

A call to action: the role of insurance supervisors in addressing natural catastrophe protection gaps

November 2023

About the IAIS

The International Association of Insurance Supervisors (IAIS) is a voluntary membership organisation of insurance supervisors and regulators from more than 200 jurisdictions. The mission of the IAIS is to promote effective and globally consistent supervision of the insurance industry in order to develop and maintain fair, safe and stable insurance markets for the benefit and protection of policyholders and to contribute to global financial stability.

Established in 1994, the IAIS is the international standard-setting body responsible for developing principles, standards and other supporting material for the supervision of the insurance sector and assisting in their implementation. The IAIS also provides a forum for Members to share their experiences and understanding of insurance supervision and insurance markets.

The IAIS coordinates its work with other international financial policymakers and associations of supervisors or regulators and assists in shaping financial systems globally. In particular, the IAIS is a member of the Financial Stability Board (FSB), member of the Standards Advisory Council of the International Accounting Standards Board (IASB), and partner in the Access to Insurance Initiative (A2ii). In recognition of its collective expertise, the IAIS also is routinely called upon by the G20 leaders and other international standard-setting bodies for input on insurance issues as well as on issues related to the regulation and supervision of the global financial sector.

For more information, please visit www.iaisweb.org and follow us on LinkedIn: [IAIS – International Association of Insurance Supervisors](#).

IAIS Reports are materials developed through committees, subcommittees, forums and other groups on strategic themes and other topics of interest to the IAIS' mission. IAIS Reports differ from issues and application papers as they typically do not undergo a formal consultation process, although stakeholders and members may be invited to provide input through other means (eg surveys, webinars and other targeted inputs). IAIS Reports are often intended to be relatively short and developed within a relatively brief project timeline, to allow for more timely publication.

International Association of Insurance Supervisors
c/o Bank for International Settlements
CH-4002 Basel
Switzerland
Tel: +41 61 280 8090

This document was prepared by the Protection Gaps Task Force in consultation with IAIS members.

This document is available on the IAIS website (www.iaisweb.org).

© International Association of Insurance Supervisors (IAIS) 2023.

All rights reserved. Brief excerpts may be reproduced or translated provided the source is stated.

Contents

Executive summary	4
1 Introduction.....	5
1.1 Identification of the issue.....	5
1.2 Purpose and scope of the report	5
2 Supervisory objectives and relationship to NatCat protection gaps	7
2.1 How supervisory objectives are related to protection gaps	8
3 Supervisory activities to address protection gaps	9
3.1 Assessing insurance protection gaps.....	10
3.2 Improving financial literacy and risk awareness.....	12
3.3 Incentivising risk prevention and reduction of insured losses.....	14
3.4 Creating an enabling regulatory/supervisory environment to support availability of insurance products or services and uptake of coverage	16
3.5 Advising government and industry, including on the design and implementation of PPP or insurance schemes.....	20
4 Conclusion and next steps.....	23
4.1 Next steps.....	23
Annex 1: Disaster risk financing landscape	25
Annex 2: Supervisory activities that address protection gaps – expanded.....	29
References	32

Executive summary

As a consequence of the effects of climate change, in combination with structural changes to economies and ongoing economic development, it is expected that natural catastrophe (NatCat) protection gaps will increase. This report outlines why addressing NatCat protection gaps matters to insurance supervisors and presents a range of supervisory actions to address challenges related to affordability, availability and take-up of insurance coverage against NatCat events.

For readers beyond the supervisory community, the report explains the actions that supervisors are currently taking, or could potentially take to address protection gaps, in the context of a broader architecture of response – spanning both public and private sector actors. The report provides a basis for engagement among insurance supervisors, consumers, the insurance industry, policymakers and other relevant stakeholders.

Five major areas of supervisory activity are identified in the report to narrow NatCat protection gaps, underpinned by current examples from IAIS member jurisdictions (see Section 3). These are:

1. Assessing insurance protection gaps
2. Improving consumer financial literacy and risk awareness
3. Incentivising risk prevention and reduction of insured losses
4. Creating an enabling regulatory and supervisory environment to support availability of insurance and uptake of coverage
5. Advising government and industry, including on the design and implementation of public-private partnerships (PPPs) or insurance schemes

Supervisory mandates can influence the range of actions taken and the tools adopted by the supervisor to support action. For those supervisors that have mandates to promote financial inclusion and market development, actions to address protection gaps are central to their mandate. However, action in support of narrowing NatCat protection gaps can also contribute to the supervisory mandates of policyholder protection and financial stability.

Addressing protection gaps presents a broad societal challenge that requires a coordinated response from a range of parties. Supervisors can contribute expertise, tools and experience to this collective effort, across both public and private sector actors, to enhance resilience against NatCat events and narrow protection gaps. This can include supporting the design and implementation of insurance programmes and PPPs or collaboration to improve access to data and knowledge on NatCat risks.

The IAIS is cognisant that protection gaps exist across a range of risks. While this report focuses on NatCat protection gaps, it can also build a platform for future work on other protection gaps. Actions presented in the report could also be applicable to initiatives aimed at narrowing other types of protection gaps.

Building on this report, the IAIS will look for opportunities to take concrete action on initiatives that can assist the supervisory community to address NatCat protection gaps, through collaboration with international partners like the Access to Insurance Initiative (A2ii), Organisation for Economic Cooperation and Development (OECD), Global Shield against Climate Risks, Insurance Development Forum (IDF) and others with expertise in protection gaps and disaster risk financing, as outlined in Section 4.

1 Introduction

1.1 Identification of the issue

The damage and economic losses caused by natural catastrophe (NatCat) events¹ are increasing, partly driven by growing exposures in high-risk areas. As the impacts of climate change intensify, it is expected that this will result in even greater damages, leading to increased protection gaps in the absence of concerted action. Protection gaps manifest differently across markets, countries and regions, but disproportionately affect more vulnerable segments of society and are felt more severely by emerging market and developing economies (EMDEs).

Insurance, including reinsurance,² can play a significant role in managing the financial impact of natural disasters, thereby contributing to resilience. Insurance offers financial protection against damage to and loss of physical assets, as well as indirect economic losses, and aids recovery and reconstruction after natural disaster events. Insurance can also provide incentives for adaptation, risk mitigation and preparedness before a disaster. Besides such microeconomic benefits, insurance also contributes to macroeconomic resilience by helping to absorb the negative financial impacts on the economy after a natural disaster.

Increases in the frequency and intensity of NatCat events can present challenges to insurance-based solutions, including around the insurability of certain risks and the availability of affordable coverage. For natural perils, insurers rely on their ability to pool losses across their policyholders (or worldwide through reinsurers). As climate change makes some losses more recurrent, this will challenge insurers' capacity to pool these losses and could lead to insurers withdrawing from offering coverage, further exacerbating protection gaps.³

The complexity of the underlying issues means that addressing protection gaps is a broad societal challenge that requires a coordinated response from a range of parties. This includes governments, the insurance industry, and consumers. Alongside these parties, insurance supervisors also have a crucial role to play in addressing these challenges. Supervisors should consider how they can apply their expertise, tools and experience to support disaster risk assessment and management, thereby contributing to a collective effort to address protection gaps.

While there is an expansive body of literature and analysis focused on protection gaps and related topics such as disaster risk financing⁴, the role of supervisors has not been as thoroughly explored to date. The IAIS, as the global standard setting body for insurance supervision, is therefore taking a more comprehensive look at the important role supervisors can play in addressing NatCat protection gaps.

1.2 Purpose and scope of the report

This report is intended to provide a basis for engagement and to stimulate discussion among insurance supervisors, the insurance industry, consumers, policymakers and other relevant

¹ For the purposes of this report, the term 'natural catastrophe' (NatCat) can be interpreted as referring 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 organisations such as the OECD, World Bank and UN.

² For the purposes of this report, references to insurance are generally assumed to also include reinsurance.

³ For example, during the summer of 2023, several insurers announced that they will stop issuing new policies in California. Insurers cited a number of factors relating to their decision, including high costs of rebuilding, access to reinsurance, and impacts on financial resilience because of exposure to NatCat events.

⁴ See for example the OECD's [Recommendation on Building Financial Resilience to Disaster Risks](#), 2023 which provides broader guidance on the financial management of disaster risks.

stakeholders on measures to address protection gaps. The ideas outlined in this report can also serve to support concrete action on this critical topic.

The report analyses various types of initiatives that can be undertaken by supervisors to help address NatCat protection gaps. Section 2 describes how actions aimed at addressing NatCat protection gaps can help achieve supervisory objectives. Section 3 provides more detail on the potential range of actions of supervisors, and how the role of supervisors could be enhanced.

The IAIS is focused on protection gaps related to NatCat and climate-related disasters in the first instance but recognises that protection gaps exist across a spectrum of risks, also including cyber, health, mortality, pandemics and pensions.⁵ The report can build a platform for future work on other protection gaps. Actions presented in the report could also be applicable to initiatives aimed at addressing other types of protection gaps.

Given its broad membership, the IAIS – through its Protection Gaps Task Force (PGTF) – was able to draw on the experiences of a diverse range of supervisory authorities from across the globe, in developing this report. The report also greatly benefitted from engagement with, and inputs from, numerous partners and stakeholders, including membership in the Task Force of the Access to Insurance Initiative (A2ii) and the Organisation for Economic Cooperation and Development (OECD).

What are protection gaps?

Protection gaps, or insurance protection gaps, can be defined in different ways by different stakeholders. A common interpretation of the insurance protection gap, in relation to NatCat, is the uninsured portion of economic losses caused by natural disaster. Other definitions focus on the insurance protection gap as the amount of insurable losses that are not insured.⁶ Protection gaps are often expressed either in monetary terms or as a percentage of total losses. In 2022, according to the latest *sigma* report, only 45 per cent or USD 125 billion, of global economic losses related to NatCat of USD 275 billion were insured. This means that millions of households and businesses face a large protection gap.⁷

It is not the intention of this report to debate differing interpretations of the definition of protection gaps, nor is the intention to attempt to measure or quantify the scale of protection gaps – figures used in this paper are taken from the work of partner organisations or industry.

The report works from the premise that NatCat protection gaps exist and in many cases are expected to grow with the impact of climate change, alongside other factors such as ongoing development in high-risk areas. They exist across IAIS member jurisdictions – albeit the contributing factors, nature and scale of the gaps differ depending on the regions and insurance market.⁸ Low levels of insurance coverage for NatCat events are due to a number of factors, although may ultimately result from a gap between the cost of insurance coverage and the amount

⁵ See for example, Global Federation of Insurance Associations (GFIA), [Global protection and recommendations for bridging them](#), 2023 which includes sections on NatCat, pensions, health and cyber protection gaps. An account of pandemic business interruption protection gaps can be found in IAIS, [The Role of Insurance Supervisors in Multi-Stakeholder Approaches to Address Pandemic Protection Gaps](#), 2022 and OECD, [Responding to Covid-19 and pandemic protection gap in insurance](#), 2022.

⁶ An explanation is found in the Global Asia Insurance Partnership (GAIP), [About the Protection Gap](#), 2023. The Geneva Association explains the notion of the insurance protection gap as the difference between the amount of insurance that is economically beneficial for both insureds and insurers on the one hand and the amount of coverage actually purchased or offered, on the other. See Geneva Association, [Understanding and Addressing Global Insurance Protection Gaps](#), 2018.

⁷ Swiss Re Institute, [A Perfect Storm: Natural Catastrophes and Inflation in 2022](#), 2023.

⁸ Supervisors indicated in the IAIS' [Global Insurance Market Report](#) (GIMAR), 2022, that they expected the impact of climate change to widen and materially affect the insurance sector's assets, risk management and product development. Many jurisdictions expect climate-related risks to impact the insurability of NatCat risk, especially in the longer term.

that policyholders are willing or able to pay for such coverage.⁹ In other cases, low insurance penetration and the unavailability of suitable insurance solutions for NatCat events can preclude the uptake of coverage.

Box 1: What are protection gaps?

2 Supervisory objectives and relationship to NatCat protection gaps

Insurance plays a key role in the financial system as a risk management and transfer tool that can provide protection against unexpected damages and losses. Insurance also supports the distribution of financial risk, mitigates the economic impacts of catastrophe events, and supports recovery and future preparedness by strengthening resilience against a variety of risks, including NatCat events.¹⁰ Insurers are also large-scale institutional investors. Thereby the insurance business model inherently contributes to financial stability, including by providing sources of funding to other institutions and by promoting risk management through the pooling and diversification of risk.

In this context, effective and globally consistent supervision of the insurance sector is critical to develop and maintain fair, safe and stable insurance markets for the benefit and protection of policyholders, and to contribute to global financial stability.¹¹

The IAIS Insurance Core Principle (ICP) 1 (Objectives, Powers and Responsibilities of the Supervisor) sets out minimum requirements for insurance supervisory mandates and objectives.¹² In line with ICP 1.2, supervisory objectives are required to at least include: “protection of policyholders, promotion of the maintenance of a fair, safe and stable insurance market, and contributing to financial stability”.

ICP 1.2 also recognises that precise supervisory objectives and their respective priority may vary by jurisdiction, and that some supervisors may have additional supervisory objectives, such as “promoting insurance market development, financial inclusion, financial consumer education”.

While supervisors continue to focus on traditional policyholder protection and financial stability objectives, the challenges posed by risks and trends such as increased digitalisation in insurance, climate risks and growing protection gaps, have seen many supervisors take on a broader scope of responsibilities and activities. For example, an increasing number of policymakers concerned with financial inclusion and resilience goals have assigned insurance supervisors an explicit market development mandate. Further, a growing number of supervisors are taking a more active role in supporting inclusive insurance markets in response to increasing societal risks because of a lack of affordable and appropriate insurance coverage.¹³ Regardless of mandate, however, all supervisors have – either explicitly or implicitly – a basis for action on addressing protection gaps.

Supervisory responses aimed at addressing protection gaps are largely influenced by the supervisory mandate in conjunction with the maturity, size and complexity of the insurance market,

⁹ See OECD, [Enhancing financial protection against catastrophe risks: the role of catastrophe risk insurance programmes](#), 2021. Another account of reasons why protection gaps emerge can be found in Geneva Association (2018).

¹⁰ See for example OECD (2021).

¹¹ See IAIS, [Introduction to the Insurance Core Principles \(ICPs\)](#); the globally accepted framework for insurance supervision. ICPs are comprised of Principle Statements, Standards and Guidance.

¹² For the purpose of this report supervisory objectives and mandates are used interchangeably.

¹³ In the last five years, close to 40 supervisors have developed and implemented dedicated or supporting regulations for inclusive insurance or microinsurance. A2ii [Inclusive Insurance Regulation Map](#), 2023.

as well as the resources of any given jurisdiction to facilitate a conducive environment for supporting or developing initiatives targeting protection gaps.

2.1 How supervisory objectives are related to protection gaps

Actions to address NatCat protection gaps can support multiple insurance supervisory objectives, such as:

- Financial stability, by improving the jurisdiction's overall capacity to handle the economic consequences of NatCat events. A lack of insurance coverage can create spill-over effects to the rest of the financial system and/or real economy. Catastrophes may have an adverse indirect impact on subsequent GDP growth and inflation, putting pressure on national budgets. If damages are not covered by insurance, the costs of reconstruction can fall to governments to provide financial support, with budgetary implications. There can also be spill over into the banking sector if uninsured households or businesses are unable to pay back loans or mortgages due to financial pressure from a disaster. However, if a high share of damages is covered by insurance, the indirect impact on GDP growth can be significantly reduced.¹⁴ Therefore, availability and affordability of insurance is an important factor for minimising the economic impact of NatCat events.
- Policyholder protection and fair treatment of customers, by providing clarity on coverage and exclusions and timely claims resolution. Supervisory measures to improve claims handling and management after a NatCat event, as well as promoting transparency and clarity in insurance contracts on the scope of coverage for NatCat events, directly enhances policyholder protection. This can reduce market conduct risks, as well as potential prudential (legal, reputational, solvency) risks.
- Financial inclusion and market development, by making affordable and appropriate insurance accessible to underserved segments of society. Financial inclusion implies the improvement in access to insurance. This improved access could be for the already covered population, new coverages for segments that have insurance but for other types of risks, and new coverages for those with no insurance protection. Supervisory measures to increase access to insurance can help narrow NatCat protection gaps.

While supervisory actions on protection gaps can reinforce various supervisory objectives, other actions, under certain circumstances, could cause unintended consequences that impact the availability, affordability and take-up of insurance coverage against NatCat events. For example:

- From a microprudential (solvency) perspective, the decision by an individual insurer not to underwrite certain risks may be prudentially sound based on the insurer's own internal risk management process, and compliant with regulatory/supervisory frameworks. However, if multiple insurers retreat from insuring such risks at the same time, supervisors should be aware that this can potentially cause macroprudential risks or consumer protection risks.
- Increasing risk management and regulatory capital requirements to reflect higher NatCat risks may trigger insurers to increase prices or reduce coverage (or both), thus further increasing the protection gap.

¹⁴ Empirical evidence confirms that the impact of disasters on GDP growth depends on insurance coverage: for example, a large-scale disaster causing over 0.1 per cent of GDP worth of direct losses can reduce GDP growth by around 0.5 percentage points in the quarter of impact if the share of insured losses is low. See EIOPA [What to do about Europe's climate insurance gap](#), 2023.

- Lowering regulatory capital requirements to increase market access in a way that does not adequately reflect the risks being underwritten could over time, reduce the financial strength of insurers or increase financial stability risks.
- Simplifying approval of new insurance products, if not properly managed, might increase risks that such products are not adequately designed, priced, or tested at the outset and, thereby, in the long run reduce policyholder protection. This, in turn, could erode customers' trust in insurance and make them less inclined to purchase insurance coverage.¹⁵
- Restricting price through regulatory actions (if intended to increase insurance affordability, eg price ceilings), could lead insurers to exit the market on grounds of reduced profitability, further reducing insurance supply. Such restrictions could also potentially undermine important price signals by obscuring the true cost of the risk and limit product innovation, which is needed to help reduce protection gaps.

While approaches taken to address protection gaps may differ, core supervisory mandates to contribute to financial stability and protect policyholders already provide a strong basis for action. For those supervisors that have objectives to promote financial inclusion and market development, actions to address protection gaps are even more central to their mandate. Accordingly, supervisors have a broad basis to contribute to narrowing the NatCat protection gap through various activities, in support of their supervisory mandates, and depending on the resources and tools the supervisor has available to drive such action.

3 Supervisory activities to address protection gaps

The following section identifies five major areas of supervisory activity that can help address NatCat protection gaps, supported by examples across IAIS jurisdictions. The examples demonstrate the role supervisors can play in addressing protection gaps while executing their mandate.

This section draws on information collected through a survey of IAIS members – including a collection of different case studies from a range of jurisdictions – as well as an analysis of existing literature. The case studies were mapped according to the supervisory objective they contribute to and grouped by the type of supervisory action. Guided by this exercise, this section is structured to group activities into the following five major categories of action:

1. Assessing insurance protection gaps (Section 3.1)
2. Improving financial literacy and risk awareness (Section 3.2)
3. Incentivising risk prevention and reduction of insured losses (Section 3.3)
4. Creating an enabling regulatory and supervisory environment to support availability of insurance and uptake of coverage (Section 3.4)
5. Advising government and industry on financial inclusion and societal resilience, including on the design and implementation of public-private partnerships or insurance schemes (Section 3.5)

As illustrated in Diagram 1, a single supervisory initiative or programme underway within a jurisdiction can span a number of these categories of action and, vice versa, the actions listed above can also support multiple supervisory objectives.

¹⁵ For more examples of balancing fair treatment of policyholders with financial stability, albeit in the context of a pandemic risk protection gap, see IAIS (2022), Section 3.3.

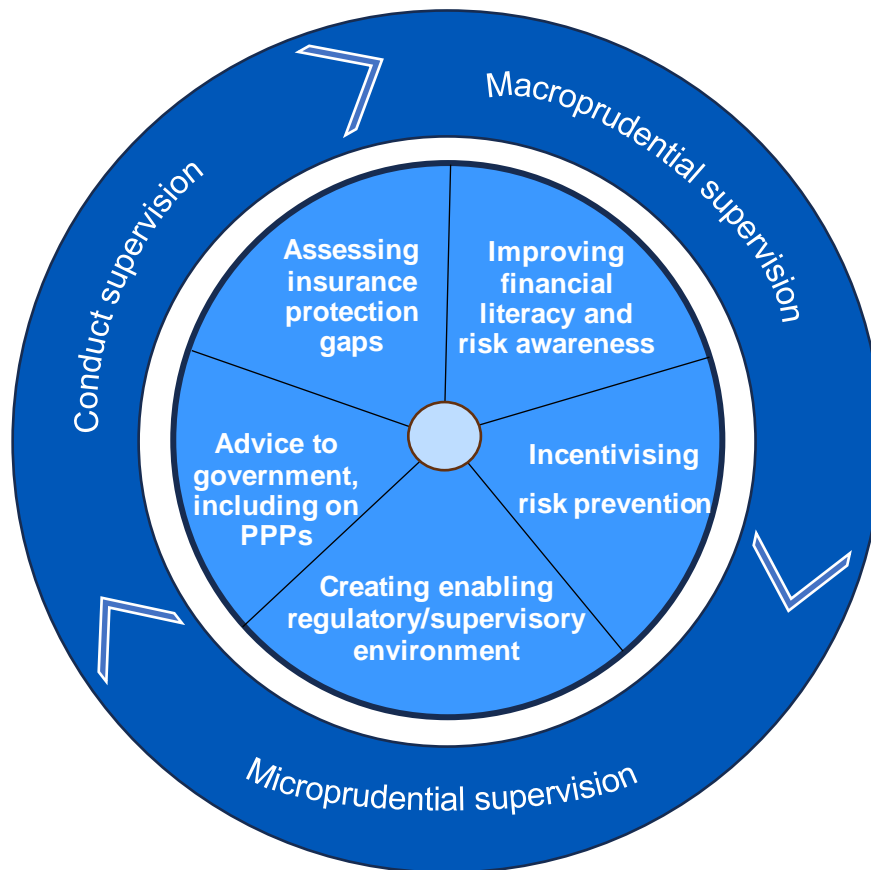


Diagram 1: Spectrum of supervisory activities to address protection gaps

3.1 Assessing insurance protection gaps

The potential activities of supervisors with respect to assessing insurance protection gaps include:

- Collecting (and potentially sharing) data from insurers on insured losses (and uninsured losses, to the extent available)
- Promoting the understanding and development of NatCat models to evaluate risks.
- Providing insurers and public authorities with analysis on the root causes and relevant importance and extent of the protection gaps.

The insight resulting from a comprehensive assessment of NatCat protection gaps can aid supervisors in achieving the objectives identified in Section 2 (eg financial stability, policyholder protection and fair treatment of customers, and financial inclusion and market development) and establish a baseline of activities, as described in the following sub-sections.

The assessment of protection gaps requires access to data and models. It is important to have different types of data and models for each of the different types of perils (eg earthquake, tsunami, windstorm, flood, wildfire, drought, hail) that can result in NatCat protection gaps. Separate data and models by geography as well as risk type (ie peril) are also key. In assessing protection gaps, historical data as well as forward-looking data (from models) are often used.

3.1.1 Data collection and sharing

Insurance supervisors can facilitate the collection and sharing of relevant data on NatCat risks. Supervisory authorities are often in a unique position to facilitate this access to data, in that they can require regulated institutions to submit data. Another role that supervisors can play is in the sharing of multi-sourced data – within the boundaries of respective legal and regulatory regimes – to help inform assessments of NatCat protection gaps.

By conducting and sharing analysis on the data, supervisors can help insurers better understand the risks and develop more accurate models for pricing their products. By enhancing insurers' ability to accurately assess and quantify NatCat risks, models can empower insurers to design products that more accurately meet the needs of individuals and communities vulnerable to specific catastrophes. The availability of robust data also supports informed decision-making and fosters collaboration among insurers and other stakeholders, such as supporting government consideration of adaptation measures. However, access to timely, accurate and complete data is also one of the greatest challenges for analysing and assessing protection gaps.

There can be additional benefits to having a central organisation responsible for driving data collection – both quantitative and qualitative data – as such organisations can define data elements, establish procedures for data collection, and develop routines for data aggregation and analysis (including data validation). For example, EIOPA released a dashboard for NatCat protection gaps in December 2022. The dashboard was developed using data on economic and insured losses, risk estimations, and insurance coverage from 30 European countries (further information in Annex 2).

In some countries a single supervisory authority is not responsible for all insurers. For example, in Canada, some insurers are supervised federally and others provincially. Similarly, in the US, insurers are regulated by the individual states. Thus, joint efforts on data collection can help ensure a comprehensive assessment of NatCat protection gaps.¹⁶

3.1.2 Models

Supervisors can play varied roles with respect to NatCat models. Many supervisors rely solely on the NatCat models used by their regulated institutions and thus do not have a lens across the entire industry. In contrast, other authorities have taken steps including engaging modelling firms directly to assess the exposure to a specific NatCat risk.¹⁷ This can include:

- Supporting involvement in partnerships (such as the Global Risk Modelling Alliance (GRMA), which offers countries open data, technology and practical learning through co-development of risk management strategies and applied risk finance projects).¹⁸ In Costa Rica, the Superintendencia de Seguros (SUGESE) has been active in supporting and coordinating the country's participation in the GRMA initiative, which will provide technical assistance in economic modelling and capacity building to understand the disaster risks faced in Costa Rica and the region.

¹⁶ As an example, in September 2023 the [US NAIC announced a plan to issue a data call](#) to help state insurance regulators collect data from insurers to better understand property markets and coverages and protection gaps, especially with regard to challenges around the availability and affordability of insurance.

¹⁷ On the other hand, a 2023 survey of IAIS members indicated that many jurisdictions did not have a defined methodology for calculating protection gaps for NatCat in their jurisdiction. A number of supervisors surveyed for the 2022 GIMAR also indicated that they are currently not able to estimate the impact at this time and these assessments are mostly still under development (IAIS GIMAR 2022).

¹⁸ The [GRMA](#) is a public-good service proposed by V20 members in the 1st Climate-Vulnerables Finance Summit in 2021, co-developed with the Insurance Development Forum (IDF), and subject to an agreement between the IDF and the V20 Group of Ministers of Finance at CoP26 in Glasgow.

- Assisting stakeholders to use NatCat modelling. An example is an EIOPA case study that uses the open-source modelling tool CLIMADA-App, supported by a user interface built by EIOPA.
- Establishing their own modelling teams. For example, in the US, the National Association of Insurance Commissioners (NAIC) created a catastrophe modelling centre of excellence, to provide resources for state insurance regulators, including access to catastrophe model documentation, technical education and training materials on the mechanics of commercial models and the treatment of perils and risk exposures tailored to regulators.

3.1.3 Stress testing and scenario analysis

Supervisors can also help insurers gauge the financial impact of various NatCat scenarios on their capital reserves through stress testing and scenario analysis. Climate-related scenario analysis could be used to better understand the risks posed to the financial system, and vulnerabilities that could arise in the local economy and community stemming from greater unaffordability or insurance coverage. In 2024, the IAIS plans to publish an application paper on climate risk scenario analysis, which considers how climate-related scenario analysis exercises should be used and the extent to which they can overcome some of the shortcomings of existing methods for assessing risks. Further examples include:

- Supervisors in France and Canada are conducting stress testing in 2023 related to NatCat risk. Stress tests are important tools for assessing the resilience of insurers but can also be used by supervisors and policymakers to evaluate losses that are not covered by insurance.¹⁹
- In Japan, the Japan Financial Services Agency (JFSA) has been in discussion with the General Insurance Rating Organisation of Japan (GIROJ) on the upgrade of the risk models owned by the GIROJ, to take into account the impacts of climate change. The risk models could be utilised for climate scenario analysis by all property insurers, which could also provide forward-looking insights on potential protection gaps.

3.2 Improving financial literacy and risk awareness

Improving financial literacy, increasing risk awareness, and educating consumers on the value and importance of insurance helps to enhance understanding of the coverage needed and the scope of coverage purchased. Increasing financial literacy can help consumers make better decisions and build resilience to financial shocks. Improving customers' financial literacy and risk awareness represents a preventative approach to narrowing the protection gap with the goal of reducing the financial effect to consumers before a NatCat event occurs.

Supervisors often play a role in promoting general financial education through dedicated consumer-centric sections of their websites, consumer outreach programmes and producing infographics and other educational materials. Additionally, supervisors, in collaboration with industry and other government agencies responsible for consumer protection, can support initiatives to enhance consumer financial literacy and risk awareness. These initiatives may comprise general programmes sponsored by government, insurance industry associations, insurers or a combination thereof.

¹⁹ The ACPR stress test aims to address protection gaps by defining 'affordability' thresholds. See [Banque de France: Climate risk analysis and supervision](#).

Supervisors can also play a role in engaging with policymakers to emphasise the value of insurance, and insurance literacy and risk awareness.²⁰

In the context of NatCat events, supervisory measures to improve consumer financial literacy and risk awareness can focus on two primary activities:²¹

- Ensuring consumers are informed through supervisory initiatives
- Imposing requirements on insurers to provide clear information on risks and available coverage

3.2.1 Measures to inform consumers

Supervisory measures to inform consumers can include:

- Socialising useful and reliable sources of information on NatCat events or tools or portals to help consumers assess their risk, eg providing links to peer reviewed/science-based materials and governmental advice/data, which may aid consumers in understanding their own risk exposure. Access to such data may encourage consumers to take appropriate action(s) to mitigate their risk through purchasing appropriate insurance coverage and adopting prevention, adaptation, and mitigation measures to reduce or eliminate their risk. For example, part of the Financial Services Regulatory Authority of Ontario (FSRAO)'s mandate is to work with stakeholders to increase consumer awareness and understanding of risks related to NatCat events. In addition, FSRAO educates consumers on preparedness, insurance options, and coverages as well as the features of disaster relief programmes through consumer-focused materials.
- Forming partnerships with other key stakeholders to develop an educational and risk awareness strategy to educate the public on NatCat risks and the role of insurance in building resilience and providing financial protection against such events. In response to severe flooding in Slovenia in July 2023, the Insurance Supervision Agency of Slovenia (AZN) collaborated with insurance companies and the Ministry of Finance on its response. This included undertaking analysis on the scale and cause of underinsurance for such an event, development of resources to assist affected parties and recommendations on options for risk mitigation against future events. In California, in response to record-setting snowfall in 2023, the California Department of Insurance (CDI) and the Department of Water Resources co-hosted an informational webinar for local residents and organisations to explain the potential flood risk as well as requirements and deadlines to obtain flood insurance, demonstrating the important role supervisors can play as insurance and risk communicators, both before and after climate events occur.
- Conducting research to better understand how consumers perceive and manage risks to identify potential barriers to taking out insurance coverage. For example, EIOPA undertook a study of demand-side barriers, drivers and possible solutions to the protection gap for NatCat insurance.²² Among others, the study found that many consumers do not buy coverage as they are not aware of, or do not fully understand, the risks to which they are exposed. Even in circumstances where coverage is available, barriers to uptake include income levels, existing financial conditions, and premium affordability. Lack of clarity in terms of costs and coverage as well as limited

²⁰ A key recommendation in the 2022 joint IDF/GA report, Insurance Development in Emerging Markets: The role of public policy and regulation, is that financial literacy should be a key policy priority. The report contends that there is strong evidence to show that higher levels of financial education help people make better financial decisions and manage risks accordingly. In effect, higher levels of financial literacy may lead to an increase in demand for insurance products and therefore an increase in insurance penetration. Regulators can and should play a role in this, alongside the objectives set by government.

²¹ In 2024, the IAIS plans to publish an application paper on climate-related market conduct issues, which considers how supervisors can support the fair treatment of customers in light of increasing intensity and severity of NatCat events and provides further recommendations on similar issues.

²² EIOPA [Measures to address demand side aspects of the NatCat protection gap](#), 2023

understanding of how insurance works plays an important role. High expectations regarding state intervention also drive down consumers' willingness to buy insurance coverage.

- The JFSA plans to conduct a dialogue with insurers on consumers' utilisation of insurance and risk prevention services, as well as efforts to promote consumers awareness. This initiative is embedded in the government's "Fundamental Plan for National Resilience".
- In Zimbabwe, the insurance supervisor – in cooperation with the private sector, other financial sector authorities and government – engages in countrywide engagements with policyholders and schoolchildren on consumer awareness and financial literacy engagements, to improve financial literacy and increase awareness of insurance products. This is undertaken by making use of various platforms ranging from in-person meetings, radio, television, and social media.

3.2.2 Imposing requirements on insurers to provide clear information on risks and coverage

Through laws, regulations and guidelines, supervisors can enforce and monitor requirements on insurers and intermediaries to be more transparent and disclose whether certain catastrophe events are covered or not.²³ For example, supervisors may introduce requirements or set expectations for insurers and intermediaries to:

- Ensure communications are accessible and understood by all consumers. For example, supervisors can require the use of clear and simple language in policy wording and other communications or templates that consumers can readily understand and act upon.
- Provide clarity on the scope of coverage (eg whether a NatCat risk is covered or excluded in the policy offered to households and business in a NatCat prone area).
- Engage proactively with consumers to highlight the risks associated with underinsurance.
 - For example, the Central Bank of Ireland (CBI) in its Underinsurance Initiative undertook a review of the risk posed to consumers of not having sufficient home insurance cover. Based on the findings of the review, firms were directed to proactively engage with consumers to highlight risks of underinsurance. Consumer-centric material was published on the CBI website and industry websites to increase understanding of risks of underinsurance.

3.3 Incentivising risk prevention and reduction of insured losses

Adaptation and risk mitigation measures ('risk prevention' measures) can help reduce policyholders' physical risk exposure to NatCat events and prevent damages and losses arising from such catastrophes. For example, property and flood resilience upgrades pre- and post- event can help to lower the frequency and severity of losses.

Insurers can integrate incentives for risk prevention in their product design as well as underwriting and pricing practices to achieve a positive impact on the amount and number of losses.

Supervisors, for their part, can raise awareness on the benefits of risk prevention, inform and encourage consumers to invest in risk prevention measures and implement supervisory measures to incentivise transparent risk-based pricing by insurers.

²³ See also ICP 18 (Intermediaries), eg ICP 18.0.20-25, and ICP 19 (Conduct of Business), eg ICP 19.7.

- For example, the Toka Tū Ake Earthquake Commission in New Zealand, not only provides natural disaster insurance for residential properties but also provides information aimed at homeowners on what they can do to minimise the risk to their properties. The goal is to improve how people perceive and manage risk.²⁴
- Another example of supervisors raising awareness about the benefits of risk prevention is found in a US property resilience study, undertaken by the NAIC. The NAIC analysed the benefits of certain wildfire risk mitigation features in California, Colorado, and Oregon (further detail in Annex 2). Simulating the reduction in losses against the costs of implementing associated mitigation measures, the study showed that structural modifications can reduce wildfire risk up to 40 per cent, and structural and vegetation modifications combined can reduce wildfire risk up to 75 per cent.

Targeted supervisory measures for transparent risk-based pricing and for considering the impact of adaptation measures can further incentivise risk prevention. Such measures can include:

- Calibrating the effect of potential prevention initiatives into reduced insurance prices, which might incentivise policyholders to invest in prevention measures. For example, in 2022 EIOPA collected underwriting data to assess the potential for a dedicated treatment of climate-related adaptation measures in non-life insurance. Insurers submitted data on a voluntary basis for insurance products with and without climate-related adaptation measures. The pilot exercise identified that the EU market appears to be at an early stage regarding the implementation of adaptation measures in non-life underwriting practices.
- Enabling the cost of property resilience measures to be included as part of repairs up to a certain value, beyond the pure reinstatement value ('resilient reinstatement'). For example, in the UK, Flood Re²⁵ worked with a group of insurers to launch a Build Back Better (BBB) scheme that offers up to GBP 10,000 in additional payments to policyholders (ie above repair costs) for flood resilience measures.
- Requiring insurers to provide premium discounts for specific community and property-level risk prevention measures. For example, the CDI issued regulations in 2022 that require insurers to give wildfire safety discounts to property owners who reduce their risk of loss from wildfire by undertaking specific mitigation efforts.²⁶ These mitigation efforts were identified in the *Safer from Wildfires* framework, an interagency collaboration between the CDI and the state's emergency response and readiness agencies.

Coordinating with public entities to align risk prevention measures or help insurers and policyholders seek potential sources of funding or financing for implementing risk-based prevention measures. For example:

- The NAIC Property Resilience Study, referred to above, showed that initiatives for wildfire risk reduction required a coordinated effort involving the supervisory community (the NAIC Center for Insurance Policy and Research), the modelling industry (Risk Management Solutions, RMS) as well as public and other authorities (Insurance Institute for Business and Home Safety, IBHS).²⁷

²⁴ The EQC is a statutory Crown Entity and first loss insurer covering the cost of settling a claim up to a capped value (of \$300,000 plus GST), private insurers typically cover any costs above this cap. As a Crown Entity, EQC is not regulated or supervised by the Reserve Bank of New Zealand (RBNZ) and the Financial Markets Authority (FMA).

²⁵ Flood Re is authorised by the Prudential Regulation Authority (PRA) and regulated by the PRA and Financial Conduct Authority (FCA).

²⁶ CDI, [Wildfire Recovery and Readiness](#)

²⁷ The NAIC recently entered into an MoU with the IHBS, details can be found [here](#).

- Also in the US, the CDI advocated for the creation of a USD 20 million Prescribed Burn Claims Fund²⁸ to encourage increased deployment of low-intensity intentional burns. This risk reduction measure reduces the presence of dry grasses, shrubs and other easily ignitable fuels, thereby reducing the risk of catastrophic wildfire.

3.4 Creating an enabling regulatory/supervisory environment to support availability of insurance products or services and uptake of coverage

Supervisors can play a role in developing, or fostering, an enabling regulatory and supervisory environment that supports the availability of insurance products or services as well as the uptake of coverage. Supervisory actions to achieve this objective could be explicitly linked to a market development mandate, or more implicitly through market conduct and prudential measures. This section focuses on the following elements:

- Supporting development of innovative insurance products and services and embracing, where prudent, technological innovations
- Measures to support the availability and take-up of NatCat insurance coverage

3.4.1 Supporting development of innovative insurance products or services

Supervisors can play a role in creating a regulatory environment that supports innovation and reduces regulatory uncertainty. There are a range of innovative products and services that can – in certain markets – help narrow the protection gap by making insurance more affordable, accessible and relevant to the evolving needs of consumers and businesses. Three examples of innovative products and services include: parametric or index-based insurance, disaster microinsurance, and regulatory sandboxes.

Parametric or index-based insurance

Parametric or index-based insurance can be used to cover a variety of NatCat events and a wide range of assets. Due to its use of technology and predetermined trigger indexes prompting swift response rates and efficient processing, such products can result in affordability advantages when compared with traditional insurance for some perils in some jurisdictions. Affordability gains are linked to reduced underwriting and loss adjustment expenses. Subject to supervisory measures that ensure fair treatment to customers, parametric insurance has been an effective type of insurance for people in low-income and high-risk areas.²⁹

In using parametric insurance it is important that its characteristics and differences from traditional indemnity insurance are properly understood by customers, especially with regard to the event that would trigger pay-outs. For example, 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 (further detail in Annex 2).

In Zimbabwe, insurance-based programmes on NatCat are fostered by several actors, including the local government, development organisations, service providers, the private sector and international capacity building providers such as the A2ii through its Inclusive Insurance Innovation Lab (iii-lab). Currently, Zimbabwe is working with the International Financial Corporation (IFC) to develop a regulation for parametric insurance for NatCat events. In Uganda, the Insurance Regulatory Authority put in place index-based insurance regulations to protect farmers from adverse weather risks. These

²⁸ California Wildfire and Forest Resilience Task Force, [Prescribed Burn Claims Fund](#)

²⁹ See the IAIS [Issues Paper on Index Based Insurances, particularly in Inclusive Insurance Markets](#), 2018.

regulations have culminated in the development a weather index insurance product. The product has allowed farmers to take out loans from banks which are insured against adverse experiences and as this is a mandatory prerequisite for any loan to be considered.³⁰

Disaster microinsurance

Disaster microinsurance is a type of insurance designed for low-income individuals and households, that covers disaster risk. This type of microinsurance is often offered in small amounts and with simplified terms and conditions, which makes it easier for people to understand and purchase. Disaster microinsurance can provide low-income households, farmers, and businesses with quick access to post disaster liquidity and finance. It can also promote investments in disaster prevention if insurers offer lower premiums to reward risk-reducing behaviour. Proportionate regulation of new forms of distribution as a means of supporting microinsurance can also be very important, noting that microinsurance business models are generally characterised by low premiums and margins, meaning providers often need to upscale quickly to become viable.³¹ For example, Belize allows insurers to sell microinsurance products that would not be covered under traditional insurance; these products have quicker pay-outs due to the small sums insured. While distribution costs are a challenge, the uptake of technology (ie digital payment methods, smartphone apps) can help reduce access barriers and costs. Based on Belize's experience, some consumer protection considerations to highlight are the importance of complaints monitoring and complaints handling, disclosure, and financial literacy.

The streamlining of approval processes can also impact the offering of new products and services that address specific NatCat risks. Ideally insurers can bring innovative products to market quickly without compromising necessary risk assessment and consumer protection measures.³²

Regulatory sandboxes

Some supervisors have created a regulatory sandbox or pilot project framework where insurers can test new NatCat insurance products on a limited scale. This allows insurers to experiment with different underwriting models, pricing structures, and risk assessment methodologies in a highly controlled environment. Regulatory sandboxes are often focused on technology and involve developing guidance on new technologies in which insurers collaborate with supervisors to develop new products that meet the needs of consumers. For example, in 2023 the National Insurance Commission of Nigeria (NAICOM) released the Insurance Regulatory Sandbox Operational Guidelines to deepen innovation and financial inclusion in Nigeria. The guidelines were developed to drive innovation of insurance products and services through digitisation of insurance operations in line with international best practice. The guidelines include Market Conduct Guidelines for Takaful and Retakaful Insurance Operators.

Insurance-based solutions in EMDEs

NatCat protection gaps are a significant challenge in EMDEs. NatCat events – and their socioeconomic impacts – can affect EMDEs more severely given the high vulnerability and low resilience to adverse events. Low insurance awareness and limited coverage can accentuate protection gaps in EMDEs.

According to the United Nations Office for Disaster Risk Reduction (UNDRR), between 2010 -2020, economic losses from NatCat events represented a higher proportion of the GDP in low and lower-middle-income countries than in upper-middle and high-income countries. The impact on GDP was relatively higher in Asia and the Pacific, and Africa.³³

³³ UN Office for Disaster Risk Reduction (UNDRR), [The invisible toll of disasters](#), 2022

Insurance is a key element within a set of coordinated and innovative solutions needed to bridge protection gaps in EMDEs. Insurance-based solutions offer vulnerable and low-income populations an alternative to selling their belongings, reducing or stopping business investments and household spending on food or education. It can also avoid vulnerable populations from depleting their savings or taking out loans, often with high interest. The greater financial security that can be provided to vulnerable and low-income populations through insurance-based solutions can in turn lead to increased investment, consumption and productivity.

Supervisors have a core role in creating an enabling environment for insurance-based solutions through proportionate regulation and supervision. Supervisors can put in place a conducive environment for developing and delivering need-based products that are affordable and accessible, while at the same time continuing to ensure that insurers treat customers fairly and offer products that are financially sound.

Implementing proportionate regulation and supervision is particularly relevant for promoting an inclusive insurance sector, including solutions such as microinsurance and index-based insurance. Access to microinsurance and index-based insurance can facilitate the provision of timely financial relief following NatCat events, support faster recovery, especially for low-income populations, and help mitigate the long-term effects of disasters.

There are several regional and global initiatives that aim to strengthen disaster risk reduction and disaster risk management, under which insurance-based solutions are a key emphasis. These include initiatives such as the V20- and G7-supported Global Shield against Climate Risks, which targets vulnerable economies.³⁴ The Insurance Development Forum (IDF) also provides an ecosystem of public and private sector actors and aims to extend the use of insurance to those vulnerable to disasters.³⁵

The IAIS and A2ii have developed a significant body of literature on financial inclusion in insurance.³⁶ Numerous supporting materials provide guidance on how relevant principles and standards can be practically applied, and explore regulatory and supervisory issues, including on regulation and supervision supporting inclusive insurance markets, product oversight, use of digital technology, and index-insurance in inclusive insurance.

Box 2: Insurance-based solutions in EMDEs

3.4.2 Supporting availability and take-up of disaster insurance coverage

Removing barriers to distribution and encouraging insurers to expand their distribution channels can also foster the development of insurance products. This might involve partnerships with local organisations, governments, or microfinance institutions to ensure that NatCat protection products are available and accessible to a broader segment of the population, including underserved communities and regions.

Mandatory insurance products or standard inclusions

Supervisors can play a role in the process of encouraging take-up by policyholders through requiring insurers to make a coverage available for all relevant catastrophe perils (ie mandatory offer) or by

³¹ A2ii [Technical Note: Evolving microinsurance business models and their regulatory implications](#), 2014

³² GFIA provides an insurance-sector view of the regulatory barriers that can inhibit the ability of insurers to provide NatCat coverage and to innovate in its 2023 report [Global protection and recommendations for bridging them](#).

³³ UN Office for Disaster Risk Reduction (UNDRR), [The invisible toll of disasters](#), 2022

³⁴ The [Global Shield against Climate Risks](#) aims to gather activities in the field of climate risk finance and preparedness together under one roof.

³⁵ The [IDF's](#) mission is to optimise and extend the use of insurance and its related risk management capabilities to build greater resilience for people, businesses, and public institutions vulnerable to disasters and associated economic shocks.

³⁶ See [Financial inclusion - International Association of Insurance Supervisors](#).

requiring that coverage for relevant catastrophe perils be included with standard property insurance coverage (ie automatic inclusion).³⁷ Often such initiatives are aligned with market conduct objectives to protect customers against the effects of specific perils (eg earthquakes, floods, wildfires). Insurers can be required to make coverage for catastrophe perils available – to the extent private markets have capacity to provide such coverage and encourage take-up – for example by requiring that coverage for relevant perils be included with standard property insurance coverage.³⁸ These initiatives are often paired with government intervention to provide a (re)insurance backstop above a certain threshold (see Section 3.5). It should be noted, however, that requiring insurers to make coverage available for risks that are beyond their capacity to absorb could lead to disruptions in coverage for other perils and have implications for insurer solvency.

Enabling access to global reinsurance

Reinsurance plays a significant role in providing NatCat risk coverage by allowing insurers to increase their underwriting capacity and protect insurers' solvency when extreme NatCat events occur.³⁹ Certain regulatory requirements can, however, impede access to reinsurance (eg the requirements for minimum local retention thresholds, restrictions on access to cross-border reinsurance, mandatory cessions to local reinsurers). While such thresholds might be introduced due to prudential reasons (such as lack of oversight of foreign reinsurers) or to reduce dependency on the global reinsurance market pricing and capacity cycles, they can go beyond the level of retention that local insurers are willing or able to take on. This could reduce their willingness and capacity to write NatCat risks.

Catastrophe bonds

Catastrophe bonds (cat bonds) are a type of insurance-linked security (ILS) used to support reinsurance capacity and respond to NatCat events. They can be used by insurers to transfer risk to investors, freeing up capital to be used to underwrite new policies. From an *ex-post* perspective, cat bonds can provide capital to governments and organisations for disaster relief and recovery. Several jurisdictions have created a regulatory framework for ILS to facilitate the issuance of cat bonds and provide an additional risk transfer option for insurers. For example, Bermuda's framework for the regulation and supervision of the ILS sector has resulted in steady growth in cat bond issuances, allowing an increase in capacity and available coverage to NatCat risks. Another example is Hong Kong, where a regulatory regime has been established to facilitate ILS; the *Insurance (Amendment) Ordinance 2020* came into effect in March 2021 to provide for a bespoke, streamlined authorisation and regulatory regime for special purpose insurers (SPI).

Risk-based pricing and capital requirements

A risk-based pricing approach allows risks to be fully reflected by insurers, which sends market signals to customers about the risk exposure of their assets to NatCat events. In addition, risk-based pricing can more easily allow insurers to reflect risk mitigation undertaken by customers or wider communities. Furthermore, if insurers can charge adequate premiums in high-risk areas, they are less likely to stop offering NatCat cover in such areas. Finally, risk-based pricing recognises the diversification between risk exposures with low correlations, which will tend to encourage insurers to

³⁷ In some cases, such as France, coverage against NatCat perils is legally tied to standard property insurance.

³⁸ See for example, OECD's [Financial Management of Catastrophe Risks: Approaches to Building Financial Resilience](#), which shows that mandatory offer – and other measures – can lead to lower protection gaps, pg 14.

³⁹ For example, Bermuda's commercial reinsurance sector incurred billions of dollars for gross claim payments to policyholders to cover the damaging effects of recent hurricanes, including hurricane Ian (2022) paying circa 25 per cent of the industry losses; and Hurricanes Harvey, Irma and Maria (2017) paying around 30 per cent of the industry losses associated with these events. Source: Bermuda Monetary Authority (BMA).

diversify their underwriting activities. This can in turn lead to more financially resilient insurers, that are more able to provide NatCat cover in high-risk areas.⁴⁰

3.5 Advising government and industry, including on the design and implementation of PPP or insurance schemes

The imperative to narrow the protection gap for NatCat events requires a collaborative effort between multiple parties – which can include governments, industry and insurance supervisors. The combination of their insights, convening power and authority can lead to the development of comprehensive strategies that bolster societies to withstand and recover from these events.⁴¹ Collaborative efforts can ensure that societies possess the financial resources necessary for recovery and reconstruction, thereby mitigating the destabilising effects of these events on economies.

Combining risk reduction measures with effective insurance coverage can foster proactive measures to minimise their impact and reduce financial vulnerabilities in the immediate aftermath of a catastrophic event. Such measures can provide fiscal relief, reducing the burden on government finances. Rather than reacting to disasters as they occur, policymakers and insurance supervisors can collaborate to establish robust strategies, ensuring that adequate coverage is in place before the disasters occur.

Government-led initiatives can range from the establishment of a multi-stakeholder working groups, administration of national schemes, provision of technical advice or the development of national financial inclusion strategies. In California, for example, CDI has convened a Climate Insurance Working Group – comprising representatives from the public and private sectors and academia – that has identified addressing the protection gap as an urgent priority. The CDI has subsequently undertaken legislative and strategic initiatives, including legislation to create a heat ranking system⁴² and publication of a Sustainable Insurance Roadmap.⁴³

In some cases, the collaboration has been instigated by a broader international or multilateral approach. The UN Capital Development Fund (UNCDF) Pacific Insurance and Climate Adaptation Programme (PICAP) provides a good example of multilateral collaboration led by multilateral institutions, involving supervisors. The PICAP works with governments and stakeholders in Pacific Small Island Developing States to develop appropriate policy and regulatory frameworks, as well as sustainable market-based climate and disaster risk financing instruments such as parametric insurance.

Supervisors can act as a bridge between government and industry, leveraging their established links with insurers and understanding of the insurance sector to enhance coordination of a broader government response. This can include raising awareness of the insurance sectors' risk capabilities with national policymakers, such as ministries of finance, agriculture, interior etc, as they advance their disaster risk management and financing strategies. Joint efforts can lead to the development of innovative products, solutions and coordinated risk management strategies. Supervisors can:

⁴⁰ In a forthcoming (November 2023) paper on climate risk insurance pricing underwriting, the Financial Stability Institute (FSI) contends that insurers' approach to underwriting and pricing of climate-related risk may have prudential and financial stability implications through misaligned incentives to influence risk mitigation or adaptation measures. Underpricing (and mis-underwriting) could lead to solvency or liquidity problems in insurers and possibly failure to meet insurance claims payments when a climate-related event occurs. Insurance supervisors therefore have an interest in climate risk adaptation as this has a direct impact on insurers' risk exposures as well as affordability and availability of insurance coverage for consumers.

⁴¹ The [OECD Recommendation on Building Financial Resilience to Disaster Risks](#), 2023 provides broader guidance on the financial management of disaster risks.

⁴² CDI, [California heat ranking system](#)

⁴³ CDI [California Sustainable Insurance Roadmap](#), 2022

- 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 or financial inclusion.
- Engage with government and the insurance sector to help gather input on regulatory changes needed to strike an appropriate balance between innovation and risk management.
- Provide advice on areas related to disaster risk financing instruments other than insurance (eg national or dedicated disaster risk funds, catastrophe risk insurance programmes or emergency funds) where insurers are not able to provide adequate insurance coverage.

Multi-stakeholder collaboration can also lead to the development of public-private partnerships (PPPs) that can encompass – for example – programmes to provide broad-based insurance coverage, creation of risk pools or new products that provide coverage for NatCat events.

3.5.1 Supporting the design and/or implementation of insurance programmes or PPPs

In certain cases, it may not be possible to address protection gaps through private insurance markets alone. Such situations could result from high frequency and severity of damages and losses from natural disasters, or restricted financial capacity of households, agricultural producers or business to acquire insurance protection. In many countries, catastrophe risk insurance programmes – entailing collaboration between parties from both the public and private sectors have been established to support the availability, affordability or take-up of insurance for certain natural disaster risks, including floods, earthquakes and wildfires (see Annex 1 for an overview of the broader disaster risk financing landscape).⁴⁴ There are several regional and international initiatives to pool risks and help build resilience against natural disasters among a group of jurisdictions.⁴⁵ The institutional set-up and scope of PPPs can vary based on institutional arrangements and coverage and premium structures:

- There are many different approaches to the design of insurance programmes based on PPP. PPPs can take various forms (eg joint insurance programmes and public insurance pools) and can cover different types of risks. Certain programmes are built upon risk pooling or co-insurance arrangements, possibly combined with a public backstop through reinsurance or guarantee arrangement by the government. Another option is direct provision of insurance coverage by the public sector, usually through a state-owned insurer.
- Some programmes limit the availability of coverage to households only, while others extend coverage to households and 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 premium structures (eg uniform pricing or simplified risk-based pricing). These products or programmes may involve some form of subsidy to support the take-up of coverage.

The advantages of PPPs are that they can leverage the strengths of both the public and private sectors. The supervisor can provide regulatory oversight and advice, government can provide financial support and secure access to data and information, while private insurers can bring their expertise in underwriting, risk assessment, and claims management. By sharing risks and costs, these partnerships – if well designed – can reduce the overall cost of insurance and make it more affordable for low-income households and small businesses. In the longer-term, PPPs can also provide better financial cushioning against the consequences of natural disasters and help partners

⁴⁴ See OECD (2021).

⁴⁵ Examples of regional initiatives include African Risk Capacity (ARC), Caribbean Catastrophe Risk Insurance Facility (CCRIF), and Southeast Asia Disaster Risk Insurance Facility (SEADRIF).

to prioritise preventative measures and develop strategies to mitigate risks (eg flood defence schemes).

The necessity and the optimal design of public-private insurance programmes depends on several factors, many of which could be market-specific. Depending on the context, PPPs may not be necessary or viable and there may be benefits in leveraging available private market capacity. Thus, it is important to have an understanding of the necessity and viability of PPPs, as well as its concrete design features, as a tool to addressing protection gaps. In doing so, addressing potential side effects of PPPs, such as the risks to public finance and mitigating moral hazard should be considered.

The establishment and operationalisation of such insurance programmes requires the involvement of a wide range of public sector organisations as well as the insurance industry. Supervisors can play an instrumental role in the establishment and operationalisation of such insurance programmes, building upon their expertise, information network and supervisory powers. Contributions from supervisors may include:

Advocating and facilitating the discussion on the needs for PPPs

Supervisors can play an important role in advocating the idea of and facilitating the discussion on PPPs at an early stage (eg through conducting research and publishing papers). For example, EIOPA and the European Central Bank (ECB) published a staff paper that sets out possible actions to increase the uptake and efficiency of catastrophe insurance while creating incentives to adapt to and reduce climate risks.⁴⁶ In the Netherlands, the Authority for the Financial Markets (AFM) highlighted the insurability challenges of climate-related catastrophe risks – in particular that property damage due to major flooding is likewise not or only partly covered in most cases – and recommended seeking a solution through PPPs.⁴⁷

Contributing to the discussion on the design of insurance programmes

The Philippines Insurance Commission (PIC) has played a key role in the initiative to develop a Philippine Catastrophe Insurance Facility (PCIF) for typhoon, flood and earthquake risks. The PIC has been closely cooperating with the insurance and reinsurance associations through a Technical Working Group to solidify the structure, governance and implementation details of the PCIF,⁴⁸ and has issued a regulation revising minimum rates for catastrophe risk insurance that will support the operation of the PCIF.⁴⁹ The Australian Prudential Regulatory Authority (APRA) contributed to the inception of a recently established reinsurance pool for cyclone and related flooding damage, which is operated by the Australian Reinsurance Pool Corporation (ARPC). In Belgium, discussions between the relevant Ministries, the National Bank of Belgium (NBB), the Financial Services and Markets Authority (FSMA) and the industry were launched with the aim of updating the existing public-private catastrophe insurance scheme, in face of severe floods that happened in July 2021. In Morocco, the insurance regime for natural disasters was established in 2020, and the Supervisory Authority of Insurance and Social Welfare (ACAPS) has the power to suggest improvements to the system, provide opinions on the coverage scheme, and decide on the applicable rates (further details in Annex 2).

Helping to operationalise insurance programmes through supervisory activities, especially when private insurers are involved in the scheme

This could include monitoring financial soundness of insurers involved, ensuring sound and efficient claims handling and distribution practices, and review and approval of insurance products or rating

⁴⁶ EIOPA [Staff Paper on Policy options to reduce the climate insurance protection gap](#), 2023

⁴⁷ AFM [Impact of Climate Change on Non-Life Insurance](#), 2021

⁴⁸ Insurance Commission [Strict Implementation Of Sustainable Catastrophe Insurance](#), 2021

⁴⁹ Insurance Commission [Guidelines on the Adoption of the Revised Schedule of Minimum Catastrophe Rates](#), 2022

structures. As mentioned above, the Philippines Insurance Commission and ACAPS in Morocco have the power to issue rules on insurance rates. In a similar manner, the JFSA conducts a review on standard rates for earthquake insurance submitted by the GIROJ to the JFSA.

When supervisors support a PPP, they should also ensure that any risks and potential shortcomings of such arrangements are adequately addressed. For example, it is important to ensure the viability of the long-term funding of subsidised insurance schemes. Any risk sharing arrangements should be sustainable for the private insurers involved while not creating a potentially unsustainable fiscal burden by passing all risk to government. Creating the right incentive structures for risk prevention are important in this regard. There is a risk that PPP arrangements do not fully deliver on their objectives, which could undermine the value of insurance to customers and subsequently lead to increasing protection gaps.

4 Conclusion and next steps

Addressing issues related to the affordability and availability of insurance for NatCat events (ie protection gaps) is of growing importance to insurance supervisors – and of relevance to society's resilience at large. Supervisory objectives may influence the range of actions taken and the tools adopted by the supervisor to support such action. In support of their mandate, however, supervisors should consider where and how risk- and evidence-based supervisory involvement can be beneficial, particularly given the important role insurance can play in providing societal resilience against NatCat events.

Globally, there are various types of initiatives already being undertaken by supervisors to address NatCat protection gaps. Section 3 of this report provides a snapshot of such initiatives, with the aim of providing concrete examples of actions that supervisors can undertake.

The initiatives outlined in the report are also intended to illustrate to policymakers, industry and other relevant public and private stakeholders actions that supervisors are taking and how supervisors can contribute to multi-stakeholder approaches aimed at addressing protection gaps. Supervisors may offer expertise, tools and experience that can be employed to actively support disaster risk assessment and management and thus contribute to the collective effort to address protection gaps. Policymakers with financial inclusion and climate resilience objectives may want to consider assigning specific market development or inclusive insurance mandates to insurance supervisors.

This report is also intended as a platform from which the IAIS and supervisors can further engage with stakeholders, including policymakers and industry initiatives, on these important issues and take concrete action, in partnership with other organisations, as relevant.

4.1 Next steps

Addressing protection gaps will continue to be a priority topic for the IAIS. The initial focus of the IAIS will remain on NatCat protection gaps, but it is the intention to broaden this work to cover other types of protection gaps over time.

The IAIS will look for opportunities to take concrete actions on initiatives that can assist the supervisory community to address NatCat protection gaps, guided by the findings in this report. As supervisors can most effectively contribute to building enhanced resilience against NatCat events and narrowing protection gaps through collaboration with other parties, the IAIS will undertake follow-up work building on the report, including:

- Collaboration with the OECD to develop supporting materials on effective supervisory practices, covering select issues outlined in the report, and also in relation to the OECD Recommendation on Building Financial Resilience to Disaster Risks.
- Establishment of a partnership between the IAIS, A2ii and the Global Shield against Climate Risks with the intention of integrating a supervisory perspective, that is guided by IAIS standards and guidance, into the Global Shield initiatives.
- Collaboration with the IDF, including to enhance the capacity of supervisors around risk modelling NatCat risks, specifically how these models are built, how they can be used, what their limitations are and what resources are available to help supervisors regulate and use such models.
- Undertake supervisory capacity building activities with partners, that build on the key elements of the report, and knowledge sharing among IAIS members. This will be particularly important in those EMDE jurisdictions that do not have sufficient supervisory resources and expertise to address these issues.

The IAIS will seek further opportunities for constructive engagement with IAIS members and other partners, as well as stakeholders more broadly, on this important work including opportunities to progress further initiatives stemming from the findings of the report, in areas such as data, metrics, supervisory guidance, and analysis of the impact of protection gaps on financial stability.

Annex 1: Disaster risk financing landscape

The costs of disasters

Disasters resulting from natural hazards such as flood, storms, wildfires or earthquakes generally create a broad range of costs to households, businesses and governments:

- Costs related to restoring access and basic services, such as debris removal and emergency infrastructure repair;
- Costs related to meeting basic needs of those displaced by the disaster;
- Costs related to the rehabilitation or reconstruction of damaged structures and replacement of damaged contents, crops/livestock, machinery or inventory; and
- Costs related to lost income or revenues.

Households, businesses (including agricultural producers) and governments generally face (to a greater or lesser extent) all of the different types of costs described above:

- Households may be faced with costs related to: (i) restoring access or basic services on their privately-owned property; (ii) meeting their own basic needs if displaced (including temporary living expenses); (iii) rehabilitation or reconstruction of private dwellings and replacement of damaged contents; and (iv) lost income if the disaster impedes their ability to earn a wage or salary.
- Businesses may be faced with costs related to: (i) restoring access or basic services on their privately-owned property; (ii) rehabilitation or reconstruction of commercial facilities and replacement of damaged crops/livestock, machinery or inventory; and (iii) lost revenues if the disaster impedes their ability to produce goods or services.
- Governments may be faced with costs related to: (i) restoring access or basic services on public property; (ii) rehabilitation or reconstruction of public facilities and infrastructure and replacement of damaged machinery or inventory; and (iii) lost revenues if the disaster impedes their ability deliver revenue-generating public services or if broader economic disruptions lead to reduced tax revenue. Governments may also face costs to support households or businesses, particularly where households or businesses have insufficient financial capacity to absorb the costs that they face – including as a result of limited availability or acquisition of insurance coverage for those losses.

Financial tools for addressing disaster costs

Private insurance is an important tool to help with meeting the cost of disasters, allowing quick recoveries of households, communities and businesses. In many jurisdictions, households and businesses can acquire private insurance to provide financial protection against disaster risks.

Private Insurance

There are a number of “traditional” types of insurance coverage that provide some financial protection against the losses and damages that households and businesses could face as a result of a climate-related event:

- Households can acquire property insurance coverage for their homes (and/or contents) that will cover some of the cost of rebuilding (or relocating) their home and/or replacing their contents (resulting from perils included within the scope of coverage). Some residential property insurance policies include coverage for temporary living expenses if the policyholder’s home is uninhabitable or inaccessible.

- Businesses can acquire property (or fire) insurance coverage for their commercial facilities along with their machinery and inventories that will cover some of the cost of rebuilding property and replacing machinery and inventories (resulting from perils included within the scope of coverage). Some commercial property insurance policies include (usually as an optional addition) coverage for business interruption losses that replace lost revenue or profit while the policyholder's business activity is disrupted. Agricultural producers can acquire agriculture insurance coverage that protects against lost income as a result of weather-related (and sometimes market-related) reductions in yield or revenues/prices.

In many jurisdictions, micro-insurance products have been developed to provide some coverage for disaster risks for households, (small) businesses and agricultural producers, including various types of crop and livestock insurance coverages, property damage coverage and business interruption covers. Micro-insurance policies tend to provide more limited pay-outs than "traditional" property and agricultural insurance which lowers the cost of coverage and increases access for low-income households, small businesses and agricultural producers.

Governments can acquire property insurance coverage from commercial insurance markets for specific publicly owned buildings or infrastructure assets. They can also create a public insurer for public assets and transfer some of the risk related to its portfolio of insured assets to reinsurance markets.

However, private insurance is not the only tool for protecting against damages and losses and in some circumstances, offering private insurance may not be possible for all types of disaster risks. This could be the case if the magnitude of potential losses or level of correlation in losses is too large for private insurers to be able to insure the risks. Also, if events occur too frequently private insurance may not be cost effective. For such risks, supported insurance schemes by government or other organisations can offer alternatives to private insurance.

Catastrophe risk insurance schemes

Recognising the value of insurance to speed up recovery following natural disasters, in many jurisdictions, governments have also supported the establishment of catastrophe risk insurance programmes to broaden the availability of affordable insurance coverage for households (and often businesses) against disaster-related risks. These programmes may provide direct insurance, co-insurance, reinsurance – and often a government backstop – for disaster-related risks. The programmes may have been established to address constraints to the availability of affordable insurance coverage for certain perils or as a broader programme aimed at ensuring the availability of affordable insurance for many perils and/or supporting solidarity for those impacted by disaster events.

Government insurance schemes may subsidise premium rates. While the provided subsidies help with affordability, they could also have a negative impact by concealing the risk information contained in risk-based insurance premiums. As a consequence, developments in risk areas without adequate risk mitigation may continue, exacerbating exposure to disaster risk.

Ex ante investment in risk reduction

The costs related to natural disasters can be reduced *ex ante* through investments in resilience or risk reduction. *Ex ante* investment in risk reduction is often the most cost-effective approach to addressing disaster costs as these costs can then be avoided for multiple occurrences of disaster events. As a result, the relative benefits of risk reduction investments are particularly high in communities facing frequent disasters.

Often, the most cost-effective risk mitigation actions are to prevent building in the high-risk areas and ensure robust building standards to reduce the impact of disaster events. Governments have a critical role to play through the establishment of land-use requirements and building codes. In many

jurisdictions, land-use planning, building code standards and enforcement may be under the responsibility of local governments. National governments can sometimes influence local government decisions by developing nationally applicable standards.

Households, businesses and governments can implement property-level mitigation measures to reduce the damage to dwellings, commercial facilities, government building/infrastructure as well as to contents, crops/livestock, machinery and inventories that will materialise in the event of a disaster. This could include structural mitigation measures to harden buildings or infrastructure, measures to protect expensive contents, machinery or inventories or measures to reduce the potential loss of revenue or income (such as backup facilities).

Governments have a critical role to play through providing financial support for risk reduction to households and businesses; and the provision of community-level protection measures such as flood barriers or sea walls.

Community-level mitigation measures are often the responsibility of local governments. However, national governments can participate in the funding of risk reduction investments.

Risk mitigation can help with making insurance more accessible and affordable. Insurance in effect spreads the costs of a NatCat event, which may affect a relatively small subset of policyholders, among the wider policyholder base. Insurance pay-outs in the event of disaster will reflect the disaster loss. So, taking appropriate actions by all members of society to reduce the underlying risk through reducing vulnerability to natural disasters will help reduce insurance pay-outs, which in turn should reduce insurance premiums, making them more affordable to a larger proportion of the population.

Ex post funding of disaster costs

The costs that remain need to be absorbed/funded when they materialise (*ex post*). These costs can be funded through savings/risk retention, borrowing/risk financing, insurance payments/risk transfer or donations/financial transfers.

Risk retention

Households, businesses and governments can retain the risk of facing disaster damages and losses and fund those costs from existing savings or reallocation of future income/expenditure. The financial capacity of households, business and governments varies significantly, and this may only be a viable strategy for wealthy households, larger businesses and governments with significant fiscal capacity and flexibility to reallocate funds from other spending priorities.

Risk financing

Households, businesses and governments can finance the cost of disaster damages and losses by borrowing funds from banks or capital markets (debt/bond issuance). Access to borrowing varies across households, businesses and even governments based on existing financial strength and leverage. Governments in developing countries may have more limited (or more costly) access to bank lending or capital market financing. Funding disaster costs through borrowing entails a reduction in future financial capacity due to the cost of repaying outstanding debt and an increase in leverage that could impact future investment plans.

Risk transfer

Some governments (mostly EMDEs) have acquired event-based insurance coverage, most often through the issuance of catastrophe bonds that provide a pre-determined amount of funding based on the occurrence of an event that meets pre-defined physical parameters such as earthquake magnitude or wind speed. The proceeds of event-based insurance coverage can be used to fund

immediate relief or recovery needs or for rehabilitation and reconstruction of damaged buildings and infrastructure (including as assistance for the reconstruction of damaged homes or businesses).

Alternatively, governments can arrange contingent disaster financing from multilateral financial institutions. These arrangements provide loans to governments if they experience large disasters, as defined in the terms of the agreement. Such arrangements allow them to draw funds for recovery and reconstruction immediately after significant disasters occur.

Finally, international and donor organisations can provide relief help, especially when particularly large disasters occur to supplement existing arrangements or where effective insurance markets, or government supported insurance schemes do not exist.

Annex 2: Supervisory activities that address protection gaps – expanded

Initiative	European Insurance and Occupational Pensions Authority (EIOPA) dashboard on insurance protection gaps for natural catastrophes		
Description	<p>The dashboard is a tool to monitor and analyse the impact of NatCat events on the insurance industry through providing supervisors with timely information on the NatCat exposures.</p> <p>It is an ex ante, voluntary initiative.</p> <p>The scope includes the countries of the EEA (Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Norway, Iceland, and Lichtenstein).</p>		
Parties involved	Thirty supervisors; also incorporates external datasets. Led by EIOPA.		
Current or completed initiative	Current initiative – continues to be developed. Current perils are flood, wildfire and windstorm. A pilot version of the dashboard was published in 2020. The latest version was published in 2022.		
Objective	<p>EIOPA’s work on protection gaps aims to raise risk awareness and inform, with technical analysis, the discussion on measures to improve risk assessment, risk prevention and adaptation measures, as well as incentives for appropriate product design and risk transfer for climate change and pandemic risks.</p> <p>The dashboard aims to provide information on the frequency and severity of NatCat events in Europe; assess the financial impact by tracking insured/uninsured losses; analyse potential systemic risk and enhance transparency and risk based supervisory by providing supervisors with timely information on the NatCat exposures. It is a tool to monitor and analyse the impact of NatCat on the insurance industry.</p> <p>As well as revealing protection gaps, the dashboard will enable evidence-based decision-making on measures to improve society's resilience against NatCat events.</p>		
Supervisory objectives supported	Financial safety and soundness (microprudential)	Financial stability (macroprudential)	Promoting insurance market development

Initiative		US property resilience study
Description	To quantify the benefits of certain wildfire mitigation features, this study uses the RMS North America Wildfire Model to quantify hypothetical loss reduction benefits in nine communities across three Western States: California, Colorado, and Oregon. The simulated reduction in losses is compared to the costs of implementing associated mitigation measures. A straightforward benefit-cost methodology is applied to assess the economic effectiveness of the two overall mitigation strategies modelled – structural mitigation, and vegetation management.	
Parties involved	NAIC Center for Insurance Policy and Research, Risk Management Solutions (RMS), Insurance Institute for Business and Home Safety (IBHS)	
Objective	This study is designed to demonstrate that learnings from building science research can be reflected in a catastrophe model framework in order to proactively inform decision-making around the reduction of wildfire risk for residential homeowners in wildfire zones.	
Supervisory objectives supported	Promoting insurance market development	
Initiative		Chile regulation to enable parametric insurance
Description	In the recently issued Fintech Law, a chapter was incorporated that allows the possibility of commercialising parametric insurance in Chile. The aforementioned Law incorporated a modification in the Insurance Law, which enables the implementation of this type of insurance. This Law establishes that the insurance market regulator (CMF) must issue a regulation with the requirements, information, types of products, indexes, and the characteristics of the policies that are deposited for their commercialisation. For its part, the 2023-2024 regulation plan that the CMF made public on April 27 2023, establishes as one of the insurance regulatory commitments, the issuance of regulations on parametric insurance during the year 2024.	
Parties involved	The domestic insurance companies, international reinsurance companies, the insurance sector regulator (CMF) and the Ministry of Finance.	
Current or completed initiative	The Law that allowed parametric insurance was issued in February 2023 and the regulations associated with parametric insurance are committed for the year 2024.	
Objective	This initiative supports CMF's market development objectives, through creating a regulatory environment to support the development of affordable and efficient products to protection against NatCat events.	
Supervisory objectives supported	Promoting insurance market development	

Initiative		Morocco catastrophe coverage	
Description	<p>The Moroccan government has implemented a national coverage regime for catastrophic events, as part of a larger national strategy for integrated risk management of natural disasters.</p> <p>This regime aims to compensate the victims of direct damages occurring in Morocco, having as their decisive origin a natural agent's abnormal intensity or the violent action of man. Natural agents that can be covered by the regime: earthquakes, tsunami, floods and tidal wave. Violent action of man consists of terrorism, riots and popular movement.</p> <p>This coverage scheme combines both an insurance component, consisting of mandatory inclusion of the guarantee in certain insurance contracts, and a benefit component for individuals who do not have an insurance coverage or whose coverage is insufficient, through the FSEC (Solidarity Fund for Catastrophic Events - Fonds de solidarité contre les événements catastrophiques).</p>		
Parties involved	<p>The Moroccan government, in collaboration with the insurance supervisor and in consultations with the Moroccan insurance industry players, was the driving force behind this project which resulted in the publication in 2016 of Law 110-14, implementing the regime that became effective on December 30th 2019.</p> <p>Currently, the ACAPS has the power to suggest improvements to the existing coverage system, provide technical opinions on this coverage scheme, as well as decide on the applicable rates for the insurance component of the system. The government, on the other hand, provides a guarantee against counterparty risk as well as a guarantee in case of a lack of coverage internationally.</p>		
Objective	<p>The objective of this initiative was to offer a minimum coverage for the victims of catastrophic events, resulting in damages that can have a significant impact on the socio-economic development of the country and harm the development of the affected areas.</p> <p>The work group in charge concluded that the best option was to combine a compulsory guarantee into insurance contracts, with a premium percentage set by law, with a benefit component for those who do not have access to an insurance coverage, thus creating the FSEC which is a legal person under public law with financial autonomy and responsible for compensating victims of catastrophic events not covered elsewhere.</p> <p>The benefit component targets populations typically excluded from financial products and specifically without access to insurance coverage. The regime thus offers them financial compensation, without the victims having to pay premiums. The insurance component widens the scope of targeted insurance contracts that now include a catastrophic event coverage. This has the potential of improving insurance penetration rate, through consumers concerned with the damages they could incur from catastrophic events.</p>		
Supervisory objectives supported	Financial stability (macroprudential)	Financial inclusion	Promoting insurance market development

References

- A2ii (2023): "[Inclusive Insurance Regulation Map](#)"
- A2ii (2020): "[Index insurance status and regulatory challenges](#)"
- A2ii (2014): "[Technical Note: Evolving microinsurance business models and their regulatory implications](#)"
- FIO (2023): "[Insurance Supervision and Regulation of Climate-Related Risks](#)"
- EIOPA (2023): "[Measures to address demand side aspects of the NatCat protection gap](#)"
- (2023): "[Staff Paper on Policy options to reduce the climate insurance protection gap](#)"
- (2023): "[What to do about Europe's climate insurance gap](#)"
- GAIP (2023): "[About the Protection Gap](#)"
- Geneva Association (2018): "[Understanding and Addressing Global Insurance Protection Gaps](#)"
- GFIA (2023): "[Global protection and recommendations for bridging them](#)"
- IAIS (2022): "[Global Insurance Market Report](#)"
- (2022): "[The Role of Insurance Supervisors in Multi-Stakeholder Approaches to Address Pandemic Protection Gaps](#)"
- (2018): "[Issues Paper on Index Based Insurances, particularly in Inclusive Insurance Markets](#)"
- IDF and GA (2022): "[Insurance Development in Emerging Markets: The role of public policy and regulation](#)"
- Netherlands AFM (2021): "[Impact of Climate Change on Non-Life Insurance](#)"
- OECD (2023): "[Recommendation on Building Financial Resilience to Disaster Risks](#)"
- (2021): "[Responding to Covid-19 and pandemic protection gap in insurance](#)"
- (2021): "[Enhancing financial protection against catastrophe risks: the role of catastrophe risk insurance programmes](#)"
- OECD (2023): "[Financial Management of Catastrophe Risks: Approaches to Building Financial Resilience](#)"
- Swiss Re Institute (2023): "[A Perfect Storm: Natural Catastrophes and Inflation in 2022](#)"
- UNDRR (2022): "[The invisible toll of disasters](#)"