

Towards a European system for natural catastrophe risk management

The possible role of European solutions in
reducing the impact of natural catastrophes
stemming from climate change

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Executive summary

This paper proposes a possible EU-level solution to address the widening gap in natural catastrophe insurance protection in Europe. Increased economic exposure and the growing frequency and severity of natural catastrophes linked to climate change have been driving up the cost of natural catastrophes in Europe. Between 1981 and 2023, natural catastrophes caused around €900 billion in direct economic losses within the EU, with one-fifth of these losses having occurred in the last three years alone. However, over the same period, only about a quarter of the losses incurred from extreme weather and climate-related events in the EU were insured – and this share is declining.

This “insurance protection gap” is expected to widen further due to the increasing risk posed by climate change. Europe is the fastest-warming continent in the world and increasing climate risk is likely to have implications for both the supply of and demand for insurance if no relevant measures are in place. As the frequency and severity of climate-related events grow, (re)insurance premiums are expected to rise. This will make insurance less affordable, particularly for low-income households. Climate change also increases the unpredictability of these events, which may prompt insurers to stop offering catastrophe insurance in high-risk areas. At the same time, low risk awareness and reliance on government disaster aid further dampen insurance uptake by households and firms.

In April 2023 the European Central Bank (ECB) and the European Insurance and Occupational Pensions Authority (EIOPA) published a joint discussion paper on addressing this growing protection gap. The paper provided evidence showing the economic significance of this gap, including its implications for the macroeconomy, the financial system and fiscal budgets. It showed, for instance, that the lack of insurance can slow down economic recovery, increase banks’ exposures to credit risk and weaken the fiscal position of governments when they step in to cover uninsured losses. To help reduce the gap, it advocated for a ladder approach to natural catastrophe insurance, calling for a multi-layered approach involving both the private and public sectors at national and EU-level. Following its release, the paper received responses from various stakeholders, which motivated this follow-up work.

Recent events, such as the 2024 flooding in central and eastern Europe and in Spain, have further illustrated the challenges that extreme weather events can pose for the EU and its Member States. These events highlight the importance of emergency preparedness, risk mitigation, and adaptation efforts to prevent and/or minimise the losses from natural disasters, as well as the relevance of national insurance schemes in reducing the economic impact of natural catastrophes. They also bring to the fore the importance of addressing the insurance protection gap and the associated burden on public finances.

The EU Solidarity Fund, which aims to support governments in the wake of severe disasters, has proved to be too small to provide meaningful support for

reconstruction efforts. Following the floods in central and eastern European countries, the European Commission thus proposed that the affected countries receive €18 billion from the EU cohesion funds to support their recovery efforts. However, these funds are not intended for responding to specific disasters, they are not available to all EU Member States and they have no mechanism for ensuring that Member States address natural disaster risk pre-emptively or increase private insurance coverage.

This paper analyses 12 existing national natural catastrophe insurance schemes and how they employ private and public funds to address the protection gap. The paper finds that the existence of such schemes in European countries correlates with higher insurance coverage. National schemes aim to broaden insurance coverage and encourage risk prevention. Typically, they do so by setting up risk-based (re)insurance structures involving public-private sector coordination for multiple perils (e.g. floods, drought, fires and windstorms). Some of the schemes further support the availability of insurance through mandatory insurance coverage and improve the affordability of insurance through national solidarity mechanisms. At the same time, there are fewer risk diversification opportunities at national than at EU level and reliance on both national and EU public sector outlays has been growing. Therefore, it is beneficial to discuss at EU level how adaptation measures can help in proactively reducing disaster losses and how the sharing of losses between the public and private sectors can help in raising risk awareness and improving risk management before disasters occur.

Building on existing national and EU structures, the paper spells out a possible EU-level solution composed of two pillars, firmly anchored in a multi-layered approach:

- **An EU public-private reinsurance scheme:** this first pillar would aim to increase the insurance coverage for natural catastrophe risk where insurance coverage is low. The scheme would pool private risks across the EU and across perils, with the aim of further increasing diversification benefits at EU level, while incentivising and safeguarding solutions at national level. It could be funded by risk-based premiums from (re)insurers or national schemes, while taking into account potential implications of risk-based pricing for market segmentation. Access to the scheme would be voluntary. The scheme would act as a stabilising mechanism over time to achieve economies of scale and diversification for the coverage of high risks at the EU level, similar to an EU public-private partnership.
- **An EU fund for public disaster financing:** this second pillar would aim at improving public disaster risk management among Member States. Payouts from the fund would target reconstruction efforts following high-loss natural disasters, subject to prudent risk mitigation policies, including risk adaptation and climate change mitigation measures. The EU fund would be financed by Member State contributions adjusted to reflect their respective risk profiles. Fund payouts would be conditional on the implementation of concrete risk mitigation measures pre-

before and after disasters. Membership would be mandatory for all EU Member States.

Pillar 1: EU reinsurance scheme		Pillar 2: EU disaster fund	
Increase insurance coverage and supply	Goal	Incentivise risk mitigation and limit public outlays	
(Re)insurers and national schemes	Participants	Governments	
Public-private	Set-up	Public	
Voluntary	Membership	Mandatory	
Risk-based premia from participants (and capital market funding incl. cat bonds)	Funding	Risk-adjusted contributions from governments (and possibly debt issuance)	
Payout according to contract conditions	Payouts	Payout calibrated to event and dependent on implementation of national plans	

The two-pillar system would enhance resilience to natural catastrophe risks at national and EU level, limiting related costs. Both pillars would complement – and be consistent with – existing national initiatives to reduce the natural catastrophe insurance gap by addressing targeted market failures, in line with the EU subsidiarity principle. It would enable both the private sector and Member States, especially those currently lacking national solutions, to increase their insurance coverage capacity, invest in more resilient infrastructure and take preventive action. The two-pillar system would also help to clarify financing responsibilities for post-disaster funding between private and public sectors and across loss layers, thus helping to contain the overall costs of future disasters. Both pillars include strong risk mitigation incentives in their contribution structures. This would ensure that there is sufficient “skin in the game” for stakeholders to reduce moral hazard at all levels and provide incentives for both the private and the public sector to be well prepared ahead of catastrophes. In addition, this system would exploit pooling and risk-sharing benefits beyond the national level, enabling greater risk diversification capacity. Finally, the discussion on a potential EU solution could promote further initiatives geared towards risk mitigation and adaptation, such as the use and development of open-source tools, models and data to achieve a clearer understanding of the risks involved.

The proposal is meant as a basis for discussion among stakeholders, to be contrasted and compared with alternative solutions. The aim of this paper is to contribute to discussions on possible ways to reduce the insurance protection gap, while preserving the integrity of national insurance schemes and solutions. The proposed solution is without prejudice to ongoing developments at national and EU level, and the interaction with existing national schemes would warrant closer examination if the proposal was pursued further. Whether an EU mechanism is established, and the design and implementation, shall be decided at the political level with the involvement of all Member States and decision-makers.

Finally, the proposed solution should be complementary to ambitious mitigation policies to tackle climate change and reduce the associated catastrophe risks. It would by no means be a substitute for such policies.

Introduction

In April 2023 the European Central Bank (ECB) and the European Insurance and Occupational Pensions Authority (EIOPA) published a joint discussion paper to address the growing climate insurance protection gap.¹ The paper highlighted that, historically, only about a quarter of the losses incurred from extreme weather and climate-related events in the EU were insured, with some countries having an even lower share of less than 5%. It also underlined that the gap is expected to widen due to the increasing severity and frequency of natural disasters caused by climate change. In addition, the paper provided evidence for the economic significance of this gap, including its implications for the macroeconomy and financial stability, which called for joint work by EIOPA and ECB on the topic (see **Box 1**). To help reduce the gap, the discussion paper suggested a ladder approach to natural catastrophe insurance, considering options for (i) enhancing private insurance and developing catastrophe bond markets, (ii) promoting an ex ante disaster risk management strategy within the public sector, (iii) developing possible shared resilience solutions between public and private entities at national level, and (iv) identifying risk pooling and diversification opportunities that could be explored at a European level.

The discussion paper received a number of responses from various stakeholders including insurers, industry associations, NGOs, international organisations, academia and private individuals.² Many responses held a positive view of the approach, in that it recognises the unique role of insurance in addressing climate catastrophe risk but also emphasises that the private sector cannot handle this risk alone. The responses highlighted several other key points, which could help reduce the gap, including:

- the importance of public sector adaptation measures such as spatial planning and building regulations to support insurers' risk-based incentives for prevention measures ("impact underwriting");
- the need to raise awareness and find bottom-up solutions tailored to local contexts, different perils and business lines;
- the opportunity for Europe to become a more attractive place for (re)insurance capital;
- the relevance of an EU pooling mechanism that would preserve risk incentives and foster investments in resilience.

Since the paper's release, further devastating natural catastrophes have struck EU Member States, also illustrating the need to address the insurance

¹ The climate insurance protection gap is defined as the uninsured portion of the economic losses caused by extreme weather and climate-related events, see EIOPA-ECB (2023).

² For example, Insurance Europe published its response on its website (2023): [Response to the ECB-EIOPA discussion paper on policy options to reduce the climate insurance protection gap](#).

protection gap. For instance, severe floods hit various central and eastern European countries in September 2024 and in Spain in late October 2024. These events drew renewed attention to the impact of natural catastrophes across EU Member States, the relevance of solutions to improve insurance coverage and the increasing burden put on public finances.

At EU level, the EU Solidarity Fund provides financial support to governments in the aftermath of severe disasters. This fund has so far committed €1 billion alone to help those countries affected by the severe flooding that took place between May and November 2023 (Greece, France, Italy, Austria and Slovenia).³ This amounts to approximately 10% of total payouts of the fund since its launch in 2002 but covers only a fraction of the overall flood damage, which came to around €23 billion.⁴ Even though the EU has increased the Solidarity Fund's budget for the coming years,⁵ the fund's resources are still too small to make a significant contribution to reconstruction efforts following a major natural disaster. This situation was also lamented by several members of the European Parliament, who called for additional EU funding capacity.⁶ In the absence of sufficient resources in the EU Solidarity Fund, the European Commission has proposed that the central and eastern European countries affected by the 2024 floods receive a further €18 billion from the EU cohesion funds.⁷ However, these funds are not designed to respond to specific disasters and they are not available to all EU Member States.⁸ More to the point, the EU cohesion funds – like the EU Solidarity Fund itself – have no mechanism for ensuring that Member States address natural disaster risk systematically and pre-emptively.

Against this background, this paper follows up by offering a possible solution to address the natural catastrophe insurance protection gap in Europe. The paper first highlights the rising costs from natural catastrophes in Europe, explains the causes for the sizeable insurance protection gap and recalls its impact on the economy, financial stability and fiscal positions (**Box 1**). As individual insurers and consumers do not typically take the broader economic benefits of insurance into account, this leads to a market failure, which involves both demand and supply-side factors, thus calling for a multifaceted approach (**Section 1**). Second, since those countries with insurance schemes at national level tend to have higher insurance coverage, the paper reviews these schemes and draws lessons from them to inform a possible EU solution that could supplement national solutions and incentivise further national initiatives (**Section 2**). The paper then outlines potential steps towards a comprehensive European system for natural catastrophe insurance protection, including possible EU-level measures to enforce more ambitious risk

³ See European Parliament (2024).

⁴ Payouts under the EU Solidarity Fund have amounted to €8.6 billion since its launch in 2002, for a total of 130 disasters, of which 110 were natural disasters.

⁵ See [European Union Solidarity Fund – Performance](#) on the European Commission's website.

⁶ See, for example, [Joint motion for a resolution on the devastating floods in central and eastern Europe, the loss of lives and the EU's preparedness to act on such disasters exacerbated by climate change](#), September 2024, and Parliamentary question on [Mobilisation of the EU Solidarity Fund in response to the flooding in Spain](#), 31 October 2024.

⁷ See European Commission (2024a, 2024b).

⁸ See [Cohesion Fund](#) on the European Commission website.

mitigation at Member State level before and after disasters. This system could build on an EU public-private reinsurance scheme, complemented by a public EU disaster financing mechanism geared towards risk prevention ([Section 3](#)). Last but not least, the paper concludes with a set of policy considerations on how best to implement such a system ([Section 4](#)).

1 The growing challenge of insuring natural catastrophes in the EU

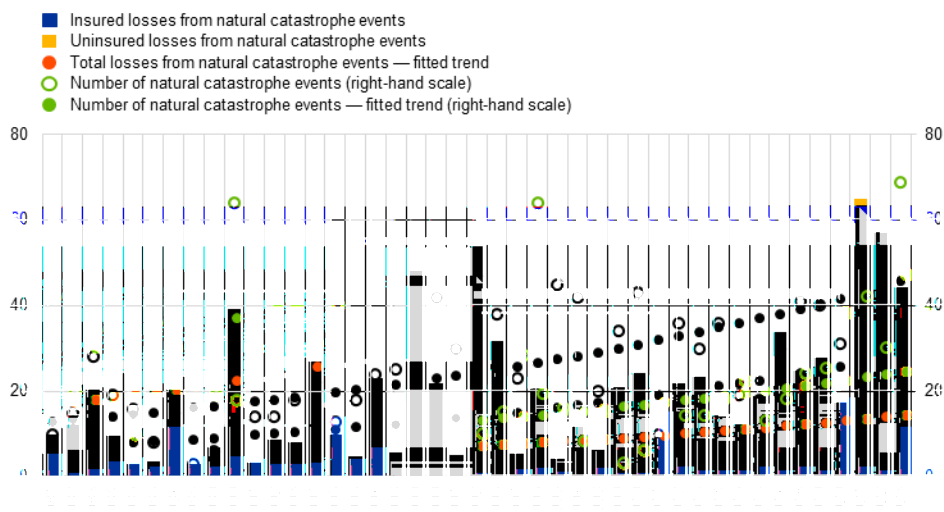
1.1 Rising economic losses and climate change

Economic losses from extreme weather and climate events are increasing and are expected to rise further due to the growing frequency and severity of catastrophes caused by global warming. Between 1981 and 2023, natural catastrophe-related extreme events caused around €900 billion in direct economic losses in the EU, with more than a fifth of the losses occurring in the last three years (2021: €65 billion; 2022: €57 billion; 2023: €45 billion; see [Chart 1](#)).

Chart 1

Economic losses from and number of natural catastrophes in the EU

(1981-2023; EUR billions as measured in 2023 values, number of events)



Sources: CATDAT (Risklayer GmbH – Europe Climate related impact Analysis Project), EIOPA's [Dashboard on insurance protection gap for natural catastrophes – European Union \(europa.eu\)](#) and EM-DAT.

Notes: The two fitted trends depict exponential trends fitted to the annual time series of the number of and the total losses (insured and uninsured) from natural catastrophe events. (Initially, two types of linear regressions were fitted, one for the original data and one for logs of the original data: since better fits – as measured by R-squared – were obtained for the logs of the original data, the estimated coefficients from these regressions were used to depict the exponential trends). The trend fitted to total losses remains upward-sloping when total losses are scaled by GDP. Natural catastrophes include both geological catastrophe events (e.g. earthquakes, volcanic eruptions) and climate-related catastrophe events (droughts, extreme temperatures, floods, mass movements, storms and wildfires). The frequency of geological catastrophe events (as opposed to that of all natural catastrophe events or climate-related catastrophe events) is not upward-trending.

Two key factors are driving this upward trend:

- Economic exposure growth: as society's wealth and property (e.g. real estate) grow over time, so do the losses associated with natural disasters. Moreover,

real estate growth is often concentrated in high-risk areas, such as flood plains or coastlines.⁹

- Climate change: the frequency and severity of climate-related catastrophes, including floods, wildfires, storms, droughts and heatwaves, are increasing due to climate change.^{10,11}

While it is difficult to disentangle the contributions made by these two factors, Europe is the fastest-warming continent in the world and the number of climate-related catastrophe events in the EU has been rising, hitting a new record in 2023 (see Chart 1).¹² Moreover, climate change is already now affecting many weather and climate extremes in every region across the globe and its adverse impacts will continue to intensify.¹³ In the EU, all Member States face a certain degree of natural catastrophe risk (see [Chart 2](#), panel a) and the welfare losses are estimated to increase in the absence of relevant measures to improve risk awareness, insurance coverage and adaptation to the rising risks.¹⁴

The increasing frequency and intensity of natural catastrophes is expected to exacerbate the natural catastrophe insurance protection gap. The 2023 joint

ECB-EIOPA paper highlighted that only about a quarter of economic losses in the EU were insured and that this share was below 5% in some EU countries.¹⁵ These figures were derived by taking historical averages of country-specific shares of insured to total economic losses over a 42-year period from 1980 to 2021.¹⁶

Considering such a long period helped control for the fact that natural catastrophes are extreme and rare events and thus the number, type and severity of these events differ from year to year. To capture the recent trend in the share of insured to total economic losses in the EU, and looking at the 10-year rather than the 41-year averages, this share has declined since 2015 (see [Chart 2](#), panel b).¹⁷ As natural disasters are expected to become even more frequent and more severe, the natural catastrophe insurance protection gap – i.e. the uninsured portion of the economic losses caused by natural disasters – is likely to increase in the absence of relevant prevention and adaptation measures at national or EU level.

⁹ For example, more than a third of Europe's total population lives in coastal regions and projected changes in the frequency and intensity of coastal floods pose a major threat to ecosystems and the population in low-lying coastal areas in northern and western Europe (see European Environment Agency, [Coastal-relative sea level](#)).

¹⁰ See, for example, European Environment Agency (2021a, 2021b).

¹¹ Natural catastrophes also include geological disaster events such as earthquakes or volcanic eruptions, the frequency and severity of which are not linked to climate change.

¹² See [European Climate Risk Assessment](#) by the European Environment Agency.

¹³ See Intergovernmental Panel on Climate Change (2023).

¹⁴ See, for example, Joint Research Centre (2020) and Fache Rousová et al. (2021).

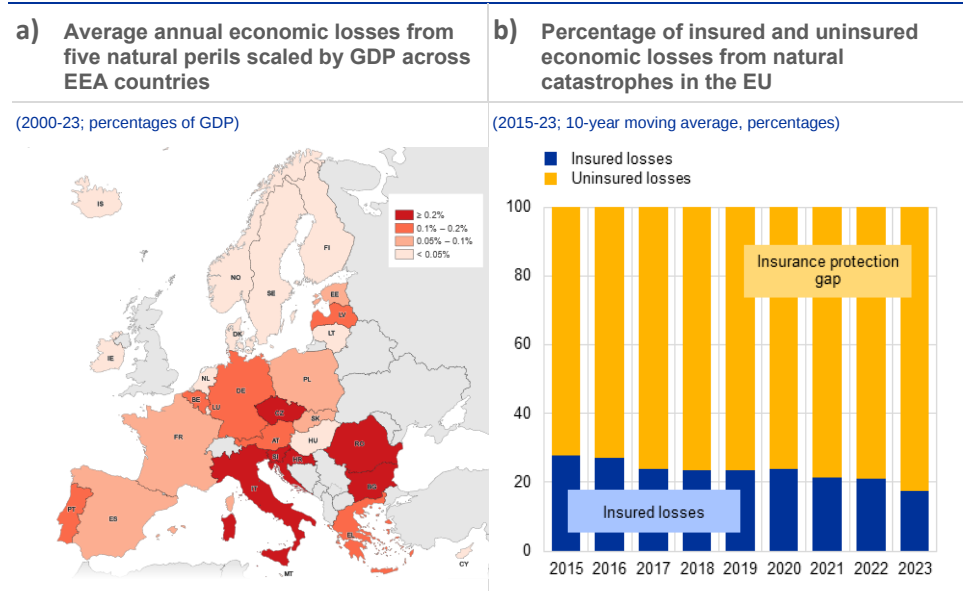
¹⁵ For individual protection gaps across EU Member States, see EIOPA [Dashboard on insurance protection gap for natural catastrophes](#).

¹⁶ This is also the maximum time period for which data are available.

¹⁷ This is also the case for the 15 and 20-year moving averages.

Chart 2

Geographical distribution of economic losses from five natural perils and the evolution of the natural catastrophe insurance protection gap in Europe



Sources: CATDAT (Risklayer GmbH – Europe Climate related impact Analysis Project), EIOPA's [Dashboard on insurance protection gap for natural catastrophes – European Union \(europa.eu\)](#) and Eurostat.
Notes: Panel a: The five natural perils are coastal floods, earthquakes, floods, wildfires and windstorms. Panel b: The chart shows the 10-year moving average of the percentage of insured and uninsured losses to total economic losses caused by natural catastrophes in the EU (e.g. the figure for 2015 refers to the average over the period 2006-15).

1.2 A multifaceted issue involving demand and supply factors

In recent years, reinsurance premiums have been rising, thereby also increasing the cost of insurance to cover losses from natural catastrophes.

Over the last ten years, the reinsurance premiums for property losses stemming from catastrophes have increased across all major insurance markets (see [Chart 3](#), panel a). In Europe, property catastrophe reinsurance rates have risen by around 75% since 2017. While there may be various factors affecting reinsurance prices, the increasing frequency and severity of events is likely to trigger further repricing of reinsurance contracts, which can in turn increase prices offered by primary insurers.¹⁸ The rising risks may even prompt insurers to retreat from certain areas or types of risk coverage.¹⁹ Moreover, since insurance policies are typically written for one year only, such repricing or insurance retreat may be abrupt.²⁰ Reduced insurance offer is justified where risks become excessively high or unpredictable. In particular, insurance cannot palliate for inadequate climate adaptation, spatial planning and (re)building conventions.²¹

¹⁸ Primary insurers typically cede part of the natural catastrophe risk (tail events) to reinsurers and, therefore, the offer and pricing of their policies usually depend on the reinsurance market.

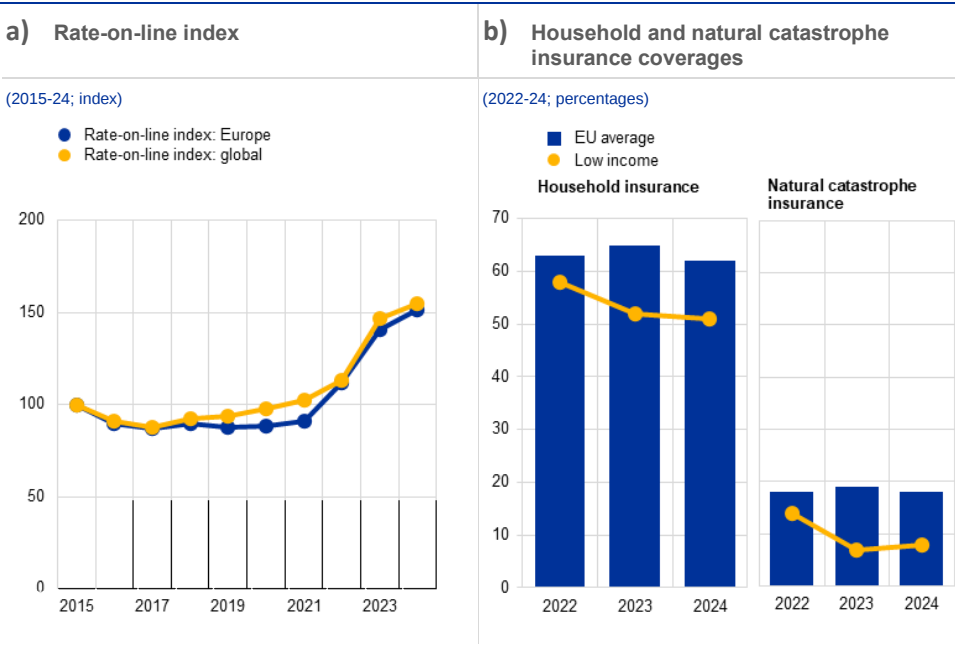
¹⁹ See, for example, Financial Times (2024a) and Reuters (2024).

²⁰ See Financial Times (2024b).

²¹ See also Elderson (2024).

At the same time, take-up of natural catastrophe insurance in the EU is declining among low-income households, thus increasing the pressure on governments to provide support in the event of a natural catastrophe.²² For instance, the share of low-income consumers with insurance for property damage caused by natural catastrophes has declined from around 14% to 8% since 2022 (see [Chart 2](#), panel b). Affordability and budgetary constraints are the main reason why 19% of European consumers do not buy or renew insurance.²³ Low-income households may also be disproportionately vulnerable to financial stress and are more likely to live in areas with increased exposure to environmental stress or natural catastrophes,²⁴ due to the affordability of land and housing or limited resources to relocate to safer areas or invest in disaster-resistant housing. Insurance affordability stress might eventually also contribute to housing affordability issues, because if a larger portion of income is spent on insurance, a smaller portion is available for other expenses (e.g. rent). Therefore, solutions should consider vulnerability and consumer protection aspects.

Chart 3
Evolution of reinsurance premiums, household and natural catastrophe insurance coverage



Sources: [Guy Carpenter Regional Property Catastrophe Rate-On-Line Index \(artemis.bm\)](#) and EIOPA 2022-24 Eurobarometer analysis (EIOPA, 2023; EIOPA, 2024).
 Notes: Panel a: “Rate-On-Line” (ROL) refers to the rate of reinsurance premium to loss recoverable under a reinsurance contract. The ROL signals how much money an insurer must pay for reinsurance coverage. A higher ROL means that the insurer must pay more for coverage, while a lower ROL means that the insurer pays less for that same level of coverage. Index normalised to 100 in 2015.

²² EIOPA 2022-24 Eurobarometer analysis; the results for 2022 and 2023 are public.
²³ EIOPA [Consumer Trends Report 2022](#).
²⁴ See, for example, European Environment Agency (2018), Deria et al. (2020) and Tesselaar et al. (2020), in which the authors point to a climate-induced socio-economic tipping point for flood insurance in Europe, where rising unaffordability and declining uptake of insurance under climate change obstruct the functioning of insurance markets in high-risk areas.

the economic recovery. The lack of insurance can also increase banks' exposures to credit risk, owing to reduced collateral values, increased borrower default risk and prolonged supply chain disruptions. Moreover, the fiscal position of governments may be weakened if they step in to provide relief to cover uninsured losses. Overall, the low insurance coverage for natural catastrophes in the EU can contribute to risks to the macroeconomy and financial stability. This is why EIOPA and the ECB jointly raise awareness of these risks and investigate the implications of, and potential solutions to, the insurance protection gap.

The wider advantages of insurance are not reflected in individual insurance contracts, which leads to market failure and insurance coverage that may be lower than is socially optimal. The positive externalities of insurance, such as a faster recovery following a disaster, less burden on fiscal budgets and reduced costs through better risk management, benefit not only policyholders but also the wider economy. However, individual insurers and consumers do not typically take these broader economic benefits of insurance into account, which leads to a market failure that exacerbates the insurance protection gap. Furthermore, the expectation that governments will ultimately cover natural catastrophe losses can encourage underinsurance; a moral hazard issue that further reduces the overall effects of insurance.

Box 1

The economic relevance of the insurance protection gap

This box briefly recalls the key macroeconomic, financial stability and fiscal implications of the EU's insurance protection gap as set out in the 2023 joint ECB-EIOPA paper. Since the paper's release, further research has underlined the economic relevance of the gap and the economic impact of natural catastrophes more generally.²⁹ In short, the insurance protection gap can pose a risk to economic growth, inflation and market competition by delaying economic recovery. It can contribute to financial stability risks by increasing the exposure of banks to physical risk and reducing the value of collateral, potentially increasing the exposure of banks to credit risk. It also increases fiscal pressure for countries that step in to carry the cost of recovery and reconstruction after a disaster.

More specifically, low insurance coverage can amplify the economic costs of disasters by limiting economies' ability to bounce back. Catastrophes have an adverse impact on GDP growth and inflation because they not only cause direct economic losses, but also damage capital stock, which hampers economic activity and supply chains after the event. This leads to lower productivity and causes further indirect losses to economic production and consumption. Catastrophe insurance mitigates these negative effects as it reduces uncertainty and enables the economy to recover faster. The lack of insurance can also hamper market competition, as increased vulnerability to the impacts of natural disasters may limit growth and the ability to innovate in some regions.

²⁹ See, for example, von Peter et al. (2024), Usman et al. (2024), Clò et al. (2024) and Mari and Ficarra (2024). For references prior to 2024, see the 2023 joint ECB-EIOPA paper, in particular Section 1.

The natural catastrophe insurance protection gap can also contribute to systemic risk in the financial sector. Physical damage to assets can result in lower collateral values and increases in borrower default risk, as well as supply chain disruptions. These in turn can cause large losses for the real economy, lower credit quality or more generally lead to losses on financial institutions' balance sheets. Less capitalised and less profitable banks can respond by providing less credit in high-risk areas and/or to lower income borrowers, potentially further hampering the economic recovery. Catastrophe insurance – when properly priced and with sufficient reserving – can contribute to banks' resilience to disaster shocks because insurance business models are specifically designed to absorb these types of risks.

The lack of insurance can also have a significant adverse fiscal impact. This is because national and European budgets typically assume a significant proportion of the recovery costs for households and businesses, as well as most of the costs of reconstructing public infrastructure.

1.3 Addressing the insurance protection gap requires a multi-layered approach

With losses from natural disasters rising, reducing the insurance protection gap is even more valuable from a macroeconomic, financial stability and societal perspective. The intricate interaction between insurance supply and demand and the severe implications of the insurance protection gap call for a comprehensive approach in reducing this gap. In particular, public and private actors should coordinate efforts ex ante to reduce the overall economic losses from disasters and improve burden-sharing between the public and private sectors.

To this end, the 2023 joint ECB-EIOPA paper proposed a multi-layered “ladder approach” that built on the existing frameworks of private insurance and public sector intervention. To recall, the paper argued that private (re)insurers should be the first line of defence against losses from natural catastrophes, but that more sophisticated frameworks such as public-private partnerships and ex ante public backstops (possibly complemented by an EU-wide solution) could also be considered in view of the rising risks. It also suggested that policy measures aimed at reducing the natural catastrophe insurance protection gap should fulfil the following objectives:

- incentivise risk mitigation and adaptation measures;
- help to provide prompt payout of insurance claims following a natural disaster;
- be complementary to existing insurance coverage mechanisms;
- require the sharing of costs and responsibilities across the relevant (private and public) stakeholders and reduce moral hazard;
- lower the share of economic losses from major natural disasters borne by the public sector in the long run.

The paper also discussed these potential measures, including measures targeting private (re)insurance and action at national and EU level.

With respect to private insurance, the paper highlighted the need for insurance policies that encourage risk prevention and adaptation. A well-functioning insurance market is key to reducing the cost of natural catastrophes by providing ex ante incentives for risk prevention and adaptation, combined with ex post insurance payouts. Notably, insurance payouts can play a vital role in protecting people's livelihoods and enabling economies to bounce back quickly in the wake of a natural disaster, thus reducing the economic burden of such events. Risk-based pricing contributes to risk awareness (i.e. higher premiums for higher risks). This can, however, also exacerbate insurance protection gaps through increased price differentiation and market segmentation – a risk which should be carefully considered. Meanwhile, including premium reductions for risk prevention and adaptation measures in insurance products (e.g. flood-proofing of homes in flood-prone areas), can lead to better risk management in a wider disaster risk management effort, thus helping to improve societal resilience in certain areas and sectors.

As for public sector measures, the paper suggested enhancing ex ante disaster risk management strategies of governments and offering compelling incentives to reduce risks. As economic losses increase, the public sector's role in supporting private insurers and managing residual risks from disasters becomes more crucial. Currently, however, the status quo is unconditional government support in the wake of a disaster: governments provide emergency aid and liquidity to businesses and households to enable their recovery and rehabilitation, while also ensuring the resilience of critical infrastructure and services. To become better prepared for the increase in contingent liabilities related to disasters, governments should improve their ex ante disaster risk management strategies (Radu, 2022). It would be necessary to curb moral hazard and positively influence insurance supply and demand by mandating insurance offer or take-up or stepping into the private market through financial backstops. Additionally, governments can support private insurance by shaping the regulatory environment through policies on spatial planning (e.g. no permits for building new homes in high-risk areas), building standards (e.g. flood-proofing of homes in flood-prone areas), capital markets (e.g. standardisation of catastrophe bond markets) and data sharing/services (e.g. promoting the use of open-source data, tools and models). Disaster risk management strategies should also ensure that national budgets are in a position to react swiftly in the event of a disaster by providing ex post disaster funding, through budget reallocations or emergency provisions.

The 2023 joint ECB-EIOPA paper also argued that public-private partnerships (PPPs) should do more than just provide a financial backstop. PPPs are insurance schemes that provide government financial support to supplement the losses insured by the private sector. The paper emphasised the need to ensure that the costs and responsibilities of such programmes are shared between the public and private sectors, with the “skin in the game” retained for the latter. Furthermore, it argued that policyholders should also retain part of the risk to mitigate moral hazard

or could be offered lower premiums if they implement risk mitigation measures. Overall, PPPs should thus do more than merely provide a financial backstop.

Regulators and supervisors also have a role to play in addressing natural catastrophe insurance protection gaps. They can assess the gaps and raise risk awareness. Insurance authorities can incentivise insurers to embed risk reduction and adaptation features in their product design and advise government and industry on the design and implementation of public-private insurance schemes (International Association of Insurance Supervisors, 2023).³⁰ The insurance coverage of real estate collateral can also be addressed in coordination with banking regulators and/or supervisors.³¹

Last but not least, various international bodies are also playing an active role in addressing the insurance protection gap. The G7, under the Italian Presidency, published a high-level framework for public-private insurance programmes against natural hazards.³² The Financial Stability Board (FSB) and the Basel Committee on Banking Supervision (BCBS) have also considered the impact of the insurance protection gap on the broader financial system.³³ For instance, the BCBS sees the loss of insurance, or its unaffordability, as a financial amplifier, that has the potential to increase the impact of climate-related financial risks for banks. It also notes that it is unclear to what extent banks know whether and to what degree their exposures and counterparties are covered by insurance.³⁴

³⁰ See IAIS (2023).

³¹ For loans granted after January 2025, the new Capital Requirements Regulation (CRR III) requires that immovable property used as collateral is adequately insured against damage. Furthermore, banks are required to put in place procedures to monitor the adequacy of insurance. See [Regulation \(EU\) 2024/1623 of the European Parliament and of the Council of 31 May 2024 amending Regulation \(EU\) No 575/2013 \(OJ L, 2024/1623, 19.6.2024\)](#).

³² See G7 Italia (2024).

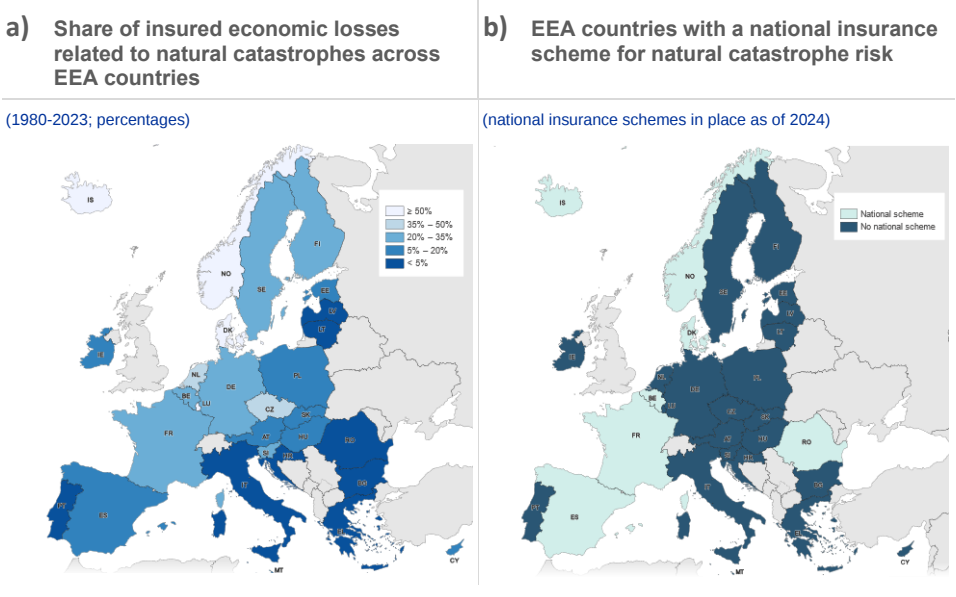
³³ See Financial Stability Board (2022, 2024) and Khoo and Yong (2023).

³⁴ See BCBS (2021).

2 Lessons from national insurance schemes

National schemes to supplement private insurance cover for natural catastrophes, such as PPPs, help improve insurance coverage and reduce the insurance protection gap. Looking at the European Economic Area (EEA), the share of insured losses tends to be higher in countries with such national schemes: the average share across countries with a national scheme is around 47%, while it is below 18% for those without a national scheme (see **Chart 4**). Currently, eight EEA Member States have established a national scheme.³⁵

Chart 4
Share of insured economic losses related to natural catastrophes and national insurance schemes for natural catastrophe risk in Europe



Sources: EIOPA dashboard on insurance protection gap for natural catastrophes, European Environment Agency (EEA) CATDAT, EIOPA and OECD (2021).
Notes: Panel b: The eight EEA countries with a national insurance scheme are Belgium, Denmark, Spain, France, Iceland, Liechtenstein (which is included in the Swiss National Hazard Pool scheme – SNHP), Norway and Romania.

Against this backdrop, this paper identifies national practices on which EU solutions could build to improve insurance coverage and reduce the fiscal burden for natural catastrophe losses across Europe. It analyses 12 existing national insurance schemes worldwide³⁶ and identifies their main objectives, design

³⁵ In addition, a national scheme in Italy is due to be launched in 2025.

³⁶ Consorcio de Compensación de Seguros (CCS; Spain), Caisse Centrale de Réassurance (CCR; France), Norwegian Natural Perils Pool (NNPP; Norway), Belgian Natural Catastrophe Pool (CANARA; Belgium), Natural Disaster Insurance Pool (PAID, Romania), Natural catastrophe insurance of Iceland (NCI, Iceland), Danish Storm (DSC; Denmark), FloodRe (United Kingdom), Japan Earthquake Reinsurance (JER; Japan), National Flood Insurance Program (NFIP; United States), Australian Reinsurance Pool Corporation (ARPC; Australia), and Swiss National Hazard Pool (SNHP; Switzerland).

features and the challenges they face. Informed by the existing national practices, the analysis also derives five lessons in relation to the design and benefits of a potential EU-wide solution. The analysis draws from both a literature review and interviews with the representatives of the schemes conducted in the first quarter of 2024.

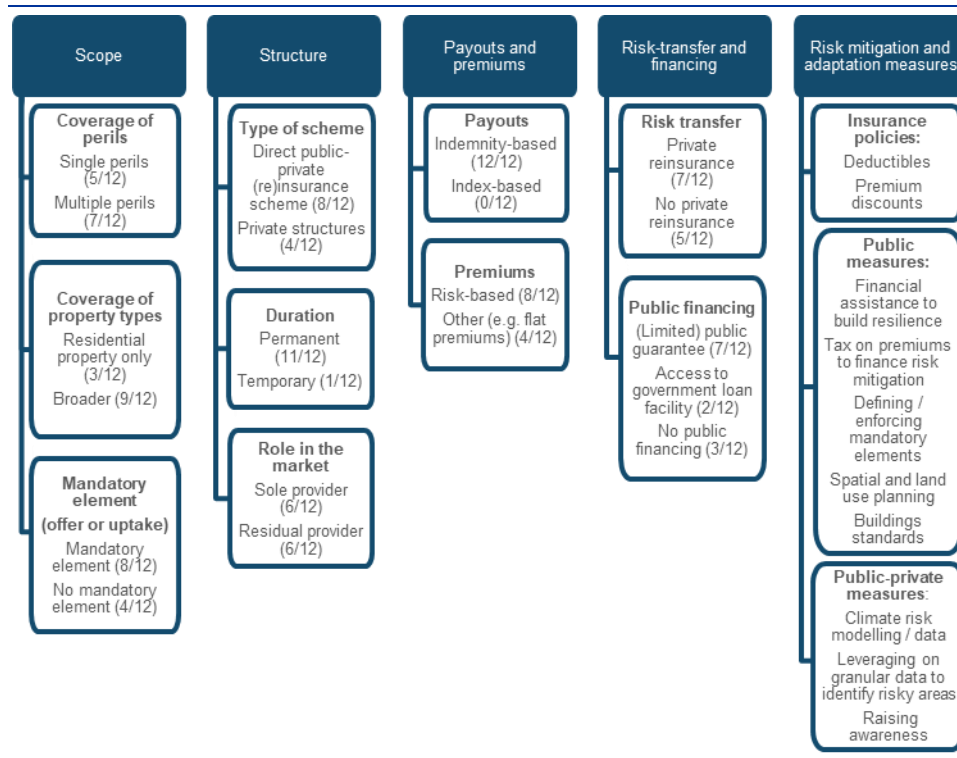
The schemes share the same objective: they all aim to enhance societal resilience against disasters. They typically do so by improving risk awareness and prevention, while increasing insurance capacity through more affordable (re)insurance.

While the design features vary by scheme, some of them are recurring (see also Figure 1 below):

1. **Scope:** most national insurance schemes have a broad scope of coverage, which allows them to pool risks across multiple perils and assets. The majority also incorporate a mandatory element, requiring either mandatory offer or mandatory take-up of insurance by law.
2. **Structure:** the prevalent structure of national schemes is that of a public (re)insurance scheme. Most schemes offer complementary direct (re)insurance and are of a permanent nature.
3. **Payouts and premiums:** national schemes are typically indemnity-based (i.e. payouts are based on actual losses rather than quantitative/parametric catastrophe thresholds). Premiums are mostly risk-based.
4. **Risk transfer and financing:** the use of reinsurance by the schemes depends on the availability and the cost of reinsurance, with national schemes increasingly facing issues over affordability. Public financing of the scheme is not an essential design feature.
5. **Risk mitigation and adaptation measures:** initiatives to ensure proper coordination between the public and private sectors on risk identification and prevention are now emerging in response to climate change. Private and public sector responsibilities are typically divided, with the private market contributing its insurance expertise and modelling capacity, while the public sector provides the legal basis and operating conditions.

Figure 1

Design features of national insurance schemes



Source: Authors.

Notes: Numbers denote the number of national insurance schemes with a specific feature. The numbers were derived on a best-effort basis by generalisation/groupings of features that can – in some schemes – be very special or unique. The last column does not include any numbers as it refers to examples of risk mitigation and adaptation measures.

The present analysis of the design features of national schemes is a first step to inform further potential initiatives at both national and EU level. The following sub-sections therefore elaborate on the main design features of the 12 national schemes. They also draw lessons for developing an EU solution that could help overcome some of the limitations of national initiatives (see also [Section 3](#)).

2.1 Scope: a broad scope of coverage across perils and assets

Most national insurance schemes have a broad scope of coverage, allowing them to pool risks across multiple perils and assets. Seven out of the 12 schemes cover multiple perils including in some cases not only natural but also man-made perils.³⁷ For example, the CCR (FR) considers floods, drought, ground movements, strong wind, earthquakes, avalanches, volcanism and tsunamis (all natural perils) as well as terrorism (man-made peril). Most schemes also offer protection for both residential and commercial property or, more broadly, cover a wide range of assets including property content, movable property or hard-to-insure

³⁷ As in the case of CCS (ES), CCR (FR), NNPP (NO), CANARA (BE), NCI (IS), SNHP (CH) and PAID (RO).

property (e.g. heating facilities, water supplies, harbour facilities).³⁸ Conversely, schemes with a narrow scope of coverage are less prevalent: five schemes focus only on a single peril or specific exposures,³⁹ four schemes cover only residential properties,⁴⁰ while one targets only property and goods that meet specific characteristics (defined as “simple risks”).⁴¹

Eight out of the 12 national solutions also incorporate a mandatory element, requiring either the mandatory offer or mandatory take-up of insurance by law.⁴² Mandatory offer means that insurers operating in specific business lines, such as property damage, must offer protection against a specific set of natural catastrophe risks. Conversely, mandatory take-up means property owners must take up insurance coverage. The schemes typically require policyholders to buy a baseline insurance product as a prerequisite for insurability through the scheme. This is often implemented by including coverage for natural catastrophes in mandatory property insurance.

Including a mandatory element in national schemes aims to achieve three key objectives: higher insurance penetration, sufficient risk diversification and avoiding adverse selection. Notably, the EIOPA insurance protection gap dashboard indicates that countries with national schemes and mandatory requirements (offer or take-up) generally have high insurance penetration rates.⁴³ Mandatory offer or take-up of insurance coverage may also improve risk diversification and increase insurers' premium income as mandatory elements typically enlarge the number of policyholders and/or pool of risks. In addition, since low-risk property owners might be less likely to buy insurance coverage, the mandatory element helps to ensure that these owners are not absent from the pool of policyholders. This in turn limits adverse selection and thus the concentration of high-risk properties in the scheme. Mandatory coverage is often combined with specific pricing rules and premium structures. These requirements would typically involve government intervention to support affordable premiums offered to policyholders and risk-sharing among market participants.

Lesson 1: an EU solution could cover a wider range of perils and assets across several Member States, thus allowing for greater risk pooling and risk diversification benefits than at a national level. This can be particularly relevant for small countries where a single catastrophe can affect the whole country and for countries without a national insurance scheme. By pooling catastrophe risk across different exposures, regions and uncorrelated perils within a single EU scheme, it

³⁸ The most common exclusions refer to uninsured property, construction defects, indirect losses, object located outside the building, special facilities or precious objects.

³⁹ As in the case of NFIP (flooding, US), ARPC (cyclone and related flood damage, AU), DSC (storm surge and inland flooding, DK), FloodRe (flood risk, UK) and JER (earthquake and volcanic eruption, JP).

⁴⁰ PAID (RO), JER (JP), FloodRe (UK) and DSC (DK).

⁴¹ CANARA (BE).

⁴² A mandatory offer is present in CCS (ES), CCR (FR), NNPP (NO), CANARA (BE), DSC (DK) and NCI (IS); mandatory uptake present in PAID (RO) and SNHP (CH); FloodRe (UK), JER (JP) and NFIP (US) have no broad mandatory requirement at national level. Lenders may also require property insurance when offering mortgages.

⁴³ See EIOPA's [Dashboard on insurance protection gap for natural catastrophes](#).

may be possible to reap larger risk diversification benefits than could be achieved at national level. This would, in turn, reduce the required capital needed to back the risks and lower the cost of reinsuring them. Mandatory elements to boost the demand for or offer of insurance could further increase the risk diversification benefits and limit adverse selection. However, this would also require a certain degree of harmonisation of existing national practices.

2.2 Structure: most schemes are permanent public (re)insurance schemes

Eight out of the 12 national schemes operate as direct public-private (re)insurance schemes, which may ultimately lead to more affordable (re)insurance premiums.⁴⁴ The schemes are typically public not-for-profit entities that rely on the private sector to help with operational support; a set-up that enables cost optimisation. These special-purpose entities utilise private sector expertise in areas such as premium collection, claims payout and customer support. The surpluses generated by these schemes are typically reinvested into the scheme to support ongoing operations or build reserves to enhance their claims payment ability. Notably, some of these schemes do not require the same level of capitalisation as private insurers or otherwise the government guarantee may reduce the capital requirement. With higher retention levels and tax relief, these schemes may be able to offer lower premiums than other solutions.⁴⁵

These schemes apply common reinsurance provisions to primary insurers on a mandatory or voluntary basis. This can limit private exposure to peak risks and make it more economical for primary insurers to offer coverage for those risks. These schemes are established through legislation as government-backed or independent, self-financed entities, and are often, but not necessarily, supported by a government guarantee.

The remaining four schemes are set up as private structures, where a group of insurers underwrite a specified risk on behalf of all participants.⁴⁶ These entities are established with private capital and operate as private insurers. Participation in the pool is often a legal requirement for all insurers offering a specific kind of insurance coverage.⁴⁷ The collected premiums and the pooled funds are used to pay claims and cover reinsurance costs, while any surpluses can be shared among members.

Almost all of the 12 schemes are permanent, thus allowing them to diversify risks over time. In parallel, some of the schemes were initially set up as temporary

⁴⁴ As in the case of CCS (ES), CCR (FR), DSC (DK), Flood Re (UK), JER (JP), NCI (IS), NFIP (US) and ARPC (AU).

⁴⁵ Schemes are expected to have sufficient funds to pay out claims and they often reassess the level of premiums on a regular basis to ensure that this remains the case.

⁴⁶ As in the case of NNPP (NO), CANARA (BE), SNHP (CH) and PAID (RO).

⁴⁷ For example, in Norway and Belgium, all (or the largest) insurers covering specific risks are required by law to join the scheme to achieve high coverage and diversification.

solutions, aimed at addressing specific market inefficiencies or supporting the development of an insurance market. However, rising losses and financing needs resulting from natural catastrophes, if not met by increasing the prevention measures, will lead to the eventual extension of some of these temporary schemes.⁴⁸

The schemes either serve as the sole provider of specific risk coverage or offer an alternative to the private market. These schemes exist because the private market offers insufficient or otherwise unaffordable protection. However, the schemes try not to compete with the private market as private market initiatives should instead be safeguarded and enhanced. As a result, the relationship between the scheme and the private market is generally one of cooperation and defining respective roles. Residual providers aim to increase coverage for policyholders in high-risk areas, upon the government's declaration of a natural disaster or for those who can demonstrate that (affordable) coverage is unavailable.

Lesson 2: an EU-wide solution could include a permanent public-private reinsurance scheme to complement private sector or national initiatives.

Setting up a public-private reinsurance scheme, as opposed to a private structure, would have the advantage that it could be accessed by a large range of entities: primary insurers, reinsurers and various national schemes. Therefore, such a scheme would require no harmonisation of existing national practices. Participation in such a scheme would be voluntary, so that the scheme supplements, rather than crowds out, private sector or national initiatives. Making the scheme permanent would allow for pooling risk over time, thus reaping even greater diversification benefits than if risks were pooled only across perils, asset types and Member States.

2.3 Payouts and premiums: national schemes are typically indemnity-based with risk-based premiums

All the national schemes assessed are indemnity-based, meaning that insurance payouts are based on the actual loss incurred by the policyholder as opposed to pre-defined parameters used in index-based solutions.⁴⁹ In general, indemnity-based structures provide slower payouts and are more costly than index-based solutions due to the need for a detailed damage assessment. However, this feature also avoids the risk of the payouts not being commensurate with the actual financial impact of the event. In contrast, this risk is present for index-based insurance: if a disaster causes damage, but the pre-defined parametric threshold (i.e. the quantitative trigger for payouts) is not met, no claim payments can be made. In addition, indemnity-based solutions can be effective in promoting more robust risk management by relying on portfolio information to assess risk. By

⁴⁸ As in the case of FloodRe (UK).

⁴⁹ For indemnity-based insurance policies, the claim settlement is determined by the amount of losses reported. Conversely, index-based or parametric insurance is based on predefined parameter(s) closely correlated with the insured risk (e.g. windspeeds or earthquake magnitudes); claims payments are triggered automatically once the threshold is reached, irrespective of the loss sustained.

leveraging this information, indemnity-based schemes can help improve disaster preparedness and emergency response.

Eight out of the 12 national schemes set risk-based premiums to cover operating expenses, reinsurance costs and aggregated expected losses, plus a margin to build up capital reserves.⁵⁰ Calculating the risk-based premium for individual insurance policies requires a detailed assessment of risk characteristics such as previous occurrence of extreme events, exact location and building characteristics. Other schemes offer flat premiums or premiums limited by law⁵¹ or simplify their pricing framework to consider only a relatively small set of risk characteristics, such as broad hazard regions or postal code zones.⁵² This latter approach typically implies solidarity across policyholders, with the degree of solidarity and cross-subsidisation among policyholders depending on the level of homogeneity within these pricing groups. Usually, policyholders in low-risk areas cross-subsidise those living in higher-risk areas by paying a slightly higher premium.

Lesson 3: an EU-wide solution could further support affordable risk-based premium setting, owing to the potentially sizeable risk diversification benefits that could be achieved across Member States. Given the significant heterogeneity in the risks faced by policyholders across Member States, flat premiums or premiums capped by law could imply a relatively high level of cross-subsidisation and solidarity, which might be difficult to agree upon at EU level. A risk-based approach at EU level could support additional risk diversification benefits achieved from risk pooling across Member States, time horizons, perils and asset types.

2.4 Financing: national schemes rely on reinsurance and varying forms of public financing

Most national schemes transfer some risks to the private reinsurance market.⁵³

The cost and availability of additional risk transfer mechanisms, such as reinsurance, are key factors in a scheme's risk management strategy. Reinsurance is normally one of the largest costs for a primary insurer or a national scheme. Moreover, reinsurance prices have been rising recently (see [Section 1](#)). Aside from reinsurance prices, reliance on private reinsurance is generally determined by an insurer's or a scheme's risk appetite, available capital, and tax conditions on retained profit.

The portfolio's composition and the availability and characteristics of a government guarantee all play a role in determining the scheme's reinsurance needs. A scheme may retain surpluses to build reserves and increase its risk-bearing capacity over time, thus reducing the need and the cost of reinsurance in the

⁵⁰ As in the case of CCS (ES), CCR (FR), NNPP (NO), NCI (IS), DSC (DK), NFIP (US), ARPC (AU) and SNHP (CH).

⁵¹ As in the case of CANARA (BE).

⁵² As in the case of PAID (RO) and JER (JP).

⁵³ As in the case of NNPP (NO), PAID (RO), NCI (IS), FloodRe (UK), JER (JP), NFIP (US) and SNHP (CH).

long run. Moreover, a government guarantee backing the scheme can help limit the scheme's reinsurance needs and thus also the reinsurance costs.

The national schemes often benefit from various forms of government financial support, mostly in excess of the scheme's own capacity (limited or unlimited "backstop").⁵⁴ Another form of public financing is where the government agrees to grant conditional loans to the scheme.⁵⁵ In theory, governments could also provide capital to these schemes, taking on some risk while reducing the overall cost of capital. Governments can also play a separate role in covering damages that are not covered by the scheme, but still considered part of the national framework for natural catastrophe events.

Lesson 4: since public funding mechanisms for disaster recovery are stretched and reinsurance prices have been rising, an EU solution could aim to finance itself through risk-based premiums and could explore tapping capital markets. In addition to collecting risk-based premiums (see Lesson 3), the scheme could explore tapping the capital markets by issuing catastrophe bonds or other insurance-linked securities. The catastrophe bonds could be indemnity-based or parametric (or both), depending on the further design features of the solution (e.g. whether it would provide indemnity-based or index-based payouts). The extensive risk pooling enabled by the EU solution could also allow for the issuance of catastrophe bonds that could be less risky and more transparent than many other catastrophe bonds, thus attracting a relatively wide set of investors. Ultimately, the EU solution could in principle be set up with no public financing or backstop.

2.5 Risk mitigation and adaptation: the impact of climate change calls for public-private coordination

Climate change affects the availability and affordability of (re)insurance options, requiring a rethinking of the existing schemes for implementing risk prevention and adaptation measures. Rising losses and increasing reinsurance costs will likely have a direct impact on the financial capacity of these schemes by influencing their pricing and premium structure. While expertise in climate risk modelling is evolving, the development of risk mitigation measures such as improved building standards (e.g. flood-proofing of homes in flood-prone areas) and spatial and land-use planning, will play a crucial role in addressing these challenges. The impact of such prevention measures should be priced in the insurance coverage of natural catastrophes.

Risk mitigation measures can be implemented at various levels, including individual insurance policies, national schemes and through public financing policies. Deductibles⁵⁶ and premium discounts can incentivise policyholders to adopt

⁵⁴ As is the case of CCS (ES), CCR (FR), CANARA (BE), DSC (DK), JER (JP), NFIP (US) and ARPC (AU).

⁵⁵ As in the case of PAID (RO) and NCI (IS).

⁵⁶ Meaning the amount of money that the insured person must pay before their insurance policy starts paying out.

risk prevention measures. Schemes providing direct insurance can better incentivise policyholders' risk reduction than coinsurance or reinsurance programmes, as they are able to apply direct premium discounts. Other solutions, however, require the intervention of local authorities and/or governments (e.g. tax subsidies or taxes on premiums to finance risk reduction measures).

Risk prevention and adaptation measures vary across the national schemes.

Several schemes price in climate change considerations or subsidise homeowners willing to implement resilience measures.⁵⁷ Some schemes utilise granular data to identify high-risk areas where significant mitigation measures can be cost-effective. They also look to build expertise in climate risk modelling and include the exchange of (and access to) risk data for the purpose of designing reduction measures.⁵⁸ Other schemes collect a specific tax on natural catastrophe premiums to finance risk reduction measures based on prevention plans or offer resilience grants, financial assistance or subsidies to support homeowners willing to implement resilience measures or looking to rebuild in the wake of a disaster.⁵⁹

Lesson 5: an EU solution could support both insurance and public sector initiatives geared towards risk mitigation and adaptation as part of a public-private concerted action. For instance, an EU solution could improve the availability, quality and comparability of data on insured losses across EU countries. It could also support the modelling of risk prevention and the integration of climate scenario analysis into estimates of future losses (both insured and uninsured) from natural disasters. The analysis of EU solutions might further promote the use and development of open-source tools, models and data to enhance the assessment of risks. In this context, care should be taken to prevent further market segmentation or demutualisation based on granular risk analysis, which could widen the insurance protection gap in the medium term.

⁵⁷ As is the case of CCR (FR), DSC (DK), JER (JP), NFIP (US) and ARPC (AU).

⁵⁸ As is the case of CCS (ES) and ARPC (AU).

⁵⁹ As is the case of JER (JP), NFIP (US), CCR (FR) and FloodRe (UK).

3 A possible EU approach

The analysis of the national insurance schemes shows their relevance in helping to reduce the insurance protection gap. Experience with national schemes shows that they can effectively support insurance coverage, for instance by raising awareness of risks or expanding reinsurance coverage to private insurers. They can therefore help minimise the insurance protection gap and overall public payouts following a disaster. The analysis of national schemes can also be useful for Member States to inform the design of national PPPs, where they do not yet exist. At the same time, the coverage of national schemes is heterogeneous and geographically smaller Member States might find it difficult to create such a scheme at national level due to limited risk pooling opportunities.

The analysis of national initiatives also reveals scope for considering possible EU solutions. As a result of climate change, broader risk diversification and economies of scale may be needed across national borders to curb the growing reliance on national and EU public interventions and incentivise adaptation measures across the EU in a coordinated manner. A public-private reinsurance component at the EU level could help capture the broader economic benefits of insurance at EU level, alleviate the burden on national and EU public budgets and promote a more coordinated and effective approach to managing natural catastrophe risks across Member States. Any EU solution implemented should, however, build on national schemes, preserve the integrity of existing national structures and support the development of national initiatives, thus ensuring complementarity with national efforts and responsibilities.

The 2023 EIOPA-ECB joint discussion paper already highlighted the potential benefits of an EU solution to the natural catastrophe insurance protection gap. In particular, it underlined the pooling and diversification benefits for Member States if they were to pool sufficient public funds for post-disaster payouts to governments through an EU-level fund. It spelled out eight key principles for ensuring that such a fund is effective in incentivising prudent disaster risk management, also on an ex ante basis. In defining these principles, it drew inspiration from existing European funding instruments beyond the EU Solidarity Fund, such as the European Stability Mechanism (ESM), the Single Resolution Fund (SRF) and the EU recovery fund (i.e. Next Generation EU and the Recovery and Resilience Facility) which tend to provide a degree of risk sharing or solidarity and enable access to financing under certain conditions, through exceptional lending or as a backstop for recapitalisation. However, it focused on the use of public sector funds at European level and did not further investigate the possibility of how public-private partnerships could be used at EU level to help boost private insurance capacity.

The feedback received from stakeholders on the April 2023 paper reaffirmed the general principles for a potential EU insurance component but called for more work in exploring the potential for public-private partnerships at EU level. Overall, there was consensus that a possible EU-level solution should aim to

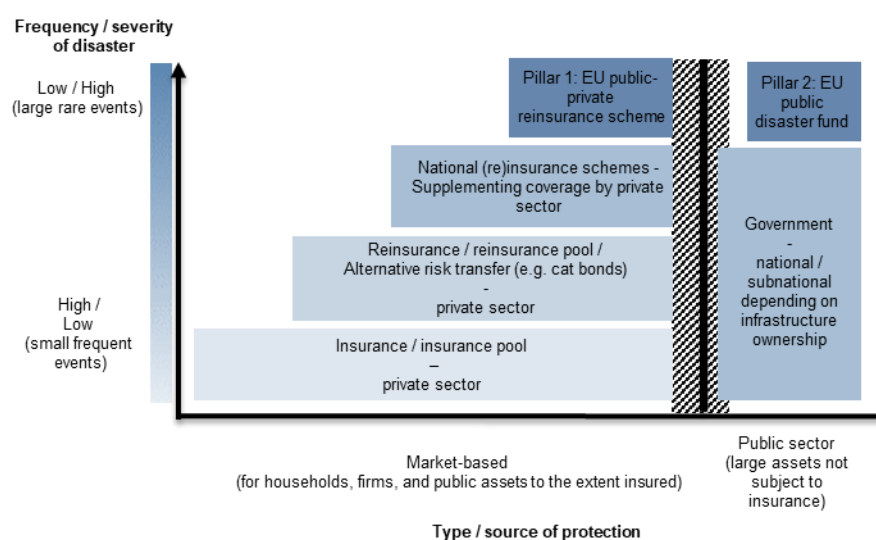
enhance the pooling of risks, maintain financial stability, reduce the role of public financing in disaster recovery, and increase insurance coverage through improved cost efficiency. Therefore, further elaboration of possible EU-level measures appeared warranted, as did further clarification of how private and public funds could best be employed in a synergetic way.

Based on these considerations, an EU-level system could rest on two pillars, building on existing national and EU structures:

- **Pillar 1: EU public-private reinsurance scheme.** Establishing an EU public-private reinsurance scheme would serve to increase the insurance coverage for natural catastrophe risk. The scheme would pool private risks across the EU, perils and over time to achieve economies of scale and diversification at the EU level (left-hand side of Figure 2).
- **Pillar 2: EU public disaster financing.** The second pillar would look to improve public disaster risk management in Member States through EU contributions to public reconstruction efforts following natural disasters, subject to prudent risk mitigation policies, including adaptation and climate change mitigation measures (right-hand side of Figure 2).

Figure 2

Ladder of intervention with EU components



Source: Authors.

The complementarity of the two pillars would ensure the efficient use of private and public sector funds for natural disaster payouts, while also encouraging ex ante risk mitigation. First, this approach would improve cost efficiency by covering risks ex ante across households, businesses and governments. The two pillars would enhance risk pooling and provide incentives for risks to be borne at the lowest possible level. Second, the approach recognises the primary role of the private insurance sector in covering most of the damages caused by a disaster, thus reducing the need for public financing for damage caused to

households and businesses. Third, and importantly, it is compatible with national initiatives for improving insurance coverage, through schemes or funding solutions. At the same time, the approach acknowledges that governments retain certain responsibilities, including the reconstruction of public infrastructure. While in principle each pillar could be implemented independently as a stand-alone instrument, the pillars would reinforce each other and be more effective if implemented jointly. Ideally, the two pillars should work in unison to provide incentives for ex ante risk mitigation and additional financial support for the highest loss layer natural catastrophes, for the ultimate benefit of households, businesses, and governments (see also [Table 2](#)).

The revised intervention ladder more clearly distinguishes between private and public funding responsibilities. The proposed EU level intervention would aim at reinforcing and supplementing the role of private insurance, reinsurance and alternative risk transfer as well as national measures, which remain crucial steps in the ladder of intervention. As in the original ladder approach presented in the 2023 paper, the first, bottom layer would cover losses from low-impact disasters, which make up the large majority of climate-related events. Higher-loss-layers would then be triggered in response to higher-impact disasters: first private sector reinsurance would serve as a backstop for private insurers, while additional backstop capacity for even higher-impact events would come from national schemes. However, for the highest loss events affecting privately insured damages, under this revised ladder, a European public-private reinsurance scheme would provide additional reinsurance to private (re)insurance companies against risk-based premiums. While facilitated by the EU, it could in principle operate solely on private funds.

Even with increased insurance coverage, market-based funding would need to be complemented by some form of government outlay for post-disaster reconstruction of public infrastructure. While the EU public-private reinsurance scheme includes public sector assets insured by private companies, some public assets may be inefficient to insure privately – particularly for sovereigns with diversified funding sources and significant risk pooling opportunities. Examples include major transport infrastructure projects like roads, bridges, or railways, which are expensive to insure privately and whose swift reconstruction is crucial for economic recovery in the wake of a natural disaster. While national and subnational governments are generally expected to cover most of the losses to uninsured public assets in the event of a disaster, a European public disaster fund – financed by Member State contributions – would provide additional immediate fiscal capacity by paying out to governments for the most severe disasters, thus supporting infrastructure rebuilding efforts. By establishing clear access criteria and payout conditions, this mechanism would encourage prudent budgeting, strengthen incentives for effective risk mitigation policies, and further help to contain public payout costs through risk pooling.

3.1 EU public-private reinsurance scheme

The EU public-private reinsurance scheme could help to provide households and businesses with affordable insurance protection against natural catastrophe risks, while also providing incentives for risk prevention.

Embedded in the ladder of intervention, the design features of the scheme build on the five lessons learned from the analysis of the national schemes (see [Section 2](#)). The scheme seeks to (i) ensure coverage of a broad range of natural catastrophe risks, (ii) fulfil a complementary role to national and private market solutions, (iii) rely on risk-based pricing, (iv) reduce dependence on public financing in the long term, and (v) support concerted action on risk mitigation and adaptation.

The scheme would aim to enhance affordable insurance coverage for natural catastrophes by offering reinsurance capacity for a broad range of risks. While this mechanism addresses the top-most part of the ladder approach, each of the solutions at private and national level could have direct access to it on a voluntary basis. The existence of a national scheme would not be a prerequisite for accessing the EU scheme and private (re)insurers could access the scheme even in the absence of a national scheme. This should not discourage Member States from implementing national schemes. On the contrary, the EU scheme would supplement national efforts and an EU-wide pool would benefit from the establishment of national schemes. Regardless of the case, the offered reinsurance capacity would be subject to existing (re)insurance coverage and priced according to the actuarially appropriate assessment of the risks assumed by the scheme. It would be in the best interests of the EU reinsurance scheme to foster a healthy and competitive private (re)insurance market because it helps keep the premiums as low as possible. Therefore, the scheme would seek to complement the private markets and the national schemes rather than compete with them.

The EU reinsurance scheme could seek to transfer part of the risks to capital markets via instruments such as catastrophe bonds. The market for these products is less developed in the EU than in North America. Part of the reason is the smaller scale of the issuances.⁶⁰ The EU scheme could explore the feasibility of a pan-European catastrophe bond covering more perils than the bonds currently issued. This would serve the dual purpose of expanding the catastrophe bond market and bringing more niche risks directly to capital markets investors. The investors, in return, could benefit from the additional diversification offered by exposure to these risks relative to the risks currently covered.

Pooling a wider range of risks offers the possibility to realise the marginal benefits of diversification beyond what may be commercially viable. As Member States are exposed to different natural hazards at different times across geographies, pooling the risks of natural catastrophes at EU level would lower the cost for covering these risks through individual insurers (see [Box 2](#)). Additionally, participation of national insurance schemes in the scheme could support the diversification effect and prevent adverse risk selection.

⁶⁰ See also Ocampo and Lopez Moreira (2024).

As a long-term stabilising mechanism, the scheme could support the smooth functioning of the private (re)insurance markets, without supplanting or subsidising market initiative. Primary insurers, reinsurers and national schemes could on a voluntary basis transfer risks to the scheme to increase their insurance capacity. By collecting premiums on a regular basis, building up for peak years with large losses, the EU reinsurance layer would add to the stability and predictability of costs. This should safeguard market competition while preventing the market from passing on excess risk to the public sector without due sharing of costs.

The scheme could follow a risk-based pricing approach and further incentivise risk reduction. The premium for accessing the scheme's reinsurance capacity would be determined in a risk-based manner. Furthermore, its intervention should be contingent on risk mitigating measures to lower the exposure in the long run. The scheme could incentivise prevention measures through public-private collaboration and promote investment in adaptation projects.

By accumulating capital and investing in risk prevention initiatives, established as a not-for-profit entity, the scheme could improve its risk retention capability over time. Cost efficiencies resulting from the pooling should translate into reduced premiums and be distributed to households and businesses, via the traditional insurance distribution mechanism. Improved insurance coverage should then translate into lower reliance on public sector intervention. The scheme would leverage its scale and not-for-profit status to lower operational and information costs in the long term. It could obtain external reinsurance at more competitive prices and, in addition, transfer part of the risk to capital markets. The operational implementation of the scheme would involve deciding on the initial capitalisation (by public or private funds) and other prudential aspects including capital requirements.

While the EU reinsurance scheme would share features with private sector underwriters and risk modelling agents, its scope could be expected to be broader. The scheme would entail developing natural catastrophe risk modelling capabilities to inform its underwriting activities. An independent view of risks at the EU level would help in better serving under-penetrated segments of the market and informing broader policy initiatives.

Box 2

A simplified exercise to illustrate the impact of pooling countries for flood risks and its benefit for policyholders

This example considers the flood peril, which is one of the most significant natural hazards affecting Europe.⁶¹ Climate change is exacerbating the frequency and severity of floods, endangering lives and leading to heavy economic losses. Notably, 10% of Europe's urban population is currently living in flood risk zones. Over the past 30 years, floods in Europe have affected 5.5 million people and caused more than €170 billion in economic damage in this period.⁶² This trend is accelerating, as evidenced by recent events such as the 2021 flood that took place in

⁶¹ See the [Floods Directive \(Directive 2007/60/EC on the assessment and management of flood risks\)](#).

⁶² See European Environment Agency (2024).

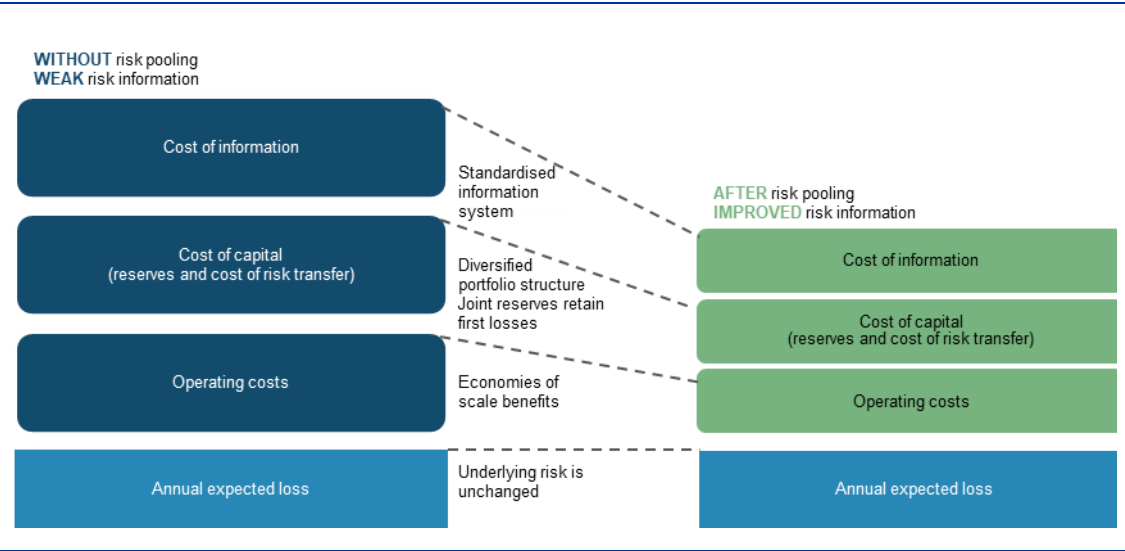
Belgium, Germany, Luxembourg and the Netherlands, which included the five costliest natural disasters to have struck Europe over in the last 50 years with estimated damages of EUR €32 billion. In August 2023 Slovenia experienced devastating floods, with the Government estimating total direct damage of €9.9 billion, equivalent to 16% of the country's GDP. In 2024, Germany again endured major floods with water levels reaching “once in a century” highs, according to the Bavarian Flood Information Service.⁶³ Severe floods also hit various central and eastern European countries in September 2024 and in Spain in late October 2024.

Risk pooling is a fundamental concept in insurance, grounded in the law of large numbers.

As independent risks are added to a (re)insurer's portfolio, the results become less volatile. For example, in a pool of insured vehicles, the actual number of accidents each year converges with the expected number as the size of the pool increases. In terms of capital, reduced volatility means lower capital needs and costs for the same level of protection. More diversified (re)insurers can therefore offer cover at a lower price and, given the level of capital, provide a higher level of protection.

To illustrate how pooling could ultimately reduce policyholder premiums, an analysis was conducted for flood risk including 12 EEA countries (Belgium, Czech Republic, Germany, Ireland, France, Italy, Liechtenstein, Luxembourg, Hungary, Austria, Poland and Slovakia). The analysis relied on the Moody's RMS Europe NatCat Climate HD model to estimate potential damages from river and pluvial floods. The output of catastrophe models is typically used to calculate the premium for covered risks and **Figure A** illustrates how a catastrophe risk premium can be decomposed and where the effect of diversification takes effect.

Figure A
Stylised decomposition of the catastrophe risk insurance premium



Source: World Bank (2017) Sovereign climate and disaster risk pooling: World Bank Technical Contribution to the G20.

As depicted in Figure A, the underlying risk (annual expected loss) remains unchanged when pooling risks together. However, the cost of covering or transferring the risk (cost of capital), along with the cost of information and operating costs, decreases with diversification and

⁶³ See Deutsche Welle (2024).

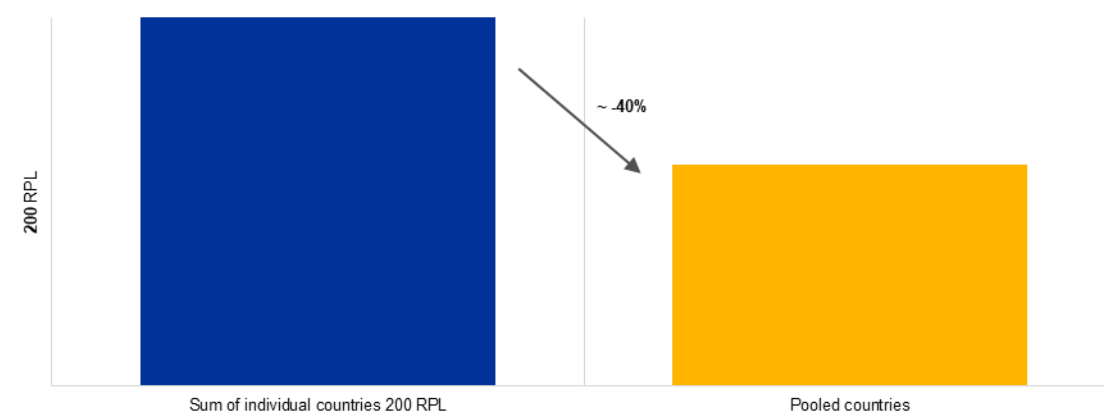
risk pooling. Operational costs are lower due to economies of scale, as they are shared among all participants in the pool. The cost of information is also lower, as the time and money required to obtain information can be shared among participants.

The primary benefit of pooling natural catastrophe risks lies in the impact of diversification of losses on the risk-bearing capital needed to support the risk across the pool. This diversification occurs both across multiple perils and also across geographical areas. The diversification effect arises from the fact that severe losses are unlikely to occur simultaneously across all participating entities. As a result, the capital needed to ensure that the pool can honour its obligations to the insured is lower than the sum of supporting capital that would be needed if countries considered their potential maximum losses individually.

Solvency II⁶⁴ requires insurers to hold sufficient capital to withstand a loss occurring with a probability of 1-in-200 years. In this example, using the Moody's RMS Europe NatCat Climate HD model, and based on the current insured landscape, the pooled portfolio shows a reduction of around 40% in the 1-in-200-year return period losses (RPL) compared to the sum of individual values for countries (see **Figure B**). This reduction might be even larger if penetration of flood insurance increases.⁶⁵ A similar analysis conducted by the World Bank, providing a framework for estimating the impact of pooling risks on policyholder premiums, supports these conclusions.⁶⁶

Figure B

Diversification benefits of pooling can reduce capital needs by around 40%



Sources: Moody's RMS and EIOPA calculations.

Notes: Diversification benefits modelled for the 12 countries considered in this analysis: sum of individual countries versus pooled countries for the 1-in-200-year return period losses.

Based on the outputs obtained from the Moody's RMS model and applying the methodology used in the World Bank paper, when pooling 12 EEA countries together for flood risks only, the premium for policyholders could be reduced by around 26%. This estimation is based on a

⁶⁴ Directive 2009/138/EC of the European Parliament and of the Council of 25 November 2009 on the taking-up and pursuit of the business of Insurance and Reinsurance (OJ L 335, 17.12.2009, p.1).

⁶⁵ Insurance penetration is measured as a percentage of total premiums collected to the country's Gross Domestic Product (GDP).

⁶⁶ See World Bank (2017). The paper uses the Pacific Catastrophe Risk Assessment and Financing Initiative PCRAFI program to illustrate the risk diversification effect; the combined portfolio shows a 65 percent reduction in the 1-in-200-year return period loss compared to the sum of individual values for countries. This reduction leads to a premium reduction of more than 40%.

simplified calculation, taking into account annual expected losses and the cost of capital for reinsurance (using the 1-in-200-year return period losses). However, the analysis does not include other costs, such as operational costs or the cost of information.

This premium reduction illustrates the benefits of pooling risks across countries versus individual approaches. However, it must be noted that pooling risks together at the EU level would not necessarily result in a 26% reduction in current premiums for policyholders in one or other of the 12 countries considered, as insurers (often the larger ones) are already pooling certain risks across countries. However, EU-wide pooling would bring additional diversification benefits in terms of cost of capital. Furthermore, pooling across more perils could result in larger benefits, although the diversification benefits of including additional perils may be diminished by correlations between certain climate risks (e.g. droughts and risk of floods elsewhere).

3.2 EU public disaster financing

The EU disaster financing component would provide a complementary mechanism that governments could tap when managing natural catastrophe losses. Natural catastrophes can lead to significant costs for governments, including damage to key public infrastructure. The EU disaster financing component would help governments to manage a share of these expenses following a major disaster, thus supplementing their national budgetary expenditure. The component would cover damages caused to key public infrastructure that is inefficient or too costly to insure privately, with a view to supporting resilient reconstruction efforts and public space adaptation. Clear rules on contributions and conditions on the disbursement of the funds should encourage ex ante risk prevention by governments, to minimise the emergency relief and residual private risks that the government may need to cover following a major event.

The EU fund for public disaster financing would be an extension of the EU's current approach to post-disaster relief, currently provided through the EU Solidarity Fund, for economic losses exceeding pre-defined thresholds. The EU Solidarity Fund is designed as a pure solidarity tool, focused on emergency relief and limited in size. In 2024, following a structural upward revision, its budget amounted to just over €1.1 billion, while payouts are limited to a small fraction of the damage incurred following a natural disaster.⁶⁷ The fund is simply not equipped to incentivise and provide meaningful support for necessary longer-term strategic planning and investment in civil protection, preventive infrastructure and large-scale reconstruction of public infrastructure in the wake of a disaster. As economic losses from natural catastrophes and related costs are rising, there is merit in considering

⁶⁷ In 2024 the EU Solidarity Fund allocation is €1.144 billion. Payouts are capped at 2.5% of total direct damage for eligible regional natural disasters, while for major natural disasters, payouts are the sum of 2.5% of total direct damage up to €3 billion or 0.6% of GNI, whichever is lower, and 6% of the total direct damage incurred above that threshold. For more information, see [European Union Solidarity Fund – Performance](#) at the European Commission website.

further solutions that promote risk prevention and lower the cost of post-disaster expenditure for Member States, in addition to supporting solidarity.

Contributions to the EU public disaster financing component should be risk-adjusted to incentivise risk mitigation action. Membership of the fund should be mandatory for all EU Member States in order to maximise its effectiveness in terms of risk sharing. Accounting for an element of solidarity, the level of contributions made by Member States to the fund should depend on three key factors:

- (i) their geographical exposure to natural catastrophe risks;
- (ii) the implementation of prevention, mitigation and adaptation measures, including spatial planning provisions;
- (iii) the adoption of measures to ensure an adequate level of private sector insurance coverage of natural catastrophe risks.

Measures under (ii) and (iii) should be based on national adaptation and resilience plans submitted before the start of the fund and assessed and approved at EU level. In addition, the implementation of the national plans should be regularly assessed.

Payouts from the EU public disaster fund should be used exclusively to support reconstruction efforts of eligible public assets not covered by private insurance, with the aim of supporting investment in resilient infrastructure. By restricting funding to a subset of public sector assets, the EU disaster financing component is set up to avoid moral hazard and reduce the residual risks that national governments hold. Importantly, the fund should ensure that reconstruction efforts are consistent with Member States' national adaptation and resilience plans, and that that damaged infrastructure is rebuilt in ways that support future resilience. It would incentivise Member States to maximise private insurance coverage in their jurisdiction and to take action to mitigate climate risks at the most effective level.

The fund should be able to make a meaningful contribution to reconstruction efforts, while ensuring that Member States retain sufficient “skin in the game”. Ideally, payouts should at least partly be in the form of grants and be able to make a difference to the speed and quality of national reconstruction efforts. However, payouts from the fund should not exceed a certain share of national losses following disasters. This would ensure that Member States maintain proper risk mitigation incentives, stemming from national budgetary exposure to disasters. To ensure that paid-in funds do not sit idle, the fund could invest some of its funds in appropriately liquid green investments. Alternatively, or in combination, it could be endowed with a borrowing mandate against a risk-adjusted guarantee structure.

Table 2

Objectives and design features of the EU public-private scheme and EU public disaster financing pillars, highlighting their complementarity

Objectives of the EU solutions		
	EU public-private reinsurance scheme	EU public disaster financing
	→ Improve the supply of affordable insurance coverage for natural catastrophes, by pooling risks across EU Member States, → As a long-term stabilising mechanism, support the functioning of private (re)insurance markets without supplanting private initiative.	→ Limit public outlays in response to natural catastrophes by clearly delineating public sector responsibilities for post-disaster financing, pooling funding among Member States eligible payouts and making payouts conditional on sound risk mitigating policies. → Facilitate economic recovery following major natural catastrophes by supporting reconstruction efforts of public infrastructure and incentivising risk mitigation ex ante.
Technical design features of the EU solutions		
Scope	→ Losses to private households and businesses that are insured or reinsured. → Coverage of extreme tail risks that are difficult to predict/model in light of climate change. The loss layer would be identified ex ante by providing reinsurance coverage. → Pooling at multi-peril, multi-asset and geographical level. → Mandatory offer or take-up of insurance could further increase the risk diversification benefits and limit adverse selection, but would require a certain harmonisation of national practices.	→ Losses incurred by Member States in rebuilding public infrastructure and adopting public space adaptation measures following a natural disaster. → Coverage of tail risks that are difficult to predict/model in light of climate change. The loss layer may need to be identified by setting thresholds or parameters to identify tail events.
Structure	→ Non-profit public reinsurance entity that collects premiums from the (re)insurance industry and/or national insurance schemes to cover losses. → Could be established through an EU Commission initiative, under Article 352(1) TFEU, without the need to amend the TFEU. → Complementary to (re)insurance and/or existing national insurance schemes: recognising the economic value of insurance as an efficient ex ante disaster risk management tool. → Acts as reinsurer: Intervention at highest loss layers. Possibility for the scheme to act as a platform for issuing catastrophe bonds for transferring risks from ceding insurers, reinsurers or national schemes. → Voluntary participation of insurers and reinsurers as well as national schemes.	→ Fully public fund collecting contributions from EU Member States, and paying out to them in the wake of large-scale climate-related disasters → Could be set up as an extension of the EU Solidarity Fund based on Art. 122 TFEU, supported by additional administrative and technical capacity for assessing national disaster mitigation policies and setting contribution levels based on objective criteria and agreed methodologies. → Payouts to be partly grant-based, although some could be given in the form of loans. → Mandatory participation for EU Member States.
Risk transfer and financing mechanisms	→ Risk-based premiums from insurers and reinsurers, including national schemes. → Does not by definition rely on public financing (for set up) or require a backstop (e.g. to cover insufficient reserves). → Possibility to issue catastrophe bonds (indemnity-based and/or parametric, to cover insured losses)	→ Risk-adjusted contributions by Member States. → Element of solidarity among Member States for external events and especially natural catastrophes beyond Member States' control, based on EU Treaty. → Possible debt issuance capacity.
Risk mitigation and climate change	→ Risk-based premiums based on the assessment of exposure and losses benefitting from the pooling mechanism. → Deductible, pricing, terms and conditions: to reflect the level of prevention measures taken by household and businesses. → Prevention measures supported by insurance and public sector initiatives, as part of public-private concerted action.	→ Risk-adjusted contributions based on exposure and losses as well as risk-mitigation measures taken at national/subnational level for public infrastructure, including compliance with EU climate targets and pre-agreed national prevention and adaptation plans. → Payouts capped at an agreed share of losses, sufficiently sizeable to provide meaningful support, though no more than half of these losses (to incentivise insurance-based solutions and other national government action). → Payouts subject to reporting on use of funds.

Source: Authors.

3.3 Legal considerations

The design and implementation of a possible EU solution calls for political decisions that balance economic arguments with political and legal considerations. EU solutions must comply with the Treaty on the Functioning of the European Union (TFEU), which aims to reduce regional economic disparities and provide solidarity support in the event of natural disasters. However, the TFEU also prohibits sovereign bailouts, requiring careful consideration of the use of EU funds to achieve the risk reduction objectives and limit moral hazard. The overarching objective of any possible EU system should be extended insurance coverage and adequate disaster funding to achieve a more resilient economy.

An EU public-private reinsurance scheme would serve as a permanent stabilising mechanism, enabling risk diversification over time. The scheme would operate as a public legal entity that works to implement the objectives of supporting territorial cohesion and development set out in Articles 174 and 175 of the TFEU. Its legal framework could be established through an EU Commission initiative, under existing law, based on Article 352(1) of the TFEU.

The proposed EU public disaster fund would pool funding from Member States to enhance the efficiency of post-disaster reconstruction of public infrastructure, conditional on sound risk mitigation policies. It could be set up as an extension of the EU Solidarity Fund based on Article 122 of the TFEU, which provides for possible EU support to Member States in the event of natural disasters. The fund should be supported by additional administrative and technical capacity for assessing national disaster mitigation policies and contribution levels set according to objective criteria and agreed methodologies.

4 Policy considerations

This paper outlines a possible EU-level solution aimed at narrowing the natural catastrophe insurance protection gap and making EU countries more resilient and better able to recover from natural disasters. The implementation of both the EU public-private reinsurance scheme and the EU public disaster financing component linked to adaptation investments could help reduce the cost of insuring against losses caused by natural catastrophes. This could make insurance more affordable. By incentivising risk prevention and reducing post-disaster losses, the combined use of both instruments could help to achieve the objective of lowering overall expenditures by public and private entities alike and extending insurance coverage against natural hazards.

A comprehensive European system for natural catastrophe risk management should be guided by certain key principles. Any EU solution should be informed by a thorough analysis of: (i) the added value perceived by European citizens; (ii) Member States' experiences with financing losses from natural disasters; and (iii) the relative merits of ex post financing versus ex ante provisioning. Consideration should be given to differences in risks and institutional arrangements across Member States. In addition, an EU solution should not discourage the implementation of national solutions, and the interaction with existing relevant national schemes should be carefully considered. To ensure effectiveness, the system should adhere to the following four fundamental principles:

- **Supplement, not supplant.** The EU system should augment, not replace, private sector or national initiatives. Incentives should be provided to encourage Member States and the private sector to increase their insurance coverage capacity and take preventive action. An EU solution should be accessible to all Member States.
- **Stabilise, not subsidise.** The EU public-private reinsurance scheme should implement market-based risk pooling to incentivise ex ante risk mitigation. Financing should come from the market (premium payments). Public financing or a government backstop may provide additional cost efficiencies. While being a political choice, the balance between these two components is an important parameter which requires careful consideration and discussion when designing a possible future system. Any public support should be conditional on objective triggers or requirements for profit reinvestment. Further consideration should be given to the operational implications of an EU reinsurance scheme concerning its licensing, investment decisions and potential calibration of EU-wide risks.
- **Prepare, not postpone.** The EU system should be designed carefully so as to reduce moral hazard on all levels and promote incentives for both private and public sectors to be well prepared ahead of a catastrophe.
- **Conditionalise, not impose.** Access to the EU reinsurance scheme would be voluntary. This should prevent interference with national fiscal measures, where

mandatory insurance coverage is often paired with tax incentives or subsidies. Care should be taken to avoid debt mutualisation, especially where nationally subsidised and non-subsidised risks are combined in the pool. A minimum level of conditionality could however improve the risk-bearing capacity of an EU approach. For the EU reinsurance scheme, this could include requirements as to:

- private insurance offer, integrating prevention and adaptation measures;
- adequate insurance coverage of real estate collateral.

For the public financing component, membership would be mandatory, although contributions would be risk-adjusted and payouts conditional on:

- a minimum implementation of national climate adaptation measures;
- exclusive use of payouts for investment in resilient public infrastructure;
- a plan to ensure an adequate level of private insurance.

The proposals for an EU-level solution would mean implementing comprehensive policy structures and incentives to enhance risk awareness and integrate risk prevention measures also into insurance product design and public disaster financing frameworks, thus building societal resilience. To

ensure the long-term sustainability of their business model, (re)insurers must incorporate climate change risks into their risk management. Moreover, insurance products should be designed to encourage adaptation and reduce vulnerability to climate-related catastrophes. This can be achieved through underwriting and pricing strategies that incentivise policyholders to implement ex ante measures, such as structural adaptation, and to reduce their exposure to climate-related hazards. Price incentives, like risk-based premium reductions for implementing prevention measures, could further support this approach. By promoting risk awareness and encouraging households and businesses to invest in cost-effective prevention measures, (re)insurers can reduce their reliance on public sector financing in the wake of a disaster. The public sector (e.g. municipalities) should also support initiatives for risk prevention, thereby building resilience. Conditionality should be built into access to EU public disaster financing, in order to further mitigate the economic losses from natural catastrophes, prevent moral hazard and lower the costs of ex post disaster financing.

Coordinated initiatives across the public and private sectors should work to promote investments in resilient infrastructure, as well as prevention and adaptation measures. The EU reinsurance scheme can support investments in resilient infrastructure that complement public sector initiatives. Coordinated private-public investments in shared-risk mitigation measures may also be a more cost-effective approach than individual initiatives. In addition, raising awareness about the risks and taking preventive action calls for close coordination with regional and local

communities. The impact of natural catastrophes is often local/regional and the solutions might require an approach tailored to local/regional conditions.⁶⁸

Implementation of a potential EU solution also calls for the exchange of data for risk assessment purposes, along with investments in natural catastrophe risk modelling. Effective risk management requires enhanced modelling of natural catastrophe risks to incorporate climate change considerations. Open-source applications can facilitate data sharing and risk assessments and help to ensure a common understanding of risks among public and private entities alike, ultimately informing strategies for risk reduction, transfer or financing.

Public authorities should promote the use and development of open-source tools, models and data, which can help to provide a clear understanding of the risks and promote competition. Governments can enhance data-driven decision-making by supporting public access to climate-related data. This would include not only satellite information, weather data and information on land use, but also standardised and granular data on fiscal costs of disasters. Insurers could share data with policymakers and governments to improve risk-based regulation. At the same time, better and more granular risk assessments could lead to greater price discrimination among insurers and may translate into further market segmentation, with the potential to widen the protection gap in the medium term. This may require insurance regulators and public authorities to become more proactive in the setting of incentives for insurance uptake. In order to be efficient, public-private schemes should be based on wide risk sharing and insurance coverage.

⁶⁸ See [European Climate Risk Assessment by the European Environment Agency](#).

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