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Disaster Risk Financing: Limiting the Fiscal Cost of Climate-Related Disasters

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Disaster Risk Financing: Limiting the Fiscal Cost of Climate-Related Disasters

Diana Radu

Abstract

Climate-related disasters have affected most EU Member States, even if unevenly, due to their different geographic situation and GDP levels. Consensus is emerging that disaster risk financing strategies can be a useful tool to manage and limit the fiscal cost of disasters. This is all the more relevant when the State acts as disaster insurer of last resort, a situation that provides little incentive to individuals to purchase insurance, leading to moral hazard. This paper presents evidence on the main elements of national disaster risk financing strategies. It starts with evidence on quantifying and disclosing disaster-related fiscal risks. It provides evidence on private disaster insurance, a risk-sharing instrument, as a complement to the public sector financial involvement in disaster relief, recovery and reconstruction. The explicit and implicit role of the public sector after disasters is reflected in the national budgetary arrangements and available public insurance schemes. Finally, the rules on the beneficiaries and eligibility for public compensation and provisions for transparency and monitoring enhance the national set-up for disaster financing.

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Keywords: natural catastrophes, disaster risk financing, insurance, risk transfer, reinsurance, recovery, climate fiscal risks.

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CONTENTS

- 1. Introduction5

- 2. The climate protection gap.....5
 - 2.1. Climate-related disaster damage in the EU5
 - 2.2. Disaster Insurance in EU Member States8
 - 2.3. Why is disaster risk financing relevant?.....9

- 3. Key elements of disaster risk financing 10
 - 3.1. Quantification of past and future climate-related disaster impacts 11
 - 3.1.1. Quantitative assessment of past losses and future loss estimates 11
 - 3.1.2. Disclosure of disaster-related contingent liabilities 15

 - 3.2. Measures to limit the fiscal cost of disasters 15
 - 3.2.1. Private disaster insurance schemes 15
 - 3.2.2. Public assets insurance 17

 - 3.3. Public sector arrangements 18
 - 3.3.1. Public insurance schemes 18
 - 3.3.2. National budgets..... 19

 - 3.4. Compensation rules and main beneficiaries.....20

 - 3.5. Transparency and monitoring.....21

- 4. Conclusions.....23

LIST OF TABLES

- Table 1. EIOPA dashboard on the insurance protection gap for selected climate-related disasters 8

LIST OF GRAPHS

Graph 1. Economic damage from climate-related disasters in EU Member States (1980-2020) (EUR billion) 6
Graph 2. Annual economic damage from climate-related disasters (EUR billion) 6
Graph 3: Average annual economic damage between 1980 and 2020 7
Graph 4: Share of insured losses in total losses between 1980 and 2020 7

LIST OF BOXES

Box 1. Terminology 5
Box 2. 2021 Fiscal risk Statement of Georgia 12
Box 3. Promising steps in Belgium..... 14
Box 4. The French ministerial plans transposing the national zero carbon strategy 14
Box 5. Various types of property insurance schemes in EU Member States 17
Box 6. Main beneficiaries – French farmers 21
Box 7. A role for the independent bodies..... 22

REFERENCES 24

1. INTRODUCTION

Most EU countries are not well prepared to deal with the cost of climate-related disasters as they rely on ad-hoc financing of disaster-related costs. Understanding the fiscal risks stemming from climate-related disasters is a crucial step in increasing financial resilience to climate change. It also broadens the scope for fiscal frameworks to play a role in climate change adaptation. Private and public insurance arrangements complement budgetary resources and are a useful tool to transfer risk (to insurance companies) or better manage disaster-risk (when the government acts as (re)insurer or guarantor) but their use is not standard practice. Nonetheless, disaster risk reduction remains the first line of defense against events known to occur with a certain frequency and probability.

This paper presents evidence on national disaster risk financing and disaster risk transfer arrangements and provides information on practices in EU Member States and non-EU countries. Based on the evidence gathered, the paper identifies the following five key elements in developing a national disaster risk financing strategy: (i) quantification and disclosure of past and future climate-related disaster impacts, (ii) measures to limit the fiscal cost of disasters through private sector participation, (iii) options available to the public sector to cover the fiscal impact of the retained / accepted climate risk, (iv) compensation rules and main beneficiaries and (v) transparency and monitoring arrangements.

This paper is structured as follows: the second section explains the importance of disaster risk financing, building on an overview of the economic losses from climate-related disasters that have hit EU Member States and the accompanying disaster insurance arrangements which, taken together, give an indication about the climate protection gap. The third section develops the five key elements of a national approach to financing climate-related disasters and provides examples of practices from EU Member States and non-EU countries. Section four concludes.

2. THE CLIMATE PROTECTION GAP

2.1. CLIMATE-RELATED DISASTER DAMAGE IN THE EU

Drawing on data provided by the European Environment Agency on annual economic losses caused by climate-related disasters in the EU Member States¹, this section provides an overview of past climate-related disasters that have occurred in EU Member States between 1980 and 2020 and associated economic damage (see Box 1 for a definition of “economic damage” and other relevant terms).

Box 1. TERMINOLOGY

The terms “economic damage” and “economic losses” are used here interchangeably. Economic damage / losses caused by disasters include damages to capital assets and infrastructure such as housing, schools, factories and equipment, roads, dams and bridges and also depletion of human capital due to the loss of life, the loss of skilled workers and the destruction of education infrastructure that disrupts schooling. They occur during or immediately after the disaster.

A “peril” is an event that can cause an economic loss; for example flood, windstorm and wildfire.

¹ [Annual economic losses caused by climate-related disasters in the EU Member States](#). European Environment Agency, February 2022.

Box 1 - continuation

A “disaster” is an event which overwhelms local capacity, necessitating a request to a national or international assistance; an unforeseen and often sudden event that causes great damage, destruction and human suffering.

A “hazard” is the process, phenomenon or human activity that carries the potential to cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation (IPCC, 2014; UNDRR, 2016); a hazard increases the likelihood of a peril to happen.

“Exposure” means people, infrastructure, housing, production capacities and other tangible human assets in places that could be adversely affected by hazards (IPCC, 2014; UNDRR, 2016)

“Vulnerability” describes the characteristics of an individual, a community, infrastructure, assets or systems to be adversely affected by hazards (UNDRR, 2016). Some examples of vulnerability include poor design and construction of buildings, inadequate protection of assets, lack of public awareness, etc.

“Insurance coverage” defines the amount of liability that is covered for an individual or entity through insurance.

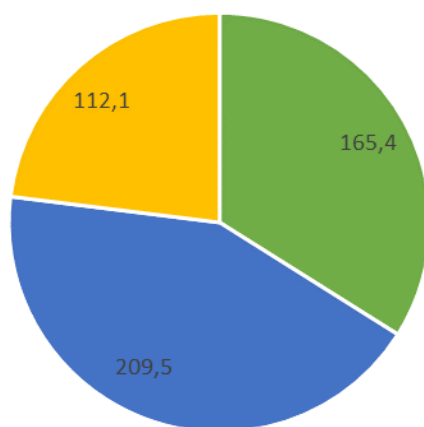
The “Climate protection gap”, also known as “Insurance protection gap”, is defined as the share of uninsured climate-related disaster losses in total losses.

Climate-related disasters are classified here as meteorological events (windstorms), hydrological events (floods, mass movements) or climatological events (heatwaves, cold waves, droughts, forest fires).

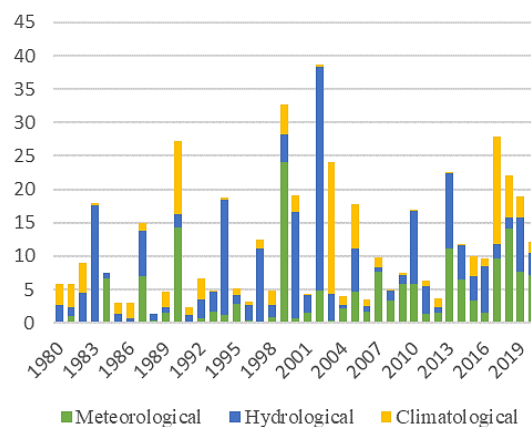
“Moral hazard” happens when vulnerable but otherwise insurable individuals or businesses choose not to hedge against disaster risks as there is an expectation of compensation from other sources.

Past data on disaster damage can inform about a region’s exposure and vulnerability to a specific disaster. Between 1980 and 2020, climate-related disasters accounted for around 80% of total economic damage caused by natural hazards in the EU, amounting to a total of EUR 487 billion in 2020 prices (or EUR 11.9 billion per year), with floods representing almost half of the damage (Graphs 1 and 2).

Graph 1. **Economic damage from climate-related disasters in EU Member States (1980-2020) (EUR billion)**



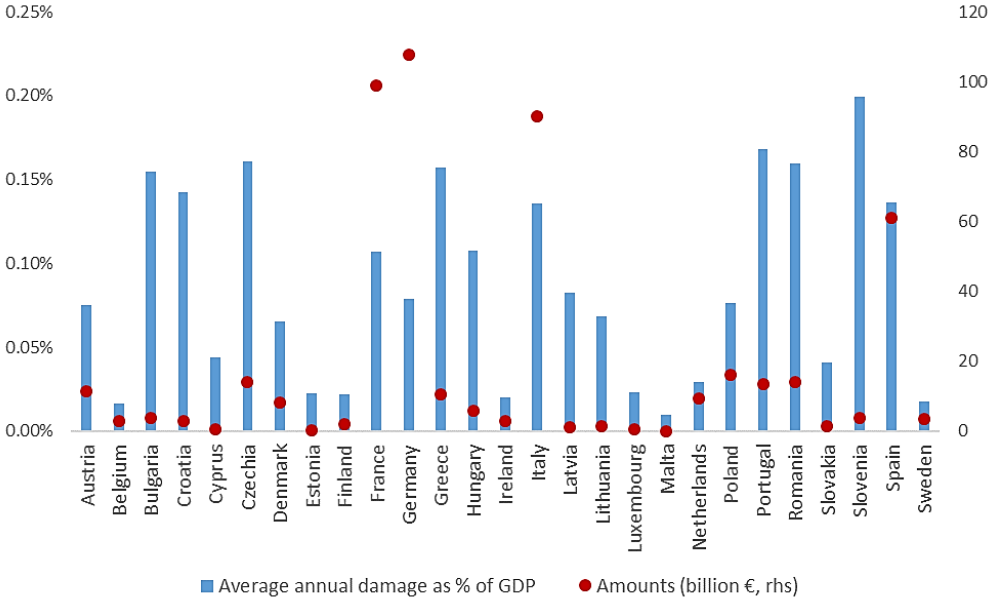
Graph 2. **Annual economic damage from climate-related disasters (EUR billion)**



Source: Annual economic damage caused by weather and climate-related extreme events in the EU Member States — European Environment Agency (europa.eu).

The economic impact of climate-related disasters varies considerably across countries. The highest losses per capita in EU Member States were recorded in Slovenia and France, and the highest losses per area were in Germany and Italy. In absolute terms, not surprisingly given the size of the countries, the highest economic losses in the period 1980-2020 were registered in Germany followed by France then Italy. While at the EU level, the average annual economic damage amounts to 0.11% of GDP, as some disasters hit some Member States harder, their weight on GDP is much higher (Graph 3). The geographic location and GDP levels explain the different messages that emerge when looking at the past disaster loss data in absolute terms and as percentage of GDP.

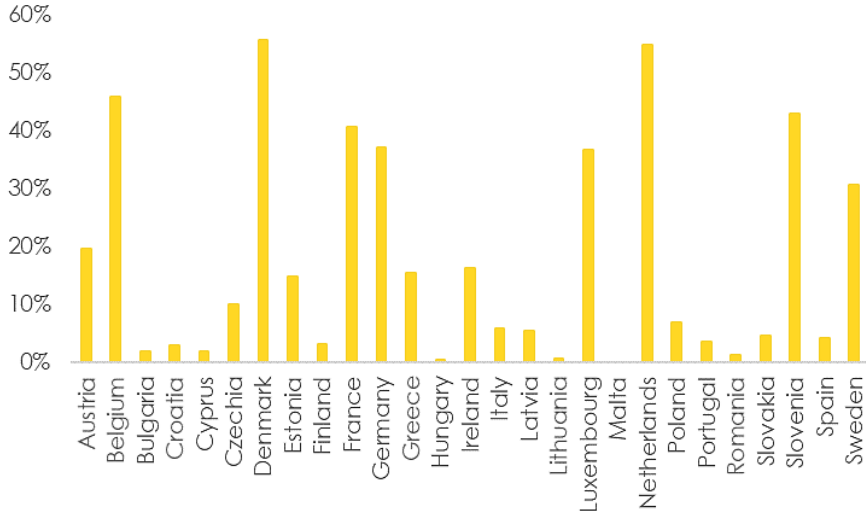
Graph 3: Average annual economic damage between 1980 and 2020



Source: EEA, DG ECFIN calculations.

Around 23% of total losses were insured, although this also varied considerably among countries, from 1% in Romania and Lithuania, to 56% in Denmark and the Netherlands (Graph 4).

Graph 4: Share of insured losses in total losses between 1980 and 2020



Source: EEA, DG ECFIN calculations.

2.2. DISASTER INSURANCE IN EU MEMBER STATES

Economic damage to physical assets can be mitigated by disaster insurance. In 2019, only 35% of the total losses caused by climate-related disasters across Europe were insured (EIOPA - European Insurance and Occupational Pensions Authority), pointing to a quite large insurance protection gap. The floods of the summer of 2021 and the forest-fires of 2022 are a stark reminder that EU Member States are exposed to natural disasters, some of them amplified by climate change. It is therefore key to understand how well protected a country is against such events and how to reduce or close the insurance protection gap as a way to manage the amount of disaster-related losses to be covered by public money. This section provides an overview of the EU and country insurance protection gaps based on a dashboard produced by EIOPA.

The dashboard provides two types of the protection gap:

- a *historical protection gap*: based on historical data on economic and insured losses to understand the protection gap in the past. The historical losses depend on past hazards (past events), exposures, vulnerabilities and insurance coverages (the three last parameters measured at the time of the event);
- an *estimation of today's protection gap*: based on a modelling approach to have an estimation of today's protection gap, based on information on hazard, vulnerability, exposure and insurance coverage at present time.

Table 1. EIOPA dashboard on the insurance protection gap for selected climate-related disasters

COUNTRY	All Peril		Flood				Wildfire				Windstorm				
	Historical Protection gap	Estimate of protection gap today	Historical Protection gap	Estimate of protection gap today	Exposure to hazard	Insurance coverage	Historical Protection gap	Estimate of protection gap today	Exposure to hazard	Insurance coverage	Historical Protection gap	Estimate of protection gap today	Exposure to hazard	Vulnerability	Insurance coverage
EU	1.4	1.0	1.5	1.0	2.0	2.0	1.7	1.6	2.0	3.0	1.4	1.0	2.0	2.0	1.0
Austria	1.5	2.0	2.0	3.4	3.0	4.0	2.0	2.6	2.0	4.0	2.0	0.0	2.0	2.0	0.0
Belgium	1.0	1.7	1.0	1.9	3.0	1.0	1.0	2.0	2.0	n/a	1.0	1.6	2.0	2.0	1.0
Bulgaria	1.8	2.0	3.0	1.7	1.0	4.0	1.0	2.0	1.0	4.0	2.0	1.2	1.0	2.0	n/a
Croatia	2.3	2.4	3.0	2.0	2.0	2.0	3.0	3.0	2.0	4.0	1.0	1.6	1.0	2.0	3.0
Cyprus	1.3	1.9	1.0	1.0	1.0	n/a	2.0	3.0	3.0	4.0	1.0	1.0	1.0	1.0	n/a
Czech Republic	1.8	1.9	3.0	2.0	2.0	2.0	2.0	2.0	1.0	4.0	1.0	1.6	2.0	2.0	1.0
Denmark	1.5	0.0	1.0	0.0	1.0	0.0	2.0	0.0	1.0	0.0	2.0	0.0	4.0	2.0	0.0
Estonia	0.5	1.1	0.0	0.0	1.0	0.0	1.0	3.0	2.0	4.0	1.0	1.5	2.0	n/a	1.0
Finland	1.0	0.7	1.0	1.0	1.0	n/a	2.0	0.0	1.0	0.0	1.0	1.8	2.0	4.0	1.0
France	1.3	0.5	1.0	0.0	2.0	0.0	1.0	2.0	2.0	n/a	2.0	0.0	1.0	2.0	0.0
Germany	1.5	1.6	2.0	2.6	3.0	2.0	1.0	1.0	1.0	2.0	2.0	1.1	1.0	2.0	1.0
Greece	2.8	2.2	2.0	1.7	1.0	4.0	3.0	2.0	1.0	4.0	2.0	1.6	1.0	1.0	4.0
Hungary	1.8	1.3	2.0	1.9	3.0	1.0	3.0	1.0	1.0	n/a	1.0	1.1	1.0	2.0	1.0
Ireland	0.8	0.7	1.0	0.0	1.0	0.0	1.0	1.0	1.0	n/a	1.0	1.9	3.0	2.0	1.0
Italy	2.0	2.4	2.0	1.7	1.0	4.0	2.0	2.0	2.0	n/a	1.0	2.5	2.0	2.0	4.0
Latvia	1.3	0.9	1.0	1.0	1.0	n/a	2.0	1.0	1.0	n/a	2.0	1.7	2.0	1.0	n/a
Lithuania	1.0	1.3	1.0	1.0	1.0	n/a	2.0	2.0	2.0	n/a	1.0	2.0	2.0	2.0	n/a
Luxembourg	1.0	1.6	1.0	2.0	2.0	n/a	1.0	2.0	2.0	n/a	2.0	1.1	1.0	2.0	1.0
Malta	0.5	2.3	1.0	1.7	1.0	4.0	0.0	3.0	3.0	4.0	1.0	1.6	1.0	1.0	4.0
Netherlands	1.0	1.9	1.0	4.0	4.0	4.0	1.0	0.0	1.0	0.0	1.0	1.6	2.0	2.0	1.0
Poland	1.5	1.6	2.0	1.0	1.0	1.0	2.0	1.0	1.0	n/a	1.0	2.3	3.0	1.0	n/a
Portugal	1.5	2.0	1.0	1.6	1.0	3.0	3.0	3.0	3.0	n/a	1.0	1.7	2.0	1.0	n/a
Romania	1.8	1.7	2.0	1.6	1.0	3.0	3.0	1.0	1.0	n/a	1.0	1.2	1.0	2.0	n/a
Slovakia	1.3	2.4	2.0	3.0	3.0	3.0	1.0	3.0	2.0	4.0	2.0	1.6	1.0	2.0	3.0
Slovenia	1.8	1.5	2.0	1.3	1.0	2.0	2.0	1.0	1.0	n/a	2.0	1.2	1.0	2.0	n/a
Spain	1.3	0.9	1.0	0.0	1.0	0.0	2.0	2.0	2.0	n/a	1.0	1.4	2.0	1.0	1.0
Sweden	1.0	0.4	1.0	0.0	1.0	0.0	1.0	0.0	1.0	0.0	2.0	1.6	2.0	2.0	1.0

Source: EIOPA, https://www.eiopa.europa.eu/document-library/feedback-request/pilot-dashboard-insurance-protection-gap-natural-catastrophes_en.

The historical protection gap score is normalised with the GDP to allow cross-country comparisons and across perils between no protection gap (score of 0) and high protection gap (score of 4). The formula for the historical

protection gap is $(\text{economic losses} - \text{insured losses}) / (\text{number of years} * \text{GDP})$. In the estimation of today's protection gap, more weight is given to exposure to hazard so that the protection gap remains low in the event of low exposure to a hazard and despite high vulnerability and low insurance coverage. The EU level results are the average of the Member States' scores. The country insurance protection gap is the average of the different perils.

Note: Data on vulnerability to floods and wildfire is not available and therefore not shown in the dashboard. For these perils, the protection gap indicator is determined on the basis of exposure and insurance coverage.

The protection gaps vary significantly among Member States as well as among different types of disasters with some countries having a very high protection gap and others having almost no protection gap. The EU protection gap is low for all perils taken together (1.4 for historical and 1 for estimated) and for any type of peril taken separately (between 1.4 and 1.7). This can be explained in particular by the fact that not all countries are impacted by the same types of disasters and that, on average, high gaps in some Member States are compensated by low gaps in other Member States. For example, considering flood disasters, today protection gap seems to be relatively high for the Netherlands, Austria and Slovakia, for wildfires the gap is relatively high for Croatia, Cyprus, Estonia, Malta, Portugal and Slovakia, and for windstorms the gap appears higher for Italy and Poland.

The dashboard can also help identify the root causes behind the protection gap. For example, low insurance coverage is behind Austria's protection gap for floods, most countries' high protection gap for wildfires, and Italy's protection gap for windstorms. Understanding the root causes, points to possible solutions. To offset high exposure, it would be important for assets to have low vulnerability and high insurance coverage. Vulnerability can be influenced and decreased by targeted actions, for example, introducing or developing building codes.

Some caveats are worth mentioning with respect to the use of this dashboard. The indicator on "exposure to hazard" can help to guide policy but the inherent uncertainty of natural disasters implies that they can strike although there is overall a low exposure (e.g., heavy storms in Germany in 1999 and 2007 despite an overall low exposure to storms). Moreover, the impact of natural disasters is normally concentrated in a specific region; such regional dimension is currently still lacking in the dashboard. In addition, the indicator does not include all types of climate-related disasters (for example, droughts are excluded), it is not a forward-looking indicator (only past and present protection gaps are presented), it is not possible to make a distinction between insurance for buildings/content or business interruption nor by type of asset (commercial, residential, public assets), and it reflects only private insurance schemes. Finally, it is not possible to determine or infer on the government contingent liabilities from climate-related disasters, making it of limited use to quantify fiscal risks.

2.3. WHY IS DISASTER RISK FINANCING RELEVANT?

As part of the adaptation to climate change, countries can embark in more or less sophisticated disaster risk reduction strategies. The amount of money needed to completely adapt to climate change is not known and even if private and public investments to limit the cost of disasters were to be fully available and implemented, a residual risk² from climate-related disasters would still persist. National choices and priorities determine how much of the residual risk is retained / accepted by the public sector and the ways it is shared across the private sector between households and companies on the one hand and insurance companies on the other. Moreover, decisions by the public sector are also affected by the fact that climate-related disasters weigh more on some economic sectors (i.e., agriculture, energy, infrastructure, tourism) because of the nature of their activity and on some segments of the

² A residual risk is a risk that could not be avoided or reduced.

population (i.e., vulnerable households). In some cases, the government needs to step in through assistance or compensation. When private insurance is either unaffordable (because the risk premia are too high) or unavailable (because of uninsurable risks), public sector involvement seems warranted. This takes the form of either direct transfers, insurance to property owners for disaster risks or reinsurance to insurance companies covering those risks. However, the government involvement should not hamper the development of disaster insurance markets and it should aim to maximise the participation of the private sector and to minimise the exposure of the government.

The uncertainty around the timing of a disaster and related losses means that the cost of climate-related disasters is a fiscal risk of an increasing importance as climate-related disasters are projected to be more frequent and intense. Member States may wish to better understand the potential size of this fiscal risk and how it is taken into account by the national fiscal frameworks and reflected in the budget decisions, together with existing and emerging fiscal challenges. They may also draw inspiration from the practices of countries outside the EU with more experience in managing disaster-related fiscal risks, in particular with more developed disaster risk financing (DRF) strategies. Finally, the authorities could consider whether their approach to disaster risk financing follows the five elements to assess and to finance disaster risks as detailed below.

A first overview points to more or less developed DRF strategies in EU Member States and a pervasive use of ad-hoc measures (Radu, 2021). Ad-hoc financing has some fundamental shortcomings as resources allocated to possible growth enhancing projects are diverted towards emergency response and relief, an issue that escalates when public finances need to address at the same time new policy priorities and challenges. Moreover, an ad-hoc approach means that timing, destination and governance of public funds are unclear if the recipients are not known in advance, if the allocation key of the funds is not defined or governance rules are not in place (i.e., missing provisions for monitoring, disclosure, and transparency). For an efficient and effective management of the disaster-related costs, it appears therefore useful to go through each of the elements necessary to defining a national disaster risk financing strategy.

3. KEY ELEMENTS OF DISASTER RISK FINANCING

Designing an effective Disaster Risk Financing (DRF) strategy is a challenging task that requires public policy makers to coordinate with external experts and across those line ministries who bear the brunt of potential financial impacts of climate-related disasters. Five elements appear necessary for a comprehensive approach to managing the fiscal dimension of climate-related disasters. These five elements are: *(i)* the quantification of past and future climate-related disaster impacts, *(ii)* taking measures to limit disaster-related fiscal costs (through private sector participation (insurance)), *(iii)* defining public sector arrangements to cover the retained / accepted disaster impact, *(iv)* clarifying the compensation rules and main beneficiaries and *(v)* establishing transparency and monitoring arrangements.

Interesting examples of managing the fiscal cost of disasters and designing a DRF strategy can be found in national experiences with floods, which are a relatively frequent type of disaster occurring in EU Member States. In particular, countries exposed to flood disasters face significant related costs at different administrative levels (local, regional, national). The financial management of floods entails

ex-ante costs for flood risk reduction (costs which are not the focus of this paper but that could fall under *ii*); *ex-post* costs to cover emergency response, reconstruction of public assets and compensation to individuals, businesses and sub-national governments affected by floods (*iii*); in certain cases, the distribution of public funds is subject to predefined rules on the amounts, beneficiaries and their insurance status (*iv*). Governments can also act as insurers, reinsurers or guarantors which can entail additional costs when the available reserves built to cover disaster losses are exhausted (*iii*). Finally, implicit government obligations (liabilities) arise when the individual financial buffers and capacity to manage disaster losses are overwhelmed and the government acts as insurer of last resort (*elements i, ii and iii*).

3.1. QUANTIFICATION OF PAST AND FUTURE CLIMATE-RELATED DISASTER IMPACTS

The effectiveness of public measures to manage disaster damages depends on the capacity of policy makers to learn from the past, to estimate the potential future disaster losses and to reflect the fiscal costs in the national fiscal frameworks and budgets.

Within this, the first step is to have an accurate view on past and future losses and a second step requires examining disaster related contingent liabilities, to estimate possible future fiscal costs.

3.1.1. Quantitative assessment of past losses and future loss estimates

The quantitative assessment of climate-related disaster risks is a challenging task when it comes to collecting data on past losses and fiscal costs or estimating future economic damage and government contingent liabilities. One challenge stems from the fact that past losses are a weak predictor of the fiscal impact that can be expected from future disasters, although they remain useful when no alternative is available.

Evidence shows that the share of the fiscal cost of floods, largely composed by emergency response and reconstruction, has also increased over time. Such data is gathered mostly by non-government bodies. For example, there is some evidence that in the US, government spending represents an increasing share of flood losses (23% for hurricane Hugo in 1989 (EUR 1.84 billion), 50% for hurricane Katrina in 2005 (EUR 62.5 billion) and more than 80% for hurricane Sandy (EUR 56 billion) in 2012 (Kunreuter and Kerjan, 2013)³). In Canada⁴, public spending for floods has averaged CAD 3.7 billion (EUR 2.8 billion of 2022⁵) between 2010 and 2013 (Insurance Bureau of Canada, 2015). From 2009 to 2015, Disaster Financial Assistance Arrangements' compensation to the Canadian provinces and territories was greater than any of the previous 39 fiscal years combined according to the Office of the Auditor General of Canada (2016). Evidence for other countries points

³Hurricane Hugo (1989) total damage of EUR 8 billion, hurricane Katrina (2005) total damage of EUR 125 billion, hurricane Sandy (2012) total damage of EUR 70 billion.

⁴ In the event of a large-scale natural disaster, the Government of Canada provides financial assistance to provincial and territorial governments through the Disaster Financial Assistance Arrangements (DFAA). Since the inception of the programme in 1970, the Government of Canada has contributed with more than CAD 6 billion (EUR 4.5 billion) in post-disaster assistance to help provinces and territories with the costs of response and of re-building infrastructure and personal property to pre-disaster condition. A province or territory may request Government of Canada disaster financial assistance when eligible expenditures exceed an established initial threshold (based on provincial or territorial population). Through the DFAA, assistance is paid to the province or territory – not directly to affected individuals, small businesses or communities.

⁵ The exchange rate of 2022 is used for the conversion of every local currency amount presented in this note.

to large amounts in government spending for floods. In Italy, government spending for emergency response and reconstruction related to floods has been estimated at EUR 2.6 billion per year between 2010 and 2012 (Swiss Re, 2015). Countries in Central Europe (Hungary, Czechia, Poland, Slovakia) have also been affected frequently by major floods judging by the requests made for EU Solidarity Fund financing and subsequently approved.

Collecting or generating data on the past and potential fiscal cost of disasters does not have to start as a comprehensive or perfect process. *Georgia* (Box 2) is an example of how to link science and policy making in order to gather and generate information on the fiscal cost of disasters and use it in the budgetary process. The *Romanian* Fiscal Strategy for 2022-2024 includes model-based simulations of annual physical losses exceeding EUR 2.6 billion and intervention costs of EUR 1.3 billion in the case of a 1-in-100-year event. The *Spanish* fiscal council, AIREF, is working to incorporate climate change in macroeconomic projections, while in *Finland* such fiscal risks are considered in the long-term projections. *Germany* provides another example of a way to tackle the quantification of disaster-related damages. While acknowledging the limitations of the exercise, a group of experts from academia has produced a wide range of estimates of disaster damages by 2030 for individuals, companies and critical infrastructure for the German Environment Agency, at Laender-level.⁶ In the *UK*⁷, similar information is available although over a short period of time (2017-2020) and is partial as it focusses primarily on economic damage for the private sector (i.e. agriculture losses from wildfires, cost of winter floods) and to a lesser extent on the fiscal cost of floods, droughts, wildfires and heatwaves.

Box 2. 2021 FISCAL RISK STATEMENT OF GEORGIA

An example of a more developed approach to fiscal risks from climate-related disasters comes from Georgia which presented fiscal risks from natural disasters and climate change in its 2021 Fiscal Risk Statement. The report focuses on the main types of disasters that have struck the country in the past - floods and earthquakes - and provides a *historical* perspective on financial losses and numbers of people affected by disasters. Average annual public disaster-related spending amounted to 0.06% of GDP between 2009 and 2018 and was mainly related to compensation and fiscal transfers. The report includes a *forward-looking* assessment of annual expected damages at different periods¹. On this basis, the authorities further refine their analysis to quantify the government *contingent liabilities*. The report provides a preliminary and partial quantification of contingent liabilities related to residential assets for different periods. The authorities acknowledge that in this exercise they could not disaggregate spending by type of disaster, that recorded public disaster-related spending might not be correlated with the economic losses and damages caused by the disasters and costs for the reconstruction of public assets might not be fully included.

⁶ “Assessment of risks associated with climate change: Damage potentials and the economic impact of climate change and adaptation measures (German only)” https://www.umweltbundesamt.de/sites/default/files/medien/479/publikationen/cc_29-2020_bewertung_klimawandelgebundener_risiken_teilbericht_1.pdf.

⁷ Third UK Climate Change Risk Assessment Technical Report. (Betts, R.A., Haward, A.B., Pearson, K.V. (eds)) Prepared for the Climate Change Committee (<https://www.theccc.org.uk/wp-content/uploads/2021/07/Independent-Assessment-of-UK-Climate-Risk-Advice-to-Govt-for-CCRA3-CCC.pdf>).

Box 2. - continuation

The analysis of climate-related risks indicates that there is also a risk that the corresponding public expenditure is much higher. Finally, the report gives an overview of budgetary instruments for disaster risk financing: a reserve fund at the general government level and funds for regions, local governments and line ministries which in a normal year cannot exceed 2% of the total budget allocation. A 2020 agriculture insurance scheme financed from the State budget aims to improve insurance coverage against specific weather-related risks for farmers and land.

Source: 2021 Fiscal Risk Statement (https://www.mof.ge/images/File/08-06-2022/FRS_ENG_2021_Dec.pdf).

Ex-post disaster costs come in different forms:

- A significant share of *ex-post* disaster costs is related to the reconstruction of public assets owned by local and/or regional authorities through compensation arrangements or specific transfers from the national government. In the *US*, the federal government is legally bound to provide assistance when local and state authorities are hit by a catastrophe. In the aftermath of hurricane Sandy, most of the *US* spending for disaster relief (therefore outside the official National Flood Insurance Program) of about USD 60 billion was spent on reconstruction of public assets (public buildings and infrastructure). At the same time, spending for claims for damage to public property under the National Flood Insurance Program amounted to USD 7.8 billion. In *Australia*, *Canada* and *New Zealand*, the compensation from the national government to sub-national governments is determined on the basis of a cost-sharing formula. *Austria* has a similar arrangement in place, whereby sub-national levels of government receive financial assistance under the Catastrophe Fund Act. In *Czechia*, municipalities are fragmented but they are generally insured against disasters. However, both vulnerable municipalities and uninsured ones still benefit from State support in case of disaster.
- *Ex-post* disaster costs also include financial assistance offered to individuals and businesses for loss of income and assets or to support recovery. In *Australia*, for example, the national government can provide an Australian Government Disaster Recovery Allowance (to cover lost income) and an Australian Government Disaster Recovery Payment (to support recovery) (OECD, 2015).

Estimating the fiscal cost of future climate-related disasters is complex and could be done as a combination between a top-down and a bottom-up approach.

In the *top-down approach*, a public body would be designated as focal point coordinating input from academia and other climate professionals. For example, in the *UK*, the Contingent Liability Central Capability is a unit within the UK Government Investments with an analytical and advisory role to the UK government to improve contingent liability expertise and risk management. A top-down approach is usually preferred as the assessment of disaster-related contingent liabilities and corresponding public spending needs rests on different sources of information and technical skills. By acknowledging the role of science and climate processes, this approach would be based on input from key stakeholders (academia and climate experts, ministries, insurance companies) and require a real effort to bring together skills and knowledge to determine the impact on each economic sector and segment of population (see Box 3 on the Belgian initiative) and reflect it in forecasts and budget plans.

BOX 3. PROMISING STEPS IN BELGIUM

An ongoing public consultation covers a set of federal adaptation measures including on disaster risk management to be implemented over a 4-year horizon (2023-2026) and presented in the document Towards a resilient society in 2050. The objectives of the proposed disaster risk management measures are to improve knowledge on the probability and size of impacts that can be expected from climate change to inform the design and implementation of climate policies and support policies to reduce the risks and increase the resilience to climate change. Among the proposed climate adaptation actions to quantify the impact of climate change and reinforce resilience, the following proposals stand out:

- (1) designate a coordinating body, the Centre of Excellence on Climate, to analyse and evaluate climate-related risks and reflect on all the components of climate policy: mitigation, adaptation, losses. This body would issue recommendations to enhance climate change management in Belgium in order to increase resilience to climate change;
- (2) enhance coordination with key stakeholders including the federal authorities;
- (3) consider more systematically the impact of climate change and the involvement of the Defence Ministry in support of civil protection services in case of severe natural catastrophes;
- (4) review of the insurance legislation for large scale natural disasters, guided by analysis performed by the National Bank of Belgium.

Source: [fr-vers-une-societe-resiliente2050.pdf \(belgium.be\)](https://www.belgium.be/fr/vers-une-societe-resiliente2050.pdf).

The *bottom-up approach* could complement the scientific expertise with information from each ministry which would provide its cost estimates at least based on past events as a proxy. For example, the Ministry of Interior would be best placed to provide information on civil protection services and emergency needs; the Ministry for Agriculture would provide information on forests and crops; the Ministries for Economic Affairs and/or for Finance for potential impact of climate-related disasters on SMEs; social security, damages to private and public assets, etc. (see Box 4 on French ministerial plans). However, relying only on ministries' input would provide only a partial view on the cost of disasters and it would need to be complemented with estimates of disaster costs by the insurance industry. *Croatia* uses a bottom-up approach for reporting incurred damage (therefore ex-post) and in order to determine the total damage from natural disasters, starting with the citizens application, to the local commission for assessment of the damage, ministries and State Commission for assessment of the damage.

BOX 4. THE FRENCH MINISTERIAL PLANS TRANSPOSING THE NATIONAL ZERO CARBON STRATEGY

So far, three French ministries (Agriculture, Environment and Economy and Finances) have prepared ministerial climate plans upon the request of the Prime Minister, aiming to transpose the National Climate Strategy into actions and measures. While still in their infancy, such practices could evolve in time and contribute to the bottom-up identification and quantification of financing needs for adaptation including to cover the potential cost of climate-related disasters.

Source: https://www.hautconseilclimat.fr/wp-content/uploads/2021/12/HCC_Avis-plans-climat.pdf (table 3).

3.1.2. Disclosure of disaster-related contingent liabilities

The disclosure, oversight and management of disaster-related contingent liabilities is a key information for the authorities that manage the disaster-related fiscal costs. Contingent liabilities represent a government commitment to cover expenditure if specific conditions are met. When underlying risks materialise, contingent liabilities become additional public expenditure. Managing government contingent liabilities is therefore important as they may entail a high fiscal risk and associated fiscal cost weighing on the long-term sustainability of public finances. As the government is acting as an insurer of last resort, this is a contingent liability that can also create moral hazard. For example, owners are less inclined to reduce risk or insure themselves against disaster risk if they know the government will step in to cover disaster damages, a situation referred to as the Samaritan's dilemma (Gibson et al, 2005; Raschky et al, 2013). However, some forms of contingent liabilities allow the government to share the risk with the private sector. For example, the government can act as insurer through public insurance schemes or as reinsurer for insurance companies providing disaster protection, thus supporting the insurance market offer.

Evidence on disclosure and management of disaster contingent liabilities is limited (see Box 5 on the UK example) but national expertise could improve, building on existing practices to quantify contingent liabilities, to reduce the risks and clarify the risk ownership between the public and the private sector. The list of contingent liabilities of the Directive 2011/85 on national budgetary frameworks is non-exhaustive and provides a framework for EU Member States to report disaster-related liabilities with a potentially large impact on public budgets. However, progress can still be made on reporting contingent liabilities going beyond those stemming from the financial sector, which are the most common type.

3.2. MEASURES TO LIMIT THE FISCAL COST OF DISASTERS

The fiscal cost of disasters can be reduced when (a) part of the population subscribes to disaster insurance and when (b) public assets are insured through a private insurance scheme and, hence, their reconstruction cost is taken off the shoulders of local authorities which are traditionally in charge of public assets reconstruction after disasters (See Section 3.1.1). It is therefore important to understand the types of private insurance schemes available and their nature (optional/mandatory) as well as practices with respect to insuring public assets. Besides knowing the types of available private disaster insurance schemes to cover private losses and damages to public assets, it is important for policy makers to compare the insurance coverage through private insurance schemes with the estimated disaster damages. In their reflection on the use and availability of private disaster insurance schemes, the authorities would need to consider the right incentives to increase insurance coverage, but also the implications for financial stability of a wide use of private insurance schemes and the possibility that climate change could amplify the exclusion of natural disasters from insurance policies.

3.2.1. Private disaster insurance schemes

Disaster insurance is a risk-transfer instrument, and it limits directly the impact of disasters for policyholders and indirectly for public finances. When insurance is provided through a private insurance scheme, the potential fiscal cost of disasters is reduced by the share of damage covered by the insurance companies. When insurance is provided through a public insurance scheme, the potential fiscal cost is the share of the insured damages that surpasses the financing capacity of the scheme (see Section 3.3.1).

There is an economic justification for having in place disaster insurance to limit the fiscal cost of disasters. Several studies have looked into the relationship between the economic consequences of disasters and the existence of a disaster insurance market. Looking at the impact of natural disasters on revenues and expenditure, countries with lower insurance penetration face larger fiscal balance deteriorations in response to disasters and the consequences for the economy are also larger (Melecky and Raddatz, 2011).

A similar analysis (von Peter, von Dahlen and Saxena, 2012) found that the impact of insured disaster losses does not weigh on long-term output (GDP trend growth before and after a disaster is broadly unchanged) while uninsured disaster losses cost 2.3% of GDP or more over 10 years. This result emphasises the role of disaster risk transfer mechanisms in limiting the economic impact of costly natural disasters (adjusted for other explanatory variables and factors such as country classification in income group, currency crisis, debt crisis, democratic vs authoritarian regime, etc.). The authors illustrate their empirical findings with two very similar catastrophes, the 2010 earthquakes in Port-au-Prince, *Haiti*, and Christchurch, *New Zealand*. The similarities include island states subject to the same type of natural disasters, the magnitude, the location next to an important economic centre. In spite of these similarities, the direct economic losses amounted to 126% of GDP in Haiti and to 5.6% of GDP in New Zealand. The damaged infrastructure in both countries included airports, main roads and ports. The different speed of reconstruction of damaged assets and infrastructure in the aftermath of the disaster (Haiti still struggling with cleaning rubble while New Zealand experienced economic growth one year after the disaster) is explained among others by the different degree of financial preparedness of the two countries. The insurance coverage in New Zealand was about 80% while in Haiti less than 1%. Although in terms of income levels and economic development, Haiti and New Zealand are by far not in the same category, these two cases illustrate the role that disaster insurance can have in the post-disaster recovery and reconstruction.

These findings suggest that risk transfer instruments such as disaster insurance have an economic value. As disaster insurance reduces the economic impact of disasters and provides room for manoeuvre to national authorities to provide post-disaster support for assistance, recovery and reconstruction, there is a case to promote and support the development and undertaking of disaster insurance in countries prone to disasters and where insurance penetration is low.

There are different disaster insurance schemes across the EU, ranging from mandatory insurance to optional schemes with different designs and degrees of involvement from the private sector (Box 6). In some countries, property owners are required to purchase disaster insurance (*mandatory insurance purchase*). In *Romania*, all residential properties need to be insured (up to a pre-set amount) for flood, landslide and earthquake risks. A mandatory insurance scheme comes, however, with the challenge that it is similar to a tax on households, which makes it a politically sensitive matter. *Mandatory extension* means that certain insurance policies are extended to include protection against disaster risks. This is the case in *Belgium* where fire insurance automatically includes disaster insurance. An insurance pricing office (*Bureau de tarification*) provides arbitrage in case the insurance premium is not affordable.

Some arrangements involve *public-private insurance partnerships* where the public and private sectors cover risks according to pre-set thresholds. Such is the case of the Japanese Earthquake Reinsurance Company which acts as the only reinsurer for the private insurance market in *Japan*. Earthquake losses are shared between the private and the public sector.

BOX 5. VARIOUS TYPES OF PROPERTY INSURANCE SCHEMES IN EU MEMBER STATES

In *Belgium*, the optional fire insurance includes protection against natural catastrophes such as earthquakes, floods, windstorms, etc.

In *Spain*, property insurance against disasters is optional but all private insurance policies written by insurers for risks located in Spain must include a mandatory clause covering extraordinary risks (flood, earthquake and strong wind).

A similar structure applies in *Iceland*, where all buildings and movables covered by legally mandatory fire insurance are insured by the Natural Catastrophe Insurance of Iceland (Náttúruhamfaratryggingar Íslands, NCI). NCI is a public institution whose role is to compensate for damage caused by earthquakes, volcanic eruptions, landslides, avalanches and floods. It provides insurance through private insurance companies who receive a fee for collecting catastrophe cover premiums alongside fire premiums.

In *France*, a compensation scheme in the form of a public-private partnership was developed 40 years ago to ensure a high coverage of natural disasters risks. Contrary to the Spanish and Icelandic cases, the *Caisse centrale de réassurance* (CCR) does not provide direct reimbursement to policyholders, but, acting as State-backed reinsurer, it offers stop-loss contracts to insurance companies in case of extreme weather events. The French PPP has used the State guarantee only once in the last 30 years. Insurance coverage is mandatory for renters and for shared spaces, in the case of co-ownership arrangements, but not for property owners (outside shared spaces). The multi-risk natural disaster coverage is compulsory included in all property insurance policies.

In *Norway*, natural perils insurance is mandatory and linked to fire insurance. All insurers providing fire insurance in Norway must be members of the Norwegian Natural Perils Pool (NNP). All perils, except for wildfire, are covered by the NNP. The Pool is a mechanism to distribute claims and costs between members in proportion to their market share.

Finally, in *Romania*, earthquake, river flood and subsidence for residential property are covered by a special law, making their coverage mandatory and implementing a fixed premium and a fixed sum insured (all other risks are not mandatory, and their tariffs are driven by the market). The Romanian Insurance Pool Against Natural Disasters (PAID) is a privately managed pool and covers around 20% households.

Outside the EU, in Switzerland, natural disaster insurance (except for earthquakes) is required for almost all property owner and the insurance is provided by a public insurer.

Source: <https://www.mdpi.com/2071-1050/12/20/8734>, DG ECFIN.

3.2.2. Public assets insurance

Different risk transfer mechanisms are available to national and sub-national governments, including insurance for public assets. Public assets are normally covered by private insurance in Latvia, North Macedonia and Serbia. Governments may also seek insurance coverage for a pool of public assets, which by diversifying risks can have cost advantages over insuring the assets individually. Mexico has

established insurance arrangements to cover approximately USD 400 million in damage to ensure a source of funding for reconstruction.

There is, however, more evidence of insurance of public assets via public insurance schemes (see Section 3.3.1).

In a similar manner as for damages and insurance coverage of damages to private assets, this review of options for disaster insurance of public assets needs to be complemented with information on the stock and value of public assets exposed and vulnerable to disasters.

3.3. PUBLIC SECTOR ARRANGEMENTS

Public disaster risk financing means pre-arranging funding through the national budget and other financial instruments commensurate to the needs to manage the financial impact of disasters on public finances.

3.3.1. Public insurance schemes

Where insurance is provided through a public insurance scheme, the *ex-post* disaster cost will reflect the financial impact that exceeds the capacity of the public insurance scheme to absorb the cost. Where the government acts as a reinsurer, the fiscal cost of the disaster will be the payments made by the government to the insurers.

Reducing the fiscal cost of public disaster insurance schemes needs to take into account several different objectives:

- the scheme is designed to be self-sustaining (a public insurance scheme must collect sufficient revenue in terms of premium income and fees to cover claims and administrative expenses). For example, in *Spain*, the CCS has operated for over 60 years without requiring funding from the government for losses beyond its capacity to pay. In *France*, the government guarantee for losses of the CCR has been triggered infrequently. In the *United Kingdom*, FloodRe has been designed to be self-sustaining up to a specific level of risk;
- the scheme provides affordable insurance particularly for extraordinary events. In the *United States*, National Flood Insurance Program premiums are established based on average annual losses excluding extraordinary events. The NFIP has borrowed funds from the US Treasury to address extraordinary losses from Hurricane Katrina in 2005 and Hurricane Sandy in 2012.

Some countries (including *Canada, Costa Rica, France, Hungary, Iceland, Israel, Latvia, New Zealand, Peru, Philippines, Switzerland, United Kingdom and the United States*) offer some form of public flood insurance or reinsurance for motor vehicles, residential properties/buildings and/or commercial properties/buildings. In some cases, the public insurance or reinsurance was established specifically to provide coverage for disaster-related risk (*France, Iceland, New Zealand, Switzerland*) or flood risk in particular (*Hungary, United Kingdom, United States*).

In *France*, property, business interruption and auto insurance include natural disaster risks, which is reinsured by a public reinsurer (*Caisse Centrale de Reassurance, CCR*). In the *UK*, FloodRe is a flood reinsurance scheme supposed to run until 2039 and offer affordable flood insurance to households at risk of flooding.

Insurance of public assets can also be provided through public insurance schemes. In *Czechia, New Zealand and Australia*, the relevant authorities are required to consider various financial protection options for public assets, including insurance, as part of their asset management strategies. Local governments in *New Zealand* are required to disclose details of their insurance arrangements in their annual reports.

Australia has special publicly-owned insurance companies that provide coverage for public assets. A number of sub-national governments have established insurance entities to provide insurance for public assets while the federally-owned public assets are insured through a dedicated insurance scheme (ComCover). The federal government in *Australia* regularly reviews the insurance arrangements for public assets owned by sub-national governments, partly as a means for reducing the moral hazard created when a large share of the reconstruction costs is borne by national governments. In most cases, these insurance arrangements are considered to provide adequate levels of financial protection (OECD, 2015, 2016). In *Iceland* and *Spain*, the public insurance provider for catastrophe risks (ICI and CCS respectively) provides insurance coverage for public assets against the same set of risks.

Considering the role of insurer of last resort, the State also needs to minimise moral hazard and manage the cost of environmental disasters with unknown economic agents or agents that are financially unable to cover damages or affecting assets such as forests that are not usually insured. *Finland* has established an off-budget fund covering environmental disasters, financed by those companies found to pose such environmental threats.

3.3.2. National budgets

Financing of extreme events can quickly overwhelm the capacity of the responsible administration, in particular when it rests at sub-national government level. Extreme events are usually covered through dedicated laws (*Croatia*) or one-off measures. Public financing of recurrent disasters (high frequency/low impact) is usually secured through national budgets.

A first overview of DRF provides a list of budgetary arrangements that can be found in the EU Member States to secure disaster funding ex-ante (Radu, 2021). In their most common form, such budgetary arrangements rely on the flexibility embedded in national budgets, which can be used to cover unexpected spending through budgetary reallocations; this, however, is an ad hoc approach that often goes at the expense of much-needed public investment. Another approach relies on explicit provisions for emergency situations, whereby the budget has embedded pre-defined leeway to deal with unforeseen circumstances; this would allow, at least in theory, to spread the fiscal impact more evenly over other budget lines. More rarely, dedicated funds such as budget reserves, contingency reserves or disaster funds can also be mobilised rapidly to meet post disaster needs. A less common disaster financing tool is international funding which can be provided by various international institutions.

Some countries have chosen to finance disaster costs ex-post through special taxes instead of debt issuance. For example, in *Czechia*, a special anti-flood tax amounting to EUR 504 million was imposed only during 2011 on every taxpayer aimed at covering losses caused by the 2010 floods. *Australia* imposed a one-off levy on high-income earners to address the costs of the Queensland floods (OECD, 2016). Alternatively, borrowing ex-post to finance the cost of reconstruction is also a possibility available to governments, with implications for debt sustainability and debt servicing.

3.4. COMPENSATION RULES AND MAIN BENEFICIARIES

An important share of the government contingent liabilities are implicit, meaning that they are not prescribed by law but ensue from the expectation that the government would step in in case of disaster and act as insurer of last resort. In this role, the government can provide financial assistance and compensation to those affected by disasters (i.e., businesses, homeowners, farmers, sub-national governments).

Implicit liabilities are difficult to quantify, and the authorities should make the effort to control their scope. This can be done by clearly specifying *ex-ante* the rules guiding such disbursements and the main beneficiaries, which provides at the same time a direct incentive to build financial protection (either through own financial buffers and/or disaster insurance). Moreover, *ex-ante* clarification of the level of post-disaster financial assistance avoids misunderstandings regarding the available amounts and the political room for manoeuvre on financial assistance.

The definition of the scope and eligibility for *ex-post* financial assistance and compensation serve a double purpose: to bring clarity on the government implicit contingent liabilities and improve disaster protection overall. Clear eligibility criteria reduce the room for political discretion and the size of unexpected post-disaster costs. For example, the *Netherlands* has in place statutory ceilings on the maximum amount of government compensation that can be claimed. In countries where financial assistance is provided by different levels of government, it is important to coordinate and avoid duplication. To encourage disaster insurance underwriting and address the issue of moral hazard, some countries do not provide compensation for damages that would have been otherwise insurable. In the *German Federal State of Saxony*, eligibility for payment of post-disaster financial assistance explicitly excludes cases where an affected person has failed to take the necessary steps to prevent a need for assistance, including taking-up disaster insurance. *Croatia* has a clear institutional set-up and allocation of responsibility in case of recurrent natural disasters provided by the Act on mitigating and eliminating the effects of natural disasters. The public compensation arrangement is very restrictive with a maximum 5% of confirmed damage possibly covered with exclusions and is described as an incentive for disaster insurance. Similar arrangements can be put in place for farmers (see Box 7).

Businesses can also receive *ex-post* disaster financial assistance in the form of loans or grants with the aim to ensure their survival and protect employment. There is, however, little evidence that financial assistance improves the business survival rate (OECD, 2016). It may therefore be more effective to improve business insurance penetration, including business interruption insurance or commercial insurance rather than providing *ex-post* compensation.

Post-disaster financial assistance provided to sub-national governments is crucial to allow them to manage the fiscal impacts of disasters when their financial capacity is insufficient. This assistance should take into account the share of national public revenues and the share of public spending responsibilities while providing an incentive to protect sub-national public assets. In *Australia* and *New Zealand*, where national governments compensate sub-national governments for 75% and 60% of the cost of public infrastructure reconstruction respectively, there is some evidence that these arrangements have hampered the take-up of insurance by sub-national governments (Australian Productivity Commission, 2014).

BOX 6. MAIN BENEFICIARIES – FRENCH FARMERS

The National Fund for the management of agriculture risks (*Fonds National de Gestion des Risques en Agriculture (FNGRA)*) is a post-disaster financing solution for the agriculture sector. The fund provides financial support to the agriculture sector after climate and environmental events (among others). Its financing is ensured through an additional contribution to the insurance policies and a State subsidy enshrined in the budget. The amount of claims that can be reimbursed is established by the Ministries of Agriculture, Finance and Budget and the compensation is disbursed at maximum during four years after the event. Farmers can hedge themselves against climate-related risks through a *crop insurance* (established by law adopted in February 2022) which is partly financed (maximum 65%) through the national risk management and technical assistance programme, co-financed by the EU under FEADER. The government provides a guarantee against natural catastrophes. As of 2020, more than 30% of agricultural land was covered against climate risks via the crop insurance.

Source: <https://www.franceassureurs.fr/assurance-protege-finance-et-emploi/assurance-protege/le-fonds-national-de-gestion-des-risques-en-agriculture/>.

<https://agriculture.gouv.fr/la-gestion-des-risques-en-agriculture>.

<https://agriculture.gouv.fr/la-reforme-de-lassurance-recolte-est-adoptee-par-le-parlement>.

3.5. TRANSPARENCY AND MONITORING

Transparency and monitoring imply tracing disaster-related public spending *ex-ante* (for civil protection, disaster prevention, mitigation) and *ex-post* for disaster risk financing. As for all public policies, the implementation of disaster risk financing to increase financial resilience to climate change could require having established independent bodies entrusted to analyse climate-related policies and make recommendations to enhance the overall climate policy outcomes or in triggering escape clauses (Box 8).

Civil protection budgets provide an illustration of the challenges to ensure transparent budgeting and monitoring of what is a small part of disaster-related spending. Spending for civil protection is not easy to trace as different public services work under the same public policy. For instance, the French civil protection policy is a transversal policy made of 10 budget programmes. The 2022 State budget allocated EUR 1.3 billion to civil protection. However, civil protection financing relies to a large extent on local governments as in 2020 it had amounted to EUR 5.16 billion. The observed and projected increase in civil protection interventions related to weather and climate-related events in 2022 has rung the bell in favour of increased budgets. At the same time, the 2022 EU Council conclusions on civil protection work in view of climate change⁸ called for the development of “adequate prevention and preparedness actions, including ensuring the availability of sufficient capacities, aimed at the risks resulting from climate change such as forest fires and flooding, that both constitute an increasing risk for Union citizens” and for the Commission “to ensure that the impacts of climate change are systematically taken into account throughout the disaster management cycle”.

⁸ [Council conclusions on civil protection work in view of climate change, 26 August 2022.](#)

BOX 7. A ROLE FOR THE INDEPENDENT BODIES

The *French* High Climate Council (HCC) is an independent body established in 2018 and having the mandate to issue opinions and recommendations on the implementation of mitigation measures and policies and on the overall consistency of climate policies with environmental objectives in France.

The implementation of the French climate strategy is laid out in two documents: the National Strategy for Low-Carbon Emissions and the National Adaptation Plan. Each ministry was asked to translate into own climate plans the operational measures implementing the part of the national climate strategy in their perimeter. The HCC has issued so far an opinion on the plans presented by three ministries (Agriculture, Environment and Economy and Finances), aiming to assess their contribution to the overall climate strategy and to assess their strengths, weaknesses and improvements. The ultimate goal of the exercise is to increase ministerial ownership and commitment towards climate action.

The plans give the cost of some of the envisaged adaptation measures but this cost is not linked with an estimation of the adaptation needs.

The HCC recommendations aim to improve the content of the ministerial plans in terms of proposed measures, indicators to assess and monitor progress with implementing climate objectives and quantified financial needs and to better articulate them with the National Climate Strategy and National Adaptation Plan. The four recommendations are:

To enforce the link between the national climate strategy and adaptation plan with the ministerial plans

To make the ministerial plans recurrent and to define how they will be monitored and revised

To link actions with quantified objectives

To improve coordination across ministries

Source: https://www.hautconseilclimat.fr/wp-content/uploads/2021/12/HCC_Avis-plans-climat.pdf (2021).

The 2017 reform of the *Czech* fiscal framework allows deficit increases, budget reserves and one-off revenues to cover disaster financing. The Czech fiscal council is involved in the classification of one-off measures.

In *Latvia*, the Fiscal Discipline Council elaborates on fiscal risks (mainly related to financial stability and state-owned enterprises) in its annual surveillance reports. In its 2021 report, the Council has also agreed with the fiscal buffer of 0.1% of GDP proposed by the Government for 2022 in accordance with the Latvian Fiscal Discipline Law. A separate by-law of 2014* prescribes how fiscal risks should be managed and calculated.

* [Regulation No. 229 regarding the general management of fiscal risks and methodology for determining the amount of fiscal security reserve, 29 April 2014.](#)

4. CONCLUSIONS

Past disaster loss data shows that Disaster Risk Financing needs are different across the EU Member States, as they are not confronted with the same types or frequency of disasters because of their geographic location. The size of the economy will also influence the relative impact of disasters when expressed as percentage of GDP. However, all EU Member States are affected to some extent, and this will likely worsen in the future because of climate change.

Public authorities need to know more about the fiscal cost of disasters, past and future. Information about the past is valuable to gauge the effectiveness of the DRF strategy and to provide, albeit very roughly, a proxy about the future in the absence of alternative estimation methods. Collecting and generating quantitative data on the fiscal cost of disasters and the government disaster-related contingent liabilities is a cornerstone in the design of DRF. For this, public authorities would need to work together across many different competence fields, while also giving a proper place to scientific evidence and research.

National fiscal frameworks can play an important role to reflect transparently such costs and fiscal risks (from explicit and implicit contingent liabilities) in the macroeconomic projections and national budgets. As disaster insurance is largely available in EU Member States, national fiscal frameworks could usefully reflect insurance coverage and its contribution to limiting the fiscal cost of disasters. National fiscal frameworks could also provide information on the resources allocated to cover the fiscal cost of disasters over a multi-annual programming horizon. Thus, the scope of national fiscal frameworks would be more encompassing, making them a tool for policy makers across different policy areas.

The incentives created by the national choices on how to cover disaster costs need to be carefully weighted. Research shows that disaster prone countries have an economic advantage if disaster insurance is widely used. However, evidence from EU Member States shows that insurance coverage was insufficient in past events, a situation that persists when simulating future disasters. Moreover, a broad availability of ex-post compensation (where the government is *de facto* the insurer of last resort) may reduce the incentives for potential beneficiaries to invest in risk reduction or to transfer disaster risk from the government to the private insurance market by undertaking disaster insurance, a situation known as moral hazard. This may ultimately increase the fiscal cost of financial assistance and public compensation.

In as much as disaster insurance systems are under-developed, policy-makers are faced with opportunity costs: On the one hand, ad-hoc disaster financing implies a significant demand for short-term resources, which would have to be diverted from other policy areas or increase debt. On the other hand, there is also an opportunity cost to pre-arranged financing commensurate to the disaster cost, as the timing and size of the latter are hard to predict. The national DRF will be a mix of available instruments: disaster insurance, budgetary tools, other financial instruments.

Given all the challenges that come with the design and implementation of national DRF, EU Member States would benefit from exchanging on their national arrangements and from exploring practices in non-EU countries. Taking stock of the national disaster risk management strategy and disaster risk reduction measures would enhance DRF and inform public authorities about the national approach to manage and limit the fiscal cost of disasters. Better knowledge across EU Member States would facilitate cross-country comparisons along the five key elements leading to a DRF strategy.

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