G20 Sustainable Finance Working Group input paper:

Identify and address insurance protection gaps

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Executive Summary

In the face of growing challenges caused by natural catastrophes, insurance should be a key element of comprehensive disaster risk financing strategies. Increasing damage and economic losses from natural catastrophes (NatCat)[1] are widening protection gaps and causing strain on economies and government budgets, with potential systemic ramifications. By promoting risk-based approaches, insurance solutions can contribute to risk reduction[2] and strengthen societal resilience.

NatCat protection gaps are a global challenge, affecting both advanced and emerging market and developing economies (EMDEs), and therefore require global responses. Insurance, including reinsurance, can play a critical role in managing the physical risk and financial impacts of NatCat events, supporting recovery efforts, and promoting resilience.

Reducing protection gaps will require strong and intensive collaboration between governments, supervisors, the insurance industry, civil society, and development partners. Coordinated action – including public private partnerships – is essential to enhancing resilience, addressing the growing impact of NatCat events, and ensuring that insurance solutions are accessible, affordable, and effective for all segments of society.

Globally, there are significant challenges to the insurability of NatCat events, many of which are more pronounced in EMDEs. Rising NatCat risks will increase insurance costs, making insurance less affordable and thereby further widen protection gaps. In EMDEs, low insurance penetration is driven by demand-side factors such as income constraints, access limitations, limited risk awareness, low financial literacy, mistrust of insurance products, and reliance on government or donor assistance. On the supply side, challenges in EMDEs include underdeveloped domestic insurance markets, limited technical capacity of insurers and supervisors, and insufficient access to data and catastrophe risk models, which are critical for accurate risk assessment and pricing.

Insurance-based solutions cannot address all NatCat risks on their own, nor is it desirable or cost effective for insurance to remove incentives to proactively plan for and manage disaster risk. As such, broader risk reduction efforts such as disaster-resistant building codes and enhanced infrastructure resilience are critical to reducing vulnerabilities and expanding the insurability of unprotected assets. Integrating these efforts with disaster risk financing strategies, including risk transfer instruments such as insurance, creates a comprehensive approach to disaster risk management and financing.

This paper outlines a range of approaches that stakeholders can take to address NatCat insurance protection gaps. To support the practical application of the paper, this is supported by illustrative case studies, with a focus on EMDEs. It is important to note, however, that there is no one-size-fits-all solution to NatCat protection gaps, and jurisdictions will need to consider local circumstances when implementing any solution.

Successfully implementing insurance-based solutions that address protection gaps will require certain foundational steps. These include:

- Building capacity to assess exposure to NatCat events and protection gaps, including addressing data and model challenges

[1] For the purpose of this paper, the term 'natural catastrophe' (NatCat) will refer to damages caused or accentuated by NatCat events such as floods, earthquakes, and storms and could be used interchangeably with the term 'disaster risk' which is commonly used by other organizations such as the OECD, the World Bank, and the UN.
[2] For the purpose of this paper, actions under the term 'risk reduction' include a range of actions, aimed at preventing new and reducing existing disaster risk and managing residual risk, all of which contribute to strengthening resilience (inspired by OECD (2023)).

- Implementing risk-based and proportionate supervisory frameworks
- Improving financial literacy and risk awareness
- And incentivizing risk reduction.

Building on these foundations, insurance-based solutions can play a transformative role in addressing protection gaps via their ability to reduce risk and limit economic losses. For example, parametric insurance provides quick payouts based on predefined triggers and can enable scalable coverage (although basis risk[3] poses a challenge), while microinsurance offers affordable and accessible products that cater to low-income populations. Technology-driven tools can further enhance the efficiency of and access to insurance-based solutions. Integrating incentives for risk reduction measures in the design of insurance products, in addition to underwriting and pricing practices, can help further reduce policyholder exposure to risk. Some jurisdictions have also implemented mandatory insurance programs (with and without premium subsidies) to increase insurance uptake. However, if adopted, these programs should be tailored to local contexts and incorporate strong consumer protections to ensure their appropriateness, effectiveness, and sustainability.

Robust risk transfer mechanisms are essential to providing more accessible and affordable insurance. These include global reinsurance, catastrophe bonds, and catastrophe insurance risk pools, all of which spread risk across larger groups, reduce the financial burden on individual insurers, and increase affordable coverage in high-risk regions. While EMDEs and small jurisdictions can face challenges to accessing such mechanisms, there are strategies to overcome this issue. These strategies involve regional catastrophe insurance risk pools that diversify risk across countries with varying risk profiles. Such pools facilitate access to international reinsurance and capital markets, and in certain cases the pricing and underwriting capacity associated with them can be favorable to EMDEs.

There is no perfect solution to narrowing NatCat protection gaps and it is important to understand the trade-offs between different options, including the role of public versus private market solutions, and to consider possible unintended consequences like moral hazard. Many of the solutions described in this paper require significant upfront investment by various stakeholders, including the government. These investments should be weighed against the alternative of inaction (both in the short term and projected), which could expose economies to uncertain and potentially severe economic, social, political, and fiscal impacts.

If well-designed and implemented, public-private insurance programs (PPIPs) can be an important part of the solution to address NatCat insurance protection gaps. Solutions to address protection gaps are most effective when they involve multi-stakeholder collaboration, including supervisors, governments, the insurance industry, and civil society. PPIPs are an example of such collaboration and can leverage the strengths of each stakeholder: supervisors provide regulatory and supervisory oversight and advice; governments, International Organizations (IOs), and Multilateral Development Banks (MDBs) offer financial and technical support and facilitate access to data; and insurers contribute expertise in underwriting, risk assessment, and claims management. Civil society can play a key role in advising on relative priorities. Where the role of the public sector in PPIPs has a substantial fiscal impact, this should be carefully assessed and modelled considering long-term implications.

Technical capacity in EMDEs can be built through expert advisory services and experience sharing, especially as a first step, though knowledge transfer is accelerated through direct experience. Actively investing in insurance foundations such as those identified in this report,

[3] Basis risk is the risk that an insurance or reinsurance product does not pay out as expected when the policyholder experiences a loss.

partnering with international market leaders (such as reinsurers and brokers) and MDBs, and building experience of insurance transactions are all required to build domestic capacity. Throughout the process, knowledge exchange with jurisdictions at different levels of insurance market development can help inform strategic decision making and build technical capacity of key stakeholders.

Building on this report, the IAIS and the World Bank will continue their efforts to provide practical guidance and tools to assist policymakers and supervisors, notably those in EMDEs, in addressing NatCat protection gaps. We will seek opportunities to work together and with other international organizations and partners to support stakeholders in implementing targeted, scalable, and sustainable solutions to strengthen resilience against NatCat events.

1 Introduction and objective

The purpose of this paper is to provide input to the G20 Sustainable Finance Working Group (SFWG) recommendations, with practical approaches that policymakers, the insurance industry, and supervisors[4] can take to address natural catastrophe (NatCat) insurance protection gaps, with a particular focus on emerging market and developing economies (EMDEs).[5] The paper builds on the IAIS call-to-action report[6] and is framed as a "guide for action," as it provides jurisdictions a range of practical and implementable actions they can take to narrow NatCat insurance protection gaps. The paper is not a literature review, nor is it intended to provide a one-size-fits-all approach to addressing such gaps.

The paper is structured to:

- Outline the context for the widening of NatCat insurance protection gaps and the implications, particularly for EMDEs.
- Provide guidance on actions that lay the foundation for effective insurance-based solutions to address protection gaps.
- Set out potential insurance-based solutions that can be pursued through multi-stakeholder approaches to reduce the financial and societal impact of NatCat events and thereby build resilience.

1.1 Responding to growing natural catastrophe risk

Over recent decades, damage and economic losses caused by NatCat events have been increasing. Globally there has been an alarming rise in the frequency and severity of NatCat events such as hurricanes, typhoons, wildfires, and floods.[7] The impact of this has been amplified by other factors such as environmental degradation, urbanization in high-risk areas, and growth in the value of exposed assets (i.e., property, infrastructure, or other valuable assets at risk of being damaged or lost due to specific hazards).

[4] In this paper "supervisors" include both regulators and supervisors. References to "supervisors" refer to insurance supervisors unless explicitly stated otherwise.
[5] In this paper the classification of EMDE is taken from the IMF World Economic Outlook.
[6] IAIS (2023), *A call to action: the role of insurance supervisors in addressing natural catastrophe protection gaps*.
[7] Between 2000 and 2020, there were 4,623 climate-related disaster events recorded in the EM-DAT International Disaster Database. They directly impacted over 3.39 billion people, equivalent to 44% of the global population in 2020. International Journal of Disaster Risk Reduction, *Global hotspots of climate-related disasters*, Volume 108, 15 June 2024.

A layered mix of instruments can be used to protect against the growing impact of NatCat events. Risk layering, at both the macro and micro levels, helps to optimize financing, improve cost-effectiveness, and address the timeliness of funding. The three layers focus on risk reduction and preparedness, risk retention, and risk transfer. Risk reduction refers to efforts to mitigate or reduce physical risks to lessen the impact of a NatCat event. Risk retention includes contingent financial products, such as contingent credit lines that provide access to immediate liquidity after a NatCat event, and budget reallocations, which divert spending from other planned government programs upon a NatCat event. Market-based risk transfer products form the top layer and consist of solutions such as domestic insurance, public asset insurance, sovereign or subnational catastrophe insurance, and alternative risk transfer solutions such as catastrophe bonds.

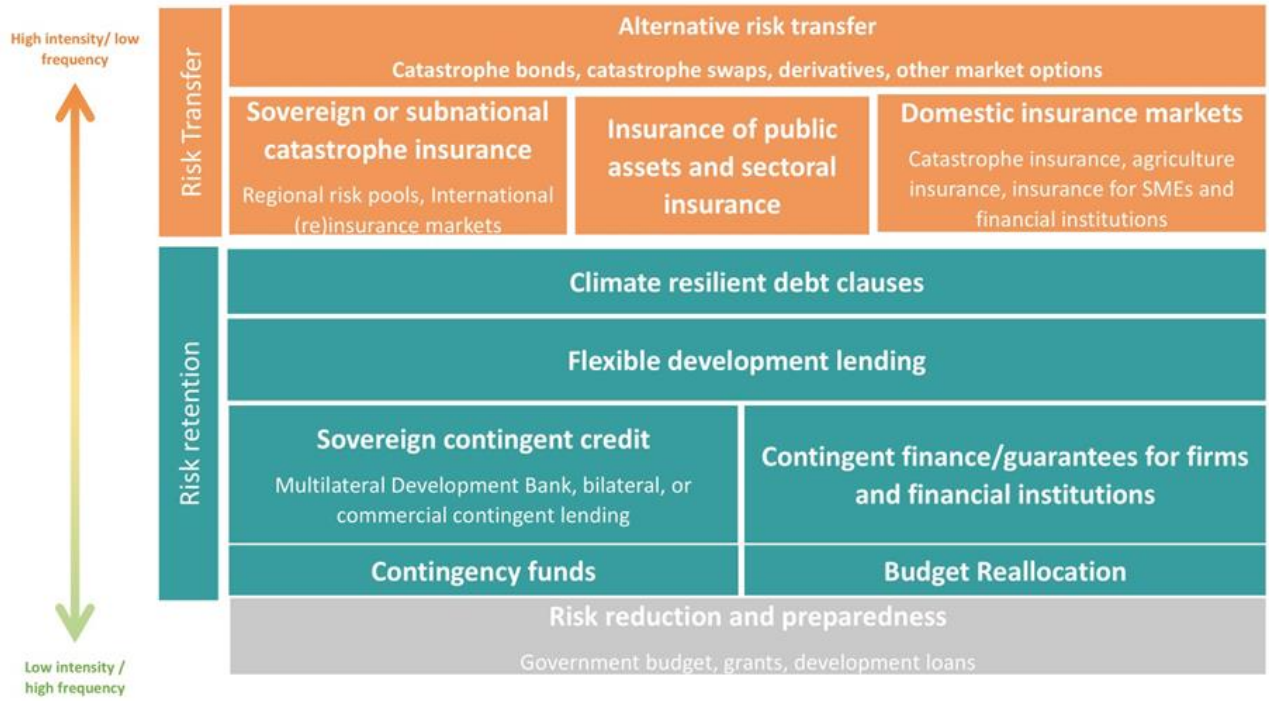


Figure 1: Risk layering of financial instruments for countries (Source: World Bank)

Within this mix of instruments, (re)insurance[8] solutions can play a significant role in managing the economic and social impact of NatCat events. Insurance offers financial protection against damage to and loss of physical assets, as well as indirect economic losses, and can provide a prompt source of funds to support response, recovery, and reconstruction after NatCat events, helping to minimize further economic disruption caused by delays. Insurance also provides incentives for risk reduction and preparedness before a disaster, which could in turn reduce the stress on post disaster response mechanisms. Besides microeconomic benefits, insurance also contributes to macroeconomic resilience by helping to mitigate the negative financial/fiscal impacts on an economy after a natural disaster and enabling faster recovery of essential services. Furthermore, the insurance business model inherently contributes to financial stability through the pooling and diversification of risk. Insurers are also large-scale institutional investors that can provide long-term funding to the economy.

[8] In this paper, references to insurance are generally assumed to also include reinsurance.

1.2 The widening natural catastrophe insurance protection gap

Increasing damage and financial losses from NatCat events are challenging the capacity of private insurance markets to provide sufficient and affordable insurance coverage. At the same time, the take-up of NatCat insurance by individuals is hampered by lack of access to insurance, lack of knowledge or trust in insurance, and reliance on government intervention or international aid to support disaster risk financing after the disaster has struck.

This results in a growing proportion of economic losses that are not covered by insurance, resulting in "insurance protection gaps" that reduce society's ability to recover from shocks. In the context of natural catastrophes, insurance protection gaps typically refer to the portion of economic losses from such events that are not covered by insurance. Another perspective defines insurance protection gaps as the uninsured portion of losses that could have been insured but were not.[9]

To effectively address NatCat insurance protection gaps, it is essential to consider how to increase affordability, availability, and take-up of insurance by households and businesses, while also incentivizing risk reduction. Doing so involves taking actions to address demand for insurance (i.e., factors affecting the willingness or ability to buy insurance) and supply of insurance (i.e., factors affecting the availability of insurance products and services). This requires a multi-stakeholder approach, engaging governments and insurance supervisors, the insurance industry, International Organizations (IOs) and Multilateral Development Banks (MDBs), and local communities and consumers.

1.3 EMDE vulnerability to protection gaps

EMDEs are especially vulnerable to NatCat events, often lacking the financial resources, infrastructure, and insurance coverage to recover from such events swiftly.[10] Access to appropriate and affordable insurance remains inadequate in many EMDEs, leaving billions without access to adequate financial protection and more vulnerable to the impacts of NatCat events. Access to insurance remains low in EMDEs compared to advanced economies. According to the 2024 IMF Financial Access Survey,[11] the number of non-life insurance policies varies significantly from country to country, ranging from as low as 9 policies to nearly 3,000 policies per 1,000 adults in surveyed EMDEs. For the advanced economies surveyed, this ranged from 868 to just under 5,800. The insurance protection gap for EMDEs is also disproportionately higher compared to advanced economies. In 2023, disaster losses worldwide covered by insurance represented 31 percent of total economic losses; in most EMDEs the figure is less than 10 percent.[12]

Insurance protection gaps, particularly in EMDEs, can severely impact economic sectors like agriculture, real estate/housing, infrastructure, and public assets (Figure 1). For example, insurance protection gaps in agriculture leave farmers and agribusinesses exposed to financial losses that can threaten their livelihoods as well as the stability of the sector. Swiss Re Institute analysis indicates that in many EMDEs more than 85 percent of insurable crop production was unprotected as of 2022, while globally there is a US$113 billion crop protection gap.[13]

[9] See, for example, Global Asia Insurance Partnership (GAIP), About the Protection Gap, 2023 and Geneva Association, Understanding and Addressing Global Insurance Protection Gaps, 2018.
[10] It is acknowledged that there is significant diversity within the broad banner of EMDE and that the challenges in establishing and operating such insurance schemes vary depending on a range of factors.
[11] IMF, *Financial Access Survey*.
[12] AON (2024), *Climate and Catastrophe Insight*.
[13] Swiss Re (2023), *Crop insurance: offering a way to support food security*.

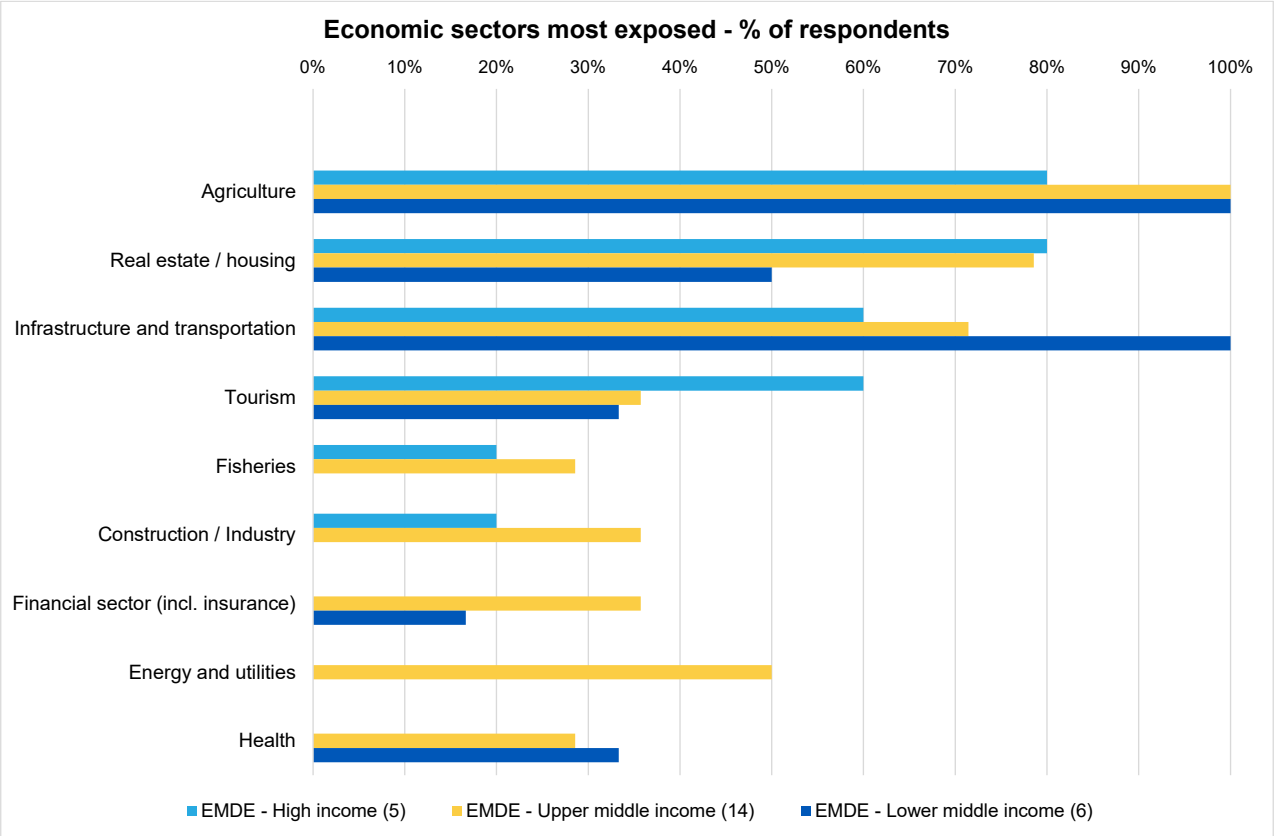


Figure 2: Economic sectors most exposed in EMDE countries (Source: WBG-IAIS Member survey, 2025. *Numbers between brackets indicate the number of countries in that country classification; classifications themselves are based on World Bank country classifications by income level).*

Common underlying factors explaining the size of the insurance protection gap in EMDEs include low levels of financial literacy, affordability, and mistrust of insurers. In addition, low institutional capacity and limited resources in insurers and supervisory authorities may lead to inadequate pricing and solvency. EMDEs also face challenges such as underdeveloped capital markets, limited access to international financial markets, including reinsurance markets, insufficient data, lack of an enabling regulatory environment, and insufficient investment in risk mitigation.

NatCat events can cause significant damage and economic losses to infrastructure and public assets, leading to disruption of essential services. Governments often bear the costs of recovery and reconstruction, especially for uninsured public assets; however, many EMDEs face increasingly limited fiscal capacity to absorb these financial shocks.[14] Thus, securing funding for post-disaster response, recovery, and reconstruction is essential to ensure timely service recovery, rehabilitation to protect lives and health, and reduction of the long-term economic impact.

2 Foundations for effective insurance solutions

Regardless of a jurisdiction's specific circumstances (such as its fiscal capacity, insurance penetration, or market development), there are certain foundational steps that are critical for the successful implementation of insurance-based solutions. These foundations should be

[14] OECD (2012), *Disaster Risk Assessment and Risk Financing: A G20/OECD Methodological Framework*.

integrated into broader strategies to address protection gaps, with the approach, stage of advancement, and specific targets tailored to the jurisdiction's stage of development. These foundations take time and scaling up solutions will be difficult without them.

2.1 Assess protection gaps and exposure to NatCat risk

It is important to develop a common understanding of the protection gap. This includes assessing a jurisdiction's overall exposure to NatCat events, the underlying drivers, and expected future trends. This entails having an understanding of the relevant perils, and current and expected economic losses resulting from NatCat events. A similar assessment is required for the current size and expected trend of the protection gap and its underlying causes (e.g., a lack of offer and/or demand for insurance.

Investments in improvement to risk data can also reduce the costs of insurance, as insurers and reinsurers can reduce the 'uncertainty loadings' that are built in to allow for insufficient data.

Data sharing challenges

Historical data is crucial for climate and extreme weather-event modelling, but does not always exist, particularly in EMDEs. The assessment of protection gaps requires access to detailed data and further development of granular models, given the spatial nature of NatCat risk. In assessing protection gaps, historical data as well as forward-looking data (from models) are often used. However, sufficiently granular meteorological data does not always exist, particularly in EMDEs. This can be, for example, due to the lack of an extensive network of meteorological stations. Additionally, data on economic losses from disasters is frequently a challenge in EMDEs, including the existence of clear budget tagging and recording of disaster spending, or through disclosure of disaster losses by the insurance and financial sectors. While various estimation techniques could be employed to address such gaps, they will introduce a level of approximation into the overall results.

Improving the quality of analysis related to NatCat exposures and protection gaps will require addressing data- and model-related challenges, and greater data sharing. Addressing challenges related to data and modelling protection gaps requires collaboration between governments, supervisors, the insurance industry, IOs and MDBs, modelling experts, and academics.[15] This will require effective data sharing, as each party often has access to specific data sets. Challenges to this include funding the cost of obtaining and maintaining data access, and legal and commercial constraints limiting the ability of different parties to share data. Making detailed and accurate data widely available will also prompt academics and commercial providers to develop more sophisticated models that require such data for their calibration and running. These advances can help build economic models to understand how the impact of NatCat events and insurance protection gaps can propagate through the wider financial and economic systems, which is an area that would benefit from improved modelling.

Challenges to modelling vulnerability

Understanding and modelling the vulnerability of different assets to NatCat risk remains an important challenge. Comprehensive NatCat assessments require detailed understanding of both insured and uninsured assets (including infrastructure and public assets). This requires not only data covering various important characteristics of each asset (construction type, size, age, etc.), but also the use of models to simulate the damages depending on the vulnerability of the asset and the severity of the NatCat event. Sufficient historical data is often key for the appropriate calibration of such models. However, barriers for sharing of such data (e.g., insurance claims data), as well as

[15] For example, the Insurance Development Forum supports multi-party initiatives aimed at improving risk modelling infrastructure and promoting accessibility and use of models and data on open platforms.

lack of data itself, especially in EMDEs, often constrain the ability to improve vulnerability modelling. Accurate evaluations of risk prevention measures will improve the reliability of such assessments. In particular, detailed data about existing adaptation measures, such as flood walls, and their effectiveness is critical. Also, it is important to consider the effectiveness of the existing infrastructure, which depends on its regular maintenance. Finally, addressing insurance protection gaps requires assessing the vulnerability of the population due to loss of livelihood, death, injury, or sickness in the wake of natural catastrophes. Such loss of resilience can put additional strain on fragile social protection mechanisms.

Peru – Developing data-driven insights into NatCat protection gaps

Peru, through its financial regulator, the Superintendencia de Banca, Seguros y Administradoras Privadas de Fondos de Pensiones (SBS), has undertaken efforts to assess protection gaps by analyzing the coverage of catastrophic risks across the country. Using probabilistic methodologies developed with local expertise, SBS evaluates insured portfolios for risks such as earthquakes, tsunamis, and floods, supported by detailed data on geolocation, structural characteristics, and economic exposure. This work has revealed a significant protection gap, with only 800,000 insured assets out of an estimated 10 million properties nationwide, leaving 92 percent of assets without coverage. SBS also collaborates with the Ministry of Finance to improve data collection for public assets, aiming to enhance disaster risk financing strategies. These efforts provide a clearer understanding of the exposure covered by private insurance while highlighting the need for broader risk management solutions.

For further detail, see Annex 2.

Various stakeholders can play a role in assessing protection gaps and exposure to NatCat risk, as shown below, noting that overall impact will depend on collaboration between all stakeholders.

Possible actions to assess protection gaps and exposure to NatCat risk		
	Starting point	**Advanced actions**
Governments	• Facilitate the collection and dissemination of comprehensive NatCat data (data on economic losses and uninsured losses). • Improve recording of fiscal spending on disasters, for example through disaster budget tagging.	• Contribute to open data initiatives. • Collaborate with various stakeholders to improve the accuracy and availability of risk models
Supervisors[16]	• Collect (and potentially share) data from insurers on insured losses.	• Promote the development of NatCat models to evaluate risk, including encouraging enhanced transparency of the modelling approach and sensitivity of results to key assumptions;

[16] For the purposes of this paper, supervisors are addressed separately from 'government' due to their particular role as the authority (or authorities) responsible for insurance supervision.

		provide (scenario) analysis on the root causes and extent of the protection gaps.
(Re)insurers (and modelers/brokers)	• Collect and disseminate relevant NatCat-related data. • Promote model transparency, helping stakeholders understand and identify potential exposures and the influence of related risks.	• Develop models to enhance risk assessment for regions lacking robust catastrophe data. • Contribute to open data initiatives. • Improve resolution and granularity of NatCat modelling to better reflect risk and enhance peril coverage for under-modeled or emerging perils; integrate vulnerability and socioeconomic data in models to betters estimate losses in underserved populations.
IOs/MDBs	• Support the development and standardization of NatCat risk data collection and sharing practices; alongside governments, facilitate the collection and dissemination of comprehensive NatCat data at the global level.	• Contribute to initiatives aimed at improving modelling capabilities and fostering international collaboration.
Academia / Research centers	• Academic and research centers can deepen analysis and provide technical expertise on particular risks and structural vulnerability to NatCat events.[17]	

2.2 Implement a sound insurance supervisory system

A sound supervisory system is necessary for the protection of policyholders and promotion of financial system stability and is therefore a necessary precondition for any sustainable insurance-based solutions. Risk-based solvency (RBS) regimes (prudential requirements) enhance insurers' financial resilience and preparedness to respond effectively to NatCat events; and market conduct supervision promotes fair consumer outcomes and strengthens public trust. In applying prudential and market conduct requirements, supervisors should apply the principle of proportionality to ensure an enabling regulatory and supervisory environment that supports market development while ensuring adequate policyholder protection. Some insurance supervisors have explicit mandates to promote or support insurance market development. Regardless of mandate, all supervisors have either an explicit or implicit responsibility to address protection gaps.[18]

[17] For example, the GAIP has undertaken work with the Earth Observatory of Singapore on rising sea levels and its importance to the insurance sector, which provided insights that could be used to further refine cat models on risks associated with storm surge.
[18] IAIS (2023)

In some jurisdictions, insurance regulatory frameworks have been purposefully adjusted to enable the design and effective distribution of appropriate and affordable insurance solutions. For example, strengthening supervisory requirements with respect to the design of products that respond to consumers' interests, allowing index-based insurance products, admitting schemes such as risk pooling or alternatives to reinsurance risk transfer mechanisms, data-sharing schemes, and innovative uses of technologies, as well as providing flexibility for the distribution of products at the macro level.[19]

2.2.1 Risk-based solvency (RBS)

An RBS regime is a comprehensive, formally structured regime that aims to ensure that insurers hold adequate capital levels to match their risk profiles and remain financially resilient, supported by a sound corporate governance framework, in particular an enterprise risk management (ERM) system. An RBS regime can contribute to the long-term viability of the insurance market and the financial strength of individual insurers. This in turn can enhance the protection of policyholders, support market development and financial inclusion, and contribute to financial stability.[20] An RBS regime encourages a strong risk management culture in insurers. It also provides incentives for insurers to adopt more sophisticated risk monitoring and risk management tools.

Implementing an RBS regime requires adequate resources and expertise within the supervisor and insurance sector. This includes having sufficient supervisory resources, expertise, technological infrastructure and data collection capabilities within the supervisor and insurers, supported by a sound corporate governance framework.

Applied to NatCat events, an RBS regime should include specific NatCat-related risk management requirements as well as risk-based capital requirements for NatCat risks. Such requirements should allow for the recognition of the economic value of risk transfer mechanisms and the risk mitigating effect they have on capital requirements. Risk-based pricing is an important aspect of risk management frameworks under RBS, as it enables insurers to more accurately reflect NatCat risks. This in turn sends market signals to customers about the risk exposure of their assets to NatCat events. Risk-based pricing also helps insurers maintain coverage in high-risk areas by ensuring premiums are adequate. In addition, risk-based pricing can more easily allow insurers to reflect risk mitigation undertaken by customers or wider communities.

An RBS regime allows for flexibility through the principle of proportionality, tailoring requirements according to the nature, size, and complexity of an insurer and the local market characteristics. Simpler requirements can be applied to smaller or less complex business models and risks without compromising policyholder protection. This flexibility in application allows new market entrants to progressively meet requirements as their businesses mature. Through the appropriate application of the proportionality principles, an RBS regime can promote the availability and uptake of insurance coverage, in support of market development and financial inclusion objectives.

[19] In Chile a new Fintech Law was recently issued that included a chapter allowing commercial parametric insurance to be provided in Chile. The insurance market regulator (Comisión Para El Mercado Financiero (CMF)) is responsible for issuing regulations dealing with the requirements, information, types of products, indexes, and the characteristics of the policies.
[20] The text for this section is largely taken from IAIS (2025b) *Guidance on transitioning to a risk-based solvency (RBS) regime*.

IAIS guidance on transition to a risk-based solvency regime.

The IAIS has developed guidance for supervisors on the practical aspects of implementing an RBS regime. This document, Guidance on transitioning to a risk-based solvency (RBS) regime, which was developed in cooperation with the IMF, provides insights into the journey to RBS taken by several IAIS Member jurisdictions and provides guidance on key considerations in the design and implementation of an RBS regime.

2.2.2 Market conduct supervision

Another key building block of a sound supervisory system is a strong framework for market conduct supervision. With rising frequency and severity of NatCat events there is a risk of unfair treatment of consumers. Examples could include cases where insurance does not effectively meet the customer's needs; where there is insufficient clarity in terms and conditions; where there are delays in the claims processing after a NatCat event; or when certain consumer groups – including vulnerable consumer groups – lack access to insurance. Market conduct supervision can contribute to the resilience of the sector and can help increase the effectiveness of any insurance-based solutions to protection gaps, notably by:

- Protecting policyholders and promoting fair consumer outcomes
- Strengthening public trust and consumer confidence in the insurance sector
- And minimizing the risk of insurers and intermediaries with business models that are unsustainable or pose reputational risk, thereby complementing the risk management framework of a solvency regime.

The IAIS' Insurance Core Principle (ICP) 19[21] sets the standards for supervisors to require insurers and intermediaries, in their conduct of insurance business, to treat customers fairly. The IAIS Application Paper on the supervision of climate-related risks, in section 12.3, discusses how ICP 19 applies to products offering NatCat protection.[22] This includes recommendations on how supervisors should, among other steps: ensure that insurers and intermediaries clearly state the extent of NatCat coverage and any exclusions in their marketing and disclosures; examine their claims handling operations and consider whether a demand surge plan or a permanent structural shift in their resourcing, systems, or practices is required to ensure adequate and timely claims handling in the event of a major NatCat event; and, if insurers decide to reduce or no longer offer coverage for certain risks following a NatCat event, communicate this in a timely manner that allows consumers to identify other options or adjust their coverage.

IAIS supervisory guidance covering market conduct aspects of increasing NatCat events

The IAIS has published an Application Paper on the supervision of climate-related risks. The paper supports supervisors in integrating climate-related risks into their supervisory frameworks. It outlines important considerations for the impact of climate-related risks on market conduct objectives, including providing a range of good practices and recommendations.

[21] The IAIS maintains a set of Insurance Core Principles (ICPs) which form the globally accepted framework for insurance supervision.
[22] See IAIS (2025a).

2.3 Strengthen financial literacy and risk awareness

Improving financial literacy, increasing risk awareness, and educating consumers on the value and importance of insurance are key demand-side strategies for narrowing the protection gap. Low levels of risk awareness among potential customers can reduce demand for insurance.[23] Many such customers are either first-time users of insurance or have had negative experiences in the past, leading to a lack of trust in insurance products. By helping consumers better understand their risks, the scope of coverage they need, and the policies they purchase, these efforts strengthen insurance demand (when paired with affordable products that meet their needs). Greater financial literacy and risk awareness reduces the insurance protection gap and supports a well-functioning insurance market. However, while building awareness at the individual level is essential, it may not be sufficient on its own to stimulate demand.[24]

Enhancing NatCat risk management through financial literacy and insurance in Guatemala

In Guatemala, the World Food Programme (WFP) has partnered with government municipalities to implement a smart subsidy model, allowing beneficiaries to gradually take on a larger share of premium payments over time. Most insured individuals in Guatemala are also members of Savings and Loans groups, which help them better manage NatCat risks while increasing their income. This enables them to progressively contribute more toward their insurance premiums. To support this initiative to integrate insurance into national systems, the WFP has invested in comprehensive financial education for beneficiaries and conducted awareness campaigns targeting stakeholders, including local governments. These efforts have significantly increased participation and contributions, growing from 1,659 individuals paying an average of US$3 to over 9,000 contributing US$8 within three years.

For further detail see Annex 2.

A further challenge in improving financial literacy and raising risk awareness is that outcomes may not be immediately tangible. A lack of awareness could go unrecognized until a NatCat event occurs, resulting in significant losses. Therefore, it is key to reflect on past examples – both from within the region and from other jurisdictions – and to analyze data, including recent geographical developments and potential natural disasters. This approach can help people better understand the risks they face and the importance of financial protection.

To be efficient, awareness and education efforts require a market with sufficient and suitable products and sound conduct; otherwise, these efforts will not trigger real resilience solutions and effective protection gap reduction. Various stakeholders can play a role in assessing and strengthening financial literacy and risk awareness, as shown below, noting that overall impact will depend on collaboration between all stakeholders.

[23] EIOPA (2024), *Measures to address demand side aspects of the NatCat protection gap*; EIOPA and ECB (2024), *Towards a European system for natural catastrophe risk management*.

[24] In a survey of 25 EMDEs undertaken to support the paper, almost all respondents identified a lack of financial literacy as a key impediment to insurance sector development in their jurisdiction. Many cited a lack of insurance awareness in particular, including not understanding the benefits of insurance, how it works, or why it is important, leading them to view insurance as an expense rather than an investment. In turn, this can limit knowledge of insurance products and affect informed decision-making.

Possible actions to strengthen financial literacy and risk awareness		
	Starting point	**Advanced actions**
Governments	• Disseminate information on the importance of insurance for disaster risk prevention and reduction at the national and global levels, collaborating with related authorities.[25] • Support financial literacy education, including in compulsory childhood education, to build long-term awareness.[26]	• Develop strategies to raise public awareness of NatCat risks and the role of insurance in building resilience and providing financial protection. These efforts can be sponsored or implemented by governments, supervisors, insurers, or industry associations.[27]
Supervisors	• Promote reliable sources of information on NatCat risks to help consumers understand their risk exposure.	• Enforce and monitor requirements for insurers and intermediaries to ensure meaningful and transparent communication about coverage, exclusions, and services. provided to policyholders, to help consumers understand their risk coverage and support the demand of insurance products in line with their needs. • Work with insurers and other relevant authorities to create tools like public risk-zoning maps, helping consumers understand risks and recovery costs to make informed coverage decisions.
(Re)insurers	• Invest in awareness and training when launching new products. For example, through training staff to explain products and claims, create awareness through flyers, radio, and digital campaigns, and use client testimonials to boost understanding. Surveys can	• Collaborate with governments and supervisors to raise risk awareness through education campaigns, highlighting the importance of risk prevention and reduction, the dangers of underinsurance, and the scope of coverage (e.g., whether NatCat risks are included or excluded).

[25] For example, insurance is highlighted in the priority of investing in disaster risk prevention and reduction for resilience in the *Sendai Framework for Disaster Risk Reduction 2015 - 2030*.
[26] For example, such programs in Chile and Mexico are detailed in: IDF and Geneva Association (2022), *Insurance Development in Emerging Markets: The role of public policy and regulation*. The Jamaican Financial Services Commission also runs a Schools' Financial Education Programme (IAIS-WB survey, 2025). The Japan Financial Services Agency (FSA), in coordination with related stakeholders, established the Japan Financial Literacy and Education Corporation in April 2024 to promote teaching and guidance of financial education and encourage individuals to achieve financial well-being
[27] The insurance industry association in Colombia, Fasecolda, has run a financial education program since 2008 (Viva Seguro), aiming to improve knowledge, skills, attitudes and behaviors in managing risks and using insurance.

	monitor product awareness post-launch. • Invest in clear consumer information documents informing on risk exposure and available coverage.[28]	
IOs/MDBs	• Raise government awareness by providing capacity building programs and technical support.[29] • Support knowledge exchange so that insurers and supervisors can benefit from knowledge and understanding of risk. • Share expertise and promote financial literacy through. seminars, publications, and educational programs.[30]	• Contribute to specific initiatives to raise awareness including developing technological tools to help disseminate information.
Consumer groups	• Explain in plain language insurance concepts through community education campaigns, helping consumers understand coverage, exclusions, and the importance of insurance in managing risks like NatCat events. • Promote accessible insurance products for underserved populations. • Build trust by advocating for transparent communication from insurers and providing feedback to improve products and services.	• Contribute to developing and testing risk communication tools and strategies to increase individuals' risk awareness.

[28] See also ICP 18 (Intermediaries), e.g. ICP 18.0.20-25, and ICP 19 (Conduct of Business), e.g. ICP 19.7.
[29] For example, The *UNDP-Milliman Global Actuarial Initiative* supports training of universities, governments and insurers on actuarial skills.
[30] As examples, the *International Labour Organisation (ILO) Global Programme on Financial Education* supports financial literacy through policy dialogue, capacity building, and training with a focus on reaching vulnerable groups; the *OECD International Network on Financial Education* provides a platform with contributions by public authorities and other stakeholders to share good practices of financial literacy policies and collect cross-comparable data.

2.4 Incentivize risk reduction

Insurance can contribute to reducing vulnerability and exposure to physical risk, as well as reduction of economic losses. At its core, insurance plays an important societal role in providing a risk transfer mechanism by improving financial resilience of businesses and consumers to withstand damages caused by NatCat events. By minimizing physical risk exposure to NatCat events, risk reduction measures reduce the likelihood of catastrophic losses, helping to make insurance more affordable and accessible in the longer term. When implemented effectively, they offer a practical and cost-effective approach to address growing disaster risks. Insurance can contribute to risk reduction, including through:

- Underwriting: The provision of insurance coverage can incentivize the private and public sectors to take prevention measures in order to reduce losses from NatCat events. The upfront payment of risk-based premiums can incentivize policyholders to take measures to limit losses. This can be further incentivized through dedicated products that, for example, provide premium rebates for implementing such risk reduction measures. Insurers can further support such risk management through risk advisory services.
- Investment: As institutional investors, insurers can decide to invest in projects, economic activities, or sectors that contribute to reducing the impact of NatCat events on households and businesses. Such investments can be part of the insurer's risk management to reduce longer-term losses on its underwriting of NatCat risk.

Insurance-based solutions for risk reduction are most effective when pursued through coordinated efforts with multiple stakeholders. For instance, measures to enhance the resilience of insured buildings or infrastructure require public sector involvement to establish building standards and prevention norms. Additionally, civil society can play a key role in advising on ways to improve living standards for communities. Furthermore, insurers can incentivize policyholders to implement flood protection measures for their properties. At the same time, public efforts for implementing flood defenses in high-risk areas can reduce the probability of flood damage, making properties in these regions more insurable. Similarly, retrofitting buildings to meet earthquake-resistant standards can decrease potential losses, allowing insurers to offer coverage at more affordable rates. Some insurers also include "Build Back Better" provisions in policies, so that rebuilds after property damage are more sustainable and thus more insurable. There are also examples of agriculture insurance bundled with drought resilient seed varieties. In this way, risk reduction measures not only lessen physical risk exposure but also support the development of sustainable insurance solutions.[31]

These efforts are particularly crucial for risks and assets that are currently uninsurable or at risk of becoming so (e.g., exposures in high-risk zones). By reducing the underlying vulnerabilities, governments, businesses, and communities could increase the proportion of assets that qualify for insurance coverage over time. As such, well-coordinated risk reduction measures can enhance the insurability of assets and risks and support the continuity of essential services.

Integrated Risk Management for Smallholder Farmers in Senegal

In Senegal, WFP implemented an Integrated Climate Risk Management (ICRM) approach through the R4 Rural Resilience Initiative, aimed at strengthening the resilience of vulnerable farmers against increasing weather-related shocks. The approach focused on four pillars: risk reduction (e.g., Food Assistance for Assets, market gardening, climate services), risk transfer (parametric insurance), risk retention (savings), and prudent risk-taking (credit and market access).

[31] A joint OECD-AfDB paper on *Scaling up Finance and Investment in Climate Adaptation* – developed under the same priority – outlines measures that can be taken to enhance the contribution of (re)insurance in risk reduction and adaptation investment.

Implemented through local economic interest groups (GIEs), the model improved access to insurance, savings, and credit, while fostering financial autonomy and strengthening social cohesion among communities. By 2023, the initiative had reached nearly 52,000 farming households, with the number of farmers fully covering their own insurance premiums rising from 1,500 in 2020 to nearly 28,000 in 2023 (54 percent of all insured participants). Following the conclusion of the R4/ICRM initiative, the programme is now being scaled up and transitioned into the Africa Integrated Climate Risk Management Programme (AICRM), in partnership with IFAD, to broaden the impact and enhance climate resilience across the region.[32]

Various stakeholders can play a role in incentivizing risk reduction, as shown below, noting that overall impact will depend on collaboration between all stakeholders.

Possible actions to incentivize risk reduction		
	Starting point	**Advanced actions**
Governments	• Invest in early warning systems and community preparedness programs: early warning systems provide timely information about impending hazards, enabling communities to take precautionary measures such as evacuations or securing property; community preparedness programs further enhance resilience by educating residents on how to respond effectively to disasters.	• Support resilient agricultural practices: In rural areas, promoting climate-resilient farming techniques, such as crop diversification, soil conservation, and the use of drought-resistant seeds can help reduce vulnerability to droughts, floods, and other climate-related risks. • Enhance infrastructure resilience and promote sustainable land use to reduce natural catastrophe risks. As emphasized by the G20 Principles for Quality Infrastructure Investment, quality infrastructure investment is the key to enhancing infrastructure resilience. Enforcing zoning, spatial planning, and disaster-resistant construction standards can also prevent high-risk development and reduce damage and economic losses.
Supervisors	• Raise awareness of the advantages of managing risks and encourage businesses to adopt measures that reduce	• Implement targeted supervisory measures for transparent risk-based pricing and for the promotion of risk reduction measures.[34]

[32] See UN WFP Disaster Risk Financing Annual Report 2024.
[34] The Network for Greening the Financial System (NGFS) has developed a paper on integrating adaptation and resilience into transition plans, also an input for the SFWG priority 2. Within it, inputs sought from the UN Sustainable Insurance Forcum (SIF) note a wide range of approaches taken by insurance supervisors to promoting climate risk assessment and adaptation measures in their jurisdictions, although these are not directly linked to transition plans yet. In addition to the examples provided in the NGFS paper, California's "Safer from Wildfires" program – an interagency collaboration between the California Department of Insurance, government agencies and the private sector – combines education and premium discounts to encourage homeowners to take specific actions that reduce wildfire risks, demonstrating how pricing incentives can drive meaningful risk reduction.

	risk, which in turn also lowers the exposure for insurers.[33]	• Encourage integration of risk reduction measures by insurers through appropriate risk-based premium discounts.
(Re)insurers	• Contribute to government and supervisors' initiatives to implement risk reduction measures through leveraging the insurance industry's data expertise and modelling that identify regions at risk of specific perils.35 • Invest in quality resilient infrastructure, as these long-term, illiquid assets align well with the investment needs of life insurers, who manage long-term, illiquid liabilities like life insurance policies.	• Integrate incentives for risk reduction measures in their product design as well as underwriting and pricing practices to reduce policyholder exposure to risk. Such incentives can include premium benefits as a financial incentive for proactive risk management and implementation of risk reduction measures.36 For example, property owners who install flood defenses, fireproof materials, or upgrade their buildings to meet disaster-resilient standards can benefit from reduced premiums. • Insurance products can also be bundled with risk management services and products, such as drought resistant seeds for farmers, and supported with risk information and education on how to identify and implement risk reduction. • Offer risk reduction solutions, such as risk management or advisory services, to support activities that mitigate the impact of natural catastrophes. These solutions, provided through underwriting or independently, are key opportunities to address growing disaster risks.
IOs/MDBs	• Support the development of services to reduce and prevent risk as well as support the design of new insurance products linking risk reduction measures and/or anticipatory action to insurance.	
Consumer groups	• Consumer groups can participate in communication and promotion efforts to incentivize citizens to invest in risk reduction measures.	

[33] For example, one effective method is impact underwriting, a concept introduced by EIOPA, where (re)insurers use their data, expertise, and risk assessment capabilities to encourage policyholders to adopt risk prevention and climate adaptation measures. See EIOPA (2023): *Impact underwriting*.

[35] For example, the *Zurich Flood Resilience Programme*, launched by Zurich Insurance in 2013, is a multistakeholder initiative that has developed more detailed weather forecasting systems and implemented flood resilience measures in high-risk areas of Indonesia, Mexico, Nepal, and Peru.

[36] The Bank for International Settlements (BIS) Financial Stability Institute (FSI) and IAIS note that insurance premiums also act as risk signals. Higher premiums in hazard-prone areas reflect the true cost of insuring properties in these locations. This discourages risky development and encourages safer land-use decisions. See FSI (2025): *Mind the climate-related protection gap – reinsurance pricing and underwriting considerations*.

3 Solutions for addressing NatCat protection gaps

Insurance-based solutions can help address protection gaps as part of broader disaster risk financing strategies. This section identifies a variety of initiatives and solutions that are being implemented in different jurisdictional contexts. There is no one-size-fits-all solution to NatCat protection gaps and jurisdictions will need to consider their own circumstances when implementing a solution.

Sections 3.1 and 3.2 describe solutions to expand the capacity of private insurance markets, and availability and uptake of insurance products; section 3.3 discusses the trade-offs between different options; and section 3.4 discusses possible public-private partnerships, including those involving risk sharing among private insurers and governments.

3.1 Promote availability and affordability of insurance products and services

In EMDEs, insurers and their customers face acute challenges that sometimes limit the feasibility of traditional insurance. Challenges include low technical capacity of domestic insurers to underwrite and assess claims, limited insurance claims data and other measurements of losses and damages from disasters, remote communities with limited access to insurers' and other financial institutions' branches, low sums insured compared to costs of administering policies, limited or poor-quality data on risk and exposures, and the acute need for rapid insurance payouts due to a lack of other sources of liquidity.

Technology and innovation provide a growing toolkit to address these challenges. They can help narrow the protection gap by making insurance more available, affordable, accessible, and relevant to the evolving needs of consumers and businesses. In addition to offering traditional insurance products, the insurance sector has explored and scaled new insurance products, including parametric insurance, and has used technology to leverage and share risk data and adopted innovative uses of technology to provide services to the end customer. Innovations such as photo-based insurance and mobile payment systems are expanding access, while fintech and insurtech solutions address delivery challenges, enabling faster payouts, better financial education, and increased financial resilience in low-income communities. Additionally, microinsurance can play a critical role in providing affordable, tailored coverage to vulnerable populations, and is often bundled with risk reduction measures like early warnings or other financial products like credit.

Mandatory insurance schemes can also provide a mechanism to support availability and affordability of insurance by ensuring broader coverage across populations. By spreading risk among a larger pool of policyholders, these schemes can improve affordability and financial resilience, particularly in vulnerable regions, although these benefits must be weighed against political and practical challenges.

These solutions are expanded upon in the following section.

3.1.1 Parametric insurance

Parametric insurance for governments

EMDE governments, especially in small jurisdictions and those highly exposed to NatCat events, need substantial liquidity after severe NatCat events such as tropical cyclones or earthquakes. While insurance can be an attractive proposition for risks beyond the government's risk tolerance, traditional indemnity-based insurance may not always be fit for purpose. While indemnity insurance is well-suited to the post-event reconstruction phase, it can be prohibitively impractical, expensive, and slow to administer for the response and recovery phases, when financial resources are needed immediately to protect life and health and to reactivate essential services and

economic activities. Parametric insurance provides a solution to this challenge by basing payouts on an objective parameter or index that can be observed rapidly, and often remotely, after the disaster, eliminating the need for the often-lengthy loss-adjustment process.[37] Rapid payouts can promote an accelerated recovery and by doing so diminish the macroeconomic impact of the disaster. For example, a tropical cyclone insurance product could pay out if independent measurements of sustained windspeed go above a certain level; or an earthquake insurance policy may pay out based on the level of independent measurements of earthquake intensity. Parametric insurance can also enable the provision of insurance in some very data poor environments, for example where there is limited information on the condition of assets, or limited expertise and technical capacity to assess losses. However, basis risk (the risk that the product does not pay out when the policyholder experiences a loss that the policy was designed to protect against) can undermine the benefits and trust in insurance, underlining the importance of careful design and communication of parametric insurance products.

A multi-stakeholder parametric facility in the Caribbean

The Caribbean Catastrophe Risk Insurance Facility (CCRIF SPC) provides parametric insurance to Caribbean and Central American governments, as well as fisheries and utility sectors, for tropical cyclones, earthquakes, and excess rainfall. CCRIF SPC has benefited from its own risk model, specifically developed for these hazards, building on detailed exposure data gathered for the region. The facility delivers quick payouts to help governments address urgent needs such as food, shelter, infrastructure repair, and economic recovery following disasters. In most countries, CCRIF SPC is integrated into their risk layering strategies, ensuring parametric insurance is used where it is most effective. Since its inception, CCRIF SPC has made 78 payouts totaling nearly US$400 million.

For further detail, see Annex 2.

Parametric insurance for households and businesses

Parametric insurance can also be valuable for households and small and medium enterprises (SMEs), addressing many specific challenges faced by the insurance sector in EMDEs. Its benefits include the potential for rapid payouts within days of an event; low cost of administration; reduced risk of moral hazard and adverse selection as payouts do not depend on individual behavior or idiosyncratic risks; and ease of administration for insurers due to standardized and remotely operated contracts.[38]

An increasingly common class of parametric insurance is agricultural index insurance, which is adopted in countries across the world to address the needs of smaller farmers with high exposure to NatCat events such as droughts, particularly in Africa, Latin America, and Asia. There are many types of parametric agricultural insurance products, which vary in their design depending on what is being insured (different crops, livestock, or fisherfolk), the nature of the risks faced, and the operational context. Two major classes are area-yield index insurance (AYII), which compensates farmers based on the average yield of similar farmers in their area; and weather index insurance (WII), which compensates farmers based on the level of an observable parameter such as rainfall, temperature, or soil moisture, which is correlated with farm-level yields or revenues. [39]

[37] FSI (2024) Uncertain waters: can parametric insurance help bridge NatCat protection gaps?
[38] See FSI (2024) and IAIS (2018): Issues Paper on Index-Based Insurance in Inclusive Insurance Markets
[39] See IAIS (2017).

Heat insurance: protecting informal workers from income losses in India

The Self-Employed Women's Association (SEWA), representing over three million women in informal trades, launched a heat microinsurance product in 2023 to address income losses from extreme heat. Using parametric insurance, it provides quick payouts when temperature thresholds are exceeded, helping women manage climate and health risks. The pilot covered 21,000 women in Gujarat and scaled to 50,000 in its second year, with further growth expected by 2025. Developed with partners and supported by donor-funded premiums, the product aims to mitigate risks faced by women in unsafe working conditions, alongside interventions to build resilience of women's lives and livelihoods to extreme heat.

For further detail, see Annex 2.

Parametric insurance can be complex to develop and communicate to policyholders and other stakeholders, particularly in light of conduct of business requirements to provide timely, clear, and adequate information to customers. This can be exacerbated significantly by basis risk which can undermine the value of – and trust in – insurance. Indeed, high basis risk can make a policyholder worse off than if they had not purchased insurance at all. As experience has grown, technology (such as satellites and remote sensing) and methods for the design of products have become increasingly sophisticated, permitting more accurate and effective products. Paired with a growing experience globally of parametric insurance, the ability to operate products with greater use of remote-sensed data allows products to be developed in less developed markets by leveraging international expertise, data, and systems. However, material levels of basis risk will continue to persist for some time and should be taken seriously in the design, communication, operation, and supervision of parametric insurance policies.[40]

The benefits of parametric insurance can only be realized through effective operational processes. While the required payout from a parametric product can be calculated in hours or days, payouts often fail to reach the end beneficiary for many months due to poor data management, inefficient administrative processes, and slow and unreliable payment systems. Such delays in payouts fundamentally undermine their value, so parametric insurance products should be implemented alongside investments in transparent digital operating procedures as well as digital payments and mobile money.[41]

Furthermore, technical capacity constraints among insurers and other stakeholders, insufficient data availability for designing and operating products, and regulatory challenges can undermine confidence in parametric insurance, ultimately limiting its uptake.[42]

3.1.2 Other technological innovations

Technology provides additional opportunities for innovation in insurance product design beyond parametric products. Underwriters and loss adjusters can use additional information on risk and losses using data from satellites, unmanned aerial vehicles (UAVs / drones), and even social or traditional news media to help improve the transparency, accuracy, cost-effectiveness and timeliness of their functions. These technology-augmented insurance contracts can improve trust in

[40] A range of suggested recommendations from supervisors and market participants to enhance the effectiveness of parametric insurance are outlined in FSI (2025).
[41] For example, following Hurricane Beryl, the government received funding within 14 days of the event from the COAST parametric insurance program, but the fisherfolk waited over five months to receive payouts in the absence of identification and payment systems.
[42] A survey conducted with insurance authorities and market participants highlights that literacy and awareness, along with product pricing and affordability, are among the most significant challenges to fostering the adoption of parametric solutions. Legal certainty emerges as a key regulatory challenge, particularly in jurisdictions where the definition of insurance is closely tied to the indemnification of losses through detailed loss assessments. See FSI (2025).

insurance, reduce premiums, and increase the appetite for international reinsurers to provide well-priced risk transfer. However, some EMDEs may encounter challenges in adopting the latest technological innovations due to costs and access to these solutions.

One area that shows promise but has not yet been scaled up is photo-based insurance. Improved cameras in smartphones, paired with the increased sophistication of machine learning technology, provide an opportunity to conduct loss assessment entirely using photos taken by the insured or by a local official. For example, there has been increasing experimentation of this technique for crop insurance in well-established markets such as India, aiming to replace in-situ traditional losses assessment with photo-based assessment for cereal crops. While such products are not yet operating at scale, the technology is improving rapidly, which may drive scale and unlock new use cases. However, scrutiny will need to be applied to such products by insurers, supervisors, and other stakeholders to ensure they provide quality coverage to customers and that risk of fraud is well managed.

India's crop insurance: supporting vulnerable farmers

India operates the world's largest subsidized crop insurance scheme by the number of insured farmers, the Pradhan Mantri Fasal Bima Yojana (PMFBY), which covers nearly 35 million farmers against multiple risks. The scheme includes an Area Yield Index Insurance (AYII) program, which benefits from a long-standing tradition of crop-cutting experiments – despite their substantial fiscal cost – and captures losses from a range of causes affecting all farmers in a given area. While challenges remain in timely claim settlements and extending coverage to uninsured vulnerable farmers, India is adopting technological advancements such as satellite imagery to enhance crop loss assessments – for example in Madhya Pradesh the program uses satellite-based yield estimates to determine insurance payouts.[43]

For further detail see Annex 2.

3.1.3 Microinsurance

Microinsurance provides accessible and affordable coverage in exchange for premiums proportionate to the likelihood and cost of the risk involved, offering protection tailored to the needs of vulnerable segments. It is a type of insurance specifically designed to provide protection to low-income individuals, households, and businesses against a variety of risks, including death, illness or injury, loss of property, and natural disasters. These products typically feature modest premiums, simplified terms, and smaller coverage amounts, making them more accessible and easier to understand.[44]

Microinsurance, and disaster microinsurance in particular, can offer risk transfer mechanisms, cover short-term financial losses, and provide access to post-disaster liquidity and finance. Bundled with risk reduction measures such as early warnings, it can contribute to building financial resilience and enabling vulnerable populations to manage the financial impacts of NatCat events.[45] In addition to providing immediate financial relief, microinsurance supports disaster reduction when insurers encourage risk-reducing behavior. These products play an important role in reducing vulnerability and fostering financial stability in low-income communities.

Microinsurance can be structured in various ways, depending on the type of risk being insured, the target population, and the specific needs of low-income individuals or

[43] https://www.undp.org/india/stories/farming-future-how-tech-and-insurance-empower-indias-cultivators-and-growers
[44] See CGAP and IAIS (2007) *Issues Paper on the Regulation and Supervision of Microinsurance*.
[45] Disaster microinsurance is one of the various insurance-based solutions designed to provide coverage for extreme weather events. Despite its potential benefits, its adoption remains low due to both supply- and demand-side challenges, including limited availability and quality of data and lack of insurance awareness. See Gogoi and Tarazona (2016).

households. Given the need for affordable and accessible coverage, microinsurance is often structured as parametric coverage due to its simplicity and efficiency. To achieve its social objectives as well as to ensure affordability and sustainability of the product over time, microinsurance often relies on public sector support. This support can include direct funding, such as program development or premium subsidies, or formal public-private partnerships that involve collaboration across various stages, from design to delivery.[46]

Effective distribution mechanisms are central to expanding access to microinsurance products.[47] The introduction of microinsurance regulation can foster microinsurance development by creating a shared understanding among stakeholders and providing insurers with the confidence to launch new products. Additionally, such regulation can offer incentives or favorable conditions, such as enabling the use of alternative distribution channels, to support the growth of microinsurance.[48]

Drought microinsurance for small-holder farmers in Mozambique

From 2014-2018, Hollard Mozambique piloted a bundled product combining parametric insurance and drought risk tolerant maize seeds. The product was designed to enhance resilience through complementarities between the risk mitigation effect of the seeds and the financial protection effect of insurance. A dual index – rainfall and vegetation – was used to cover mid-season and end-season drought. The drought tolerance of the seeds lowered the cost of the insurance. The pilot found that farmers who adopted the bundle showed greater resilience and immediately bounced back from shocks. However, trust and cost benefit analysis were the main drivers of adoption. Following the small pilot (1,237 farmers in Mozambique) Hollard has scaled the product to 16,000 farmers under its flagship microinsurance initiative, Hollard-Agri.

3.1.4 Integrating insurance into broader financial services to improve financial resilience while enhancing delivery and take-up of insurance

Financial resilience can be more efficiently achieved through a range of financial services, including savings, credit, and payment systems, alongside insurance. While insurance is critical to building financial resilience and unlocking investment, it is a means and not an end. Households and businesses can more effectively respond to smaller and more frequent shocks using savings, and then by borrowing, reserving insurance for more severe and infrequent shocks.

Bundling of insurance with other financial products, such as credit, can therefore provide a comprehensive package for investment and resilience, while keeping transaction costs low. There can be natural partnerships between lenders and insurers, for example, sharing data and distribution networks and packaging products and services together. Compulsory or voluntary bundling of insurance and credit can bring mutual benefits for all stakeholders, including increasing access to finance for customers, increasing take-up for insurers, improving loan performance for lenders, and potentially increasing growth, investment, and financial stability.

Fintech and Insurtech solutions play a critical role in overcoming delivery challenges to unlock affordable insurance in such contexts. Delivery of insurance in EMDEs can be challenging due to factors such as remote and hard-to-reach populations, limited financial inclusion and interaction of populations with formal institutions, and low operational capacity of insurers,

[46] See Kousky, Wiley, Shabman (2020): *Can parametric microinsurance improve financial resilience?*
[47] In 2022, the most important distribution channel globally, in terms of the number of people reached, was microfinance institutions (72 million people), followed by financial institutions (43 million people) and agents and brokers (37 million people). Africa stands out from other regions with agents and brokers as the most important distribution channel reported. Microinsurance network, see *The Landscape of Microinsurance 2023*.
[48] Microinsurance network, *The Landscape of Microinsurance 2024*

including slow and opaque systems. The use of digital payment systems and mobile money can dramatically increase the speed and transparency of insurance payouts while also opening access to insurance to new customers. Mobile phone apps have also proven to be an effective tool to build understanding of risk, financial education, and access to information and financial services. For example, a number of markets in Africa and Asia have begun to roll out such apps to farmers to help them take more risk-informed planting and investment decisions, while reducing their credit risk and increasing access to agricultural inputs and insurance.

Comprehensive financial resilience and technology-enhanced insurance in the Horn of Africa

Pastoral communities in the Horn of Africa are highly vulnerable to climate shocks such as droughts, which often lead to the loss of livestock. In 2022 Djibouti, Ethiopia, Kenya, and Somalia launched the De-Risking, Inclusion and Value Enhancement of Pastoral Economies (DRIVE) project which includes technology-enhanced micro-level index-based livestock insurance and the first parametric Takaful that uses satellite vegetation data to trigger timely payouts when livestock face insufficient food. The insurance product was first delivered alongside savings incentives to cope with minor drought shocks and encourage financial inclusion. The product allows pastoralists to intervene early, such as by purchasing fodder, to prevent livestock losses more cost-effectively. Payouts are disbursed through digital platforms like M-PESA[49] or digital bank accounts, ensuring both timeliness and transparency, while the project also supports market access and private investment in the livestock value chain.

For further detail see Annex 2.

Innovation in delivery methods is also essential to enable widespread access to insurance and can be facilitated by networks that targeted beneficiaries know and trust. These networks include microfinance institutions, cooperatives, retail shops, mobile network operators, fast-moving consumer goods (FMCG) networks, government service centers, and others.

3.1.5 Support offer and take-up of insurance through mandatory insurance

Mandatory NatCat coverage has been used in some jurisdictions to increase insurance penetration. Such coverage can be stand-alone or part of existing mandatory property damage insurance, with or without the possibility for policyholders to opt-out. Such initiatives are aimed at increasing insurance penetration, while discouraging adverse risk selection and increasing diversification (and hence affordability through lower premium loadings) while supporting solidarity across society. Mandatory insurance aims to insure a larger proportion of the population against NatCat risks, thus directly addressing the protection gap. This can improve financial resilience for households and businesses by reducing the economic disruption caused by NatCat events.

Mandatory NatCat coverage spreads risk across a wider base of policyholders, including lower-risk individuals. This enables efficient risk pooling, reduces the volatility of insurance claims, and prevents premium spikes for high-risk policyholders. Such coverage may lead to more affordable rates, as risks are spread and diversified across different geographic areas and segments of society.

However, mandatory insurance presents many challenges. Requiring insurers to cover risks beyond their capacity to absorb could disrupt coverage for other perils and threaten insurer solvency. Additionally, if not designed with affordability in mind, mandatory insurance could disproportionately impact low-income households, in particular those in high-risk areas, as premiums may be unaffordable without government subsidies. Mandatory NatCat insurance often has a fixed premium

[49] M-PESA is a mobile money service and FinTech platform.

(e.g., capped or with simplified risk-based features) or is paired with some form of government intervention (e.g., in the form of tax credits). In many cases, such solidarity mechanisms are topped with government (reinsurance) backstops to cover an excess of loss of an insurance pool. Other schemes exist to maintain affordable premia without government subsidies.[50]

Implementing mandatory insurance can be challenging, and experience of mandatory schemes does not translate to 100 percent coverage. In some jurisdictions, take-up of insurance has been required for access to government support programs, when paying utilities bills, or when accessing other financial services such as credit.

Mandatory insurance schemes can become unsustainable if not combined with risk reduction efforts and investment in prevention measures. This can include, for example, retrofitting buildings or enforcing building codes. These measures would aim to reduce losses over the longer term and contribute to premium affordability. They should also contribute to insurers' capacity to cover risks within their capacity without disrupting coverage for other perils or threatening insurers' solvency.

3.1.6 Support affordability and take-up directly through subsidies

Premium subsidies have been a frequently used tool by governments – particularly in critical sectors such as agriculture – to encourage scale-up of insurance markets, with the objectives of generating economies of scale and diversification of insurance, increasing supply of credit and stimulation of productive investment, and substantially reducing costs compared to the counterfactual of slow ad-hoc disaster aid to uninsured households and businesses.

Premium subsidy programs have brought scale to many insurance markets in EMDEs, but they can come at a substantial fiscal cost and can be politically difficult to remove or reduce. There is a further risk that markets supported by subsidies will collapse when the subsidies are removed. If governments decide to offer premium subsidy programs, they must be carefully designed to be fiscally sustainable and build the right incentives. Such programs may be justified if they directly address a market failure, are targeted and transparent, are partial and time-bound, support programs that have the potential to scale, replace other subsidies, and have a clearly identified budget cost.

Various stakeholders can play a role in promoting the availability and affordability of insurance products and solutions, as shown below, noting that overall impact will depend on collaboration between all stakeholders.

Possible actions to promote availability and affordability of insurance products		
	Starting point	**Advanced actions**
Governments	• Provide necessary risk data (exposure, hydrometeorological, risk modelling, ground data on losses such as agricultural production). • Encourage take-up by policyholders by requiring insurers to make coverage	• Support the uptake of innovative products and services. • Facilitate public-private partnerships by enabling insurers to use government networks for distribution. For example, establish nationwide agricultural insurance schemes that leverage government data on beneficiaries and use government

[50] For example, in France, a determined proportion of the premium paid for any non-life contract (home, car, or business premises) fuels an insurance scheme against NatCat events. Thus, the pricing does not directly depend on the risk, and is part of a public-private scheme with no direct government subsidy.

	available for all relevant catastrophe perils (i.e., mandatory offer) or by requiring that coverage for relevant catastrophe perils be included with standard property insurance coverage (i.e., automatic inclusion).	service centers or other government networks for distribution. • Invest in digital infrastructure to enhance access to technology in remote areas for the purpose of facilitating access to insurance via digital means.
Supervisors	• Work with legislators to put in place regulatory certainty and an enabling supervisory environment for nontraditional insurance products such as parametric insurance and microinsurance.	• Create a regulatory sandbox or pilot project framework where insurers can test new innovative insurance products on a limited scale. This allows insurers to experiment with different underwriting models, pricing structures, and risk assessment methodologies in a controlled environment. • Develop proportionate regulation that enables distribution via alternative networks. This could, for example, include bundling with other products while at the same time ensuring that the necessary consumer protection measures are in place. • Financial sector regulators can support lenders to better understand their disaster risk and consider risk capital incentives for better risk management including insurance. • Encourage quality of parametric insurance, and aid customer decision-making on product adoption, by implementing a quality certification system.[51]
(Re)insurers	• Develop new products, bringing experience from other markets through reinsurance, brokers, and broader corporate relationships. • Build partnerships with other private sector actors (tech, banks, mobile payments networks) to improve service	• Handle policy distribution, premium collection, and claims processing where mandatory insurance offer or take-up is promoted.

[51] For example the QUIIC program developed and piloted by UCDavis' Feed the Future Lab.

	quality, e.g., through mobile payments to ensure transparent and timely payouts. • Work through aggregators (e.g., to cooperatives, employers, lenders) to provide insurance products and services to increase take-up and minimize basis risk of parametric insurance.	
IOs/MDBs	• Provide technical assistance and policy advice to governments, insurers, and other stakeholders to ensure access to cutting edge expertise and tools (e.g., accessible and easily interpreted satellite data for risk modelling and parametric insurance). • Provision of guarantees and capital support to insurance markets, companies, and insurtech firms.	
Civil society / others	• NGOs and humanitarian organizations can incorporate parametric insurance into their operations by bundling insurance for the beneficiary with their other services and products, or by insuring their own operations.	

3.2 Risk transfer solutions

In the face of increasing NatCat events and challenges to providing affordable insurance, robust financial mechanisms are needed to manage risks effectively. This section focuses on three risk transfer solutions (global reinsurance, catastrophe bonds, and sovereign catastrophe insurance risk pools) that can help narrow the protection gap, either by transferring risk from sovereigns or from local insurers to increase the underwriting capacity in the jurisdiction.

While globally the supply of risk transfer capacity is heavily skewed toward developed economies, many EMDEs can be attractive to international markets given the value they provide in terms of diversification from major markets and predominant risks. However, the overall attractiveness of these markets, and therefore the supply of affordable capacity for any jurisdiction, will depend on the extent and resolution of many of the challenges raised in this paper.

3.2.1 Global reinsurance

Access to global reinsurance allows insurers to manage their risk portfolios more effectively. The global nature of international reinsurance markets allows for some portion of the losses from an event to be absorbed by international markets (and investors), thereby diversifying the burden away from the domestic financial system, maintaining solvency levels, and continuing to provide coverage even in the aftermath of NatCat events.[52] This enhanced risk management will aid in timely compensation to policyholders and help lead to more rapid recoveries.

Global reinsurance also expands the capacity of insurers to underwrite policies, particularly in high-risk areas. Without reinsurance, insurers might limit exposures in regions prone to natural disasters, leaving many without adequate coverage. Global reinsurers, with their broader risk

[52] OECD (2018), *The Contribution of Reinsurance Markets to Managing Catastrophe Risk*.

appetite, ability to diversify risk globally, and generally strong capital positions, enable insurers to offer policies that would otherwise not be feasible, thus improving overall risk cover.

EMDE insurers rely on global reinsurers not only for reinsurance coverage but also for know-how and technical expertise, from product design and risk modelling to pricing and underwriting. Leveraging advanced modelling techniques and data analytics, reinsurers can help insurers develop more accurate risk profiles and create tailored products that address specific vulnerabilities. This innovation can enhance the overall resilience of communities against NatCat events. As such, lack of access to global reinsurance may negatively impact the development of domestic insurance markets, including in economically essential sectors such as agriculture.[53]

Access to global reinsurance may be constrained by domestic reinsurance requirements. Global reinsurance is particularly important for EMDE jurisdictions, as they tend to have underdeveloped domestic reinsurance markets, leaving them more vulnerable to financial shocks from NatCat events. For example, some jurisdictions have requirements that mandate insurers to cede a percentage of their risk to domestic reinsurers, giving domestic reinsurers a 'right of first refusal.' Domestic reinsurance requirements can contribute to market stability by strengthening local reinsurers and retaining capital within the country. This can foster a more resilient domestic insurance market capable of handling significant loss events. There may also be foreign exchange rationale for such requirements. However, such requirements can lead to higher costs for primary insurers due to limited competition (i.e., few domestic reinsurers), reduced access to international reinsurance markets, concentration of risk, and reduced financial stability if the economy is hit by a major catastrophic event.

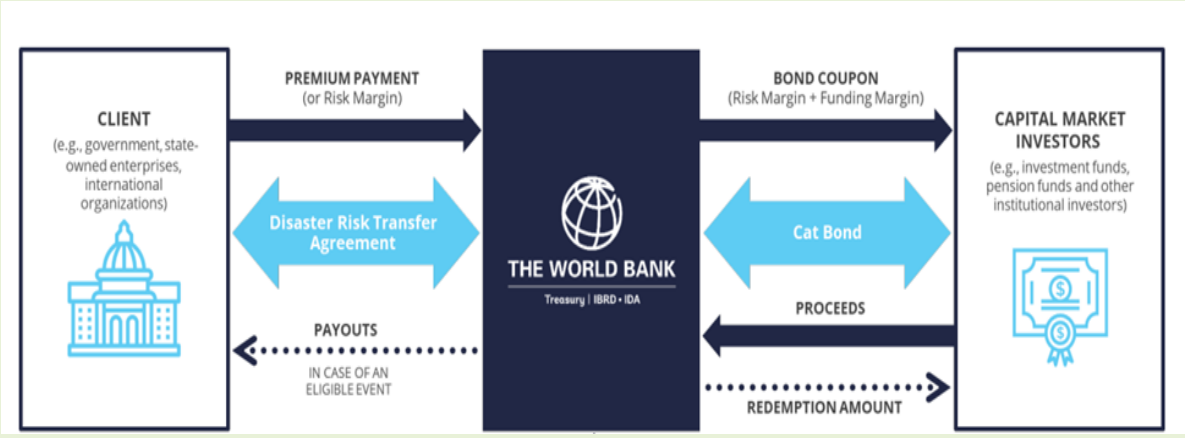
3.2.2 Catastrophe (cat) bonds

Cat bonds, a form of Insurance Linked Security (ILS), allow institutions such as insurers to transfer significant catastrophe risk to capital markets and thus expand access to risk carriers beyond traditional reinsurance and retrocession. By issuing cat bonds, insurers can access a broader base of investors, thereby enhancing their capacity to manage large-scale disaster exposures and providing additional financial resilience.

Cat bonds, just like catastrophe insurance, involve the transfer of risk in return for a payment commensurate with the risk. Rather than structuring this through an insurance contract, investors provide capital which is at risk of partial or total loss if a disaster event occurs. In exchange, investors receive a coupon that reflects the insurance premium for such risk. Cat bonds can be based on actual portfolio losses due to a catastrophe, akin to traditional catastrophe reinsurance – over 90 percent[54] of the cat bond and ILS market is indemnity-based or based on an index of industry losses – or parametric (see section 3.1.1). In addition to insurers, governments can also use cat bonds to transfer risk directly to capital markets.

[53] See FSI (2025).
[54] In 2024 the market grew by 10.5%, with the outstanding market standing at $52.2 billion. Artemis.

World Bank catastrophe bond platform for governments

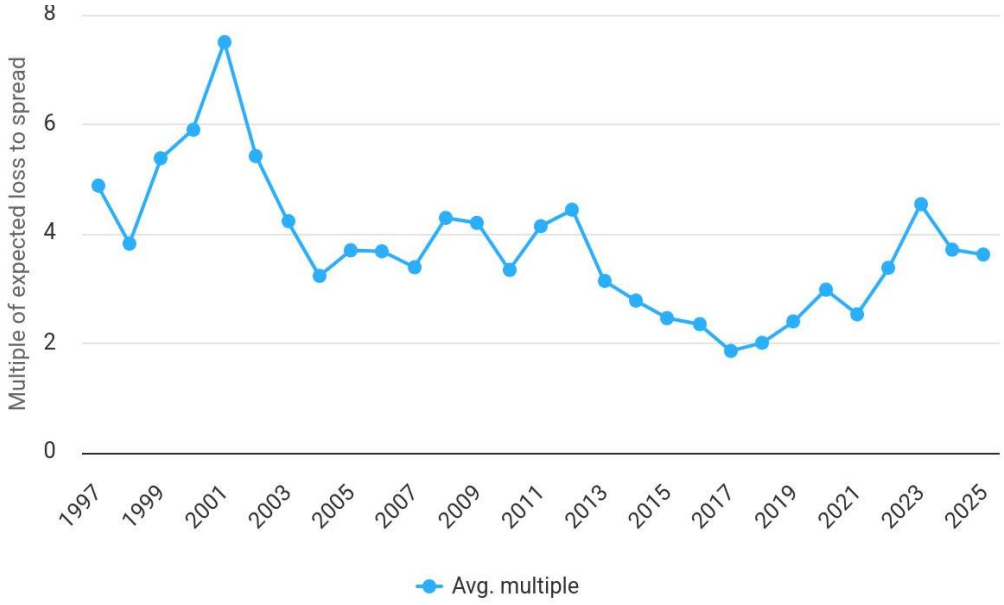


The World Bank provides a platform for governments to make use of cat bonds. To date, these bonds have all been parametric, with payouts triggered by the physical parameters of an event rather than actual losses incurred. For example, the World Bank issued cat bonds covering earthquake events in Mexico that provide payouts to the government if the magnitude and depth of the earthquake meet pre-agreed criteria.

While the ILS market, comprising cat bonds and other means of transferring insured risk to capital markets, has grown rapidly over recent years,[55] the majority of the volume of risk in cat bond and ILS is from the US, with risk in developing markets (predominantly World Bank intermediated cat bonds) making up only a few percent of the total. Lack of data and modelling challenges in EMDEs could contribute to the perceived risk for investors and make them more expensive in EMDEs and thus less attractive to investors. In practice, only the most sophisticated (re)insurers have and are likely to utilize cat bonds in their risk and exposure management. In addition, in some jurisdictions, supervisors may not recognize cat bonds as an effective risk transfer mechanism for supervised insurers.

Cat bonds typically can provide greater capacity and coverage for longer durations than the traditional reinsurance market. However, cat bond transactions are more complex and have greater modelling requirements and transaction costs compared to traditional reinsurance. As such, catastrophe bonds are most suitable for larger transactions with a low probability of occurrence. To date, 62 percent of cat bonds and ILS have had an expected loss of 0.01 percent to 1.99 percent. For smaller volume targets and non-USD risk transfer, traditional reinsurance is often more appropriate.

[55] Ibid.



Source: www.Artemis.bm Deal Directory

Figure 3: Cat bond and ILS pricing as a multiple of expected loss by year

Cat bond prices vary based on a range of factors including the nature of risk, the quality of risk data and analytics, the extent of diversification from other risks in the market, and the current state of the market. Indeed, cat bond prices vary substantially through time, and may be more or less attractive depending on the state of the market. Engaging with market experts such as brokers and structuring agents before entering into a transaction can help inform effective decision making on whether to pursue a cat bond and, if so, how it can best be structured to achieve a good price while meeting the needs of the risk cedent.

Cat bonds to build resilience in Jamaica

Jamaica, heavily impacted by natural disasters, issued a US$185 million catastrophe bond in July 2021 to enhance financial resilience against tropical cyclones, covering three hurricane seasons until December 2023. As the first small island state to independently sponsor a cat bond, Jamaica used this parametric insurance tool to secure predefined payouts for severe and infrequent events, with cost predictability ensured through a fixed premium. Positioned as part of a broader disaster risk financing strategy, the cat bond complements other instruments designed for more frequent, less severe events, ensuring comprehensive risk coverage. Building on its disaster risk financing strategy, Jamaica renewed coverage in 2024 with another catastrophe bond for four additional hurricane seasons.

For further detail see Annex 2.

3.2.3 Sovereign catastrophe risk insurance pools

Catastrophe risk insurance pools provide regional solutions for governments in EMDEs to manage financial risks associated with natural disasters. These pools generally offer parametric insurance to fund emergency response post-disaster and are supported by international reinsurance and enhanced by financial aid from development partners and donors for premium financing and capitalization.

The establishment of regional catastrophe risk pools, such as the Caribbean CCRIF SPC, African ARC, Pacific PCRIC, and Southeast Asian SEADRIF, over the past 15 years has empowered low-income countries to secure emergency liquidity and respond quickly to disasters. By 2022, these pools collectively provided global insurance coverage totaling US$1.4 billion, with CCRIF SPC accounting for over 70 percent of global coverage.

These pools address market imperfections that typically restrict insurance coverage in EMDEs by:

- Diversifying risk across countries with varying risk profiles
- Creating joint reserves for partial self-insurance
- Facilitating access to international reinsurance and capital markets
- Sharing operational costs, including program development and daily operations
- And building a stronger foundation of risk information.

By developing standard products based on each jurisdiction's needs and structuring a portfolio of diversified risks, these regional risk pools offer large transaction sizes, making them appealing to both global reinsurance and capital markets. Moreover, risk pools can reduce premiums by minimizing capital costs, operational expenses, and the cost of risk information. The figure below illustrates how risk pooling with improved risk information can reduce premiums.

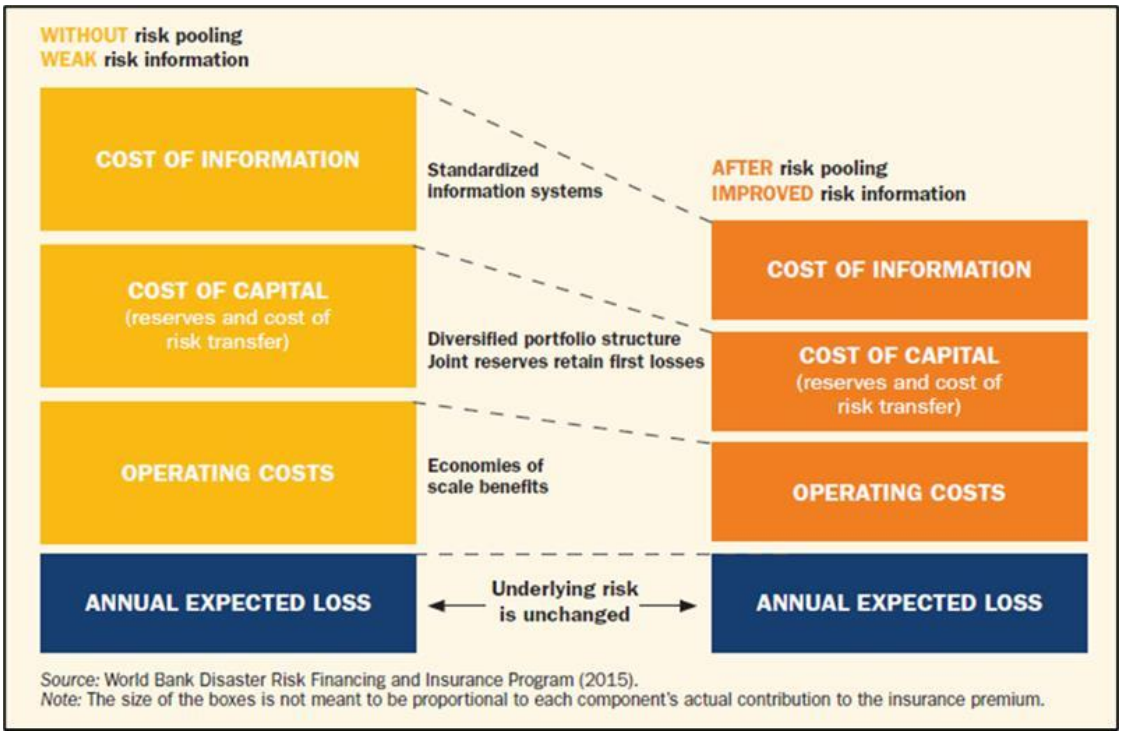


Figure 4: Catastrophe Risk Premium Decomposition

Various stakeholders can play a role in enabling risk transfer solutions, as shown below, noting that overall impact will depend on collaboration between all stakeholders.

Possible actions to enable risk transfer solutions		
	Starting point	**Advanced actions**
Governments	• Facilitate access by creating a conducive regulatory environment, providing guarantees or subsidies in a transparent manner and fostering public-private partnerships to enhance risk transfer mechanisms.	• Support the establishment of regional risk pooling mechanisms.
Supervisors	• Ensure that local insurers maintain robust risk management practices and comply with international standards, thus gaining the confidence of global reinsurers.	• Assess risks related to concentration of reinsurance offers and the impact of NatCat risks on the pricing and availability of reinsurance coverage.
(Re)insurers	• Act as sponsors by structuring and transferring NatCat risks to the capital markets through instruments like catastrophe bonds, thereby broadening the availability of reinsurance capacity.	
IOs/MDBs	• Support access by offering technical assistance, policy advice and funding, and facilitating international cooperation to strengthen the resilience of insurance markets. • Provision of guarantees and capital support to insurance markets, companies, and risk pools.	
Capital markets	• Capital markets can provide additional capacity and liquidity for NatCat risks through nontraditional financial instruments such as catastrophe bonds and insurance-linked securities, thereby diversifying the risk pool.	

3.3 Public policy trade-offs between different options

When developing a strategy to reduce NatCat protection gaps, governments should understand the policy trade-offs between different options. The fiscal costs of developing insurance market capacity can be high. As illustrated throughout this paper, costs can include investments in data, institutions, and technical capacity building (for both supervisors and industry), but also include incentives (e.g., tax incentives and premium subsidies) and risk sharing (e.g.,

guarantees for first loss or insurer of last resort). These investments should be compared to the alternative of inaction. For example, the alternatives to investment in market capacity building could be: 1) the substantial economic, social, and political impacts of an unprotected population, alongside reduced economic activity as lack of insurance inhibits investment; or 2) the cost of government funding formal adaptive social protection systems or other government disaster response programs; or 3) the large, disruptive, and uncertain cost of ad-hoc government disaster response. The trade-offs will differ between countries and should also be considered alongside the feasible timeframe for investment, policy reform, and behavioral change. A country may adopt a short-term approach (e.g., adaptive social protection and/or targeted disaster aid and recovery programs funded by sovereign disaster risk financing instruments) while pursuing a gradual approach to a longer-term objective of developing financial markets so that households and firms can effectively finance and insure their risk and thus reduce the liability of taxpayers.

Governments will need to set public investment at a level that maximizes value for taxpayers while maximizing the private capital mobilized. When considering public guarantees, for example, these should be: a) considered only when there is a market failure (stemming, for example, from high concentration of catastrophe risk), b) set at a level that avoids excessive crowding-out of private capital (which may require a careful market sounding), c) ideally, paid for by the insurance market in terms of a regular premium, and d) assessed and redetermined regularly, allowing for a reduction over time.

3.4 Establish public-private insurance programs (PPIPs)[56]

Many of the solutions for addressing NatCat insurance protection gaps involve multi-stakeholder collaboration, involving supervisors, governments, private sector participants, IOs and MDBs, and civil society. As highlighted in previous sections, multi-stakeholder collaboration is key for any approach to addressing NatCat insurance protection gaps. It can also take the form of a formal partnership between the public and private sectors, such as by establishing public-private insurance programs (PPIPs). PPIPs can take several forms, ranging from provision and sharing of data on natural hazards to joint efforts on preventive measures and catastrophe risk insurance programs involving risk-sharing among private insurers and governments.

The advantages of PPIPs are that they can leverage the strengths of both the public and private sectors. The supervisor can provide regulatory and supervisory oversight and advice, and government and IOs and MDBs can provide financial and technical support and secure access to data and information. And private insurers can bring their expertise in underwriting, risk assessment, and claims management. Civil society representatives can help in advising on the priorities of public-private cooperation.

Such collaboration can also lead to the development of PPIPs that can encompass – for example – programs to provide broad-based insurance coverage, creation of risk pools, or new products that provide coverage for NatCat events. For the establishment of PPIPs, the following considerations apply:

- PPIPs should be seen as part of a comprehensive, risk-layered Disaster Risk Finance and Insurance (DRFI) strategy. Insurance and PPIPs should be seen as one instrument within a

[56] This section builds on the WBG strategy paper (2025), Mobilizing Public-Private Solutions to Manage the Financial Impacts of Natural Hazards in EMDEs, and the G7 High-level Framework for Public-Private Insurance Programmes (PPIPs) against Natural Hazards.

broader menu of options available to governments. Different instruments should be combined to protect against events of different frequency and severity.

- Long-term objectives should be considered alongside immediate needs. It is important to consider a phased and prioritized approach to help governments find practical solutions to address urgent priorities (saving lives and livelihoods) while building the foundations for more sophisticated solutions in the long run, especially in low-income countries where the financial system is weak and the insurance sector is underdeveloped.
- PPIPs require strong political commitment and ownership. Even in the most challenging of contexts, a strong champion within the government is essential to ensure continuity and to carry through reforms
- PPIPs can present an opportunity to embed risk reduction investment into insurance programs, by either directly investing or promoting collaboration across public and private sectors to ensure that insurance enables and encourages improved risk management standards.

These collaborations can take several forms depending on (i) the policy objectives of the government (who they want to protect and for what), (ii) the level of development of the insurance market and more broadly the level of development of the domestic financial sector, as well as (iii) the financial and institutional capacity of the government to prepare for and respond to disasters.

While governments often focus on protecting vulnerable populations through adaptive social protection programs funded by public resources, PPIPs enable, for example, integrating market-based instruments like sovereign parametric insurance backed by international reinsurance, with support from development partners. Additionally, in the infrastructure field, PPIPs can be a valuable tool to help minimize disruptions to essential services, particularly for vulnerable populations.

Scaling agricultural insurance in Senegal through public-private partnership

In Senegal, the government established the Compagnie Nationale d'Assurance Agricole du Sénégal (CNAAS), the country's only agricultural insurance company, as a public-private partnership to provide farmers with effective risk mitigation tools. The government owns 45 percent of CNAAS, with the remaining shares held by private actors such as (re)insurers and financial institutions. CNAAS offers a range of insurance products, including parametric drought insurance, livestock insurance, and multiperil crop insurance, with policies subsidized at 50 percent by the government. In 2022, it provided coverage to over 600,000 farmers, or about 8 percent of all farmers. CNAAS is now focused on developing a business strategy to achieve greater scale and long-term sustainability.[57]

For further detail see Annex 2.

There are many different approaches to the design of insurance programs based on PPIPs. PPIPs can take various forms (e.g., joint insurance programs and public insurance pools) and can cover different types of risks. Certain programs are built upon risk pooling or co-insurance arrangements, possibly combined with a public backstop through reinsurance or guarantee arrangement by the government. Some programs limit the availability of coverage to households only, while others extend coverage to businesses, including agricultural producers. Basic types of coverage often entail property damages, but there are examples where business interruption or temporary living expenses are also covered. There are also different options in terms of premium structures (e.g., uniform pricing, simplified risk-based pricing, or risk-based pricing). These products

[57] ILO: CNAAS: Upscaling agricultural insurance to reach sustainability,

or programs may involve some form of subsidy to support the take-up of coverage (see also section 3.2.5 above).[58]

With respect to building financial resilience in EMDEs, which are characterized by underdeveloped financial sectors and low financial inclusion, public intervention can foster competitive insurance markets by improving risk market infrastructure, such as data systems, risk models, and legal frameworks. These interventions reduce startup costs and entry barriers, in turn lowering insurance premiums and benefiting policyholders. The focus of PPIPs may therefore be on building domestic insurance capacity, facilitating risk transfer to global markets, and educating the public about insurance. The operationalization of PPIPs to build domestic insurance capacity in EMDEs can take a number of paths. The categorization below draws on the World Bank's experience supporting governments in leveraging insurance markets for resilience.

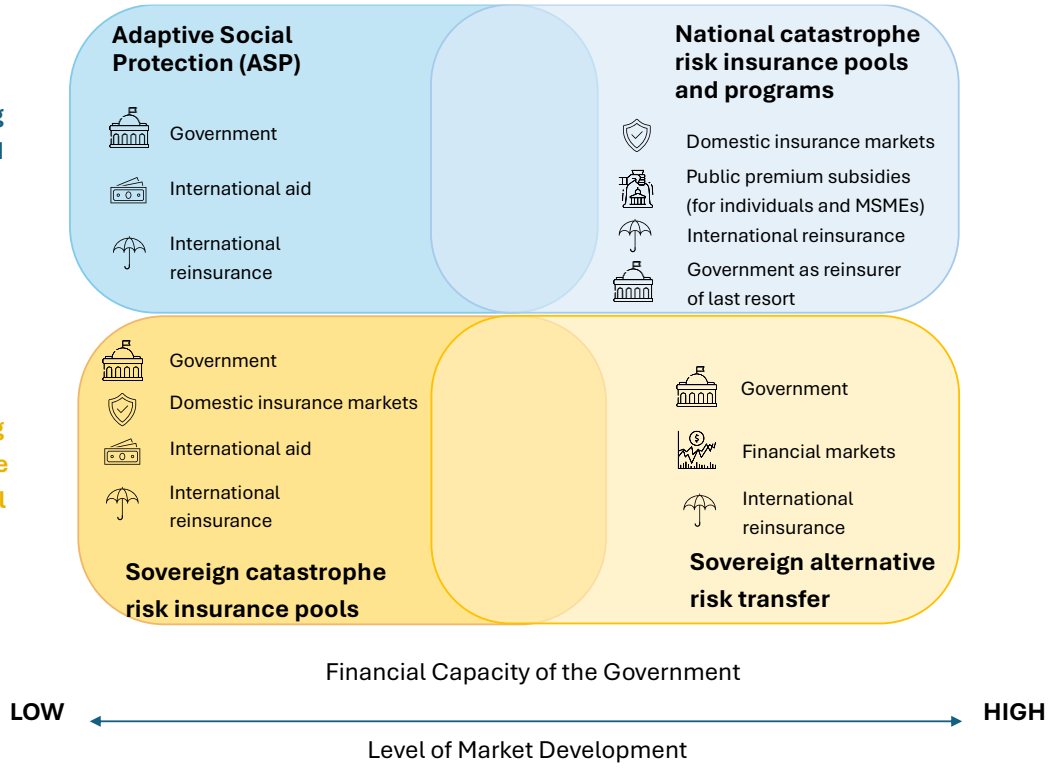


Figure 5: Categorization of PPIPs for insurance purposes in EMDEs[59]

- When the primary objective for protection are individuals, households or businesses, the government's role in PPIPs typically ranges from "social insurance" through adaptive social protection programs, to national catastrophe risk insurance programs that build on the domestic insurance industry. The balance between instruments depends on the level of development of the insurance market and the financial capacity of the government, but multiple instruments usually coexist to cover different populations or different risks. Countries with lower financial capacity may transfer part of the risk related to these programs to international reinsurers, while countries with higher financial capacity will be able to act as insurer of last resort.

[58] IAIS (2023).
[59] Mobilizing Public-Private Solutions to Manage the Financial Impacts of Natural Hazards in Emerging Market and Developing Economies : Challenges and Opportunities of Operationalizing Public Private Insurance Programs, World Bank

- In countries with higher financial sector development and stronger government capacity, domestic insurance and financial markets tend to be more developed, with broader access to financial services, which makes it possible to deploy different instruments. The government also has some financial resources to manage climate shocks and disasters. In this context, examples of PPIPs include national catastrophe risk insurance pools for homeowners to manage catastrophe risks through joint reserves and joint access to international reinsurance. While countries with strong financial capacity can have the government act as insurer of last resort of national catastrophe risk insurance pools, many countries need external support to make their instrument resilient to the largest disasters.

Türkiye - Addressing market failures and low insurance penetration
The Turkish Catastrophe Insurance Pool (TCIP) aims to increase market penetration and offer affordable insurance. The government provides a financial guarantee and enabling environment, while allowing companies to compete for operating the TCIP; private insurers then act as agents. TCIP is mandatory for urban areas and now insures more than 50 percent of the population (short of 100 percent due to challenges in comprehensive enforcement). TCIP has also achieved efficiency and speed of payouts, as demonstrated following the 2023 earthquake.

Alternative models include Dual Catastrophe Risk Insurance Programs for Homeowners. A compulsory extension of guarantee against catastrophe risks can be included in all property insurance policies offered by domestic insurers, backed by international and public reinsurance. If property insurance penetration is low, this can be complemented by a national fund to compensate uninsured households, and the system can be backed either by the government (if it has enough capacity), by external support (e.g., through contingent finance instruments), or by transferring the highest risks to international markets.

Morocco – Protecting insured and uninsured households

Morocco developed a dual catastrophe PPIP that builds on market-based insurance and solidarity principles to protect insured and uninsured households against disasters. It covers insured households through a compulsory extension of guarantee against catastrophe risks in all property insurance policies. However, insurance penetration is low (less than 5 percent). To protect uninsured households, the government established a Solidarity Fund (FSEC). Following the Al-Haouz Earthquake in 2023, the FSEC unlocked around US$300 million to cover eligible losses, out of which US$275 million came from the FSEC (parametric) reinsurance policy. Under this PPIP the government provides a guarantee against counterparty risk as well as a guarantee in case of a lack of coverage internationally. The supervisor (ACAPS) has the power to suggest improvements to the existing coverage system and decide on applicable rates for the insurance component of the system.

Various stakeholders play a role in the establishment of PPIPs, as shown below, noting that overall impact will depend on collaboration between all stakeholders.

Possible actions to establish PPIPs		
	Starting point	**Advanced actions**
Governments	• Develop national risk financing strategies to anchor the development of risk financing	• Provide financial support to help increase take-up of insurance and increase risk taking capacity of (re)insurance markets, while paying

	and insurance, including risk layering of financial instruments. • Directly support or facilitate data generation and sharing between public and private sector. • Champion PPIPs to demonstrate public support and provide stable legal and institutional foundations for such programs. • Enhance social safety net programs to increase scalability, including through beneficiary registries, data systems, and linking to digital payments.	attention not to provide moral hazard for public financial support. This could be in the form of partial premium subsidies; or providing guarantees as insurer of first or last resort. • Build shock responsive social protection systems and other distribution mechanisms, which can be backed with insurance to ensure that public disaster support is effective and protecting the most vulnerable.
Supervisors	• Inform policymakers on areas where insurance is unaffordable because of the level of risk (or the limited financial capacity of consumers) to help guide effective interventions in risk reduction and/or financial inclusion.	• Provide advice on areas related to disaster risk financing instruments other than insurance (e.g., national or dedicated disaster risk funds, catastrophe risk insurance programs or emergency funds) where insurers are not able to provide adequate insurance coverage.[60]
(Re)insurers	• Contribute their technical capacity in underwriting, risk assessment, and claims management, as well as their financial capacity in risk-bearing. In addition, the industry has a role to play in revealing the cost of risk (i.e., through risk-based insurance premiums), incentivizing proactive risk management and driving risk management standards through society.	
IOs/MDBs	• Contribute to the development of sound and sustainable catastrophe risk insurance markets through the provision of technical assistance, policy advice, capacity building, funding, and policy guidance to the public and private stakeholders. Such support is usually embedded in a broader agenda, including financial inclusion, the development of adaptive social protection systems, and the development of a resilient financial sector.	

[60] IAIS (2023).

EMDEs can work with global initiatives to build technical capacity and scale NatCat insurance and disaster risk financing programs. Such initiatives bring together partners from developing and developed countries, international organizations, the private sector, and civil society.

Select examples of international initiatives supporting EMDEs to leverage NatCat insurance and DRF

G20 Initiatives under Sustainable Finance Working Group, Disaster Risk Reduction Working Group and G20-V20 InsuResilience Global Partnership support actions to reduce the disaster risk finance and insurance gaps.

Global Shield against Climate Risks is a joint initiative of the Vulnerable Twenty (V20) Group and the Group of Seven (G7). It aims to provide and facilitate more and better pre-arranged protection against climate and disaster related risks for vulnerable people and countries.

The ASEAN+3 Disaster Risk Finance Initiative is a regional initiative that aims to strengthen the capacity of ASEAN+3 members to manage the impacts of disaster and climate risks.

The Insurance Development Forum is a public-private partnership led by the insurance industry and supported by the World Bank, the United Nations, and other international organizations. It aims to enhance the use of insurance to build greater resilience against disasters.

4 Conclusions and next steps

Insurance, including reinsurance, plays a critical role in managing the financial impacts from NatCat events. Insurance can support recovery, facilitate investment, and promote resilience through risk reduction and preparedness. This paper highlights the importance of having a range of collaborative approaches to address NatCat insurance protection gaps, particularly in EMDEs.

However, insurance-based solutions alone cannot address all NatCat risks. Broader risk reduction efforts are critical to reducing vulnerabilities and expanding insurability. Investing in foundations for the successful implementation of insurance-based solutions – such as enhancing capacity to assess exposure to NatCat events, implementing risk-based and proportionate supervisory frameworks, and improving financial literacy and risk awareness among consumers, as well as incentivizing risk reduction efforts and resilience – should be pursued under most circumstances. These foundations take time and scaling up solutions will be difficult without them.

There is no one-size-fits-all approach to addressing NatCat protection gaps, given the unique challenges faced by different jurisdictions. These differences reflect not only variations in insurance market development and fiscal capacity, but also the distinct nature of natural catastrophes and risks faced across regions. This is not only true for advanced economies compared to EMDEs, but even among EMDEs there is significant diversity in economic structures, institutional capacities, and exposure to risks. The choice between and sequencing of possible solutions will depend on the individual jurisdiction's context and consideration of trade-offs.

Therefore, this paper describes a range of possible incremental actions that jurisdictions can take, tailored to their specific circumstances. For example, jurisdictions with low financial literacy and low financial capacity could first focus on developing adaptive social protection, which focuses on protecting poor and vulnerable populations, while enhancing financial inclusion and developing their insurance market and supervisory capacity. In contexts where insurance uptake is low or where traditional models are unsuitable – such as markets with low sums insured, informality, small populations, or a focus on welfare protection rather than investment – microinsurance and premium subsidies can help address these gaps. Jurisdictions with more advanced insurance markets and

access to global reinsurance could explore regional or sovereign risk pools to manage NatCat risks at scale.

The following graphic illustrates the variety of solutions described in this paper and how a comprehensive approach to closing NatCat protection gaps will require different solutions, ranging from government support to market-based solutions. The graphic illustrates a different range of solutions, depending on whether coverage is for individuals and (small) businesses or central/local governments. This is meant as an illustrative example and is not meant to address all jurisdictional circumstances and specificities, nor all possible solutions. Jurisdictions could start at any point on the graphic depending on their priorities and current level of development. In addition, jurisdictions should not just consider a single solution but instead should look at how multiple solutions can complement each other and have greater impact.

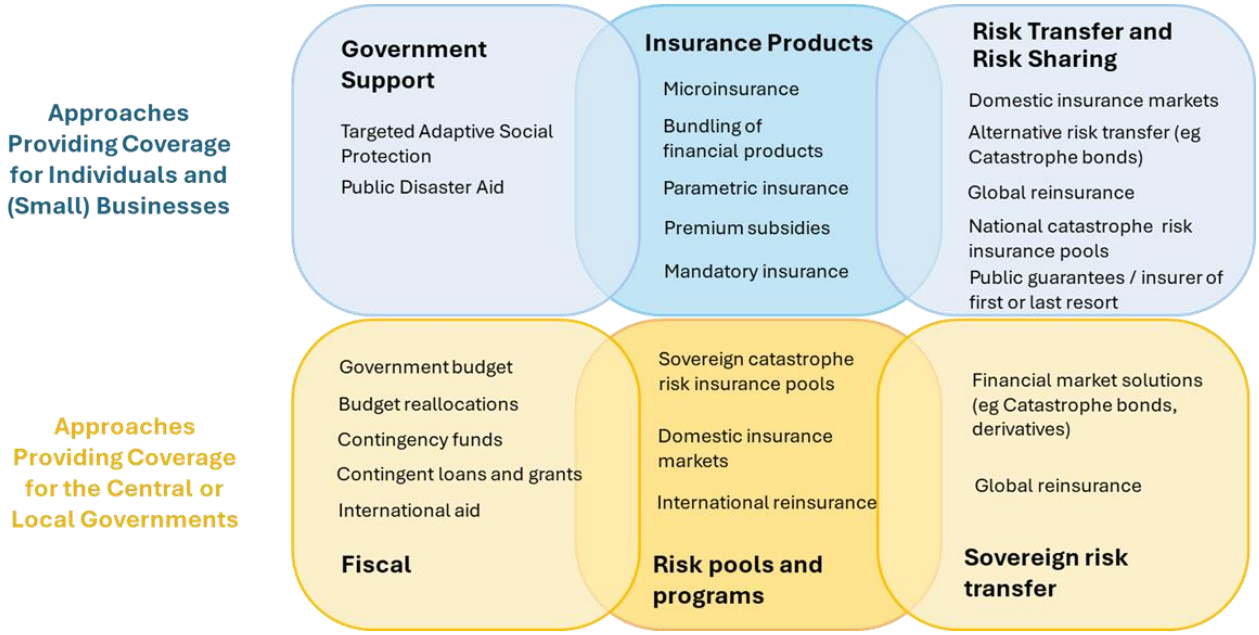


Figure 6: Possible approaches to addressing NatCat protection gaps (Source: Authors)

When developing a strategy to reduce NatCat protection gaps, it is important to understand the trade-offs between different options, including the role of public versus private market solutions. Many of the solutions described in this paper require significant upfront investment by various stakeholders, including the government. These investments should be weighed against the alternative of inaction, which could expose economies to uncertain but potentially severe economic, social, political, and fiscal impact. Equally, when considering the level of involvement from the government, it is important that its involvement is structured in ways that support financial and fiscal sustainability, involving appropriate risk-sharing with private insurance markets. Ultimately, the trade-offs will differ for different jurisdictions and should also be considered alongside the feasible timeframe for investment, policy reform, and behavioral change.

This paper emphasizes that there is a role for multiple stakeholders and multiple solutions in narrowing NatCat protection gaps. The following example illustrates how a combination of tools and approaches could be used in South Africa to narrow protection gaps and strengthen the resilience of South Africa's municipalities.

South Africa – Untapped potential to strengthen resilience of South Africa's municipalities

South Africa faces a significant NatCat protection gap, with 71 percent of losses over the past decade uninsured, despite a well-developed insurance sector (Swiss Re, 2023). Municipalities, which own local assets and manage disaster response, are particularly underinsured due to constrained budgets, limited risk management capacity, and poor understanding of risk transfer options.

Three key protection gaps persist: insufficient infrastructure coverage, underinsurance of covered assets, and disputed claims.

Insurance alone cannot address systemic municipal challenges but can enhance resilience and transfer of risk. South Africa's well developed insurance industry is well placed to strengthen municipal coverage. The following options are being explored by the national and municipal governments:

- Partnerships between insurers and municipalities to improve risk management and data, reducing disaster risk and enhancing coverage affordability
- Formalizing self-insurance or establishing captives with a reinsurance layer for larger claims, as piloted by some of the metros, to lower costs and expedite claims
- Developing parametric insurance for urban risks, integrated into legislation, to enable faster payouts for severe events (parametric insurance pays based on predefined triggers and thresholds)
- Creating public-private partnerships to address large infrastructure or uninsurable risks.

For further detail see Annex 2.

Going forward, jurisdictional stakeholders can follow a multi-step approach to develop a strategy to close the NatCat insurance protection gap: 1) develop an understanding of the risks the jurisdiction faces; 2) set clear objectives; 3) conduct diagnostic studies to identify the specific challenges in the jurisdiction; 4) identify policy, capacity building, and investment options to address these challenges; 5) develop a costed, multi-year reform plan in partnership between government, the supervisor, the insurance sector, development partners, and other relevant stakeholders. Throughout the process, knowledge exchange with jurisdictions at different levels of insurance market development and with the international (re)insurance market can help inform strategic decision making and build technical capacity of key stakeholders.

Building on this report, the IAIS and the World Bank will continue efforts to provide practical guidance and tools to assist policymakers and supervisors in addressing NatCat protection gaps. This collaboration will aim to support stakeholders in implementing targeted, scalable, and sustainable solutions to strengthen resilience against natural catastrophes. It will entail practical resources for policymakers and supervisors to continue to share experiences, insights, and challenges. The IAIS and the World Bank will also work with other international organizations and partners to ensure the support provided is inclusive, well-informed, and aligned with the diverse needs and priorities of jurisdictions.

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Annex 1: Glossary

Adaptive social protection: A framework that integrates social protection, disaster risk management, and climate change adaptation to build resilience and reduce vulnerability to shocks, particularly for vulnerable populations.

Basis risk: The risk that an insurance or reinsurance product does not pay out as expected when the policyholder experiences a loss. In reinsurance, it refers to the risk that the insurer's actual loss experience does not align with the risk transferred to the reinsurer.

Catastrophe bonds (cat bonds): Risk-linked securities that transfer a specified set of risks, often related to natural disasters, from an insurer or reinsurer to investors. Investors receive a return, but they may lose their principal if a predefined catastrophic event occurs.

Contingent financial products: Financial instruments that provide funding or liquidity in response to a predefined trigger event, such as a natural disaster or economic shock.

Emerging market and developing economy (EMDE): Classification taken from the IMF World Economic Outlook, which divides the world into two major groups: advanced economies and EMDEs.

Enterprise risk management system: Strategies, policies, and processes used by insurers to identify, assess, monitor, and mitigate risks across the entire organization.

Fast-moving consumer goods (FMCG): Nondurable products that sell quickly at relatively low costs.

Financial inclusion: Refers to a state in which all working-age adults have effective access to the following financial services provided by formal institutions: credit, savings (defined broadly to include transaction accounts), payments, insurance, and investments.

Insurance Core Principes (ICPs): The globally accepted framework for insurance supervision, aimed to promote consistently high supervisory standards in IAIS member jurisdictions.

(Insurance) Intermediaries: Individuals or entities, such as brokers or agents, involved in the distribution, marketing, or sale of insurance products.

Insurance Linked Security: Financial instruments whose value is linked to insurance-related risks, such as catastrophe bonds, allowing insurers to transfer risk to capital markets.

International organization (IO): An entity established by treaty or other formal agreement between multiple nations, with a mandate to address international issues or foster cooperation (e.g., the United Nations, World Bank).

Market conduct (risk): The risk of financial loss or other adverse consequences that arises from insurers and/or intermediaries conducting their business in a way that treats customers unfairly or results in harm to customers.

Microinsurance: Insurance products designed to be affordable and accessible to low-income individuals, often covering risks such as health, agriculture, or property.

Multilateral Development Bank (MDB): International financial institutions, such as the World Bank or Asian Development Bank, that provide financial and technical assistance to support economic development in member countries.

Natural catastrophe (NatCat): Damages caused or accentuated by NatCat events such as floods, earthquakes, and storms and could be used interchangeably with the term 'disaster risk' which is commonly used by other organizations such as the OECD, the World Bank, and the UN.

Parametric insurance: Insurance that pays out a predetermined amount based on the occurrence of a specific event (e.g., a hurricane reaching a certain wind speed), rather than actual losses incurred.

Premium subsidy: Financial assistance, often provided by governments, to reduce the cost of insurance premiums for individuals or businesses.

Probabilistic methodologies: Risk modeling techniques that estimate the likelihood and impact of potential events, including the uncertainty around those estimates.

Proportionality: In insurance supervision, proportionality allows the ICPs to be translated into a jurisdiction's supervisory framework in a manner appropriate to its legal structure, market conditions and consumers. Proportionality allows the supervisor to increase or decrease the intensity of supervision according to the risks inherent to insurers, and the risks posed by insurers to policyholders, the insurance sector or the financial system as a whole.

Protection gaps: The difference between the amount of insurance coverage that is economically necessary and the amount actually purchased or available.

Public-private partnership: Collaborative arrangement between governments and private sector entities to achieve shared goals, often in areas like infrastructure, healthcare, or disaster risk management.

Reinsurance: Often referred to as insurance for insurance companies, reinsurance is a contractual agreement where an insurer transfers some of its risk to a reinsurer, effectively sharing the financial burden of claims.

Resilience: The ability of individuals, communities, or systems to anticipate, absorb, and recover from shocks or disasters while maintaining essential functions.

Risk-based pricing: Setting insurance premiums based on the level of risk associated with the insured entity or event, often informed by technical models.

Risk-based solvency: A regulatory approach that assesses an insurer's solvency based on its specific risk profile, ensuring it has sufficient capital to meet its obligations.

Right of first refusal: A contractual right allowing an entity to match or decline an offer before the asset is offered to others.

Risk reduction: For the purpose of this paper, actions under the term ‘risk reduction’ include a range of actions, aimed at preventing new and reducing existing disaster risk and managing residual risk, all of which contribute to strengthening resilience.

Risk transfer: The process of shifting financial risks from one party to another, often through insurance or reinsurance.

Scenario analysis: A technique used to evaluate the potential impact of various hypothetical scenarios, often based on historical or projected events.

Supervisor (insurance): In this paper refers to regulators or supervisory authorities responsible for supervision of the insurance sector.

Uncertainty loadings: Adjustments made to insurance premiums to account for uncertainty in risk estimates, ensuring the insurer remains financially viable.

Underwriting: The process by which an insurer evaluates and assumes financial risk in exchange for a premium, determining the terms and pricing of coverage.

Annex 2: Expanded case studies

The following annex provides further detail on case studies referenced in the body of the report, or relevant to the paper.

World Food Programme (WFP) approach to close the insurance protection gap

The widening protection gap is a key driver of global hunger, leaving vulnerable communities without the financial means to recover from shocks that threaten food security and livelihoods. Climate risk insurance plays a vital role in bridging this gap by enabling timely responses, faster recovery, and enhanced resilience. To address it, the WFP focuses on two core workstreams: inclusive and macro-level risk financing. Since 2011, and building on the R4 Rural Resilience Initiative, the WFP has supported the development of inclusive insurance markets in EMDEs, reaching over 10.5 million vulnerable people across more than 20 countries.[61]

Challenges and Lessons learned

Over the past decade, the WFP has faced several challenges in implementing inclusive insurance, including low awareness, limited affordability, underdeveloped insurance markets, poor accessibility, and unfavorable policy and regulatory frameworks. To address these, the WFP applies a holistic approach targeting demand, supply, and policy and regulatory constraints – investing in designing, piloting and scaling up valuable insurance products, in financial literacy, offering temporary subsidies, building local capacity, and supporting the development of enabling policy and regulatory frameworks. From this experience, four key lessons have emerged:

- **Context-specific interventions are essential**. Barriers across policy, regulation, supply, and demand are unique for each context and must be addressed through tailored approaches adopted jointly with local partners. In **Guatemala**, the WFP, jointly with its partners, designed a business interruption insurance product focused on protecting indigenous communities and women-led economic activities beyond agriculture, tackling unique barriers such as limited land ownership. Engagement with the insurance supervisor was critical to bringing this product to market.
- **Appropriate targeting and integration of insurance with interventions that are highly valuable, ensures impact and sustainability.** Insurance products and models should be appropriately targeted and integrated with high-impact interventions to ensure lasting impact. Products must be tailored to beneficiaries' socio-economic needs and priorities, while also aligning with the goals of stakeholders invested in improving their livelihoods. Insurance works best as part of a broader support package that addresses beneficiaries' most pressing challenges. In **Ethiopia,** the WFP jointly with its partners, supports farmers, by linking insurance to the Government's Input Voucher System (IVS), enabling scale-up from 20,000 households in 2022 to over 247,000 in 2024. By connecting insurance with input access, the program targets a specific segment of farmers who highly value inputs. In **Kyrgyzstan**, the WFP collaborates closely with local governments to enable forecast-based payouts as part of a meso-level index insurance scheme. The payouts are then used by local governments to support vulnerable pastoralists with access to fodder and other essential assistance during extreme winters and droughts.
- **It is crucial to have a vision of sustainability from the start**. From the inception, insurance schemes must be designed for long-term viability, with committed stakeholders, strong public-

[61] See the WFP Disaster Risk Financing Annual Report 2024

private partnerships (PPPs) and clear exit strategies. A key for success is the integration of climate risk insurance within national systems promoting resilience, productivity or social protection. In the **Guatemala**, WFP partnered with government municipalities and implemented a smart subsidy model where beneficiaries progressively took on a larger share of premium payments. In **Ethiopia**, the WFP promoted a market systems approach, fostering PPPs to enhance both demand and supply of agricultural insurance. Initially the WFP subsidized the cost of the premium, so it could later be integrated into the input package.

- **Strategic combination of financial services and awareness-raising maximize effectiveness of appropriate risk management and sustainability**. Financial instruments to manage risks should be selected based on the severity and frequency of risks and should be combined to increase impact. For instance, insurance is a critical tool to manage severe and less-frequent risks, whereas savings can be instrumental to build reserves enabling risk retention of more frequent and less severe risks. In such context, beneficiaries but also other stakeholders, such as governments, must understand insurance's role, its limitations and the need for combination. In **Guatemala**, most insured individuals are also part of Savings and Loans groups, enabling them to better manage their climate risks and increase their income so they can gradually increase their contributions. In addition, the WFP has invested in robust and impactful financial education of beneficiaries and awareness campaigns to other stakeholders such as local governments, which significantly boosted participation and contributions – rising from 1,659 individuals paying an average of US$3 to over 9,000 contributing US$8 within three years.

2.1 Assess protection gaps and exposure to NatCat risk

Peru – developing data-driven insights into NatCat protection gaps

Peru, through its financial regulator SBS, has taken significant steps to assess protection gaps and improve understanding of catastrophic risk coverage across the country. Using probabilistic methodologies developed in collaboration with the National University of Engineering of Peru, SBS evaluates insured portfolios for risks such as earthquakes, tsunamis, and floods. These methodologies incorporate detailed data on geolocation, structural characteristics, and economic exposure, tailored to Peru's unique geological and historical risk profile. This work has revealed a substantial protection gap, with only 800,000 insured assets out of an estimated 10 million properties nationwide, leaving 92 percent of assets without coverage.

To address this gap, SBS also collaborates with the Ministry of Finance to enhance data collection for public assets, aiming to improve disaster risk financing and insurability. For example, SBS advises on the development of databases that meet the quality standards required for catastrophe modeling, enabling better risk assessment for public schools and other government-owned properties. These efforts not only provide a clearer picture of the exposure currently covered by private insurance but also highlight the need for broader risk management strategies to reduce the country's vulnerability to natural disasters. While progress has been made in assessing risks and developing tools, challenges remain with regard to data quality and availability.

2.3 Strengthen financial literacy and risk awareness

Japan Financial Literacy and Education Corporation

The Japan Financial Services Agency (FSA), with related ministries and the Bank of Japan outlined in 2013 the minimum financial literacy to be acquired as fundamental skills. In November 2022, the Japanese Government developed the "Doubling Asset-based Income Plan", which stated that a new public organization would be established in 2024 as a neutral body to strategically implement financial and economic education in which the public and private sectors act in unity. Building on this plan, the FSA, in coordination with related stakeholders, established the Japan Financial Literacy and Education Corporation in April 2024 to promote teaching and guidance of financial education and encourage individuals to achieve financial well-being.

3.1.2 Parametric insurance

For governments

A multi-stakeholder parametric facility in the Caribbean

The Caribbean Catastrophe Risk Insurance Facility (CCRIF SPC) offers parametric insurance policies to Caribbean and Central American governments for tropical cyclones, earthquakes, excess rainfall and fisheries as well as electric and water utility companies in the Caribbean. It is owned, operated, and registered in the Caribbean. It limits the financial impact of catastrophic hurricanes, earthquakes, and excess rainfall events to Caribbean and Central American governments, and to the fisheries and utilities sectors, by quickly providing short-term liquidity through parametric insurance payouts. Since its inception, CCRIF SPC has made 78 payouts totaling almost US$400 million. Members have used payouts to meet their most pressing needs following a disaster – including providing food, shelter and medicine; repairing infrastructure and public assets such as buildings, roads, and bridges – and indeed making these structures more hazard resilient; and supporting key economic sectors such as agriculture and tourism to enable them to recover faster.

For households and businesses

Heat insurance: protecting informal workers from income losses

The Self-Employed Women's Association (SEWA), representing over three million women in informal trades, launched a heat microinsurance product in 2023 to address income losses from extreme heat. Using parametric insurance, it provides quick payouts when temperature thresholds are exceeded, helping women manage climate and health risks. The pilot covered 21,000 women in Gujarat and scaled to 50,000 in its second year, with further growth expected by 2025. Developed with partners and supported by donor-funded premiums, the product aims to mitigate risks faced by women in unsafe working conditions. During the expanded pilot, the product was complemented by a cash assistance layer that triggered at lower temperatures than the insurance product.

3.1.2 Other technological innovations

Parametric-based insurance coverage for Indian farmers

Today India has the largest subsidized crop insurance scheme in the world by number of insured farmers. The government's national scheme, Pradhan Mantri Fasal Bima Yojana (PMFBY), provides insurance coverage to farmers against multiple risks. It offers affordable premiums, with the central and state governments heavily subsidizing the majority of the premium cost. PMFBY includes an AYII program at its core, now with the option of including provisions for both pre- and post-harvest losses, helping farmers recover from both climate and non-climate related adversity and stabilize their income. Nearly 35 million farmers are currently covered under PMFBY. Challenges remain regarding the timely settlement of claims and ensuring protection of the livelihoods of the tens of millions vulnerable farmers currently not insured under the PMFBY and for whom PMFBY microinsurance may not be most suitable, especially in regions prone to high climate risks. India is constantly making improvements. Almost all states have opted to include "add-on" covers to the base AYII cover aiming to make crop insurance more comprehensive and better aligned to farmers' risk management needs. The huge government investment in ground-breaking technology for crop insurance extends to improving automatic weather recording networks, crop health monitoring with drones, and extensive upgrades to NCIP back-end technology. These all have the aim of enabling scale-up of crop insurance, better quality of service to farmers, and other improvements to PMFBY.

3.1.4 Integrating insurance into broader financial services to improve financial resilience while enhancing delivery and take-up of insurance

Comprehensive financial resilience and technology-enhanced insurance in the Horn of Africa

Pastoral communities in the Horn of Africa (HoA) are particularly vulnerable to climate shocks such as droughts. During a shock, pastoralists are at risk of losing their main assets – livestock – or find themselves forced to sell them at rock-bottom prices to cover basic needs. In 2022, HoA countries (Djibouti, Ethiopia, Kenya, and Somalia) launched the De-Risking, Inclusion and Value-Chain Enhancement of Pastoral Economies (DRIVE) project. DRIVE offers pastoral communities a package of financial services to help them cope with shocks: digital accounts and savings offer rapid funding during minor shocks, while index-based livestock insurance provides payouts when severe drought conditions occur. The insurance provides a timely payout to pastoralists at the start of dry season, if satellite observations of vegetation fall below a certain level. This payout can be used to purchase e fodder while the markets are functioning, which is several times more cost effective than replacing the animals. Payouts are disbursed to beneficiaries' bank or mobile money accounts opened under the project, which supports timeliness and transparency. Index-Based Livestock Takaful was also developed under DRIVE for Muslim pastoral communities. The project also funds activities to organize pastoralists and better connect them to livestock markets, facilitate regional livestock trade, and attract private investment in the livestock value chain by de-risking such investments. The combination of improved access to financial services and livestock markets reduces vulnerability to shocks and enables more productive livelihoods, thereby fostering long-term prosperity in pastoralist communities.

3.2.2 Catastrophe bonds

Cat bonds to build resilience in Jamaica

Jamaica faces significant threats from natural disasters, having incurred US$1.2 billion in damages from 2001 to 2010, with Hurricane Ivan alone costing over US$350 million. In July 2021 the World Bank issued a US$185 million catastrophe bond to enhance Jamaica's financial resilience against tropical cyclones, covering three hurricane seasons until December 2023 by transferring risk to 21 international institutional investors. The Government of Jamaica was the first government in the Caribbean region, and the first of any small island state, to independently sponsor a cat bond. This initiative built on Jamaica's disaster risk financing strategy – which contained a National Natural Disaster Risk Fund, contingent credit (including a World Bank Cat-DDO), and insurance from CCRIF SPC – to increase protection against the most severe disasters. The cat bond provides insurance cover with a predefined payout trigger based on metrics of a tropical cyclone's intensity, targeting an expected loss of around 1.5 percent, meaning that it is designed only for very severe and infrequent events. The bond's premium is fixed, ensuring cost predictability alongside quick potential payouts supported by the parametric design. In 2024 the Government of Jamaica sponsored a further catastrophe bond to renew coverage for a further four hurricane seasons

3.4 Establish public-private insurance programs (PPIPs)

Scaling agricultural insurance in Senegal through public-private partnership

In Senegal, the government established the Compagnie Nationale d'Assurance Agricole du Sénégal (CNAAS), the country's only agricultural insurance company, as a public-private partnership to provide farmers with effective risk mitigation tools. The government owns 45 percent of CNAAS, with the remaining shares held by the National Food Security Council (12 percent), a pool of domestic private insurers and reinsurers (37 percent), as well as farmers' organizations and private actors (6 percent). CNAAS offers a range of insurance products, including parametric drought insurance, livestock insurance, and multiperil crop insurance, with policies subsidized at 50 percent by the government. In 2022, it provided coverage to over 600,000 farmers, or about 8 percent of all farmers. CNAAS is now focused on developing a business strategy to achieve greater scale and long-term sustainability.[62] It is exploring products for additional sectors, such as fishing, aquaculture, and agroforestry. In addition, there is a drive to bundle its offering with agricultural loans, production inputs and other insurance products. On the demand side, CNAAS has also been working on financial literacy activities for producers to address important socio-cultural and religious barriers.[63]

[62] ILO: CNAAS: Upscaling agricultural insurance to reach sustainability.

[63] World Bank Group (2024). *Sénégal : Diagnostic sur le Financement des Risques Climatiques et de Catastrophes*.

4 Conclusion and next steps

South Africa – Untapped Potential to Strengthen Resilience of South Africa's Municipalities

South Africa faces a severe disaster protection gap, with 71 percent of losses over the past decade uninsured despite its well-developed insurance sector (Swiss Re, 2023). Municipalities, responsible for frontline disaster response, are particularly underinsured.

South Africa's 257 metro, district, and local municipalities are constitutionally independent, owning local assets and managing service delivery and disaster risk. Funded by local tariffs and national allocations, they rely on six disaster risk finance tools: budget reallocation and reprioritization, contingency reserves, two national grants (response and recovery), debt, and insurance. However, they must exhaust their own budgets and reserves before applying for national support, a challenge for smaller municipalities during severe events. National grants, constrained by fiscal limits, are often slow to disburse and complex to deploy. A 2025 study commissioned by the World Bank and National Treasury found that while most municipalities are insured, only one-third of 26 surveyed claimed post-disaster and those that claimed cited lengthy claims processes with smaller than expected settlements.

Three key protection gaps persist: insufficient infrastructure coverage, underinsurance of covered assets, and disputed claims. Barriers include:

- **Municipal constraints**: Constrained budgets combined with limited risk management capacity and poor understanding of risk transfer options lead to underinsurance, self-insurance without reserves, or insuring at book rather than replacement value. Inadequate asset registers, aging infrastructure, and poor maintenance further hinder insurability. Policy conditions are often misunderstood, complicating claims.
- **Industry constraints**: Few insurers serve municipalities, with one dominant provider covering over half the market. Weak governance and data gaps – asset values, asset location, and historical losses – make municipal assets difficult to price and reinsure. Limited demand has stifled innovation, and while not prohibited, parametric insurance remains outside formal legislative frameworks.

Opportunities to close the gap: Insurance alone cannot address systemic municipal challenges but can enhance resilience and transfer of risk. South Africa's well developed insurance industry is well placed to strengthen municipal coverage. The following options are being explored by the national and municipal governments:

- **Partnerships** between insurers and municipalities to improve **risk management and data**, reducing disaster risk and enhancing coverage affordability.
- **Formalizing self-insurance** or establishing captives with a reinsurance layer for larger claims, as piloted by some of the metros, to lower costs and expedite claims.
- Developing **parametric insurance for urban risks**, integrated into legislation, to enable faster payouts for severe events.
- Creating **public-private partnerships** to address large infrastructure or uninsurable risks, paired with technical support for municipal disaster risk reduction to boost future insurability.

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