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FROM RISK TO RESILIENCE
CLOSING THE CLIMATE INSURANCE PROTECTION GAP

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INTRODUCTION

The world's economy is insufficiently protected against climate disasters. The accelerating pace and severity of extreme weather events are exposing significant gaps in our collective physical and financial resilience systems. In a growing number of regions, communities and businesses are facing mounting economic losses without adequate financial protection. This underscores the urgent need for comprehensive climate adaptation measures coupled with expanded insurance coverage.

Insurers play a systemic role in shouldering financial risks that would otherwise hit economies in a disorderly manner. By pooling premiums and mutualizing risks, they spread disaster costs across time and space, contributing to economic stability. Beyond simply indemnifying losses, insurers can also support climate adaptation by incentivizing risk prevention measures, thereby reinforcing broader societal resilience. Policymakers and regulators have recognized this role in climate adaptation as a key insurer responsibility.

There is a tension between insurers' collective role and their individual incentives. The insurance industry's collective function is to pay for damages after disasters, but each individual company strives to maintain low loss ratios. Confronted with rising claims and exposures, insurers typically react by increasing premiums, shrinking coverage or withdrawing from high-risk zones. These are financially rational responses to preserve each insurer's solvency and profitability in the short term, but together they erode the broader risk pool needed to sustain insurance availability and affordability over the long term.

When insurers stop covering climate risks, these risks are transferred onto individuals, businesses, and taxpayers. Insufficient insurance coverage not only undermines the financial system's ability to absorb shocks but also has wider economic, fiscal, and social repercussions. Insurance protects mortgage lending, underpins business investments, and empowers entrepreneurs to innovate. It shields vulnerable households against catastrophic loss, curbs inequality by preventing single events from having existential consequences, and cushions public finances against shocks. A retreating insurance market, therefore, imperils growth, social equity, and governments' budgets.

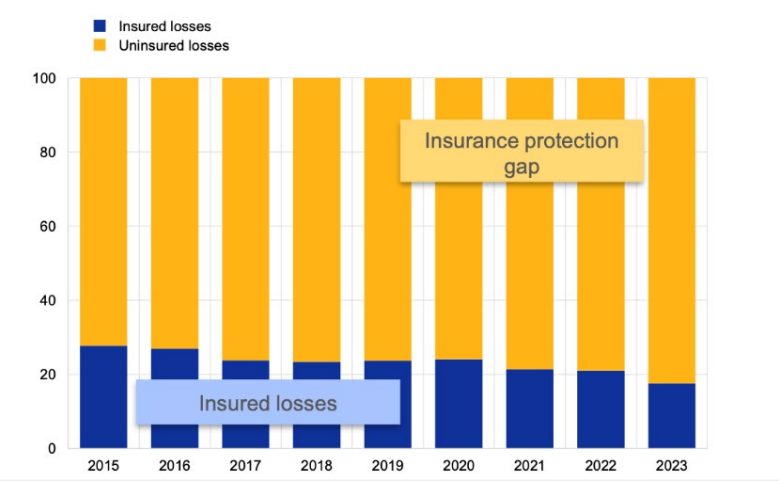
Closing the climate insurance protection gap requires coordinated policies to enhance both physical and financial resilience. Misaligned incentives between public authorities, insurers and insurance customers can jeopardize financial stability. A collaborative multi-stakeholder roadmap is needed to mitigate climate risk through physical adaptation measures and to ensure that the residual financial losses are shared across all economic actors. Our policy recommendations comprise 1) actions within the direct remit of insurance regulators and supervisors, and 2) proposals to link them to broader climate-resilience strategies.

THE CLIMATE INSURANCE PROTECTION GAP AND THE TENSION AT THE HEART OF INSURANCE

Definition and Size of the Climate Insurance Protection Gap

The climate insurance protection gap is the difference between the total economic losses caused by climate disasters and the insured losses. This gap is a key indicator of financial vulnerability in the face of increasing climate risks. Empirical data consistently show that a significant share of economic losses remains uninsured. Major reinsurance companies and brokers estimate that the global protection gap for natural catastrophes[1] amounted to around 60% of economic losses for the year 2024[2]. In Europe, analysis from the European Environment Agency (EEA) exhibits an even larger protection gap of around 80% over 1980–2023[3], with an increasing trend over the last years as shown in Figure 1 below.

Figure 1 - Share of insured losses in total losses caused by natural catastrophes in the EU (percentage, 10-year moving average)



Source: CATDAT (Risklayer GmbH – Europe Climate related impact Analysis Project), EIOPA's Dashboard on insurance protection gap for natural catastrophes

Forward-looking analysis suggests that the protection gap will widen in the coming years. As climate risks and the concentration of assets keep growing, insurers are expected to react by further increasing prices and withdrawing from the worst-affected regions. For example, France's financial supervisor ACPR has conducted climate stress tests simulating the impact of increasing climate risks on insurance portfolios. A majority of insurers who responded to the survey indicated that they are either already implementing or considering higher premiums in the future, as well as new geographic exclusions[4].

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[1] Including earthquakes and volcanic activity in addition to extreme weather events

[2] Natural Catastrophe and Climate Report: 2024, page 14, Gallagher Re, January 2025, page 14, and Sigma No 1/2025, page 3, Swiss Re, April 2025

[3] Economic losses from weather- and climate-related extremes in Europe, figure 2, European Environment Agency, October 2024

[4] Main results of the climate exercise for the insurance sector, section 3.2.3. Trends in insurance gap, ACPR, May 2024

The protection gap disproportionately affects small and medium-sized enterprises (SMEs) and lower-income households. Large corporations generally have more resources and access to comprehensive insurance coverage, which enables them to invest in climate adaptation and to absorb financial losses from climate events. In contrast, SMEs frequently lack access to or cannot afford comprehensive insurance coverage, for instance, for business interruption risks following climate disasters and supply chain disruptions. Similarly, the assets of many households, particularly those belonging to vulnerable socioeconomic groups, often remain underinsured. The climate protection gap also varies significantly by country [5] (reflecting differences in market maturity, regulatory frameworks, and risk awareness), by peril type (such as floods, storms, wildfires) and by insurance lines of business (such as property insurance, agricultural insurance, and business interruption insurance), underscoring the complexity of the challenge.

Drivers and Dynamics of the Climate Insurance Protection Gap

The combination of increasing climate hazards, rising exposure, and persistent vulnerability explain the climate protection gap. While the increasing frequency and severity of extreme weather events are an important driver of the protection gap, it is not the only one. At the same time, more people and assets are exposed due to urban expansion and economic development in risk-prone areas. Inflation in the value of the assets insured and in repair costs also plays a key role in this increase in exposure. Beyond hazard and exposure, the actual damages to assets depend as well on the adequacy of climate adaptation measures and on vulnerability factors such as infrastructure maintenance (like storm drain cleaning, for instance), urban planning (such as limiting the extent of impervious concrete surfaces around buildings, which can exacerbate flood risk), and the presence of intact natural buffers against extreme weather events.

The role of climate change as a driver of the insurance protection gap will continue to grow. Due to the inertia in atmospheric and oceanic systems, even a complete halt in greenhouse gas emissions now would not prevent further increases in climate hazards for years to come. Climate risks could even escalate sharply and unpredictably if critical climate tipping points are reached (such as the melting of the Greenland ice sheet, the dieback of the Amazon rainforest, or the collapse of the Atlantic Meridional Overturning Circulation oceanic current), with further negative consequences on the availability and affordability of insurance.

Escalating climate-related risks challenge traditional insurability criteria. The availability and affordability of insurance depend on actuarial and market conditions, which notably include predictable loss frequency and severity, diversified exposures to avoid large claims accumulation, and premiums set at levels that policyholders can reasonably pay for[6]. Climate-related risks, in contrast, are growing over time and developing in a way where past data cannot reliably forecast their future scale. These risks are also increasingly systemic, as simultaneous extreme weather events can strike large policyholder pools in different regions, undermining the possibility of diversification needed by insurance. The problem is exacerbated by a reinsurance protection gap, wherein reinsurers, also confronted with

[5] For an overview of the differences in protection gap between European countries, see The climate insurance protection gap, European Central Bank, retrieved September 2025

[6] An Investigation into the Insurability of Pandemic Risk, section 3.2. The criteria of insurability, Geneva Association, October 2020

increasing natural catastrophe losses, raise reinsurance premiums, reduce capacity or withdraw from certain markets entirely, further diminishing primary insurers' ability to underwrite climate risks.

Annual repricing and selective underwriting from insurers amplify the climate protection gap. Every year, insurers reassess their pricing models and their underwriting policies based on updated risk assessments. It often leads to substantial premium increases or reduced coverage for insurance customers exposed to increasing climate hazards, rising concentration of exposed assets, and high vulnerability of assets and infrastructure in coastal areas, floodplains, or wildfire-prone zones. These reactions fragment insurance risk pools (the groups of policyholders whose risks are combined so that their potential losses are shared, allowing insurers to spread risk and set premiums), leaving vulnerable regions deprived of affordable policies. Insurers' annual risk and profitability management cycle is reinforced by the micro-prudential focus of insurance supervisors, with a one-year horizon embedded in most solvency frameworks (such as Solvency II in Europe), thus limiting the ability of financial supervisors to address the systemic and long-term nature of climate insurance challenges.

Private insurance markets are increasingly unable or unwilling to provide the risk transfer services that society and the financial system need. Insurers send correct price signals by charging risk-based premiums or exiting markets with climate risks that are too high to be insured. From a strictly actuarial standpoint, they cannot sustainably underwrite homes or businesses in areas where the probability of destruction rises above their profitability threshold, even as the need for coverage grows. However, this leaves communities exposed and undermines the social contract underpinning insurance. The aggregate result of these financially rational decisions by individual insurers is a macro-level breakdown in collective financial resilience against climate extremes. It also undermines the long-term business model of insurers themselves: they may be protecting their profit margins today, but their customer base and business volume are gradually shrinking over time.

Several demand-side barriers compound the supply-side challenges. A common obstacle to purchasing insurance against extreme weather events is individuals' and businesses' deficient perception of climate risks. They may be unaware of their exposure, notably in regions where extreme weather events were historically rare but are now growing due to escalating climate change. Policyholders may also mistakenly believe that their current insurance coverage is sufficient. In Germany, for instance, basic home insurance policies do not include coverage for natural catastrophes. Such underestimations of risk, exposure and vulnerability might become less prevalent as climate change impacts become more evident to the public, but other factors are also at play. For instance, a lack of trust in insurers, spurred by fears that claims will not be honored or that the indemnification process will be overly burdensome, can lead to overestimating counterparty risk and discourage adequate insurance uptake. Expectations that government disaster relief will fill the insurance protection gap in case of major disasters also play a significant role in reducing insurance demand and perpetuating a moral hazard loop, which undermines collective risk-transfer mechanisms[7].

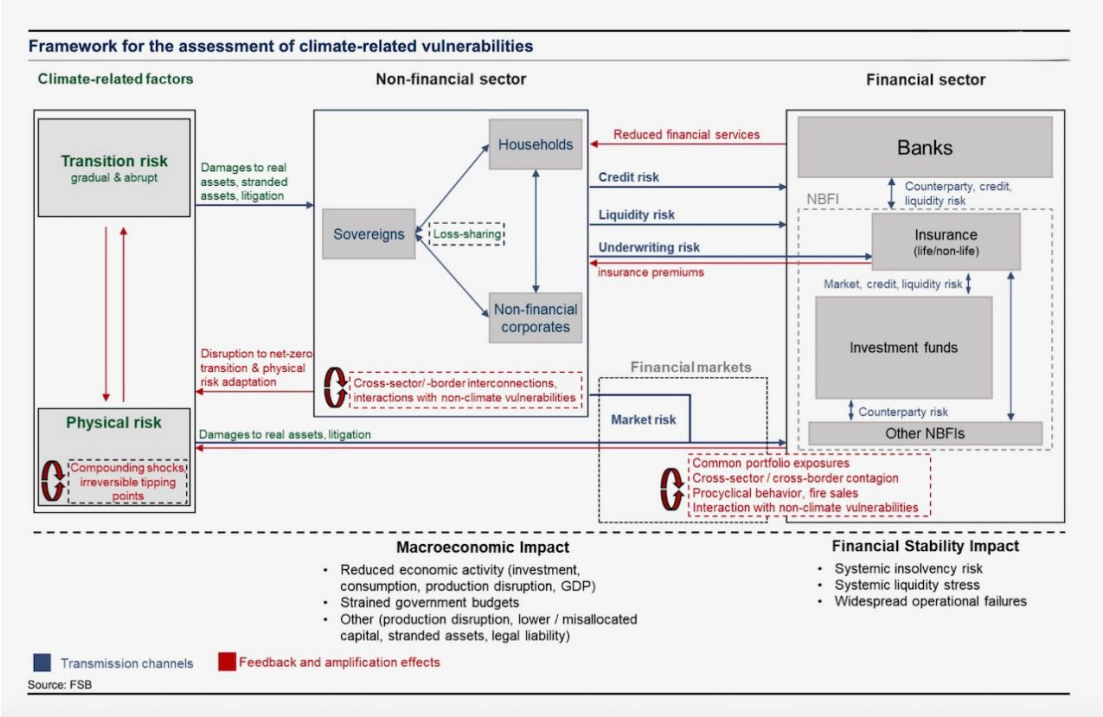
[7] Measures to Address Demand Side Aspects of the Natcat Protection Gap, EIOPA Staff Paper, February 2024

Consumers' calls for subsidies and risk-sharing can be at odds with financial realities. The principle of mutualization in insurance is challenged by the scale and concentration of climate risks. The insurance system cannot simultaneously provide affordable (i.e., non-risk-based) premiums in high-risk areas while keeping premiums low (i.e., risk-based) in those areas less exposed to climate change. To achieve this goal, governments would have to mobilize substantial funding and inject financial resources to subsidize coverage, otherwise underwriting and pricing policies cannot balance affordability and actuarial soundness. This disconnect between consumer expectations and the financial constraints imposed by climate risk is another driver of the protection gap.

Systemic Consequences and Threats to Financial Stability

Insurance is critical to mitigate the risks climate change poses to financial stability. Insurance underpins economic stability by absorbing and redistributing disaster risks that could otherwise disrupt growth and the financial system. As a consequence, the climate insurance protection gap has adverse macroprudential implications. The Financial Stability Board outlined in their 2025 assessment of climate risk vulnerabilities[8] the risk transmission channels through which physical shocks, such as extreme weather, flooding, or wildfires, transmit through the financial system, creating amplification mechanisms and risk feedback loops. When insurers faced with losses significantly increase premiums or pull back coverage, this can trigger waves of credit tightening, asset fire-sales, and balance-sheet stress that reverberate through banks, other insurers, and non-bank financial intermediaries.

Figure 2 – Climate Risk Transmission Channels



Source: Assessment of Climate-related Vulnerabilities, Financial Stability Board

[8] Assessment of Climate-related Vulnerabilities, Figure 1, Financial Stability Board, January 2025

Mortgages and real estate markets are vulnerable to climate change and to a lack of insurance. On the one hand, many high-risk-zone properties remain overvalued, leaving borrowers exposed if prices adjust downward, which can increase the likelihood of mortgage defaults[9]. On the other hand, lenders generally require home-insurance backing that insurers no longer offer in some coastal, fire-prone, or flood-exposed areas. U.S. Federal Reserve Chairman Jerome Powell remarked on the potential long-term implications that, going forward, mortgages will become unavailable in certain regions[10]. Together, these trends threaten to curtail lending, depress home values, raise household debt burdens, and erode local property-tax revenues, with potentially far-reaching financial repercussions.

Retreating insurance markets can trigger a downward spiral ending in broader economic crisis As U.S. Senator Sheldon Whitehouse warned in May 2024, "*This isn't complicated. Climate risk makes things uninsurable. No insurance makes things unmortgageable. No mortgages crashes the property markets. Crashed property markets trash the economy.*"[11] This risk transmission chain highlights the magnitude of the problem: addressing the underinsurance problem is not only an insurance issue, but also a critical financial stability concern that demands immediate attention from policymakers, regulators and financial supervisors. Without coordinated policy interventions to realign incentives, support climate adaptation, and preserve risk-sharing across all economic actors, climate-driven insurance breakdowns could cascade into a systemwide economic crisis[12].

Insurance coverage is critical for credit and investment. A lack of insurance acts as a barrier to business growth and economic resilience. Companies depend on property, liability, and business interruption insurance to secure loans and attract investments. Without such insurance, banks would start to tighten credit conditions or even withdraw credit facilities. Similarly, investors would demand higher returns to compensate for uninsured asset exposures, raising firms' cost of capital, possibly diverting funding away from innovation and resilience projects precisely when they are most needed for climate mitigation and adaptation.

Uninsured or underinsured climate catastrophes amplify economic losses and delay recovery. When climate disasters strike regions with insufficient insurance coverage, households and businesses must self-finance the reconstruction or wait for government aid, lengthening downtime and reducing consumption. Economic losses also ripple through local and national economies, reducing productivity and increasing the cost of recovery. Research by EIOPA shows that the negative impact of large disasters on GDP growth is higher where insurance coverage is low[13]. In regions repeatedly hit by extreme weather events, underinsurance can ultimately compound into chronic underinvestment in infrastructure and public services, further eroding their long-term growth potential[14].

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[9] Unpriced climate risk and the potential consequences of overvaluation in US housing markets, Gourevitch & al., Nature, February 2023

[10] Insurance could kill mortgages in some of the US, Insurance Business Magazine, February 2025

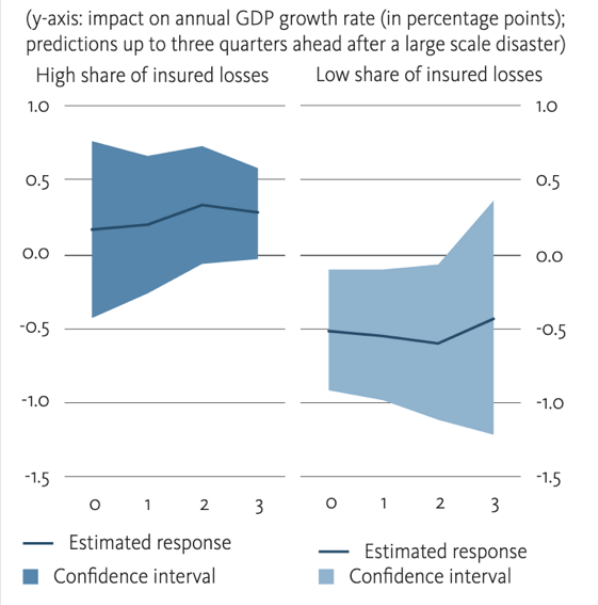
[11] Whitehouse Opening Statement at Hearing on Insurance Upheaval from Climate Change, US Senate Committee on the Budget, May 2024

[12] How the Next Financial Crisis Starts, Financial Times, June 2025

[13] Climate Change, Catastrophes and the Macroeconomic Benefits of Insurance, EIOPA, July 2021

[14] The Uninsurable Future Is Nearly Here, Michael C. Mitchell, August 2025

Figure 3 – Impact of large-scale disaster with high and low shares of insured losses on annual GDP growth rate for a sample of 45 countries



Source: Climate Change, Catastrophes and the Macroeconomic Benefits of Insurance, EIOPA

Government disaster relief for uninsured damages strains public finances. After Germany's catastrophic Ahrtal floods in 2021, federal and state authorities mobilized over EUR 30 billion in emergency reconstruction funds[15], amounting to about 0.8% of the country's GDP. Such government spending would not be sustainable in the long term, especially in the absence of a robust insurance framework to support risk and cost sharing. In comparison, France's national natural catastrophe insurance regime has shown how public-private partnerships can manage climate-related risks more effectively, with a historical split of natural disaster claims around 50/50 between private insurers and the state reinsurer CCR (Caisse Centrale de Réassurance). Over the years, CCR has generated a cumulative net positive contribution to state finances, requiring only limited public funds after the 1999 European winter storms[16].

The climate protection gap entrenches socio-economic inequalities. As private insurance markets become increasingly selective in risk underwriting, wealthy individuals and corporations remain better positioned to secure coverage, while those in vulnerable areas and lower-income households are increasingly left without financial protection. This reinforces socio-economic divides, exacerbating pre-existing inequality and leaving the most exposed populations to bear disproportionate financial and human costs. Lack of coverage also undermines small businesses in exposed neighborhoods, curbing local job creation and tax bases, and preventing these areas from achieving their full human and economic development potential. As the insurance gap widens, governments are also set to face mounting political risks. Deepening inequalities, poorly planned disaster relief, and unpopular fiscal choices to replenish public finances can ultimately combine to fuel public distrust and erode the legitimacy of public authorities.

[15] German leaders agree on €30 billion for flood-hit regions, DW, October 2021
[16] Das französische System der Studie Elementarschadenversicherung, page 16, Centre européen de la Consommation, November 2023

Central banks and financial supervisors recognize the systemic implications of the climate insurance protection gap. The International Association of Insurance Supervisors (IAIS) has issued a call for insurance supervisors to close protection gaps through enhanced supervision and market development[17]. It recently reemphasized and extended this call to action in a joint input paper with the World Bank for the G20 Sustainable Finance Working Group[18]. Similarly, the Bank for International Settlements (BIS) published a report analyzing the reinsurance protection gap and its potential to amplify financial instability[19]. In Europe, the European Insurance and Occupational Pensions Authority (EIOPA) has articulated a supervisory duty to address insurance protection gaps, advocating for measures that promote broader coverage and resilience[20]. Concrete policy steps are also emerging locally, such as Italy's introduction of mandatory climate insurance for businesses[21] and recent proposals from the German government aimed at expanding coverage through the mandatory offer of natural catastrophe coverage by insurers[22].

Why Markets Cannot Fix the Problem Alone: Misaligned Incentives and Obstacles to Coordinated Action

Climate risk reveals the tension between the micro-prudential and macroprudential goals of insurance supervision. Insurance supervisors are caught between their twin mandates of avoiding bankruptcies from insurers to protect customers over the short-term, and ensuring functioning insurance markets to protect society, the economy and the financial system over the long-term. In practice, insurance regulation and supervision focus mostly on micro-prudential aspects, i.e., ensuring that individual companies maintain sufficient capital buffers to meet their claims[23]. This is compatible with insurers repricing or avoiding increasing climate risks, but it can be at odds with the broader macroprudential need to preserve insurance markets' vital role in safeguarding financial stability. Over time, the primacy of the micro-prudential lens may erode the market resilience that supervisors seek to protect.

There are limits to what can be achieved through voluntary market initiatives. In the private insurance market, companies are primarily accountable to shareholders and incentivized to act individually, optimizing their own financial outcomes rather than working together toward long-term solutions for climate resilience. Anti-trust regulations also limit the ability of insurers to collaborate on systemic risk management strategies. Without binding commitments, even well-intentioned voluntary initiatives often fail to create the structural changes necessary to realign the insurance market with societal and macroeconomic goals.

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[17] A call to action: the role of insurance supervisors in addressing natural catastrophe protection gaps, IAIS, November 2023

[18] G20 Sustainable Finance Working Group input paper: Identify and address insurance protection gaps, IAIS/World Bank, July 2025

[19] Mind the climate-related protection gap – reinsurance pricing and underwriting considerations, Financial Stability Institute, March 2025

[20] The supervisory duty to address insurance protection gaps, EIOPA, February 2024

[21] Italy is implementing a mandatory regime to cover natural disasters, Howden, March 2025

[22] Koalition plant Pflichtversicherung gegen Naturgefahren, Euronews, April 2025

[23] Better green than sorry - Why the prudential framework for insurers should integrate systemic climate risks, Sebastian Mack, Jacques Delors Centre, June 2025

Limited regulatory interventions may also fall short. Piecemeal regulatory responses without holistic policy design and broad systems-thinking risk distorting market incentives and shifting risk, rather than addressing the underlying structural issues that exacerbate the climate protection gap. In Romania, for instance, mandatory property insurance against natural disasters exists on paper but lacks enforcement, leaving many homeowners without coverage despite legal obligations[24]. In California, regulation limiting premium increases was historically introduced in response to high insurance costs in wildfire-prone areas, but has gradually led to a number of insurers exiting the market. This has created a void filled by the state-created FAIR (Fair Access to Insurance Requirements) Plan. This situation is financially unsustainable over the long term since the plan, which was originally intended as an insurer of last resort, now finds itself burdened with a deep concentration of high-risk policies[25].

Deep-seated behavioral barriers hinder the adoption of solutions. Individuals often resist purchasing new coverage or renewing insurance at higher rates for coverage they perceive as unnecessary, particularly when the risk does not feel immediate. Similarly, governments and insurers hesitate to set up new risk-sharing initiatives such as Public-Private Partnerships (PPPs) or mandatory insurance schemes, due to concerns over the political and financial implications. This status quo bias can slow down the implementation of necessary reforms, but experience shows that once such policies are entrenched, the resistance factors tend to fade when such measures are already in place. This can be observed, for instance, in the case of the long-established forms of mandatory natural catastrophe insurance or public-private systems in countries as politically different as France and Switzerland[26].

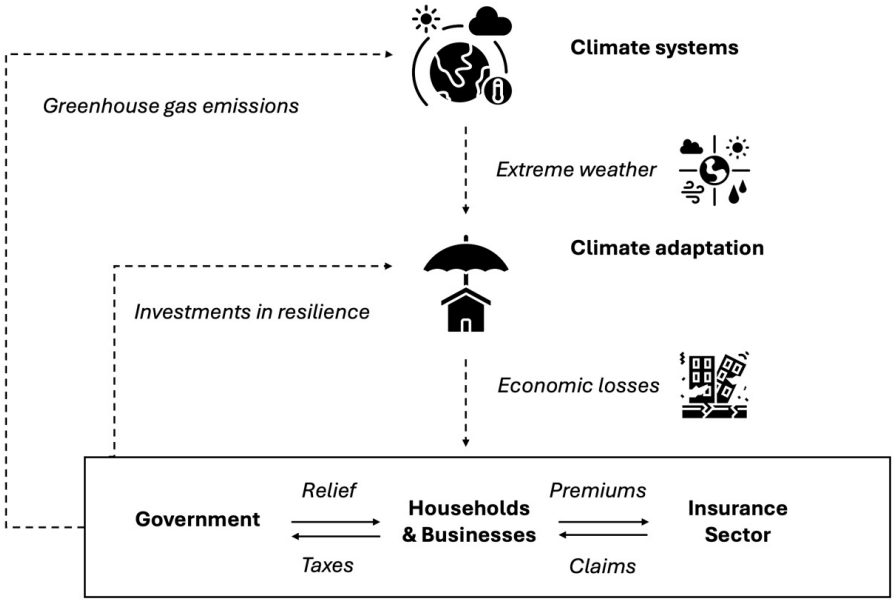
The main challenge to closing the climate protection gap is the misalignment of incentives between consumers, insurers, and governments. Households and businesses often expect insurers and governments to cover increasing climate-related risks, while governments hope that private insurance markets will shoulder the burden of risk transfer and that consumers will voluntarily invest in risk mitigation. As for individual insurers, they are not incentivized to take the lead in solving such collective action problems, and they also expect policyholders and governments to invest in resilience and risk mitigation efforts to reduce their vulnerability to catastrophic losses. This creates a circular dynamic where each party defers responsibility to the others, even though households and businesses end up paying anyway (whether through their own capital, insurance premiums, or taxes). To close the protection gap, we need coordinated public policies designed to ensure that governments, insurers, and consumers all bear a material share of the financial costs and benefits, with the goal of avoiding moral hazard and making sure that all stakeholders are incentivized to contribute to climate resilience.

[24] Four in five homes in Romania are uninsured despite law making it mandatory, Romania Insider, June 2022

[25] Structure of the California FAIR Plan and the financial challenges, Kennedys Law, April 2025

[26] Mind the climate-related protection gap – reinsurance pricing and underwriting considerations, Annex 2, Financial Stability Institute, March 2025

Figure 4 – Climate adaptation cycle (author's visualization)



POLICY RECOMMENDATIONS FOR ADDRESSING THE CLIMATE INSURANCE PROTECTION GAP

Bridging the gap between what insurers need to charge and what consumers can pay requires public intervention. As insurers reprice or reduce coverage to reflect mounting climate risks, many potential customers are deterred. For some, the obstacle is high premiums. For others, it is the upfront investment needed in physical resilience measures such as climate-resilient infrastructure, building hardening, early warning systems or nature-based solutions that would reduce their vulnerability and keep their risks insurable. Conversely, if the availability and affordability of insurance artificially increased without appropriate investments in climate adaptation to turn bad risks into insurable ones, demand may expand but insurers would face unsustainable exposures. Policy intervention from governments, in the form of regulatory changes, public-private risk pooling or targeted subsidies [27], is therefore necessary to keep climate insurance coverage simultaneously available, affordable and financially sustainable.

Governments need to preserve private insurance markets and step in only where they are retreating or absent. For many regions, economic sectors and lines of business, private insurers continue to price and underwrite climate risks effectively. In these cases, policy interventions could distort insurance's price-risk signals and increase moral hazard. However, in areas where insurance markets are retreating or non-existent, public-sector solutions are warranted to ensure basic coverage and societal resilience. The justification for such intervention is that climate insurance (like health insurance) is a public good which supports recovery and reduces demands on government budgets. By providing targeted support to private insurance markets in areas with the greatest need, policymakers can minimize distortions while extending coverage to those who would otherwise be left unprotected.

No single policy measure can eliminate the protection gap; a systems approach is essential. The complexity and scale of the climate insurance protection gap mean that piecemeal or isolated solutions are insufficient. Insurance markets face mounting strain in a growing number of climate risk hotspots and, in some cases, may collapse as climate change escalates and irreversible natural tipping points are crossed. To reverse this spiral and prevent insurance markets from "*swirling the drain*" [28], public authorities need to weave together a holistic suite of measures. Only by integrating upstream efforts (climate mitigation to curb greenhouse gas emissions), midstream policies (climate adaptation and investments in physical resilience) and downstream solutions (financial resilience and risk sharing through collaborative insurance solutions) can they bolster insurance coverage and meaningfully shrink the protection gap.

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[27] G20 Sustainable Finance Working Group input paper: Identify and address insurance protection gaps, section 3.1.6, IAIS/World Bank, July 2025

[28] Whitehouse Opening Statement at Hearing on Insurance Upheaval from Climate Change, US Senate Committee on the Budget, May 2024

Our policy framework advances two complementary axes: strengthening physical resilience and improving insurance coverage. We need to simultaneously reduce losses through enhanced physical resilience and expand the share of these losses covered by insurance. On the one hand, investing in climate adaptation and risk reduction (such as early warning systems, sustainable land use, flood barriers, improved drainage, and wildfire-resistant buildings) directly mitigates the physical impacts of climate change, lowering overall losses when disasters occur. On the other hand, expanding insurance coverage (by making products more accessible, affordable, and tailored to evolving climate risks) ensures that a greater share of losses is absorbed and mutualized by the insurance sector rather than falling directly on households, businesses or governments, thus strengthening the ability of societies to recover after disasters.

Increasing Physical Resilience through Incentives for Climate Adaptation

Boosting physical resilience requires investments from all economic actors and innovative financing partnerships. Research from the World Resources Institute shows that every dollar invested in resilience can save between 4 and 11 dollars in future losses[29], underscoring the value of proactive investments in climate adaptation. Long-term investment from policyholders, insurers, and governments alike is essential to enable meaningful resilience measures, since short-term financial horizons rarely justify the upfront costs of adaptation. Without a combination of premium rebates from insurers, subsidies from governments, and own financing by households and businesses, only minimal resilience upgrades are likely to be undertaken, leaving societies exposed to escalating climate risks. Banks and other financial institutions can further accelerate adaptation by extending affordable credit for upfront resilience measures. Central banks can support these initiatives through targeted refinancing facilities [30]. More generally, blended-finance structures combining public grants with private capital can amplify resilience investments and thus improve insurability.

Effective climate adaptation will only happen when policy, markets and insurance oversight move in step. Catalyzing physical resilience notably hinges on linking general prevention measures (like upgraded building codes or climate-proofed infrastructure) to financial resilience and to insurance, so that only the residual unmitigated risk ends up on insurers' books. For instance, financial regulators and insurance supervisors can condition subsidies, state guarantees, reinsurance support, or capital requirements on the adoption of climate adaptation measures by consumers and insurers. Critically, adaptation standards must be forward-looking and anticipate the climate conditions expected many years ahead, rather than merely respond to today's still evolving baseline. Otherwise, they may incentivize maladaptation.

Cultivating collective risk awareness reduces the losses from natural catastrophes. Japan's long-standing investment in building rules, public alerts, and school curricula for earthquakes and typhoons exemplifies how preparedness reduces human and economic losses. State-of-the-art, open-source risk maps (rather than a myriad of proprietary models from individual insurers) are also a public good, ensuring that all stakeholders share a common understanding of climate hazards, exposure and vulnerability. Creating a culture

[29] Adaptation Finance and Investment, World Resources Institute, retrieved July 2025
[30] Hitting the Mark: Design Choices in Targeted Refinancing, Muhammad Qaisar, Council on Economic Policies, April 2025

of risk awareness and prevention is a precondition for the economic viability of catastrophe insurance schemes. As reported in the New York Times after the 2025 Texas floods, "*Disaster preparedness is among the trickiest public services. Natural disasters happen regularly and everywhere, but they don't happen predictably, which means being ready for them requires extra precautions: It requires a lot of people on duty even when nothing is going wrong, to ensure they will be able to act when something inevitably does. It requires expensive infrastructure that does fairly little during normal times. That makes it a very good indicator of state capacity and wisdom.*"[31]

Preventing uncontrolled development in climate risk zones is key to halting the rising share of uninsured homes. Despite a rising awareness of climate hazards, more homes are still being constructed in vulnerable zones, increasing the share of uninsured households and exposing more people to disaster risks[32]. Stricter zoning and updated building standards for new developments, mandating fire-resistant materials or flood-proof foundations, are essential to counter this trend and preserve insurability. However, rules for new buildings alone cannot help with the vast stock of existing at-risk assets, underscoring the need for complementary insurance-linked adaptation incentives.

Resilience-enhancing investments should qualify for insurance discounts. Programs like Alabama's roof hardening initiative and California's Safer from Wildfires offer practical examples of how targeted incentives and insurance premium reductions can drive adaptation at the property level [33]. Better recognizing the resilience value of such infrastructure for reducing damage – and pricing it in insurance products – would encourage broader adoption and maximizes societal benefits. At the same time, nature-based solutions, such as wetlands that buffer storm surges or urban green spaces that reduce heat, should also be explicitly valued in insurance models, allowing hotels, utilities, or municipalities to price ecosystem services alongside traditional engineering. For instance, a new law mandates insurers in Colorado to either incorporate property-specific and community-level wildfire mitigation efforts into their models or provide discounts to policyholders who take such actions[34], and could serve as a blueprint elsewhere.

Embedding a long-term horizon in insurance underwriting is necessary to build back better after climate disasters. The UK's Flood Re program, for example, links premium discounts to rebuilt homes meeting elevated floor-level or flood-resistant design standards, shifting insurance from pure indemnification to resilience partner. Where adaptation hits limits (such as subsiding barrier islands or eroded shorelines), programs supporting voluntary, state-assisted relocation could also be integrated into insurance schemes, ensuring communities move before risks become physically and financially untenable.

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[31] As the Texas Floodwaters Rose, One Indispensable Voice Was Silent, New York Times, July 2025
[32] How Wildfires Are Torching The Home Insurance Industry, Forbes, June 2025
[33] How homeowners are saving on insurance by upgrading their houses against disasters, NPR, June 2025
[34] Risk Model Use in Property Insurance Policies, Colorado General Assembly, retrieved September 2025

Careful use of Artificial Intelligence (AI), geospatial data and other innovations can enhance resilience and insurability. Satellite imagery and sensor networks refine hazard models in real time, improving site-specific underwriting and early warnings. Post-event, automated damage assessment can accelerate claim payouts while curbing fraud. However, the adoption of these new technologies by insurers must be carefully supervised to avoid pitfalls such as privacy concerns, opaque algorithmic decisions and the demutualization of risk, ensuring that technological innovation supports inclusive and sustainable adaptation outcomes.

Insurers' investment portfolios should be mobilized to finance resilience upgrades. Insurers can play a transformative role not just in indemnifying ex-post losses but also in financing ex-ante climate adaptation[35]. Mobilizing the vast pools of financial assets managed by insurers toward climate adaptation projects is a powerful and underutilized lever for systemic change, provided insurers have clear incentives to invest proactively in climate resilience. Policy frameworks should vigorously encourage insurers to channel their investments into climate adaptation to reduce both their own future claims and society's collective vulnerability, thereby aligning their private interests with public resilience goals.

Increasing Financial Resilience through Better Insurance Coverage

The climate insurance gap can be narrowed by shifting market dynamics and by direct financial intervention. First, insurance market dynamics and participants' behavior can be reshaped by giving insurers new incentives to offer affordable and comprehensive coverage (such as through public reinsurance backstops and other regulatory incentives), by prompting consumers to value insurance more highly (for instance through educational campaigns aiming at improving financial literacy), and by making insurance more easy to purchase (for example by bundling it together with other products or financial services) [36]. Second, governments and collective risk-sharing pools can fill the remaining gap through solidarity-based premium surcharges or targeted subsidies, thereby redistributing costs to make insurance more available and affordable for those most exposed to extreme weather events. In this case, transparent and targeted pricing mechanisms are essential to avoid regressive cross-subsidies (otherwise, low-income households could end up paying more to subsidize wealthy homeowners in high-risk areas).

Regulators and supervisors are uniquely positioned to increase society's financial resilience by promoting better insurance coverage against climate risks. Regulatory and supervisory bodies play a central role in setting standards, monitoring market developments, and encouraging better insurance product design. In line with their macroprudential mandate to safeguard financial stability, they must drive the collective effort to reduce the climate protection gap. However, their effectiveness depends on coordinated action with governments and insurance market participants. This multi-actor approach is essential for closing the protection gap, as highlighted by the European Insurance and Occupational Pensions Authority (EIOPA) and other international bodies.

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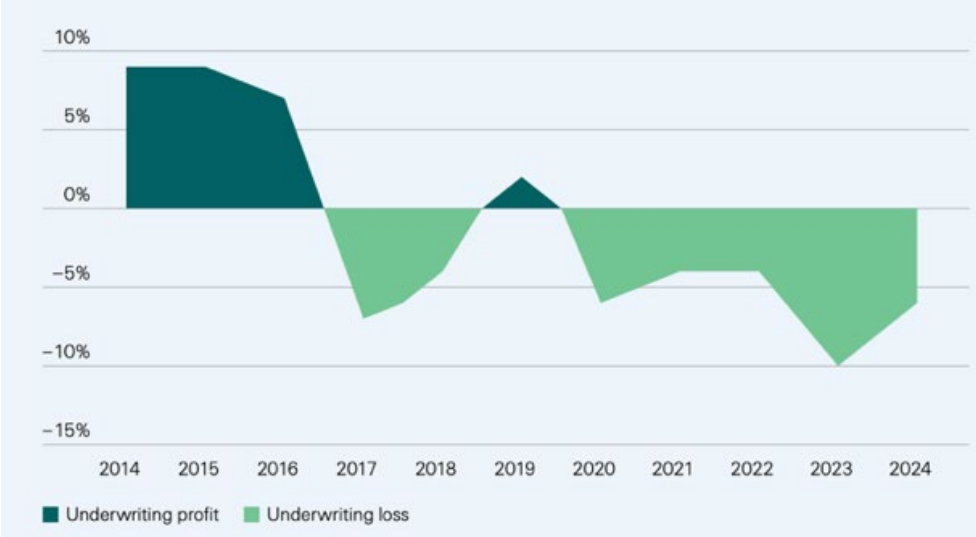
[35] G20 Sustainable Finance Working Group input paper: Identify and address insurance protection gaps, page 18, IAIS/World Bank, July 2025

[36] G20 Sustainable Finance Working Group input paper: Identify and address insurance protection gaps, sections 2.3 and 3.1.4, IAIS/World Bank, July 2025

Tailored capital requirements can incentivize the provision of insurance against climate risks – but alone they are insufficient to address the protection gap. Prudential authorities should introduce a macroprudential capital buffer to account for the systemic risks linked to the climate insurance protection gap[37] and then grant capital reductions to those insurance companies that underwrite properties and other assets with demonstrated resilience measures in high-risk regions, with a view to influencing insurers' return-on-equity calculations and nudging market behavior. However, where underwriting results trend towards increasing losses (as evidenced by Swiss Re's analysis of U.S. property insurance markets[38]), reducing the capital denominator in the return-on-equity equation will not offset negative profits in the numerator and entice insurers to return. Changes in capital requirements are thus a useful but light-touch intervention, which needs to be complemented by broader public action.

Figure 5 – U.S. homeowner insurance underwriting result



Source: AM Best, Swiss Re Institute

Parametric insurance and catastrophe bonds can support coverage in regions vulnerable to climate risks. Parametric insurance, which pays out based on predefined triggers such as rainfall levels or wind speeds rather than actual loss assessments, can speed up claim payment and lower administrative costs. It is already widely used in parts of Africa and China, notably for agricultural insurance, and has untapped potential in developed insurance markets. Similarly, catastrophe bonds transfer risk from insurers to global capital markets, offering insurers additional capacity for insuring extreme weather events beyond traditional reinsurance. They are well developed for U.S. property insurance but underutilized in Europe. Promoting the use of such instruments for qualified investors by simplifying their regulatory frameworks and ensuring appropriate capital treatment could catalyze wider adoption and help extend coverage[39].

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[37] Principles for Addressing Climate Systemic Risks with Capital Buffers, Pierre Monnin, Council on Economic Policies, October 2024

[38] Sigma No 1/2025,Swiss Re, April 2025

[39] G20 Sustainable Finance Working Group input paper: Identify and address insurance protection gaps, sections 3.1.1 and 3.2.2, IAIS/World Bank, July 2025

Carefully designed multi-year contracts would align stakeholders' incentives with long-term resilience and foster market stability. Multi-peril, no-exclusion natural catastrophe insurance that locks in coverage for several years could potentially replace annual insurance policies with partial coverage. This would encourage policyholders and insurers to co-invest in preventive measures, knowing that they will both reap benefits over the longer contract horizon. Ensuring the portability of such contracts would protect consumers and allow them to transfer policies when they sell or refinance, while claw-back conditions could guarantee insurers' upfront contribution to investments in resilience. From a capital standpoint, regulators could grant favorable macroprudential treatment for longer contracts, recognizing their market-stabilizing effect relative to one-year policies. Aligning insurance terms with mortgage durations would also be beneficial for real-estate financing, since property insurance is a prerequisite for bank lending in most countries. Isolated practices for long-term property insurance already exist, such as fire insurance contracts in Japan (which also include coverage against wind disasters like typhoons, lightning strikes, snow and hail)[40].

Mandatory climate risk coverage can strengthen insurance pools – but only if coupled with risk awareness and prevention measures. Implementing obligatory insurance for climate perils (as is already the case in several countries) may be necessary to prop up retreating insurance markets[41]. However, it must be carefully designed and supported by complementary risk prevention incentives to ensure long-term financial viability. Options include mandates to buy, to sell, or to include disaster insurance within property insurance policies, or some combination thereof, each with distinct trade-offs. Allowing opt-out options (as seen in Germany's recent proposal) may seem politically appealing, but it exposes the scheme to adverse selection, as lower-risk or lower-income households may leave the pool and undermine collective risk-sharing. Even for solidarity-based mandatory insurance schemes, premiums should reflect true actuarial costs and preserve as much as possible the critical insurance price-signal of risk. Any cross-subsidies should be made clearly visible to insurance customers, rather than hidden within 'net-affordable' premiums that blur risk reduction incentives and obscure true costs. This approach would ensure that insurance remains both affordable and effective as a risk management tool.

Public–Private Partnerships (PPPs) and multistakeholder initiatives can pool risk at scale and optimize collective governance. Effective PPPs can share responsibility and promote risk resilience to help address affordability and insurability challenges in the face of escalating climate risks[42]. According to research from the ECB, EIOPA, and the OECD, European countries with a national scheme for natural insurance catastrophe have a share of insured losses that is twice the continent's average. PPPs can be implemented through a variety of local models, as documented by the Carnegie Endowment for International Peace[43]. Examples of public schemes that effectively support coverage against natural disasters and risk mitigation notably include France's natural catastrophe regime[44] and

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[40] Homeowners Insurance in Japan: Fire and Flood Insurance Explained, realestatejapan, February 2022

[41] G20 Sustainable Finance Working Group input paper: Identify and address insurance protection gaps, section 3.1.5, IAIS/World Bank, July 2025

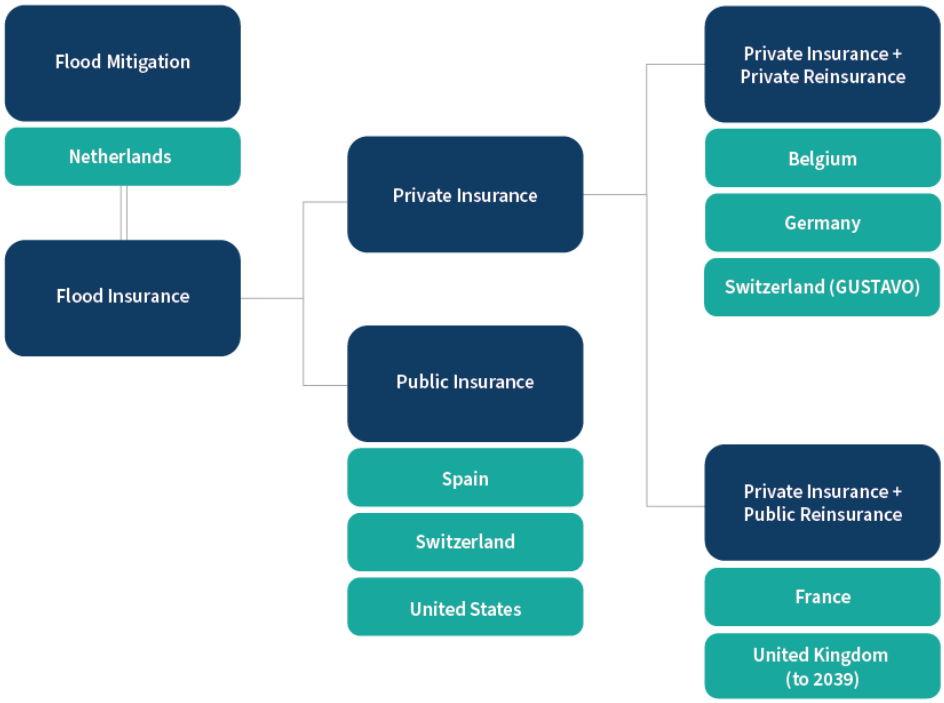
[42] G20 Sustainable Finance Working Group input paper: Identify and address insurance protection gaps, section 3. 4, IAIS/World Bank, July 2025

[43] Comparing National Flood Insurance Frameworks: Lessons and Trade-Offs, Carnegie Endowment for International Peace, May 2025

[44] Under this regime, the indemnification is conditional on the French government issuing an official decree declaring a state of natural disaster for the specific locations, dates, and type of event involved

Flood Re in the United Kingdom[45]. There is also additional potential at the regional and supranational level, as exemplified by the joint ECB/EIOPA proposal for a European reinsurance PPP aiming to aggregate cross-border risk[46]. In order to facilitate new innovative PPP initiatives, legal constraints on public subsidies and antitrust competition laws should also be adapted.

Figure 6 – Typology of flood management systems



Source: Carnegie Endowment for International Peace, Comparing National Flood Insurance Frameworks: Lessons and Trade-Offs

[45] Flood Re covers residential UK properties which have been built before 01 January 2009, but does not extend to businesses or to recent residential properties

[46] Towards a European system for natural catastrophe risk management, ECB/EIOPA, December 2024. However, this proposal does not entail mandatory participation or a direct link to risk prevention measures.

CONCLUSION

Climate change threatens insurance markets and requires systemic intervention. Persistent underinsurance in the face of escalating climate risks highlights the misalignment of short-term market incentives with long-term societal needs for resilience. Addressing these challenges requires more than incremental reforms. It calls for comprehensive policy solutions and systemic interventions spanning climate adaptation, regulatory changes, and public-private risk sharing to bridge the climate protection gap and adapt to the realities of a warming planet.

The future of insurance will be defined in part by its commitment to climate resilience. As outlined in scenario analyses such as the Climate Majority Project's Future of Insurance[47], the insurance sector faces starkly divergent paths. On the one hand, a future-proof pathway sees insurers, governments and communities co-investing in adaptation and broadening coverage through innovative instruments. On the other hand, failure to reform and business-as-usual results in widespread insurance withdrawal from high-risk areas, soaring protection gaps and cascading financial shocks.

Balancing risk-based pricing with affordability is a central policy dilemma. Adequately reflecting climate-driven hazards in insurance rates is crucial to signal risks and incentivize adaptation, but unchecked premium increases will price out vulnerable households, small businesses and ultimately entire regions. Designing schemes that preserve affordability while maintaining actuarial integrity is the delicate trade-off lying at the heart of closing the protection gap. Navigating this tension requires innovative regulatory approaches and targeted public interventions, such as risk pooling and investment in risk climate resilience.

A long-term, multi-stakeholder policy vision is essential to safeguard insurability and financial stability. To contain the climate protection gap, financial supervisors, regulators, policymakers, and insurers must jointly commit to a long-term strategy that aligns market incentives with effective public intervention, and where the costs and benefits are shared between all stakeholders. This collaborative vision is necessary to ensure that insurance remains a cornerstone of climate adaptation and financial stability in the decades ahead. The time to act is now, before the climate protection gap becomes an unbridgeable chasm.

[47] Future of Insurance in a post-1.5°C world, Climate Majority Project, February 2025

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