

# Beyond the insurance gap: building economic resilience in a climate-challenged future

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## Introduction

In 1906, the great San Francisco earthquake caused unprecedented devastation, with insured damages estimated at over \$235 million, equivalent to \$6.3 billion in 2018 dollars. Of the \$235 million in insured losses, only about \$180 million was paid out in claims, as insurers faced financial difficulties following the event. In the aftermath of this event, at least 12 American insurers went bankrupt. As climate change exacerbates natural catastrophes and the insurance gap becomes more important every year, we still face the challenge of mitigating the economic impacts of natural catastrophes through insurance while ensuring insurers' solvability.

Last year, global losses related to natural catastrophes amounted to USD 280 billion, with only about 38% of the losses insured. This means that the global protection gap was USD 174 billion in 2023, up from USD 153 billion in 2022, and the previous 10-year average of USD 134 billion<sup>1</sup>. Several factors suggest that this gap will continue to rise, as property exposure continues to grow, the number and severity of natural catastrophes increase, and insurers withdraw from high-risk regions.

In this context, political authorities are starting to grasp with the concept, alerted by supervisors and insurers alike. Multiple EIOPA, NAIC, and reinsurers reports have emerged over the past few years, describing the widening insurance gap and its dangers. In early 2024, the long-awaited French Langreny report on the insurability of climatic risks was released and contained a series of recommendations for adapting the French insurance system in the face of rising climatic risks. Despite these advances, political authorities are still sorely lacking in initiatives and solutions to this problem.

Yet, the importance of the economic losses linked to

climate change is increasingly recognized, on the one hand through the growing visibility of the damage caused by natural disasters, and on the other through the recurrent publication of studies. The multiplication of adaptation plans in several countries shows just how crucial adaptation is considered to be by policymakers to mitigate losses. Insurance and the insurance gap are however mentioned little in these plans, and where they are, operational measures often lack.

It is also important to note that climate risks could be undermining the insurance model based on mutual risk-sharing. People buy insurance because they think they have roughly the same chance of experiencing a loss as everyone else. With climate risks, however, this is not the case, as some areas, people, and activities are more vulnerable than others. It may therefore prove difficult to continue basing insurance schemes on mutualisation since, in reality, they become a call for solidarity.

In addition, as losses grow, it is legitimate to question whether the private sector will continue being able to cover the costs. In 2023, several important (re) insurers reported experiencing losses due to natural catastrophe payouts, resulting in some withdrawing from certain areas. Reducing the damages that are too likely will therefore be necessary to keep insurance as a primary responder to climate-related catastrophes.

In the context of growing anticipations of future physical and economic damages, the insurance sector, as an expert in risk, will necessarily have a role to play. How this role articulates with other actors, with adaptation strategies, and with global economic resilience however remains to be formally articulated. It is nevertheless the only solution to building an economically resilient future, in which losses can still be borne to ensure economic activity and growth.

<sup>1</sup> Swiss Re <https://www.insurancejournal.com/news/international/2024/03/26/766556.htm#:~:text=Last%20year%2C%20economic%20losses%20from,average%20of%20US%24134%20billion.>

## 1. The many challenges for coping with the physical and economic impacts of climate-related disasters

### 1.1 Rising and worrying estimations of future physical and economic losses

Over the years, the cost of climate change has become a recurring question to which no one seems to be able to identify a clear answer. Yet, to estimate the extent and the cost-effectiveness of our so-called "mitigation actions" and to assess the extent of the insurance gap, it is crucial to assess the economic impact climate change and climate-related catastrophes will have in the future.

**As the number and severity of natural climate-related disasters escalate, physical losses around the world continue and will continue to rise significantly even in a 1.5°C scenario.**

The most visible layer of losses is naturally **physical losses**, which have risen steadily over the past 50 years. In its 2020 Ecological Threat Register, the Institute for Economics & Peace revealed that natural disasters had increased tenfold in 60 years, from 39 recorded incidents in 1960 to 396 in 2019. This can only be attributed to an increase in climate-related natural disasters, as non-climate disasters such as earthquakes or volcanic eruptions have not increased. The resulting cost of the damage caused by natural disasters has risen from US\$50 billion per year in the 1980s to US\$200 billion per year in the last decade in constant 2019 dollars<sup>2</sup>. In 2017, this **represented about 0.4%** of the world's GDP<sup>3</sup>, moderately affecting the potential GDP. This number is however expected to increase significantly in the next few years.

Indeed, models have predicted an increase in both the number of these catastrophic events and their strength. So too are costs associated with physical loss expected to rise, according to Gagliardi et al. (2022), even under a 1.5°C global warming scenario, **physical losses related to climate disasters across the EU are anticipated to double by 2050 and triple by the century's end**. Costs are expected to be notably higher in scenarios with average temperature increases of 2°C or 3°C<sup>4</sup>.

**The hidden costs of climate change encompassing indirect economic impacts are highly superior to physical losses and are expected to far exceed initial estimates by 2050.**

Beyond the physical costs associated with the

effects of natural catastrophes, the financial burdens significantly increase due to slow economic recovery (*i.e.* when economies take a prolonged period to bounce back) and from low economic resilience (*i.e.* the inability of economies to withstand and adapt to shocks). These factors truly rack up the costs.

Recent studies have revised estimates of the economic damage from climate-related catastrophes, projecting that by 2050, the costs will be at least six times greater than previously thought, representing a significant share of GDP. In an article published in Nature in April 2024, Kotz, Levermann, and Wenz estimated that the **world economy is committed to an income reduction of 19% within the next 26 years**, in comparison with a baseline without climate-change impacts, **independent of future emission reduction choices**. Depending on the scenario of future income development this corresponds to about 19 to 59 trillion dollars in 2005 US dollars.

In May 2024, the National Bureau of Economic Research published a working paper by Bilal and Känzig confirming this new order of magnitude, estimating that a **1°C increase in global temperature would lead to a 12% decline in world GDP**. Although this study is currently only at the stage of a working paper and has therefore not yet been peer-reviewed, the orders of magnitude found in both studies are comparable. Indeed, it is estimated that by 2050, the average temperature will have risen by between 1.5°C and 2.7°C, which suggests that despite the different methods used in the two studies – one chose to look at the effect of global average temperatures on the economy, while the other went down to a very local scale, taking into account not only variations in local average temperatures but also temperature extremes and precipitation – the estimates are consistent with each other.

The predicted reduction in GDP will however not be sudden and will be smoothed out over time, making it more difficult to perceive these indirect economic losses than purely physical, clearly visible damages.

**Although regional disparities in climate change impact will exist, the likely disruption of global value chains, as well as the anticipated migration waves climate change will trigger, demand a wide and general mobilisation to mitigate global income losses.**

Regional differences in climate impact are significant. According to a study published in Nature in April 2024, low-income countries face an income

2. <https://www.visionofhumanity.org/global-number-of-natural-disasters-increases-ten-times/>

3. <https://ourworldindata.org/grapher/weather-losses-share-gdp>

4. [https://economy-finance.ec.europa.eu/document/download/69d8a3f4-2a15-48a0-970d-92a7fb9d921b\\_en?filename=dp168\\_en.pdf](https://economy-finance.ec.europa.eu/document/download/69d8a3f4-2a15-48a0-970d-92a7fb9d921b_en?filename=dp168_en.pdf)

loss of 8.9 percentage points (61%) greater than high-income countries by 2050, mainly due to their economic models and geographic locations. North America and Europe may see a median income reduction of about 11%, while South Asia and Africa could face reductions of around 22%<sup>5</sup>.

Even at 11%, income reduction is substantial, and these regional disparities will likely cause global economic tensions. With nearly half of global trade involving interconnected value chains, disruptions in one region will affect others, highlighting the need for international solidarity. Support for adaptation in high-risk areas and addressing economic disruptions caused by natural disasters, which can trigger migration and strain resources, will be crucial for global economic stability.

**Furthermore, impact studies fail to take into account certain factors such as human health, and therefore underestimate economic impacts.**

Income reduction estimations are furthermore often underestimated due to the exclusion of significant factors like heatwaves, sea-level rise, tropical cyclones, tipping points, and non-market damages to ecosystems and human health. This exclusion is primarily due to scientific limitations and the lack of historical data needed to assess future effects accurately<sup>6</sup>.

A paper complementing these first two studies published in Nature in March 2024 estimates the economic impact of increased heat wave frequency and severity by 2060. According to Sun et al., the authors of this study, **global economic losses could range from 0.6% to 4.6%**, attributed to health losses (37%-45%, *i.e.* losses associated with mortality due to high temperatures), labour productivity loss (18%-37%), and indirect loss (12%-43%) from supply chain disruptions due to heat stress. The losses vary based on Social Economic Pathways and emissions reduction levels<sup>7</sup>.

All of these studies are not coordinated which therefore makes it difficult to understand how they relate to each other. In any case, their multiplication and their similar orders of magnitude are alarming and show that economic losses due to the direct and indirect impacts of climate change have cruelly been underestimated. Indeed, new estimations for losses represent a **significant cost that is likely to have important consequences on future development.**

## **1.2 Despite the expected increase in physical and economic costs in the face of climate change, and the evident benefits of insurance, the world is still poorly insured**

**High subscriptions to insurance can limit the GDP growth decline following a natural disaster and can have important roles in providing post-disaster economic relief.**

If the world is largely committed to an important part of these losses, studies have shown that insurance can typically diminish the adverse effects of natural disasters on GDP growth rates. In 2012, von Peter et al. affirmed that there was little evidence that countries rebounded from natural catastrophes when uninsured, finding a typical drop in growth of 0.6 to 1% on impact and a cumulative output loss of two to three times this magnitude, with higher estimates for larger catastrophes<sup>8</sup>. By contrast, well-insured catastrophes were found to be inconsequential or even positive for growth over the medium term as insurance payouts helped fund reconstruction efforts. Facher Rousova et al. (2023), confirm these findings, observing that **a major disaster causing direct losses exceeding 0.1% of GDP can diminish GDP growth by roughly 0.5 percentage points in the quarter of impact, particularly if the proportion of insured losses is low, *i.e.* below 35% of the total. This adverse effect on GDP growth persists over the subsequent three quarters<sup>9</sup>.**

**Yet, the insurance gap continues to grow every year as climate-related disasters intensify.**

Despite the increasing frequency and severity of natural disasters, and the evident benefits that insurance can bring out, a significant insurance gap persists worldwide. In 2023 alone, global economic losses from climate-related catastrophes amounted to a staggering USD280 billion, yet only 38% of these losses, totalling USD106 billion, were covered by insurance. The global insurance gap in natural catastrophes in 2023 therefore amounted to USD174 billion.

This glaring disparity highlights the urgent need for enhanced insurance **coverage** in vulnerable regions. Even as communities face mounting losses from events like hurricanes, wildfires, and floods, many remain underinsured, leaving them exposed to financial devastation in the aftermath of such catastrophes. For the European Economic Area, the statistics are slightly lower, with about 55% of

5. <https://www.nature.com/articles/s41586-024-07219-0>

6. <https://www.nature.com/articles/s41586-024-07219-0>

7. <https://www.nature.com/articles/s41586-024-07147-z>

8. <https://www.bis.org/publ/work394.pdf>

9. <https://www.suomenpankki.fi/globalassets/en/financial-stability/events/sra-2023/papers/margherita-giuzio---the-macroeconomic-effects-of-the-climate-insurance-protection-gap.pdf>

losses being uninsured. Some regions and countries are however more exposed to the insurance gap than others, for example, the Netherlands to floods. In 2023, only about 4% of possible losses due to coastal floods were insured, although the risk level for floods in this specific region is extremely high<sup>10</sup>.

### **Both demand and supply side factors can explain the insurance gap.**

Two main factors can be identified within this issue of an underinsured world: the first one is what properly causes the insurance gap: a lack of universal subscription to insurance. The second is the difficulty of measuring and modelling risks, whose consequence is a solvability risk for insurers, which triggers insurance coverage reduction.

Certain levels of risks are however such that they cannot be insured by the private sector because of their cost and will have to be taken over by the public sector.

#### **1.2.1 On the demand side: Moral hazard, wrong perceptions of risks, and insurance costs are leading to underinsurance**

**The insurance gap is mainly a demand-side challenge, with a lack of subscription to insurance leaving important parts of the economy uninsured.** In the past, only about a quarter of the total losses caused by extreme weather and climate-related events were insured. If today, about 1/3 of losses are insured, room for improvement subsists and policyholders must be encouraged to underwrite themselves. In a study published in 2024, EIOPA identified key reasons for the lack of insurance uptake for natural catastrophes.

Firstly, **consumers often perceive insurance as unaffordable because they focus on the premiums rather than the overall value of the coverage.** Many see premiums as too high, even when the insurance is valuable, due to a lack of understanding of the coverage's comprehensiveness. Additionally, income influences housing choices, with some homes being expensive or difficult to insure.

**Confusion about costs and coverage, along with limited knowledge of how insurance works, exacerbates this issue.** Misunderstandings about affordability often result from financial illiteracy or the complexity of insurance products, making it hard for consumers to choose the right policy. Negative past experiences with insurers also deter people from purchasing NatCat insurance; only half of the surveyed individuals trust that insurance companies would compensate for NatCat losses.

**Risk perception** also plays a crucial role in insurance uptake. Over 30% of consumers cited a lack of awareness or misperceptions of risks as their main reason for not buying insurance. Those who have experienced NatCat events are more likely to be insured, indicating that firsthand experience influences risk awareness.

Lastly, **high expectations of state intervention** discourage people from purchasing insurance. Many believe the government will cover losses from NatCat events, creating a moral hazard. Studies show that in countries with lower insurance uptake, 59% of respondents think the government should be responsible for NatCat losses.

#### **1.2.2 On the supply side: insurers underestimate natural catastrophe risk due to outdated models and underestimation of potential impacts, which, when improved, could lead to reduced coverage and higher premiums, further widening the insurance gap**

*a) Risk assessment is difficult, and few insurers have conducted a comprehensive and complete analysis of climate change and natural catastrophe impacts*

While the demand side represents the main reason for the insurance gap, there is also **increasingly a gap in the knowledge of risk on the supply side**, related to the failure of common catastrophe models relying on historical data. The currently used internal models, statistical tools that use available historical data and scientific principles describing the physical mechanisms that control the occurrence and behaviour of natural hazards, are being rendered obsolete by climate change, as past events are no longer an accurate predictor of future events.

Furthermore, some insurers have yet to analyse climate change impacts on their activities. A 2022 EIOPA report highlighted that over 50% of insurers hadn't assessed climate change's potential impact. Insurers often underestimate changes in natural catastrophes, with more than 67% reporting no change in or inability to evaluate wildfire losses. S&P Global estimates that (re)insurers' estimates of their exposure to natural catastrophe risk could be underestimated by 33% to 50%<sup>11</sup>.

McKinsey notes that many in the property and casualty insurance industry underestimate the immediacy of climate change's economic effects, stressing its systemic risks to local economies.<sup>12</sup> Forbes suggests this underestimation stems from assumptions that other financial actors, like insurance companies or the state, will cover losses.

10. [https://www.eiopa.europa.eu/tools-and-data/dashboard-insurance-protection-gap-natural-catastrophes\\_en](https://www.eiopa.europa.eu/tools-and-data/dashboard-insurance-protection-gap-natural-catastrophes_en)

11. <https://www.spglobal.com/ratings/en/research/articles/210923-global-reinsurers-grapple-with-climate-change-risks-12116706>

12. <https://www.mckinsey.com/industries/financial-services/our-insights/climate-change-and-p-and-c-insurance-the-threat-and-opportunity>



However, insurers might reprice or withdraw coverage from high-risk areas, and state intervention is not assured<sup>13</sup>.

**The evolving landscape of climate change poses significant challenges to traditional insurance risk assessment models, leading to potential underestimation of future risks by insurers and society at large.**

*b) In the meantime, better assessment of risk may well lead to less insurance coverage, as insurers withdraw, and premiums increase*

Better assessing risks could however lead to a widening of the insurance gap through two main mechanisms: where risk is important, insurers will face a dilemma: withdrawal or significant premium increase<sup>14</sup>.

The insurance gap is indeed further accentuated by a high probability of risks in certain areas, as **insurers exposed to natural catastrophes rush-react to deep unexpected losses by withdrawing**. For instance, after the devastating wildfire season in California, several major insurers significantly reduced their coverage or entirely exited the market.

Further, enhanced risk models enable insurers to more precisely price policies based on the true level of risk, which often means higher premiums in areas more susceptible to climate-related events. Premiums have already considerably increased over the last years, with for example two of Florida's private insurance companies having applied in February 2024 to increase premiums by over 50%, decreasing affordability. This escalation in costs can lead to decreased insurance uptake, leaving more people exposed to the financial repercussions of natural disasters.

*c) Even if these coverage challenges were resolved, insurance cannot be the sole pillar of attenuation of the effects of climate change, and it has to be complemented by adaptation, and at times, by solidarity mechanisms*

The insurance gap presents a complex challenge that includes issues on both the supply and demand sides. Efforts are needed to address consumer perceptions, encourage greater insurance uptake, and improve risk analysis. However, other barriers to insurability need to be rectified. Even if insurance becomes more widely purchased, climate change will worsen existing events, making some costs related to natural catastrophes uninsurable for the private sector, which will inevitably lead to the withdrawal of insurance companies from certain regions.

Insurance alone cannot serve as the sole means of mitigating the impacts of climate change on the economy, as costs are high and cannot only be borne by it. This calls for other pillars of action including adaptation, elimination of highly probable risks, and solidarity.

**Adaptation is essential for keeping insurance affordable and available.**

Often misconstrued as a diversion from emission reduction efforts, **adaptation however stands as an indispensable strategy that must go hand in hand with emissions reduction**. Indeed, irrespective of emission reduction efforts in the near term, we are already bound to significant climatic shifts, translating into a projected 19% global income reduction by 2050. Only after 2050 do the benefits of emission reduction appear. Adaptation is therefore crucial in the immediate future.

To determine the value of adaptation, one must consider the costs of inaction, adaptation, and its benefits. A 2023 European Environment Agency study found that adaptation investments exponentially decrease economic losses from climate impacts, with larger investments leading to lower losses<sup>15</sup>. In a June 2020 report, the French Caisse Centrale de Réassurance showed that preventive flood measures significantly cut losses<sup>16</sup>. By lessening the impact of climate-related events, insurers can offer more reasonable rates, ensuring broader access and reducing financial burdens on individuals and businesses. It also allows for continued coverage in areas where losses were previously too expensive to be borne by private insurers. Without adaptation, insurance could become prohibitively expensive or unavailable in some areas.

**Some regions might however become or already are too risk-prone, which means that more drastic population and economic activity relocation measures must be put into place.**

In certain regions, the feasibility of adaptation measures may be severely limited by the inevitability of highly probable climate risks. Here, the imperative shifts towards mitigating these risks directly, often through measures like relocating communities from vulnerable areas. Such decisions are going to be difficult and must be driven by political will. The relocation of populations due to climate impacts represents a profound challenge, requiring careful consideration of social, economic, and ethical implications. These decisions are however going to be necessary, as they will

13. <https://www.forbes.com/sites/ninaseega/2024/03/01/why-the-insurance-industry-must-wake-up-to-the-harsh-reality-of-climate-change/>

14. <https://www.forbes.com/sites/ninaseega/2024/03/01/why-the-insurance-industry-must-wake-up-to-the-harsh-reality-of-climate-change/>

15. <https://www.eea.europa.eu/publications/assessing-the-costs-and-benefits-of>

16. <https://www.ccr.fr/documents/35794/1252212/CCR+Rapport+efficacite+PPRI+web+06102023.pdf/4dccc23-0cd8-af1f-6b16-9167d32e56f1?t=1697038007610>

safeguard the long-term viability of the insurance system by reducing unsustainable financial exposures.

**If we consider that the scale of the losses is of the same order of magnitude as the current ratio between insurance premiums and GDP, insurance could effectively cover these losses, provided that effective measures are taken to delimit insurable risks from those that are not.**

It was noted that direct economic losses linked to climate-related disasters currently represent about 0.4% of world GDP. According to the OECD, the ratio of direct gross premiums to GDP has fluctuated between 8.1% and 9.4% over the last 20 years. This data suggests that the amounts that will need to be compensated by insurers are challenging but realistic. However, in recent years, insurers have withdrawn from covering certain regions due to unmanageable losses. In these regions, risks have changed from hazards to certainties.

To tackle this challenge, it's crucial to implement effective adaptation measures, such as enforcing stricter construction norms and taking preventive actions. In some extreme cases, adaptation might not be possible, and it may become necessary to relocate populations from high-risk areas. This approach will help distinguish between insurable and uninsurable risks, ensuring that the insurance industry can continue to function effectively.

Approximately 10% of the global population lives in areas less than 10 meters above sea level. Although this represents a significant portion of the population, the dimensions are still manageable. However, difficult decisions will have to be made, which will necessarily be painful, even if they affect limited proportions of the population.

Such crucial decisions cannot be dictated by insurers' behaviours, as they are too important politically, socially, and economically. The leadership will therefore necessarily have to be political.

**Because it is impossible to predict all occurrences, even in the case the right adaptation and relocation measures are taken, some climate-related catastrophes will still be particularly destructive and will require a shift from mutualisation (insurance) to solidarity.**

Mutualisation, which involves spreading risk among a large pool of policyholders, works effectively for manageable and predictable risks. However, when facing unprecedented and severe climate events, mutualisation may become insufficient. In such

exceptional cases, solidarity mechanisms must come into play to ensure swift recovery.

This shift should remain exceptional, reserved for instance long-tail events that are too destructive for the insurance sector to cover without jeopardizing its financial stability. Even with the implementation of appropriate adaptation and population displacement measures, there will be instances where the magnitude of the disaster exceeds what the insurance industry can manage.

*d) The insurance gap underscores the larger issue of ensuring economic and financial resilience in the face of current and future climate change impacts, which necessitate beforehand adaptation, elimination of highly probable risks, and finally insurance-focused solutions*

Despite the urgency of addressing climate change, there exists a widespread perception that its impacts are distant, leading to a delay in proactive measures. However, the reality is that the tangible economic consequences of climate change are already evident through the consequences brought about by devastating natural catastrophes. In April 2022, Toyota's plant in Prospecton, South Africa, was severely affected by floods, resulting in substantial financial losses and disruptions to production. The incident led to the destruction of over 4,300 vehicles, a three-month work stoppage, and damages estimated at nearly \$1 billion<sup>17</sup>. Such events underscore the critical need for prompt implementation of adaptation measures, aiming to mitigate future economic losses. Waiting for the full force of climate change to manifest before taking action, is not only shortsighted but also economically unsustainable. According to a working paper published by the National Bureau of Economic Research by Adrien Bilal and Diego Känzig, the 0.75°C warming observed between 1960 and 2019 has already weighed on the planet's economy: without it, they found, global GDP would be 37% higher<sup>18</sup>.

**The term "insurance gap" therefore conceals the broader challenge of ensuring economic resilience against climate disasters, necessitating adaptation and coordinated efforts between insurers and the public sector.**

While the term insurance gap has widely been assumed to encapsulate a shortfall in coverage, it is a deceitful word for a much broader issue concerning future economic resilience in the face of climate disasters. Even if individuals were mandated to insure themselves and insurers possessed perfect predictive capabilities, the sheer magnitude of losses from large natural catastrophes and even

17. [https://www.insuranceinsider.com/article/2abh903ix1jjoonkom6q68/reinsurers-section/japanese-big-three-on-risk-for-1bn-south-african-toyota-flood-loss?zeph\\_ sso\\_ott=zFBAUq](https://www.insuranceinsider.com/article/2abh903ix1jjoonkom6q68/reinsurers-section/japanese-big-three-on-risk-for-1bn-south-african-toyota-flood-loss?zeph_ sso_ott=zFBAUq)

18. <https://www.nber.org/papers/w32450>

more so from long-tail events would and will surpass the capacity of private insurers to bear.

In reality, the insurance gap is but part of a **wider problem of ensuring future economic resilience** in the face of climate disasters and their indirect economic effects which will have disastrous consequences on GDP growth. Two natural conclusions arise from this. The first one is the necessity of adaptation, and, where not possible, of population and economic displacement, to bridge the insurance gap and reduce the losses that future climatic events will create. The second is that bridging the gap calls for a response not only from the private insurance sector but also from the public sector, who must cooperate to establish each actor’s responsibilities and liabilities.

**2. Ensuring economic resilience in the face of climate change will require combining articulated adaptation measures (or more, such as population and economic activity displacement, when necessary), insurance gap reduction ones, and building an efficient solidarity mechanism**

The wording “insurance gap” merely suggests a low insurance subscription rate and is not the all-encompassing problem it is described as being. Bridging this insurance gap, for example, by ensuring a broadening of insurance coverage, would not fully address the whopping losses that are predicted to occur because of natural catastrophes in the next decades, nor the inevitable rate increases in the most exposed areas.

The issue in itself is that of ensuring economic resilience and recovery after a disaster. To achieve this, we will need on the one hand adaptation strategies, which will allow us to limit losses up to economic affordability, but which also demand possibly excluding certain geographical areas where life and economic activity will become too obviously unsafe, and on the other hand, elaborated insurance coverage spread across the public and the private sectors to achieve fast economic recovery in case of losses following a natural catastrophe.

To address this, we must focus on three main routes: **enhancing economic resilience to climate-related events, ensuring the affordability of potential losses, and maintaining the insurability of risks.**

These approaches must be intertwined and coordinated with each other to succeed and can be brought about by **risk prevision, risk awareness, adaptation, a decreased insurance gap, and when necessary, an increase in solidarity.**

The table below is a breakdown of the objectives and the tools that can be used to fulfil them.

**2.1 Adequately limiting financial and economic impacts requires achieving economic resilience to climate-related events, ensuring the affordability of potential losses, and fostering the insurability of risks**

**2.1.1 Building economic resilience to climate-related events by reducing direct and indirect damages and accelerating recovery**

The most pressing objective to limit financial and economic impacts will naturally be that of achieving economic resilience to climate-related events. Current projections suggest potential GDP losses exceeding 15% by 2050. These estimates however assume that no measures to limit losses will be

Objectives	Underlying objectives	Main tools				
		1. Risk prevision	2. Risk awareness	3. Adaptation	4. Decreased insurance gap	5. Increased solidarity
1. Economic resilience to climate related events	1a. Decrease the extent of direct and indirect damages	XXX	XXX	XXX	XX (if mutualisation becomes possible)	XX
	1b. Increase the speed of recovery					
2. Affordability of potential losses	2a. Affordability of the probability of damages	XXX	XXX	XXX	X (if mutualisation becomes possible)	XX
	2b. Affordability of the extent of de facto damages					
3. Insurability of risks (mutualisable risks)	3a. Increase the number of policy holders	XXX	XXX	XXX	XXX	/
	3b. Exclude highly likely damages (not insurable)				/	

taken, *i.e.*, economic resilience to climate-related events is and will stay low.

These losses, while gradual and not tied to single catastrophic events, will significantly impact future development. To sustain growth, efforts must focus on **decreasing the extent of direct and indirect damages** on the one hand and **increasing the speed of recovery post-damage** on the other hand.

Building financial resilience to climate-related events requires **reducing the extent of direct damages**, which directly affects the **extent of indirect damages**. Indeed, if direct damages are limited, businesses can keep operating smoothly by minimizing disruptions like supply chain interruptions and service losses, protecting jobs and economic stability. This approach also helps prevent spillover effects throughout the economy.

For those indirect damages that will remain and that cannot be eliminated, because we cannot accurately predict everything, **increasing the speed of recovery** will be crucial to economic resilience. Indeed, it is the length of the recovery that usually determines the amount of indirect losses following a catastrophe.

### **2.1.2 Ensuring the affordability of potential losses by reducing damage probability and minimizing impact**

**Keeping potential losses affordable** is also a key objective in limiting the financial and economic impacts of climate-related disasters because it ensures that affected economies can recover more swiftly and effectively. By managing risks and containing financial losses, it is possible to mitigate long-term impacts on livelihoods, infrastructure, and economic stability. Indeed, unaffordable damages could overwhelm insurance companies and governments, causing widespread economic consequences. Affordability depends firstly on **decreasing the probability of damage**, and secondly on **decreasing the extent of the de facto damages**.

**Decreasing damage probability** involves comprehensive risk assessments, resilient infrastructure, and adaptation measures. Unfortunately, decreasing damage probability will also mean that in some areas that will become too risk-prone, population displacement will have to be put in place. Ultimately, this means that there has to be a political leadership leading these adaptation plans, and, where impossible, leading these populations displacement, because the topics are sensitive and not only financial, but rather also social and economic. By prioritizing preventive measures and planning, the likelihood of

catastrophic damage from climate events can be significantly lessened. This effective prevention decreases the frequency and severity of claims, which helps keep insurance viable and eases the financial burden on government resources.

Since damage probability cannot be completely eliminated, **reducing the extent of the damages** remains important. In some places, this will correspond to effective emergency response, adequate insurance coverage, and promoting resilience through education and training can help minimize impacts. Limiting damages makes recovery more manageable, speeds up return to normalcy, and reduces long-term economic strain. Controlling damage extent keeps costs affordable for insurers and governments, ensuring they can provide necessary financial support without risking their own solvency or fiscal health.

### **2.1.3 Maintaining insurability by expanding the number of policyholders and mitigating likely fragilities and damages**

Lastly, keeping risks insurable (*i.e.*, "mutualisable") allows for efficient risk spreading among policyholders, reducing the impact on any single entity. By pooling resources and sharing risks, the financial burden is distributed, providing stability and security. Maintaining insurability requires **increasing the number of policyholders** and **implementing adaptation measures to suppress highly likely damages**. This ensures that insurers and reinsurers remain the primary responders, keeping the private sector at the forefront of risk management.

**Increasing the number of policyholders** strengthens risk mitigation strategies and helps close the insurance gap. When more individuals or organizations are insured, the insurance system's overall ability to manage risks improves. A larger number of policyholders not only spreads risks more widely, but also contributes to a more sustainable insurance system. Ultimately, expanding participation helps ensure that losses are covered and allows for swift payouts when needed.

However, **certain damages are so likely that they cannot be addressed by insurance mechanisms**. Indeed, taxpayers and policyholders with reasonable levels of exposure will refuse to pay for these losses. They have to be identified to assess whether risks can be mitigated enough through adaptation measures, or if these risks are no longer hazards and can therefore no longer be underwritten. This proactive approach to managing uninsurable risks helps to minimize the overall impact on policyholders and insurers



alike, ensuring the long-term viability and stability of the insurance industry. It however also means that there will necessarily be a need to displace some populations in areas that are considered to be no longer insurable, a decision which once again has to be a very political one.

## 2.2 The main tools that can be used to answer these objectives

Having outlined these primary goals, it is crucial to consider practical strategies to achieve these objectives. To address the challenges posed by climate-related events, several key tools have been identified: risk prevision, risk awareness, adaptation, decreasing the insurance gap, and fostering solidarity. These tools represent tangible solutions that will enable individuals, businesses, and governments to better prepare for and respond to future and current climate impacts.

### 2.2.1 Enhancing risk prevision to limit financial and economic impacts of climate-related events

**Improving risk prevision** is an overarching need to limit the financial and economic impacts of climate-related events by enhancing overall preparedness and resilience. At its core, risk prevision means improving risk assessment and modelling, which is crucial for accurately predicting the timing, severity, and frequency of climate-related catastrophes.

This enhanced predictive capability allows for the **identification of areas where adaptation is necessary and where it is not**, as well as when and where adaptation measures are not sufficient, and population economic activities displacement is necessary.

Risk prevision therefore allows for better adaptation and prevention plans, essential for ensuring **post-disaster economic resilience**, both through the speed of recovery that can be enhanced through knowledge of possible damages pre-disaster, as it allows for the creation of effective planning, and through the decrease in the extent of indirect damages. Further, **through accurate risk prevision, we can ensure the affordability of potential losses** by decreasing their likelihood and mitigating their severity when they do occur.

Better risk prevision also ensures that **insurance mechanisms remain viable**. By keeping risks insurable, we reinforce the principle of mutualization, spreading the financial burden across a broad base of policyholders who face similar levels of risks, while maintaining the stability and functionality of insurance systems.

Effective risk prevision allows us to distinguish insurable risks from those that are uninsurable by the private sector.

This differentiation is vital for the **correct pricing of insurance premiums**, ensuring that insurers do not face situations of insolvency.

Finally, an improvement in risk assessment and modelling would lead to better previsions and therefore **accrued credibility**, a necessary condition to spread risk awareness, and also an essential tool to answer these objectives.

### 2.2.2 Enhanced risk awareness allows for more insurance subscription and better policy decisions, but can only be achieved through the proliferation of information and studies on the topic

Indeed, **enhanced risk awareness** is crucial for informed decision-making across individuals, businesses, and policymakers to mitigate the financial and economic impacts of climate change. Robust models and widespread dissemination of research findings are fundamental in fostering this awareness. As models improve, they provide clearer insights into potential consequences, emphasizing the urgency for effective mitigation and adaptation strategies.

Greater risk awareness also **boosts insurance subscriptions** and insurability as stakeholders recognize specific climate threats. This broader participation spreads financial risks, enhancing the sustainability of insurance mechanisms. Additionally, a well-informed public supports mitigation measures like relocating from high-risk areas or investing in resilient infrastructure, reducing overall risk exposure.

Risk awareness furthermore plays a critical role in **shaping policy decisions**. When policymakers are well-informed about the potential impacts of climate-related events (and when voters are too, putting pressure on policymakers), they are more likely to implement effective policies and regulations that promote resilience and risk mitigation, such as climate-resilient building codes and zoning laws.

Finally, risk awareness can only be **heightened through the proliferation of studies** highlighting the severity, frequency, and urgency of potential events. This also contributes to the credibility of predictions; as studies are released, one can assume that prediction models get better. Research and the spreading of findings ensure that risk awareness remains high, driving ongoing efforts to mitigate and adapt to climate change.

**2.2.3 Adaptation has to be put in place where necessary, but public authorities will also have to make difficult political decisions on where adaptation is impossible, and population and economic activities displacement are therefore necessary**

Seeing the colossal losses that climate change will induce in the future, it becomes obvious that **adaptation is a crucial component** to mitigate the financial and economic impacts of climate-related events. By enhancing infrastructure and community resilience, implementing strategic adaptation plans, and addressing the insurance gap, adaptation can importantly mitigate the impacts climate-change-related events will have.

First and foremost, adaptation can significantly **enhance infrastructure and community resilience**. This involves fortifying buildings, roads, and other critical infrastructures to withstand the increasingly severe impacts of climate-related events. By constructing resilient infrastructure, we can reduce the extent of physical and indirect damages, ensuring that economic activities continue with minimal disruption. This not only helps in maintaining economic stability but also supports the speed of recovery post-disaster.

Adaptation efforts can take two primary forms: **adapting to stay in place** or facilitating **population displacement** if risks remain too high. In cases where adaptation measures can sufficiently mitigate risks, communities can continue to live in their current locations with improved safety and resilience. This can make previously uninsurable areas insurable again, as the risks become manageable and mutualisable by the private sector. On the other hand, if the risks are too great and cannot be effectively mitigated, political decisions will have to be made that involve relocating populations to less risk-prone areas.

**Insurance and adaptation should not be treated as separate entities.** Ensuring economic and financial resilience in the future will necessarily involve both adaptation and insurance and reinsurance mechanisms. Unfortunately, it seems that insurance and adaptation have only been remotely put together. Indeed, while many countries including France, Germany, Italy, and Spain have published national adaptation plans for climate change, they have not linked these plans to insurance and to addressing the growing insurance gaps. Integrating insurance considerations into adaptation plans would create a more comprehensive and effective approach to managing climate risks. As France prepares its third Plan National d'Adaptation au Changement Climatique (PNACC), and as the long-awaited Langreny report on insurability was released, the occasion might finally

present itself to mix the two topics into the next French PNACC, which could serve as a leading example for other countries.

**2.2.4 Closing the insurance gap as part of the solution to ensure insurability of risks and foster economic resilience and affordability**

**Decreasing the insurance gap** also constitutes a key tool for limiting the financial and economic impacts of climate-related events. This involves increasing the number of policyholders, thereby expanding mutualization, and ensuring that more people are protected in case of disasters, which facilitates faster economic recovery.

Decreasing the insurance gap obviously begins with **increasing the number of policyholders**. More policyholders, means a broader base for mutualization, and therefore risks spread across a larger group. This mutualization is crucial for maintaining the sustainability of the insurance system, as it distributes the financial burden of potential losses more evenly. With a larger pool of policyholders, insurance companies can better absorb the impacts of catastrophic events without overburdening any single entity.

Another critical benefit of decreasing the insurance gap is that it ensures **swift payouts in the event of a disaster, as insurance is more automatic than state compensations**. Swift pay-outs are essential for quick recovery, as they provide the financial support needed to rebuild and resume normal activities. When policyholders receive timely compensation, it reduces the economic standstill, allowing businesses to reopen and communities to recover faster. This rapid recovery is a cornerstone of economic resilience as it minimizes long-term disruptions to economic activities and livelihoods.

Decreasing the insurance gap is particularly vital for **maintaining the insurability of risks**. By increasing the number of policyholders, insurers can **better manage and distribute risks**, ensuring that insurance remains a viable option for more people. This is especially important for high-risk areas that might otherwise be deemed uninsurable. When risks are widely shared, the financial strain on insurers is reduced, allowing them to continue offering coverage even in areas prone to climate-related events.

However, it is crucial to note that while increasing the number of policyholders addresses the first sub-objective of insurability (increasing the number of policyholders), it does less for the second sub-objective (suppressing highly likely damages). Highly likely damages that are predictable and frequent will become uninsurable. They must be addressed through targeted adaptation measures

to reduce their likelihood or impact. Therefore, decreasing the insurance gap works best in tandem with adaptation strategies that mitigate highly probable risks.

### **2.2.5 Fostering solidarity in cases where mutualisation cannot handle the level of losses**

**Reducing and adapting to highly likely damages is therefore the priority.** However, climate change will exacerbate climatic events and will inevitably at times lead to unpredictable and severe events that exceed normal risk management capabilities by private insurers. Solidarity will therefore have to step in when losses from a catastrophe, or a series of catastrophes in a given year, become too high for traditional insurance mechanisms to handle.

Solidarity, in this context, refers to a collective approach where people contribute to cover other's losses, even if they are not faced with the same level of risk. Unlike mutualisation, where risks are shared among policyholders with similar risk levels, solidarity requires contributions from individuals regardless of their exposure. Adaptation and prevision will never be able to fully take out a surprise or a long-tail event, and in those cases, private insurers cannot bear the full burden of climate disasters.

Solidarity must be an **exceptional measure**, activated only when all highly likely damages have been suppressed through adaptation, but a catastrophic loss is too high and could pose a serious systemic risk to the insurance sector. This shift from mutualization to solidarity is necessary because private insurance alone cannot manage the most destructive climate events.

### **2.3 Coping with increasing natural hazards will require a systematic, coordinated approach that will sometimes involve solidarity mechanisms, particularly for long-tail events, which suggests a role for the European Union**

All of these tools must be used in conjunction to truly allow for economic resilience. At the same time, a specific 4-level insurance scheme should be implemented so that even in cases of very important losses (long tail events specifically), economic recovery is fast. A 4-ladder approach with insurance, reinsurance, state intervention, and an eventual European layer would allow this, with the following repartition: the more the event is low-frequency and high-impact, the more public and bigger the entity taking charge of it has to be. On the contrary,

for high-frequency, low-impact events, insurance has to be the first responder, with reinsurance providing relief for higher-impact events that do not reach the required level for state or supra-state intervention. Said otherwise, the private sector would be responsible for events where mutualization is sufficient, and the public sector for events where solidarity is necessary.

Indeed, even if we manage to anticipate and therefore eliminate all likely damages, long-tail natural catastrophe events will occur at times and put the insurance sector in difficulty, were it to endorse alone the financial burden they create. In these events, we must switch from a scheme of mutualization organized by private (re)insurance to a scheme of solidarity organized by public actors. If the national level could help with some of these events, a European level will allow to deal with asymmetric chocs, which could put the financial health of a member state in danger.

Further, risk dissemination through all these layers can go through various tools. To disseminate risks, it is important that not only the different actors prepare actively, for example for the public sector by creating ex-ante a fund for natural disasters, or a specific state reinsurer with funds instead of raising funds ex-post, but also that alternative risk transfer mechanisms are used. Amongst those, cat bonds have proven to be resilient for the private sector, although they are not yet very widespread. The more widespread use of such instruments both by the private and the public sector would enhance economic and financial resilience.

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## **Concluding remarks**

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Climate change and climate-related disasters will represent an important economic loss for all regions, countries, communities, companies, and individuals. The scale of losses makes investment in economic loss reduction essential. It is not just the physical losses that are costly, but also, and foremost the economic losses that result from primary physical losses.

Often blamed as the source of this, the insurance gap is but a logical consequence of the extent of losses. Without remedies, it will further widen in the years to come, as insurers experience heavier unexpected losses that they cannot cover, and irremediably either withdraw from regions or raise premiums, making them unaffordable to policyholders.

To ensure that the financial and economic impacts of climate change and climate-related disasters

stay manageable, we will necessarily need to achieve economic resilience to these events, secure the affordability of losses, and establish continued insurability of risks.

Several steps remain to be taken to guarantee economic resilience. Firstly, as states continue drafting their adaptation plans, there is an urgent need to define an insurability plan within these adaptation plans. Adaptation and insurance need to go hand in hand, as they will sustain each other. Secondly, we will need to continue working on improving risk anticipation, with the dual aim of better identifying the financial mass at risk, the financial mass that can be insured, and that may need to be covered by solidarity schemes when long-tail events happen.

Importantly, a future without insurance is not something that we can manage. However, one where the insurance sector faces systemic risks is not either. Private insurers are capable of taking on such a challenge as climate change, but only and solely if they are helped by policymakers. A lot of the decisions that will need to be taken in the future will have to be political, as they involve hard societal and economic choices that directly impact people's lives (for example, relocation). We would do well to dwell upon the topic of the insurance gap, as the dire consequences for our future resilience and economic stability impel us to urgently implement viable solutions.