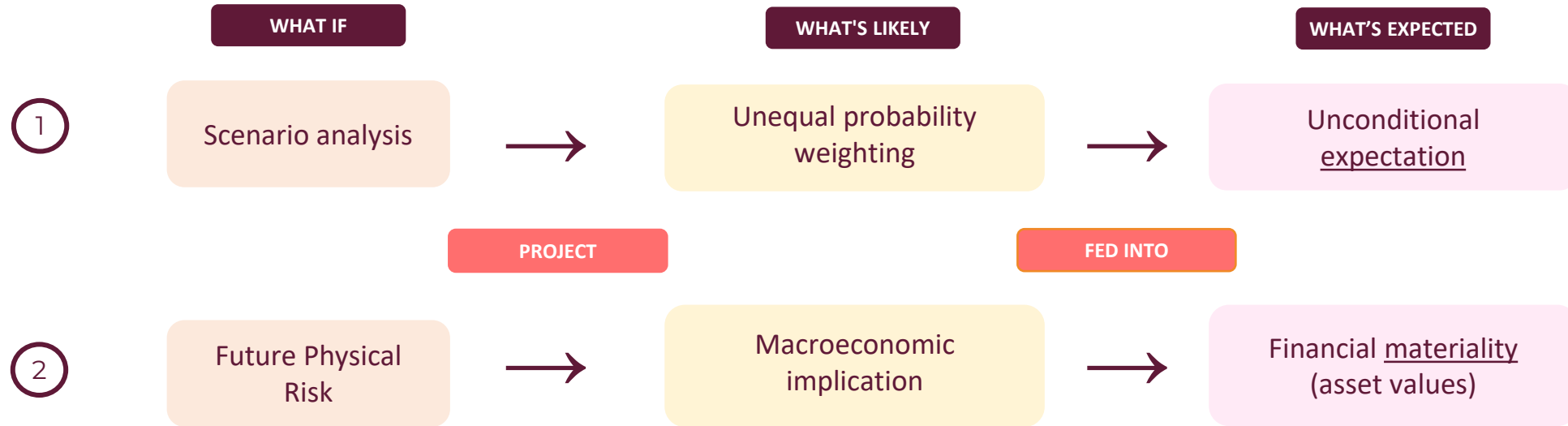
Acute vs chronic components of physical risks, these have heterogeneous :

(a) treatment effects

(b) weight in media headlines

(c) practical impact channels (asset-level capital destruction vs. TFP in Cobb-Douglas Production Function).

Background: this matters to investment management



Physical risk enters both sides of the financial valuation model:

1. **Cash flows:** projected GDP shocks reduce the expected cash-flow path.
2. **Discount rates:** reduced GDP growth implies weaker expected consumption growth which lowers the risk-free rate, while state-dependent discount rates reflect the price of this uncertainty on future cashflows — depending not only on when losses occur, but also on in which climate state they occur in.

Spatial Momentum: From ECI Applied Research to EDHEC Ventures' Product Offering



Applied Research I: Macroeconomic damage functions are a mediator in climate-finance

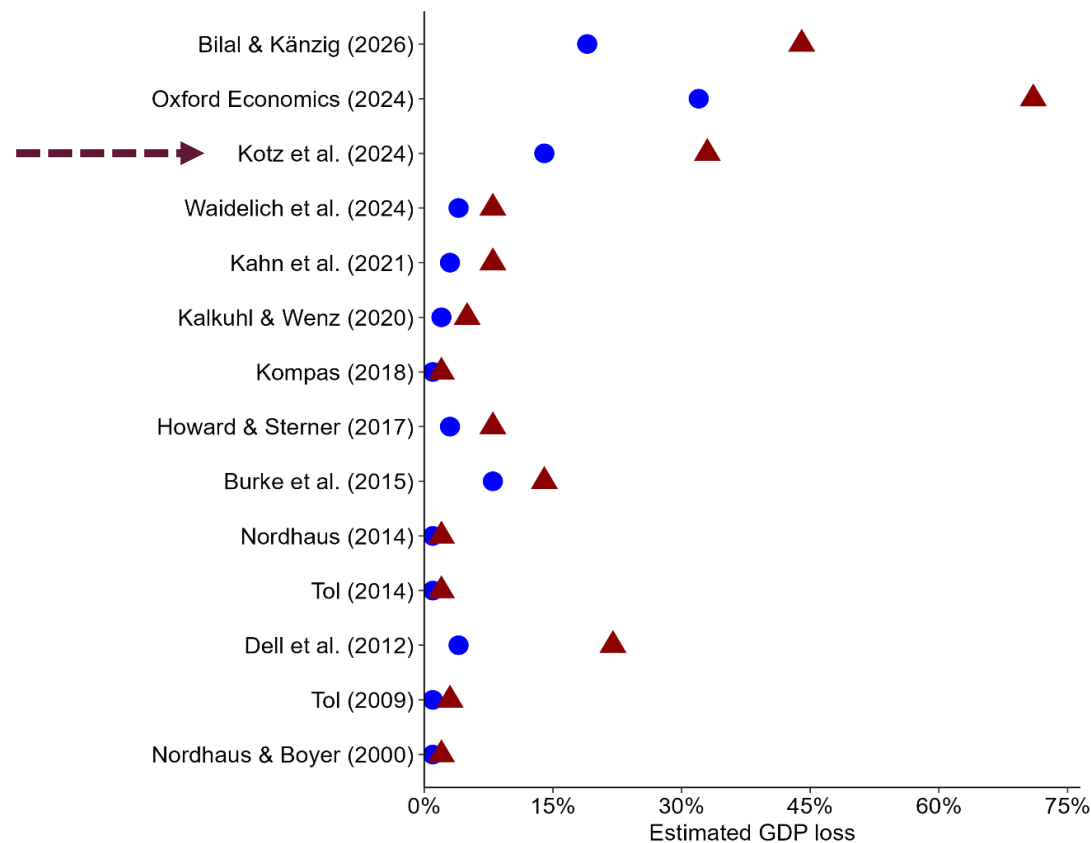
EDHEC Climate Institute
(2026) development,
in: *Cambridge Elements of
Quantitative Finance*.



The Global Geography of Long-Term Projected Macroeconomic Damages from Chronic Physical Risk and the Aggregation Problem

An EDHEC Climate Institute Working Paper

March 2026



Momentum from global,
enumerative approaches to

→ increasingly spatially granular
analyses (countries and intra-country
economic regions) ...

→ with novel insights into the
heterogeneity story of physical risk
for economic systems.

Core inputs to applied physical-risk
modules offered by central banks,
and scenario providers: **NGFS, OE**.

Debates over GDP damage estimates matter to investors because these
estimates enter valuation models and scale (down) the projected cash flow path.

Applied Research I: matching climate and economic data

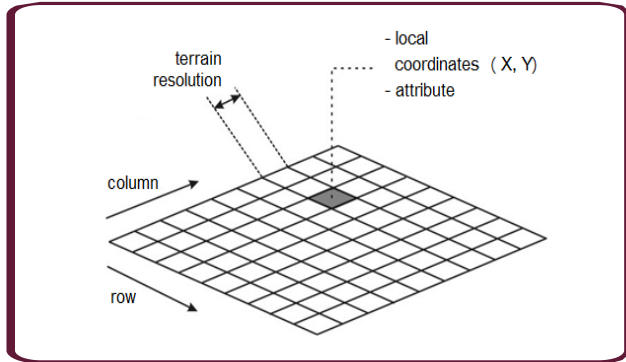


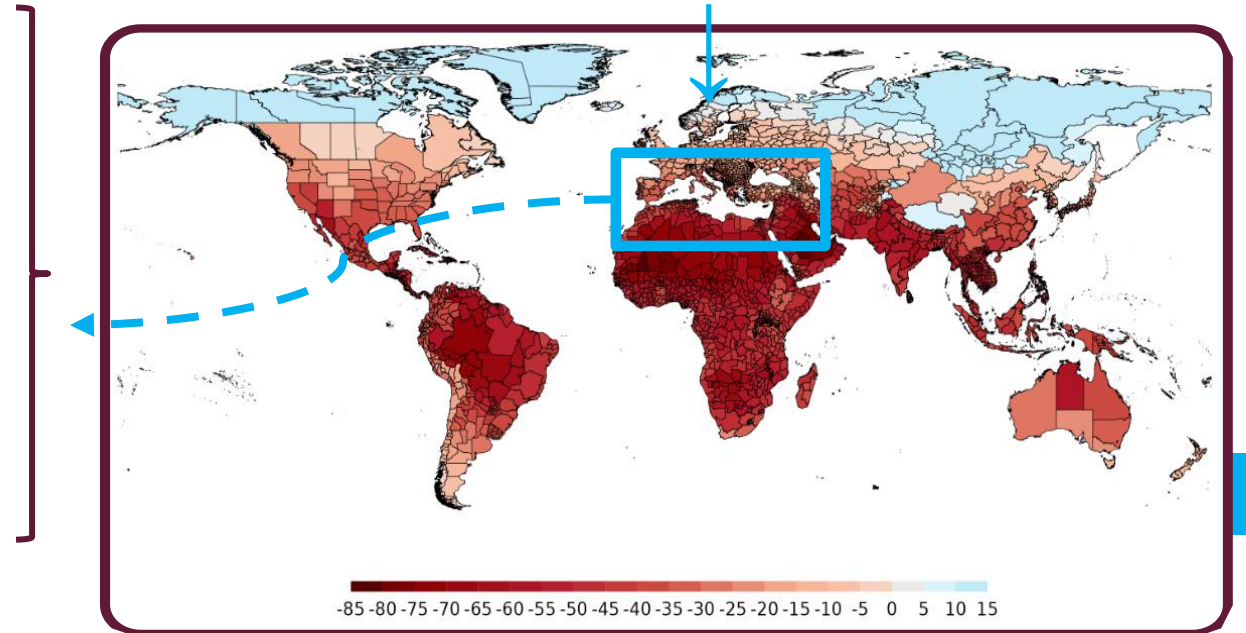
Fig. 5. We spatially intersect NASA's grid-cell coordinates with the sub-national region identifiers in which they fall.



Fig. 6. Combining estimated GDP responses to weather with region- and scenario-specific **climate change simulations from NASA**.

Fig. 7. **For each sub-national economic region**, we can quantify an ensemble of projected GDP losses/gains distributed across:

- 1) **Physical risk components** (e.g., temperature, precipitation extremes etc...)
- 2) **Intensity of effect** (e.g., long stochastic average vs. extreme weather event)
- 3) **Persistence of effect** (e.g., short-run, lagged long-run)
- 4) **30 Global Climate Models** (GCMs)
- 5) **RCP/SSP scenarios** (e.g., SSP2.RCP4.5, SSP5.RCP8.5 etc..)
- 6) **Future Epochs**: 2030, 2035, ..., 2100.



Tool: EDHEC-CLimate-Induced Regional MACro impacts Projector

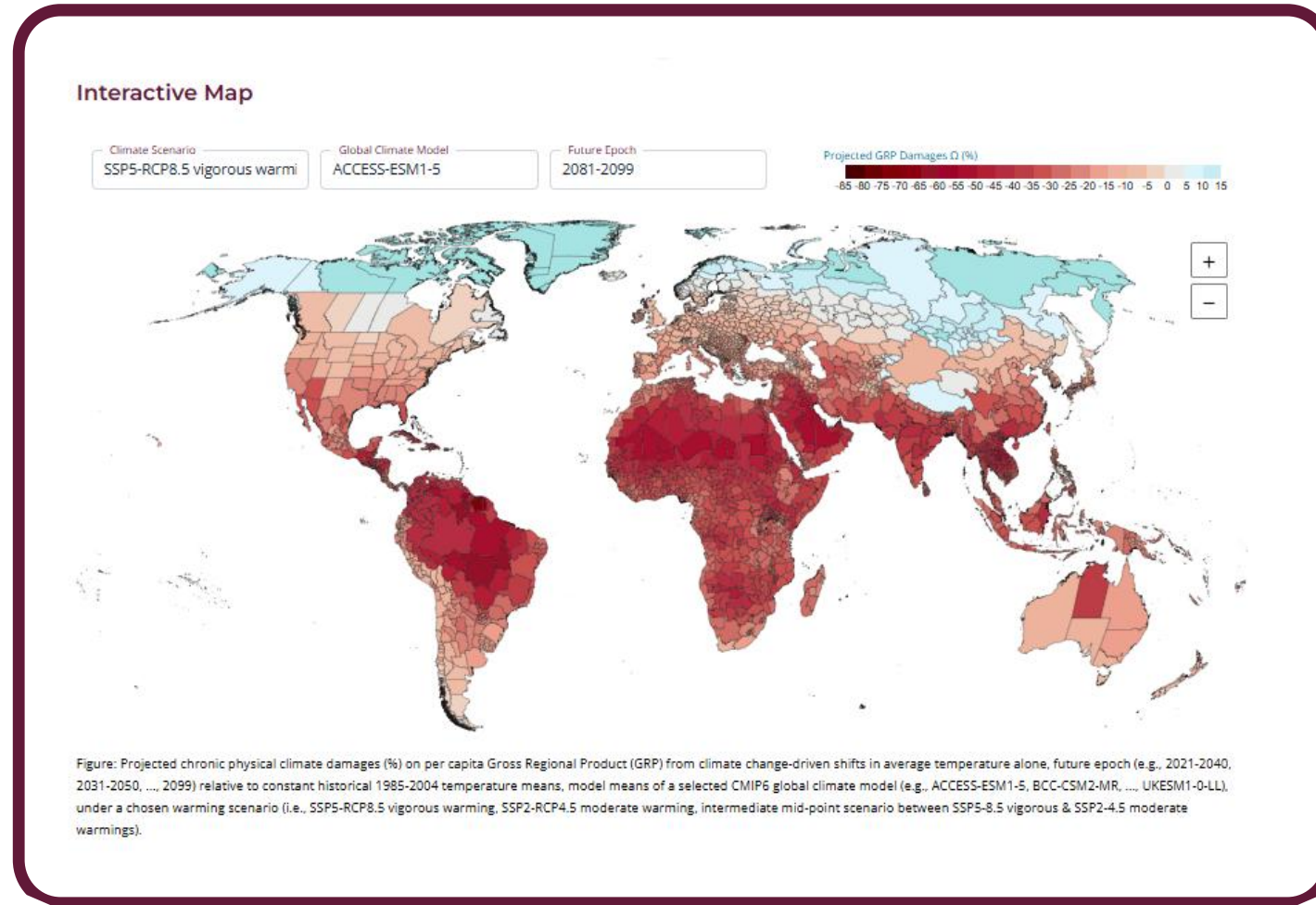


Fig. 1. Snapshot of the interactive tool.

<https://climateinstitute.edhec.edu/data-visualisations/edhec-clirmap>

The tool was recently featured in a section of a paper by **Central Bank of the Netherlands**; Gallet, Prodani and Rang (2026) "From Nature Shocks to Financial Stability Incorporating Nature Physical Risks into Banks' Credit Risk Models and Insurers' Market Risk Models".

Applied Research II: Scientific Climate Scenarios

Three major innovations to the NGFS climate scenarios:

- **Granular projections** at the “sector × country” level, enabling more refined analyses at both asset and portfolio levels.
- An **expanded scenario universe**, with two additional scenarios - Climate Breakdown and Destabilisation.
- **Scenario probabilities**, allowing us to move beyond hypothetical stress tests towards an expected value of climate risk.

Scenario	Probability	Warming ~2050	Warming ~2100
Low Demand	0.2%	~1.5°C	~1.0°C
Net Zero 2050	0.2%	~1.5°C	~1.3°C
Below 2°C	1.5%	~1.6°C	~1.6°C
Delayed Transition	2.4%	~1.9°C	~1.6°C
Fragmented World	12.3%	~2.0°C	~2.3°C
NDCs	9.2%	~1.8°C	~2.2°C
Current Policies	30.9%	~2.1°C	~2.9°C
Climate Destabilisation	32.9%	~2.4°C	~3.6°C
Climate Breakdown	10.4%	~2.7°C	~4.4°C
Expected Scenario	100%	~2.1°C	~3.1°C

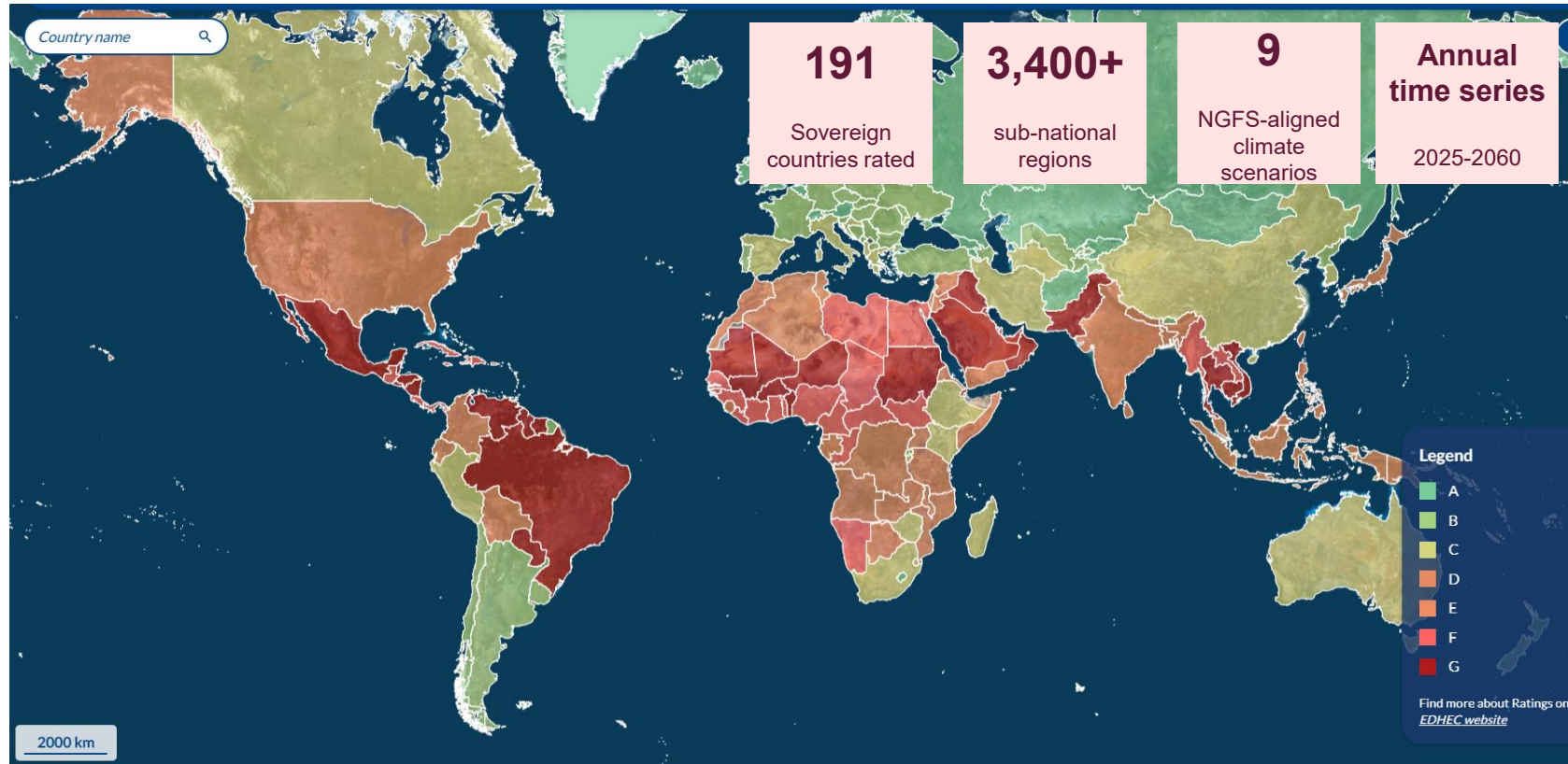
High-damage scenarios of climate change have been attributed high probabilities (ECI research).

This approach complements existing scenario narratives by adding a probabilistic dimension, which is essential for effective asset pricing and capital planning.

Ingestion into a Product: Sovereign Climate Risk Rating (SovCRR)

Expected annual GDP per capita impact from chronic physical climate risks

Expressed as a % deviation from a no-climate-change counterfactual. Probability-weighted across NGFS-aligned scenarios.



The economic impact of climate change depends critically on initial climate conditions and economic sensitivity - warming does not affect all countries equally.

SovCRR: User segments



Institutional investors → Use expected GDP-per-capita losses to assess sovereign valuation, test portfolios across climate scenarios and identify potentially unpriced risk.



Banks → Feed sovereign GDP shocks into climate stress tests and country-risk assessments, with evidence for supervisory review.



Public institutions → Compare countries and regions to inform adaptation finance and sovereign debt analysis.



Corporate treasuries → Identify climate-risk concentrations in sovereign holdings and the geographies where they operate.



Product Roadmap:

- Financial Spreads: End 2026
- Temperature regionalisation: End 2026
- Sectoral breakdown: Feb 2027

Financial Transmission

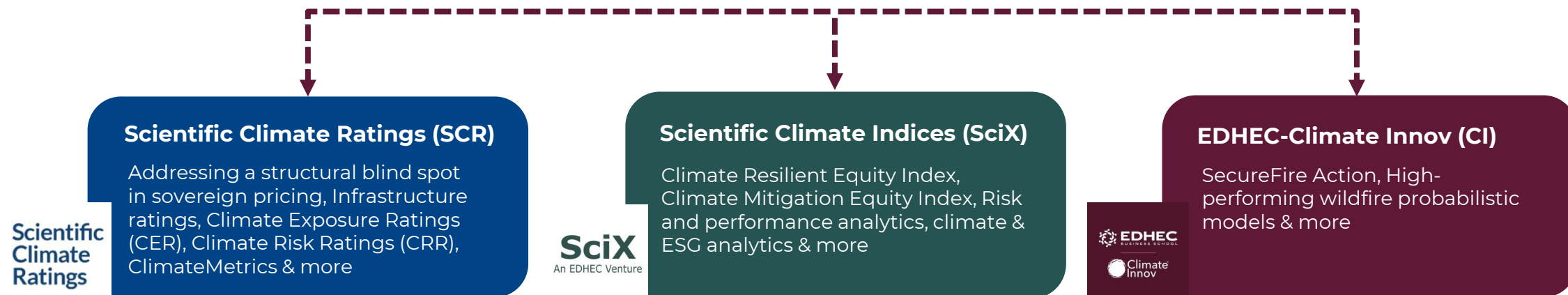


Financial transmission – is physical risk priced?*

*If it was priced, we would not be here today.



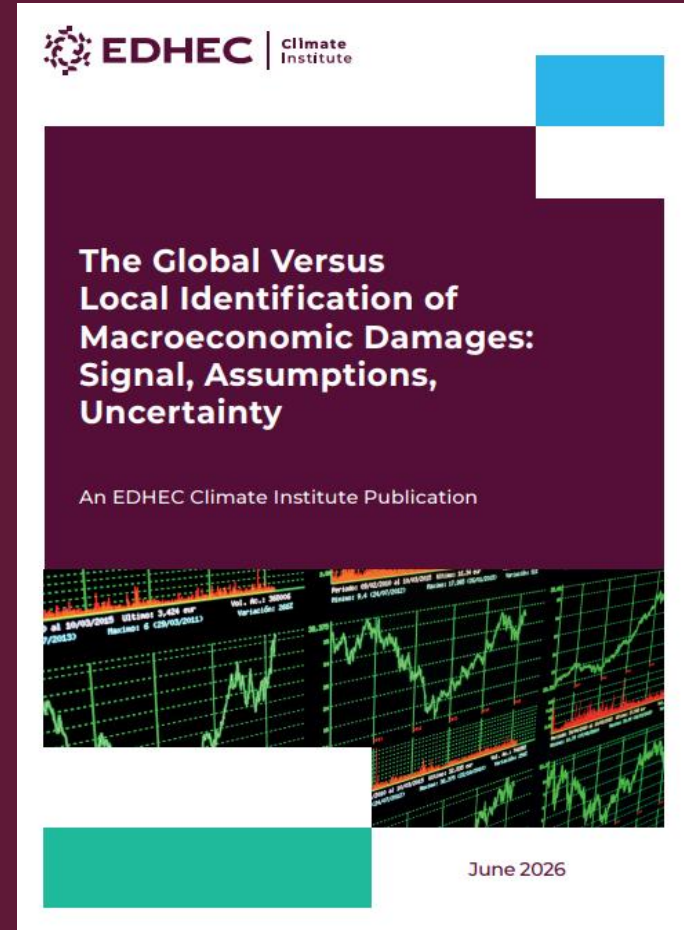
It is critical to bring that early information to investors before it materialises
(e.g., into the credit spread widening, rising implied equity risk premium)



Larger Lesson & Future Developments

Markets need more. E.g.

- » Sub-sectoral components,
 - » Direct versus unobserved supply chain-propagated damages,
 - » Certainty in uncertainty: envelopment, scenarios, GCMs, model calibration
- Decompose in the macroeconomic signal, the true weight of
- » chronic gradual increase in average temperatures versus the correlated unobserved increase in acute extreme realizations.
 - » Tipping points, adaptation margins



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Thank you for your time and attention

We welcome your questions



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