

# Assessing Financial Protection against Disasters: A Guidance Note on Conducting a Disaster Risk Finance Diagnostic

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Disaster Risk Financing  
& Insurance Program



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Disaster Risk Finance Diagnostic:  
Assessing Country Financial Protection Against Disaster Risk

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**GFDRR**  
Global Facility for Disaster Reduction and Recovery

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# ABBREVIATIONS

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ADB	Asian Development Bank
AEL	annual expected loss
CIMA	Conférence Interafricaine des Marchés d'Assurances
DRM	disaster risk management
CPEIR	Climate Public Expenditure and Institutional Review
ECLAC	Economic Commission for Latin America and the Caribbean
FTS	Financial Tracking Service
GAR	Global Assessment Report on Disaster Risk Reduction
GDP	gross domestic product
GFDRR	Global Facility for Disaster Reduction and Recovery
GIS	geographic information system
IMF	International Monetary Fund
MoF	ministry of finance
PDNA	Post-Disaster Needs Assessment
PML	probable maximum loss
PEFA	Public Expenditure and Financial Accountability
PER	Public Expenditure Review
UNISDR	United Nations Office for Disaster Risk Reduction



# Executive summary

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The World Bank and Asian Development Bank have worked in more than 50 countries to (i) quantify the economic and fiscal impact of disasters; (ii) take stock of existing mechanisms to finance these costs and analyze their legal and institutional underpinnings; (iii) review aspects of the insurance and capital markets that are relevant for disaster risk finance; and (iv) estimate potential funding gaps following disasters. This note provides guidance on how to conduct such a diagnostic exercise in a systematic and comprehensive manner, covering the following areas:

1. **Assessments of the impact of past disasters:**
  - **The economic, fiscal, and social impact of disasters.** Collates information on the impacts of past disasters based on historical data and/or simulated impact data from catastrophe risk models and relevant reports.
2. **Assessment of the current approach to disaster risk finance, including**
  - **Legal and institutional foundations for disaster risk finance policies and instruments.** Analyzes the existing legal and institutional framework that defines and governs mandates, responsibilities, budget execution, and accountability within a government for financial protection against disasters.
  - **Portfolio of disaster risk finance mechanisms.** Uses the risk layering framework to document existing disaster risk finance instruments (including those used by development partners) and related funding amounts.
  - **Framework governing resource mobilization and execution.** Reviews processes for the mobilization and execution of disaster risk finance, including for both government and donor-funded mechanisms.
  - **Cost-sharing arrangements.** Analyzes explicit and implicit cost-sharing arrangements for disaster response between the national and subnational governments.
3. **Review of domestic insurance and capital markets.** Reviews the legal and regulatory framework for catastrophe risk insurance; reviews market-based financial instruments available to homeowners, farmers, and businesses to protect their assets and livelihoods against disasters.
4. **Funding gap analysis.** Analyzes historical data in order to estimate the fiscal funding gap, defined as the difference between estimated fiscal costs and funds available to meet those costs; discusses timing of expenditure requirements for relief, recovery, and reconstruction (short-term and long-term funding gaps), and timing of disasters relative to the fiscal calendar.
5. **Options for improved financial protection.** Uses the findings of the above sections to assess gaps and/or areas that need strengthening, and lays out potential next steps for the government's consideration.

# Introduction

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Disaster risk finance aims to improve the ability of governments to clarify and meet obligations arising from shocks caused by disasters while minimizing threats to development progress and fiscal stability. Increasingly, governments seek to meet this objective and manage the financial impact of disasters triggered by natural hazards in a comprehensive and strategic way. Development partners have stepped up their support for such efforts over the last 15 years, and have helped countries estimate their financial exposure, take stock of existing mechanisms to finance disaster response and reconstruction, and develop policy frameworks, implementation plans, and financial instruments to manage the financial risk from disasters efficiently.

The purpose of this note is to help development practitioners gather relevant information, conduct analysis, and present both in a standardized diagnostic framework. Such a diagnostic serves three purposes: (i) it allows governments to assess their level of financial protection against disasters and gives them an overview of current policies and mechanisms for financial protection; (ii) it serves as the foundation for identifying specific gaps and setting policy priorities for implementing reforms and introducing new financial instruments to strengthen financial resilience; and (iii) it provides the basis for new or deepened engagements on disaster risk finance by international partners, as part of the broader disaster risk management (DRM) and/or public financial management dialogue. The findings of the diagnostic can feed into the development of disaster risk finance strategies, which set out policy priorities aimed at meeting post-disaster financing needs in a strategic way.

The proposed diagnostics aim to serve as a basis for evidence-based dialogue with governments. A diagnostic can be thought of as a *living document*, to be updated as new information emerges and the dialogue advances. Rather than capturing definite findings, it can serve as an evolving repository for key disaster risk finance information for a country.

The main audience of a diagnostic is government officials, in particular from ministries of finance. While development partners will typically lead the diagnostic work, it is important to identify a technical focal point in the ministry of finance early in the process. Such a focal point will be crucial to validate preliminary findings and help coordinate the exercise.

In addition to the guidance note itself, this document comprises a questionnaire to help practitioners gather key information for a diagnostic (annex I)<sup>1</sup> and a suggested outline for a country diagnostic (annex II).

This guidance note treats five main areas: impact of past disasters (section A); current approach to disaster risk finance (section B); domestic insurance and capital markets review (section C); funding gap analysis (section D); and summary and options for consideration (section E). The sections mirror the structure of the diagnostics to which this document should give rise. Each briefly sets out the objective of the section and explains relevant concepts, discusses key information that should be captured, and lists expected outputs (e.g., graphs or tables). Where relevant, sources for important data and information will be provided.

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1. Much information will be obtainable through desk research or expert interviews and can subsequently be validated by government officials.

The proposed diagnostic approach is applicable in any country, regardless of income and capacity level. However, depending on country context, different aspects of the outlined issues may need to be emphasized. In low-income countries, for instance, foreign aid and humanitarian organizations in particular play a large part in the response to disasters; thus their role in these countries will probably receive greater emphasis than it will in middle-income countries, where a relatively greater focus on government is likely warranted. Nonetheless, the overall framework that underlies the proposed diagnostics is widely applicable, as are the questions practitioners should seek to answer at the beginning of an engagement on disaster risk finance.

Finally, in many countries data constraints may be severe and hamper the analysis of numerous factors that determine a country's level of financial protection against disaster risk. However, diagnostics based on the best available data are generally still useful for initial engagement with governments on disaster risk finance, even if they will not be as comprehensive as suggested in the guidance note.



# A. Disaster risk and the impact of past disasters

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Governments and other stakeholders are often not aware of the past or potential future scale, exact nature, and distributional implications of disaster impacts. To the extent that available data permit, a new engagement with a government on the financial risk from disasters should be based on information about the hazards a country faces, the impact of past disasters and associated losses, and assessments of disaster risk. The first section of the diagnostic note should provide this information.

## 1. Basic facts of past disasters

### 1.1 Hazard profile and history of disasters

The first step in diagnosing a country's financial vulnerability to disasters is to clarify what types of natural hazard the country faces and the frequency with which they occur at varying levels of intensity. A brief description of the country's risk profile, including its geographical location, hydrometeorological and geophysical profile, topography, and surface characteristics (such as forestation), provides the necessary context for understanding what types of hazard can occur. The risk profile can be illustrated with historical examples, which may loom large in the national consciousness (e.g., Typhoon Haiyan in

the Philippines). The history of disasters should be told in a few paragraphs. This overview of prevalent risks and past disasters can serve as a basis for initial conversations on disaster risk in a country.

### 1.2 Human toll of past disasters

Next, the human toll of past disasters should be described. This includes the number of lives lost, the number of people injured, and the number of displaced persons. An overview should be provided in a summary table. See for example table 1, taken from a disaster risk finance note for Serbia.

This information, together with information on damage and losses, is most likely held by the national statistics office or national disaster management agency. However, the quality and depth of information will vary significantly across countries.

### 1.3 Geographical distribution of impacts

Next, a description of the geographical distribution of disasters should be provided. This step helps clarify where the highest impacts of disasters can be expected in the future, and may allow for more focused disaster risk finance efforts in particularly disaster-prone areas.

**Table 1: Illustrative example - number of people affected by major disasters, by type of hazard: Serbia, 2000–2013**

Type of hazard	No. of events	No. of deaths	No. of people affected
Contamination	4	0	2,650
Drought	45	0	9,100
Earthquake	1	3,106	9,164
Epidemic	12	0	2,230
Explosion	21	4	15,353
Fire	261	228	1,536
Flash flood	6	188	6,986
Flood	234	2	122,151
Forest fire	490	0	1,947
Frost	13	0	0
Hailstorm	134	0	46,652
Landslide	42	50	1,502
Leak	12	0	100
Snowstorm	106	12	140,275
Storm	24	0	101,953
Other	16	0	5,950
<b>Total</b>	<b>1,421</b>	<b>3,590</b>	<b>467,549</b>

Source: UNISDR, Desinventar database, [http://www.desinventar.net/index\\_www.html](http://www.desinventar.net/index_www.html). Adapted from World Bank and GFDRR (2016)

Note: The Desinventar database contains information up to 2013. These figures do not include the catastrophic 2014 floods.

## 2. Existing disaster risk assessments

This subsection of the diagnostic should describe what type of risk assessments have been undertaken in the country, if any, and how up to date they are (see annex III for a discussion of risk data and models in developing countries). It should focus on the quantification of disaster risk in monetary terms.

This subsection should discuss geographical area of coverage, types of hazards assessed, quality of data, and the granularity of existing risk assessments. It should also indicate if open access catastrophe models exist. Finally, it should provide information on how, and how extensively, the results of any risk assessments have been communicated to the wider public, especially in the context of financial preparedness for disasters. This information is needed to ensure that going forward gaps can be adequately addressed.

Information is most likely available from a country's national disaster management agency, from relevant technical/research agencies and institutes (including universities), and from international partners such as the United Nations Office for Disaster Risk Reduction (UNISDR). Key questions that should if possible be answered in this subsection include the following: Does the assessment cover all types of natural hazard? Does it cover technological hazards as well? Or does it cover only a subset of natural hazards? What exposure data are captured in the model? How has vulnerability been determined?

When risk assessments or risk models are not available, a basic preliminary risk assessment can be completed using limited historical data. This can be used to inform initial discussions and analysis. The steps entailed are described in annex IV.

**Table 2: Template for table on economic impact of past disasters**

Economic impact (damages + losses), by sector	US\$	Local currency
Social		
Housing		
Education		
Health		
Culture		
Nutrition		
Infrastructure		
Water & sanitation		
Community infrastructure		
Energy & electricity		
Transport & telecommunications		
Productive		
Agriculture, livestock, and fisheries		
Commerce & industry		
Tourism		
<b>Total economic impact</b>		

### 3. Economic impact

This subsection of the diagnostic should describe the economic costs of recent disasters. This information may be available from Post-Disaster Needs Assessments (PDNAs), from regular economic monitoring reports such as the International Monetary Fund (IMF) Article IV reports, or from annual budget speeches. In some cases, however, practitioners may need to estimate economic impacts themselves using available information on physical damage and economic disruption together with available economic data. Even crude estimates can be useful for illustrating the potential economic impact of disasters in the policy dialogue with government counterparts. Estimates of total damages and losses (see box 1) should be presented in monetary terms as well as relative to gross domestic product (GDP) and government expenditure. This approach puts damage and loss estimates in context and helps determine their wider macroeconomic significance.

#### 3.1. Impact of past disasters by sector

If relevant data exist, this subsection should discuss the disaggregated impact on different sectors such as housing, transport, and agriculture, among others. Disaggregated data are often available only for disasters for which a PDNA has been conducted. Data on impacts of past disasters by sector can be presented in the format of table 2.

**Box 1: Damage vs. loss**

International organizations and governments increasingly follow a standard methodology when estimating the economic impact of major disasters. This methodology was originally developed by the United Nations Economic Commission for Latin America and the Caribbean in the 1970s and was subsequently refined by the European Union, World Bank, and the United Nations Development Programme. The methodology underpins Post-Disaster Needs Assessments and involves detailed examinations of the impacts and consequences of major disasters.

The definitions used in PDNAs are as follows:

- Damage is the replacement value of physical assets wholly or partly destroyed, built to the same standards that prevailed prior to the disaster.
- Losses are the foregone economic flows resulting from the temporary absence of the damaged assets and/or due to any other disruption of economic activity caused by the disaster.

Sources: ECLAC 2003; UNDP 2013.

## 4. Fiscal Impact

This subsection should describe the fiscal impact of major past disasters. Disasters impact government finances through additional, unplanned spending for relief and reconstruction and through declines in expected revenues. A disaster's local impact can also spread to the national economy, as insolvencies and loan defaults create a domino effect.

### 4.1. Contingent liabilities<sup>2</sup>

This subsection should describe government expenses incurred due to explicit and implicit contingent liabilities after past disasters.<sup>3</sup> If sufficient information is available to distinguish between the two, they should be described in separate subsections (see annex V for further background on contingent liabilities).

#### 4.1.1. *Explicit contingent liabilities*

“Explicit contingent liabilities are obligations based on contracts, laws, or clear policy commitments” (Cebotari 2008, 6). Hence, they include the costs of repairing and reconstructing damaged public assets and infrastructure, such as roads, bridges, hospitals, schools, and power and water infrastructure.

Information on past realizations of explicit contingent liabilities after disasters<sup>4</sup> can often be obtained from PDNAs, budget outturn documents, IMF Article IV reports, or other official reports. PDNAs include assessments of the damage inflicted on public infrastructure and other public assets and corresponding needs for repairs and reconstruction. The latter, and any costs incurred due to explicit contractual obligations that a government had to meet following the event, constitute the fiscal cost faced by the government due to explicit contingent liabilities. Contractual obligations that are triggered by disasters can include social protection payments linked to disasters, or payments linked to the public backing of catastrophe insurance schemes and institutions. They can also include the falling due of indirect obligations related to government guarantees in support of other entities—for instance, liabilities relating to a publicly guaranteed bank that finds itself under pressure as a consequence of large-scale loan defaults in the aftermath of an earthquake.

#### 4.1.2. *Implicit contingent liabilities*

Implicit contingent liabilities relate to moral or commonly recognized but nonlegal public obligations. In the context of disasters, they can include (i) search and rescue services

2. See Cebotari [2008] for a thorough discussion of contingent liabilities.

3. When analyzing relevant data, care needs to be taken to ensure that actual expenditures are analyzed rather than allocations.

4. That is, information on the explicit contingent liabilities that have actually fallen due after past disasters. The sum of these liabilities is not necessarily the same as the amount spent by a government on explicit contingent liabilities after a disaster, since a government can renege on [some of] its obligations.



and humanitarian relief; (ii) the provision of support, in particular to poorer households, to rebuild homes, replace productive assets, and provide compensation for injury and loss of life; and (iii) measures to support the recovery of the private sector, such as tax breaks and the bailout of private institutions.<sup>5</sup>

Governments sometimes choose to absorb significant implicit contingent liabilities in the aftermath of a disaster.<sup>6</sup> Implicit contingent liabilities are not defined in advance and are therefore hard to measure. An examination of past expenditure may provide some indication of the cost incurred by a government due to implicit contingent liabilities. Such information is most likely contained in budget (outcome) documents and reports by development partners, or it may be directly obtainable from ministry of finance (MoF) officials.

#### 4.1.3. Measuring explicit and implicit contingent liabilities

In practice, data on expected explicit and implicit contingent liabilities are often unavailable. In such cases, this subsection of the diagnostic should present whatever information is available on the actual total fiscal outlays due to disaster-related contingent liabilities following recent events; if possible, this information should be presented both in absolute terms and relative to reported damage and loss, to total annual expenditure, and to GDP. Recent IMF work estimates that, on average, these fiscal costs are equivalent to 1.6 percent of GDP.<sup>7</sup> Information on the fiscal costs of past disasters is again most likely found in PDNAs, budget outcome reports, IMF Article IV reports (see annex VI for an example), or other relevant reports such as regular economic and fiscal updates produced by the World Bank and the Asian Development Bank.

5. In some countries, specific government agencies are mandated and resourced to be first responders in the event of disasters, and statutory levels and types of compensation (e.g., for loss of life, destruction of homes) are predetermined, implying that such responsibilities are explicit contingent liabilities. In consequence, the split between explicit and implicit contingent liabilities varies between countries.

6. For instance, following the 2011 Tōhoku earthquake and tsunami, which caused \$360 billion in economic losses, the government of Japan spent more on economic and social support to affected communities and businesses than it did on the repair and reconstruction of public infrastructure.

7. See IMF [2016a]. It is important to bear in mind that this average masks the wide variation in different countries' fiscal costs due to the realization of disaster-related contingent liabilities. Furthermore, it is based only on events leading to fiscal costs in excess of 1 percent of GDP. These are relatively rare events, indicated by the fact that only 65 events, going back to the late 1980s, were included in the analysis. This figure should therefore not be taken as an indicator of likely disaster-related fiscal costs for any particular country.

## 4.2. Foregone revenue

Disasters also impact government finances on the revenue side. Decreased economic activity due to disasters can translate into a reduction in tax receipts, at least initially. To get a sense of foregone revenue after past disasters, several metrics can be calculated. First, actual revenue outcomes can be compared with projected outcomes. However, in countries where revenue projections tend to be poor, and where other factors may have plausibly caused a revenue shortfall, this metric may not be useful. In such instances, the deviation of actual outcomes from the projected outcome could be compared to deviations in other years instead. If revenue shortfalls from pre-disaster projections in the year after the disaster are significantly larger in percentage terms than revenue deviations in the past, this result may give an indication of the revenue shortfall caused by the disaster. But again, such an interpretation would only be sensible in the absence of other factors that could have plausibly caused or contributed to a poor revenue outcome. In practice, other factors influencing revenue outcomes are often prevalent, and it may not be possible to make accurate estimates of foregone revenue without expert knowledge. Where such expert estimates exist, they should be presented.<sup>8</sup> Table 3 provides a template for presenting the fiscal impact of a past disaster.

**Table 3: Template for table on fiscal impact of past disasters**

	US\$	Local currency
Expenditures		
Expenditures due to explicit contingent liabilities		
Expenditures due to implicit contingent liabilities		
Foregone revenue		
<b>Total</b>		

8. In addition to the issues covered in this section, a more complete discussion of disasters' impact on public finances would also include issues such as (i) donor inflows following a disaster and how they change the overall revenue impact of disasters; (ii) the impact of disasters on the government's debt position and debt sustainability; and (iii) the impact of disasters on local government finances. These topics go beyond the scope of the proposed diagnostics for which this note provides the template and guidance. If task teams want to include these impacts and quantify them nonetheless, a public finance expert should be consulted.

## 5. Impact of past disasters on the poor

This subsection should present information on the impact of past disasters on the poor, including the number of people who fell into poverty as a result of them. The definition of poverty applied should be explicitly stated in the diagnostic to help inform potential intercountry comparisons. The gathered information can be presented in the format of table 4.

**Table 4: Impact of past disasters on the poor**

Impact on the poor
Number of poor affected
Percentage of poor affected
Number of non-poor affected
Percentage of non-poor affected

## 6. Key outputs

Key outputs include the following:

1. Table on number of people affected by and number of deaths caused by major disasters, by date and type of hazard
2. Table on economic impact of past disasters; if data permit, this information can be broken down by damage and loss, and by sector
3. Table on fiscal impact of past disasters; if data permit, this information can be broken down by expenditures due to implicit and explicit contingent liabilities and foregone revenues
4. Table on impact of past disasters on the poor

Other potential outputs include a map illustrating the spatial distribution of past disaster impacts. This is likely difficult to generate without good data and expertise in GIS (geographic information system) or a similar program, but in some countries such maps could be obtained from PDNAs or potentially from universities or technical institutes.

## 7. Resources

Resources include the following:

- EM-DAT Database

<http://www.emdat.be/>

This database, maintained by the Belgian Centre for Research on the Epidemiology of Disasters (CRED), contains data on over 18,000 disasters globally since 1900. Data sources include governments, United Nations agencies, nongovernmental organizations, insurance companies, research institutes, and press agencies.

- DesInventar

[http://www.desinventar.net/index\\_www.html](http://www.desinventar.net/index_www.html)

Hosted by the UNISDR, DesInventar is a disaster information management system that can be used to analyze disaster trends and their impacts in a systematic manner. By visualizing disaster information, it also facilitates dialogue on risk management between relevant actors, institutions, and sectors as well as provincial and national governments.

- Munich RE annual statistics on natural catastrophes

<https://www.munichre.com/touch/naturalhazards/en/natcatservice/natcatservice/index.html>

Munich Re's NatCatSERVICE database, which contains more than 30,000 entries, provides a platform with a wide range of information and services on various aspects of natural catastrophes. The database analyzes and records up to 1,000 new natural hazard events each year.

- Swiss RE Sigma Explorer

[http://www.swissre.com/reinsurance/insurers/sigma\\_explorer\\_the\\_data\\_you\\_need\\_at\\_your\\_fingertips.html](http://www.swissre.com/reinsurance/insurers/sigma_explorer_the_data_you_need_at_your_fingertips.html)

The sigma explorer is an interactive, web-based app that provides access to information about catastrophes and world insurance premiums from 1970 onward.

- Post-Disaster Needs Assessments

[http://www.recoveryplatform.org/pdna/key\\_documents](http://www.recoveryplatform.org/pdna/key_documents)

<http://www.gfdr.org/sites/gfdr/files/urban-floods/PDNA.html>

<http://www.cepal.org/cgi-bin/getprod.asp?xml=/noticias/paginas/7/37037/P37037.xml&xsl=/tpl/p18f.xsl&base=/tpl/top-bottom.xsl>

<http://www.undp.org/content/undp/en/home/librarypage/crisis-prevention-and-recovery/pdna.html>

- The Global Assessment Report on Disaster Risk Reduction (GAR)

<https://www.unisdr.org/we/inform/gar>

The GAR is a biennial global assessment of disaster risk reduction and comprehensive review and analysis of the natural hazards that are affecting humanity. The linked website provides data and maps.

- Government disaster damage and loss databases

- Government economic reviews

- Fiscal risk statements

- Government sector performance reviews

- Annual budget statements

- IMF Article IV reports

<http://www.imf.org/external/np/sec/aiv/index.aspx>

- Sector-specific information from line ministries on the impact of past disasters

- Poverty data

<http://data.worldbank.org/topic/poverty>



# B. Existing legal and institutional framework and financial instruments for disaster risk finance

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## 1. Objective

This section should present an overview of the legal and institutional framework for disaster risk finance and of existing disaster risk finance instruments in the country. This overview should provide a basis for discussing potential legal, institutional, and financial reforms to strengthen the framework.

## 2. The legal and institutional framework for disaster risk finance

To start, relevant laws and institutions that govern resource mobilization and execution and the country's broader DRM framework should be reviewed and described. Broadly, three sets of laws provide the foundation for the legal and regulatory framework for disaster risk finance: budgetary, DRM, and insurance laws. Since relevant insurance laws will be discussed elsewhere in the diagnostic (see section C), this subsection should focus on the two former sets of laws. After describing the relevant legal and institutional framework, this subsection should present the referenced laws and their key provisions in a table at the end.

### 2.1. Laws governing the budget process and current practice

This subsection should list and briefly review the laws governing relevant budget processes. It should describe the responsibility of different actors with regard to post-disaster relief, early recovery, and reconstruction (including any contingent budget line requirements); it should indicate the timeline for key steps in the budget process; and it should indicate whether the actors and their responsibilities and the timeline are clearly defined. It should also review procedures governing the reallocation of budgets in the aftermath of a disaster, the preparation and approval of supplementary budgets, and rules governing the release of public resources for disaster response purposes (typically linked to the declaration of a state of disaster at different levels of government). If budget flexibility is constrained by a limited proportion of discretionary expenditure, this should be stated. Finally, any important differences between actual budgetary practice and formal processes and procedures should be noted.

### 2.2. Post-disaster budget execution

To maximize the benefits of financial resources immediately available after a disaster, governments must be able to spend them efficiently. Executing funds in a timely and efficient manner is a great challenge for many governments, even

under normal circumstances.<sup>9</sup> After a disaster, the surge in funds and the disruption wrought by the event combine to compound the challenges of execution.

Understanding budget execution processes and potential associated issues is a first step in improving post-disaster spending. This subsection should review reports that analyze the country's expenditure efficiency, including Public Expenditure and Financial Accountability (PEFA) assessments and Public Expenditure Reviews (PERs). Key issues to highlight are (i) the efficiency of public investment management in a country, as this relates to government capacity to execute reconstruction projects; (ii) the efficiency of social welfare expenditure and delivery mechanisms, as this relates to government capacity to channel relief payments through existing systems; and (iii) the expenditure efficiency of the various sectors through which emergency funds might be channeled.

This subsection should also describe any special mechanisms to expedite the execution of funds in emergency situations, including emergency procurement processes; procurement processes for disaster reserve funds; pre-agreed contracting for the provision of emergency relief and early recovery; goods and services; and special (streamlined) budget execution processes. The described processes should be compared to actual experience from recent disasters to identify any challenges to efficient post-disaster execution.

### 2.3. Law(s) on disaster risk management and disaster risk finance

This subsection of the diagnostic should review laws and regulations that govern post-disaster response more broadly, such as civil protection laws. It should also analyze/describe the following:

- Who the key actors are in disaster relief, recovery, and reconstruction, along with their responsibilities.
- Whether institutional mandates complement each other and avoid overlap.

- Whether legal provisions exist for mechanisms to coordinate action.
- Whether there are stipulations for emergency procurement procedures in the event that a national calamity is declared.
- Whether the circumstances under which a state of national disaster/calamity can be declared, and the process for declaring it, are well defined.

This point is particularly important in countries where the declaration of a state of national disaster or calamity is the trigger that activates catastrophe contingent credit lines or disaster reserve fund withdrawals.

- What the process and methodology are for assessing damages, losses, and needs after a disaster.

Such assessments are a key part of disaster response since they form the basis for post-disaster resource mobilization and allocation. If government resources are insufficient, they inform donor decisions on aid provision. The quality and speed of past assessments should also be described, together with the prescribed methodology and (where it differs) the actual methodology employed.<sup>10</sup>

- What the legal requirement is with regard to auditing of post-disaster expenditure; the extent to which post-disaster expenditure has been subject to audits in the past.
- What the requirements are for and practice of monitoring and evaluation of post-disaster interventions.

If a DRM act establishes a dedicated disaster reserve fund, this subsection should say so explicitly and review any decrees that stipulate how the fund is financed, what it can be used for, and how expenditures are accounted for.

In the unlikely case that a specific law on disaster risk finance exists, this subsection should document its implications for financial preparedness by government, households, and businesses. It should also discuss any other laws that are relevant for the mobilization and execution of resources in response to a disaster.

9. This is particularly true for public investment projects, under which post-disaster infrastructure reconstruction falls. According to the IMF, "the average country loses about 30 percent of the value of its investment to inefficiencies in their public investment processes." See <https://www.imf.org/external/np/fad/publicinvestment/pdf/PIMA.pdf>.

10. See Box 1 for more information on the methodology for Post-Disaster Needs Assessments promulgated by the European Union, World Bank, and United Nations Development Programme.

## 2.4. Institutional setup for disaster risk management and finance

This subsection should describe the institutional setup for disaster response and related financing, and should analyze the capacity of relevant institutions and the level and quality of coordination among them.

It should first review reports that examine the functioning of the MoF and the state of public financial management in the country, such as PEFA assessments or functional reviews of the MoF. This step should be complemented by interviews with the heads of key units in the MoF, such as treasury, budget, and macroeconomic management.

Next, the diagnostic should describe the nature and quality of the relationship between the MoF and other ministries involved in disaster response and related financing. The extent to which the MoF is willing to delegate oversight of funds to other ministries depends on the legal framework, but also on levels of institutional trust. Effective coordination among different ministries and agencies is crucial for disaster risk reduction, preparedness, and response, and its absence can have significant financial implications.

If a formal coordination mechanism exists that brings together key DRM actors—e.g., a national disaster risk management platform—the diagnostic should describe whether such a platform is functional; whether it exists at the political level, the technical level, or both; how often it holds meetings; what powers it has; and what its role is in determining the allocation of finance for DRM, including post-disaster response, and in making decisions around disaster risk finance policy.

Furthermore, this subsection should review the presence and role of development partners in driving the country's disaster risk finance agenda. It should describe the humanitarian response to disaster, including how this response is coordinated. In countries at risk of disasters, a wide array of organizations, including nongovernmental organizations, are often involved in response efforts. An overview of active players should be provided.

## 2.5. Local government

Local governments often have very limited revenue-raising capabilities of their own and therefore generate few resources that they can retain for post-disaster response or use to procure risk transfer instruments. This subsection of the diagnostic should discuss the role of local governments in disaster response, any rules that define cost-sharing arrangements between local and regional or national governments, financial mechanisms that local governments have at their disposal to respond to disasters, and recent disaster experience in practice from a budgetary perspective, including with regard to the speed and adequacy of transfers from the national government. Gathering this information will require discussions with a few selected local governments as well as with relevant national government agencies, including the MoF.

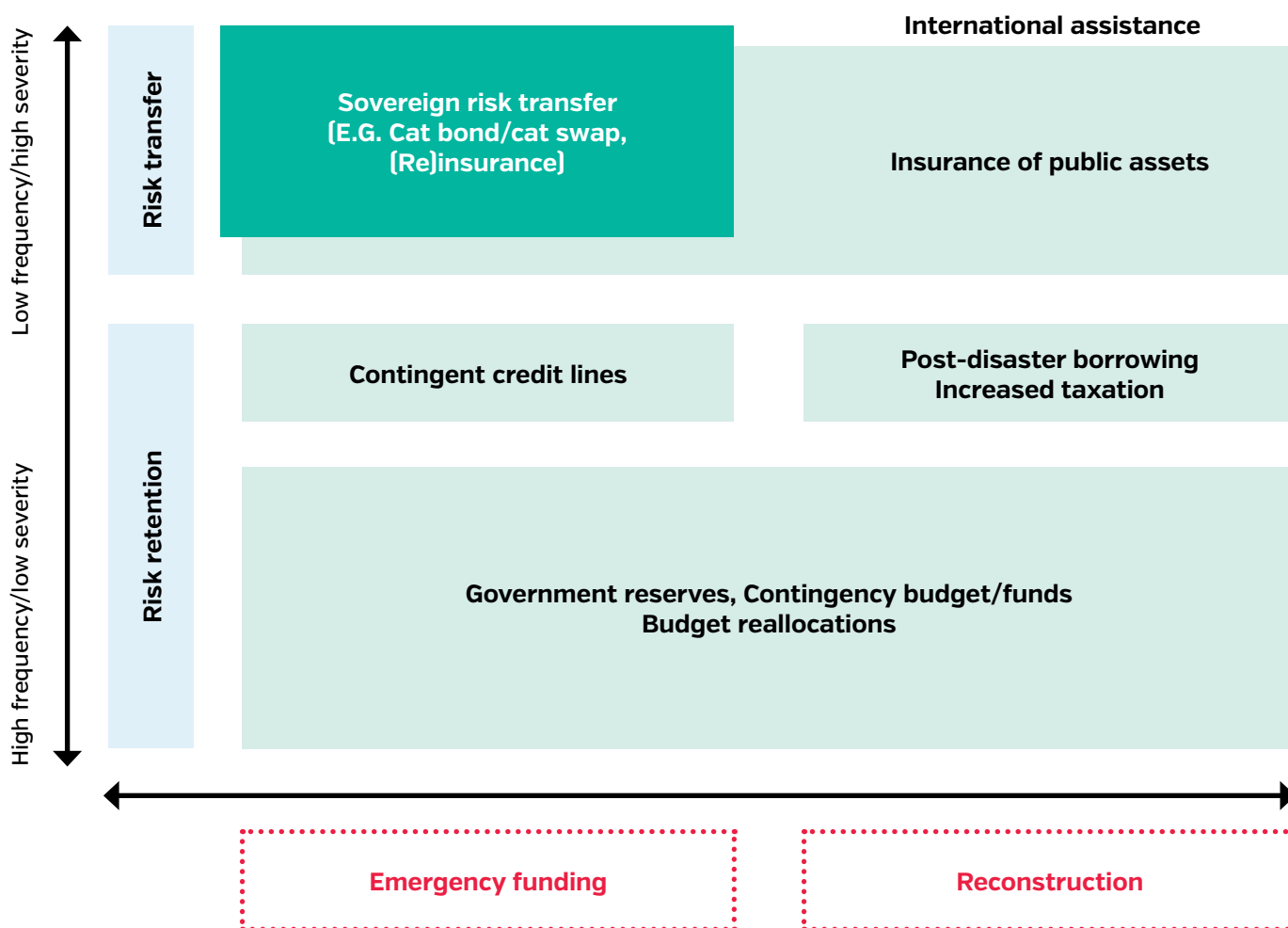
## 3. Existing disaster risk finance mechanisms and instruments

This subsection should describe how the country currently finances disaster-related expenditures. This assessment should generate a list of any financing mechanisms explicitly designed to mitigate disaster-related financial risk, as well as other mechanisms that have helped to meet the financial burden from disasters in the past, or that might do so in the future.

### 3.1. Risk layering

International experience has shown that governments should ideally combine different instruments to protect against events of different frequency and severity. Financing mechanisms can be grouped into two main categories:

1. *Retention.* The government assumes and manages disaster losses through its budgetary resources—e.g., budgetary reserves, post-disaster budget reallocations, or borrowing.
2. *Transfer.* The government transfers potential future disaster losses to financial or insurance markets by paying a premium—e.g., through traditional insurance/reinsurance.

**Figure 1: Three-tiered risk layering strategy for governments**

Source: Adapted from World Bank and GFDRR 2014.  
Note: Cat = Catastrophe

Combining different instruments to protect against events of different frequency and severity is known as risk layering (figure 1). A bottom-up approach is recommended: the government first secures funds for recurring disaster events and then increases its post-disaster financial capacity to finance less frequent but more severe events. Risk layering ensures that cheaper sources of money are used first, with the most expensive instruments used only in exceptional circumstances.

### 3.2. Ex ante vs. ex post disaster risk finance instruments

Disaster risk finance instruments can also be categorized as either ex ante or ex post financing instruments. Ex ante

instruments are arranged before an event, whereas ex post instruments are arranged after an event. The two should be combined to provide an effective package of instruments. Generally, there will be some scope for budget reallocations following a disaster, as planned investments in disaster-affected areas have to be postponed. There may also be scope for borrowing, depending on market access and existing levels of domestic and external debt. If financing needs are large, however, obtaining sufficient resources after an event can be difficult and may entail significant delays and economic and developmental costs. Putting ex ante instruments in place smooths disaster-related costs over time and can lead to better planning and processes for post-disaster expenditures.



### 3.3. Ex ante disaster risk finance instruments

This subsection of the diagnostic should describe the financing mechanisms governments have put in place to respond to disaster-related financial contingencies.

#### 3.3.1. Contingency budgets

MoF officials and/or budget documents should be consulted to determine whether the budget includes any provisions for disaster-related contingencies. If it does, further investigation is required to determine (i) the amount of annual budget allocations in recent years and how these amounts were agreed on; (ii) whether allocation amounts are discretionary or set in law; (iii) whether remaining balances can be rolled over to the next year; (iv) procedures for allocating and approving disbursements; (v) historical data on allocations to, and use of, the contingency budget for post-disaster response; and (vi) broader rates of disbursement over the budget year if contingency budget lines are available for non-disaster-related purposes as well. This last question is important because in practice, contingency budgets may provide minimal support for disaster response if they are fully utilized for other purposes relatively early in the budget year.

#### 3.3.2. Reserve funds

In some countries, general or disaster-specific reserve funds are used to meet the costs of high-frequency, low-impact disasters. In some countries, they also pay for disaster risk reduction and preparedness. If such a fund exists, this subsection should describe (i) which ministry manages it and what role the MoF plays in its management; (ii) whether the fund is on- or off-budget; (iii) how the fund is financed; (iv) how funds are managed; (v) the fund's current balance; (vi) its eligible uses; (vii) the procedures for accessing it; and (viii) the circumstances under which funds are released. Actual disbursement of the fund should also be reported, including dates and purpose. Should subsovereign disaster reserve funds exist, they should be analyzed and described along the same lines.

#### 3.3.3. Contingent credit

Some development organizations and private creditors offer contingent credit for disaster recovery and reconstruction, facilitating rapid access to financing in times when liquidity tends to be constrained. This subsection of the diagnostic

should describe any existing contingent credit lines for disaster response, and dates and purpose of any drawdowns. MoF officials should be able to provide information on contingent credit lines in place, including their size and under what circumstances they can be activated.<sup>11</sup>

#### 3.3.4. Sovereign risk transfer solutions

This subsection should describe existing sovereign and subsovereign risk transfer solutions. These can include products that protect the government's budget against fiscal shocks from disasters by transferring the risk to international insurance, reinsurance, and capital markets, for instance via sovereign risk pools, parametric or index insurance products, or catastrophe bonds. This description should include information on levels of cover and on any payouts. This subsection should also discuss to what extent public assets are insured. Any policies that govern the insurance of public assets of different government agencies should be described elsewhere (see section C). Finally, this subsection should specify whether insurance can be underwritten only by an insurer licensed, registered, or authorized to do business in the country where the insured risk is located (admitted insurer), or whether coverage can be provided by an insurance company from another jurisdiction that is not authorized by the host country's regulation to cover risks in that country.<sup>12</sup>

### 3.4. Ex post disaster risk finance instruments

Governments typically meet part of their post-disaster financing needs through budget reallocations, tax increases, or increased borrowing. This subsection should discuss ex post risk finance instruments used after past disasters and describe any bottlenecks that were experienced in the mobilization of funds.

11. Contingent credit can typically be activated immediately following the occurrence of prespecified trigger events, such as the declaration of a national disaster.

12. Many countries restrict transaction of insurance by entities without a license. The same restrictions apply to local brokers who are intermediating on behalf of an affiliate without a license. Consequently, insurance supervisors need to determine the conditions that must be met by the local subsidiaries or affiliates to insure local risks with a nonadmitted insurer, such as prior approval from regulators, a specific registration of the existence of the insurance, use of a local placement broker, or the payment of insurance premium taxes locally by the local insured or local broker.

### 3.4.1. Budget reallocations

This subsection should describe the mechanics of budget reallocation, including

- Regulations regarding reallocations within existing budget lines at the discretion of the budget line holder (e.g., a line agency), including any limits on amounts
- Regulations regarding reallocation between budget lines and government agencies, including any limits on amounts
- The approximate amount of time it takes to pass a supplementary budget
- Historical data on the scale of post-disaster reallocations
- Historical experience regarding any hurdles and delays faced by government in implementing post-disaster budget reallocations<sup>13</sup>

The process described should be compared to actual experiences from recent disasters in order to identify existing challenges and potential reforms to address them. Data on reallocations—and particularly on reallocations within budget lines (e.g., within operations and maintenance budgets of line agencies)—may be difficult to obtain. Supplemental budget statements and related speeches may contain information on any substantive reallocations between government agencies. Budget speeches for subsequent years may also provide an overview of post-disaster reallocations.

### 3.4.2. Tax increases

Tax increases are another way to finance increased expenditure needs after disasters. Their effectiveness depends on various factors, including a country's tax base, tax compliance, and tax collection capacity. However, they can be politically costly and potentially aggravate the economic stress caused by the disaster itself. This subsection

of the diagnostic should indicate whether the government has increased taxes after past disasters, and provide details on the specific taxes concerned, rate increase(s), amounts collected (and, for comparison, equivalent figures from past years), how long it took to implement the tax increase(s), and the time period for which the increased rate(s) remained in place.

### 3.4.3. Post-disaster borrowing

Governments may borrow to finance disaster costs, depending on their access to capital markets and their creditworthiness. This subsection should describe whether raising money from private lenders or official donors is an option for post-disaster financing, and to what extent this approach figures in official planning (e.g., in the government's debt management strategy). This subsection should also describe any constitutional or other legal constraints on borrowing, such as rules on the debt-to-GDP ratio or deficit spending. It should report as well on any past post-disaster borrowing, including any bond issues, and on the implied consequences for levels of debt and, if relevant, credit ratings.

### 3.4.4. Donor presence and assistance<sup>14</sup>

Development partners and their activities affect how governments plan financially for disasters. This subsection should describe the financial resources and mechanisms donors can mobilize in post-disaster situations. In some low-income countries, the number of international actors active in post-disaster response might be large. For such environments, or environments where instruments target the population directly, this subsection should provide information on the targeted groups and targeting mechanisms through which resources are channeled to recipients. It should also include details on international assistance provided in response to recent disasters, including how long it took donors to mobilize and disburse pledged funds.

<sup>13</sup> Minor reallocations are often within the discretion of individual line agencies, particularly as regards recurrent spending.

<sup>14</sup> There is much innovation around donor-financed ex ante mechanisms for disaster response. For example, within the humanitarian community the provision of in-kind assistance sometimes occurs through forward purchase facilities, allowing purchases of commodities in advance of emergency needs. These have reduced delivery times and achieved greater cost-efficiencies, as well as supported the piloting of alternative procurement and financial management arrangements. Innovations such as storage pre-positioning, pre-contracts with financial institutions for cash delivery, and work around virtual food reserves might also be relevant in certain countries. If so, such mechanisms could be described under a separate heading within subsection 3.3.

**Table 5: Amount of funds available for disaster response – the example of Serbia in 2016**

Disaster risk	Financing source available	Amount of funds available
High-risk layer (e.g., major floods, major earthquakes)	Donor assistance	Unpredictable and unreliable (e.g., in 2014 the total commitment was €235 million, often in kind)
	Emergency borrowing	Unpredictable (e.g., €227.5 million drawn from World Bank for 2014 floods emergency recovery)
	Insurance of public assets	Unclear but very low
Medium-risk layer (e.g., regional floods, minor earthquakes)	Contingent financing	Not currently available [US\$100 million CAT DDO is in early preparation]
Low-risk layer (e.g., localized floods, droughts, landslides)	Budget funds: permanent budgetary reserve	€17,000 [originally budgeted, increased one-off by 2014 supplementary budget to almost €20 million]
	Budget funds: compensation for damage caused by the natural disasters [account 484]	€700,000 [originally budgeted, increased one-off by 2014 supplementary budget to approximately €1.5 million]
	Budget reallocation	Unclear [10 percent of each appropriation available immediately; higher if supplementary budget is passed]

Source: World Bank 2016.

Note: CAT DDO = Development Policy Loan with a Catastrophe Deferred Drawdown Option

### 3.4.5. Tabulation of disaster risk finance instruments

A table with available financing sources and amounts for the different disaster risk layers should summarize the information of this subsection. An example from Serbia is given in table 5.

## 4. Key outputs

Key outputs include the following:

- Table of relevant laws and their key provisions
- Table of existing disaster risk finance sources and amounts, organized by risk layer

## 5. Resources

Resources include the following:

- Legislative and regulatory databases
- Existing institutional reviews

- Hyogo Framework for Action National Progress Reports  
<http://www.preventionweb.net/english/hyogo/progress/reports/>

These reports assess levels of progress achieved in implementing the five priorities of the Hyogo Framework for Action 2005–2015. Going forward, they will likely be supplemented by progress reports on the implementation of the Sendai Framework for Disaster Risk Reduction 2015–2020.

- Project documents of donors
- Government budget documents
- BOOST databases

<http://wbi.worldbank.org/boost/boost-initiative>

BOOST facilitates user-friendly access to budget data in about 40 countries as of mid-2016. Data sets typically contain information on the approved budget, revised budget, and actual expenditure amounts broken down by (i) government level; (ii) administrative unit; (iii) subnational spending unit; (iv) economic classification; (v) functional classification; (vi) program classification

(if the country uses program-based budgeting); and (vii) financing source.

- Public Expenditure Reviews

<http://wbi.worldbank.org/boost/tools-resources/public-expenditure-review>

- Climate Public Expenditure and Institutional Reviews (CPEIRs)

<https://www.climatefinance-developmenteffectiveness.org/CPEIR-Database>

Using the PER methodology, CPEIRs carry out systematic qualitative and quantitative analyses of a country's public expenditures as they relate to climate change. CPEIRs present evidence on public expenditures across all ministries, and review a government's climate change plans and policies, institutional framework, and public finance architecture. Since 2016 the methodology has also been used in DRM public expenditure and institutional reviews.

- PEFA assessments

<https://pefa.org/>

PEFA is a methodology for assessing public financial management performance with quantitative indicators. PEFA is designed to provide a snapshot of this performance at specific points in time using a methodology that can be replicated in successive assessments, hence providing a summary of changes over time.

## 6. Indicative list of key counterparts to meet

1. Ministry of Finance
  - Budget Department
  - Macroeconomics/Fiscal
  - Treasury/Debt
  - International cooperation
2. Ministry of Planning
3. Ministry of Public Works
4. Ministry of Transport
5. Ministry of Energy
6. Ministry of Rural Development
7. Ministry of Environment
8. Ministry of Agriculture
9. National Disaster Management Agency
10. Ministry or department that oversees subnational governance
11. Department or agency that oversees state-owned enterprises
12. Ministry or agency responsible for food security
13. Managers of provident/pension funds<sup>15</sup>
14. Development partners
15. Local government (small sample)

<sup>15</sup> In some countries, special arrangements may exist that allow for emergency withdrawal of retirement funds to expand social safety nets after a disaster. In such cases, the fund managers should be consulted.

# C. Domestic insurance market review

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## 1. Objective

This section of the diagnostic should review the state of the country's domestic insurance and reinsurance industry, and the relevant legal and regulatory environment governing the sector. It should provide information on key aspects of the regulatory framework, the non-life insurance penetration rate, property catastrophe insurance, agricultural insurance, and disaster microinsurance. It should assess a country's level of uptake of disaster-related risk transfer through insurance and reinsurance. The availability of disaster risk assessments, which provide the basis for the development of risk transfer products, is discussed elsewhere (see section A).

## 2. Insurance penetration and insurance market

This subsection should report on the country's non-life insurance penetration rate and trends over time, with a specific focus on catastrophe insurance. Comparisons with countries that are in the same region or that have similar characteristics, together with views of credit rating agencies, can provide useful context. This subsection should also provide information on the number of private insurers, captives, and, if applicable, government-owned insurance companies.

## 3. Regulatory environment

This subsection should provide information on whether insurance regulations are set domestically or by a regional regulatory body, such as the West African Conférence Interafricaine des Marchés d'Assurances (CIMA). It should

indicate whether there are specific laws or regulations that require the purchase of catastrophe insurance, describe local reinsurance regulations, and say whether premiums are tax deductible. The subsection should also indicate whether the country's regulations permit the sale of index-based insurance products, and whether such products are based on parametric triggers or aggregate output indicators.

## 4. Property catastrophe insurance products

Property catastrophe insurance is a key instrument of financial protection against disaster risk. It protects households and businesses, thereby also reducing a government's implicit contingent liability.<sup>16</sup> Furthermore, it offers direct cover for public properties.

This subsection of the diagnostic should provide information on the perils and market segments for which property catastrophe insurance products are available in the country, along with premium rates for different perils (e.g., residential, industrial and commercial fire, earthquake, wind, etc.). For each product line, information should be provided on whether catastrophe coverage is embedded, an endorsement, or stand-alone. Policy exclusions, deductibles, and limits of coverage should also be documented.

If parametric products are available, this subsection should describe the parametric triggers. It should also note any mandatory insurance products and, in the case of residential insurance, indicate whether mandatory purchase is tied to mortgage eligibility. It should also provide information on

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16. This is true insofar as government would otherwise support the restoration of private homes.

the percentage of commercial and residential properties that are insured against catastrophe risk.

Finally, this subsection should discuss whether public assets (e.g., buildings, infrastructure) are insured against disasters and under which conditions.

## 5. Agricultural insurance

This subsection should discuss the availability and uptake of agricultural insurance, including crop, livestock, forestry, and aquaculture insurance. It should examine government involvement in agricultural insurance, including any public or public-private schemes, premium subsidization, or loss co-sharing arrangements. It should also provide information on the cost of any public support (subsidy), if available.

## 6. Microinsurance

Microinsurance can be an effective risk transfer mechanism and an integral part of an overall disaster risk finance framework. It can provide access to post-disaster liquidity, thus protecting assets and livelihoods as well as providing funds for early recovery. This subsection should describe the kind of disaster microinsurance that exists in the country, the penetration rates, and the segments of the population and business community that are served.

## 7. Resources

Resources include the following:

- Axco reports  
<http://www.axcoinfo.com/countries.aspx>
- Reports from the Access to Insurance Initiative  
<https://azii.org/en/knowledge-centre/reports>
- Reports from the Micro Insurance Network  
<http://www.microinsurancenetworg.org/resources>

## 8. Indicative list of key counterparts to meet

1. Insurance regulator/supervisor
2. Insurance industry association
3. Banking regulator



# D. Funding gap analysis

## 1. Objective

This section should present estimates of the potential shortfall of funds a government might face after a disaster. The objective is to provide the key information required for entering into dialogue with government on potential funding gaps and options for strengthening financial preparedness for disasters. While estimating funding gaps precisely requires extensive data that are not readily available in many countries, calculations based on historical data can provide a reasonable approximation of the potential funding gaps, particularly if combined with available information on probable maximum losses. The following paragraphs provide some guidance on estimating disaster-related funding gaps and explain how to conduct a funding gap analysis with relatively little data.

## 2. Estimating funding gaps

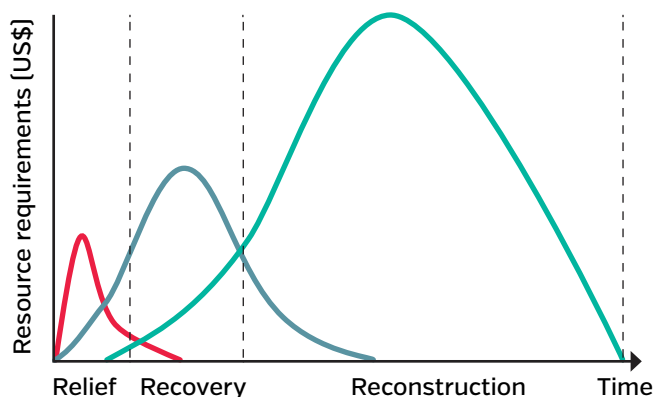
Ideally, a funding gap analysis should be based on estimated contingent liability (see section A) combined with full information on available disaster risk finance (see table 5) and should derive estimated funding gaps for different disaster scenarios. The funding gap can be derived by subtracting available disaster risk funds from the costs associated with each scenario. Estimating funding gaps precisely requires comprehensive data on public contingent liabilities for all types of hazards experienced by a country, the hazards' return periods at varying intensities, and all existing ex ante disaster risk financing mechanisms (both formal and informal), together with assumptions on the scale of fund flow from ex post disaster risk financing instruments. In the case of ex post analysis, it requires data on actual flows of funding.<sup>17</sup> Anyone undertaking this latter analysis should

bear in mind that even where all identified needs for disaster response, early recovery, and reconstruction have been met, they may not have been met in the most cost-effective or timely manner.

However, even simplified analysis, focusing solely on ex ante tools, can be useful in providing a first approximation of funding gaps as a basis for reviewing and strengthening disaster risk finance arrangements and for exploring the wider fiscal consequences of these gaps. If ex ante tools are too limited to serve as the sole basis for an analysis, it will be necessary to make assumptions about ex post options for financing post-disaster needs and to incorporate these into the analysis.

It is important to develop a clear picture of the likely relative spread of funding needs and resources over time, distinguishing between the relief, early recovery, and reconstruction phases of the response effort for each type of natural hazard (see figure 2). The consequences of the timing

**Figure 2: Timing of needs and execution of financial instruments**



Source: World Bank and GFDRR 2014.

17. It is important to remember that contingency budgets may be intended to cover all events over a particular period, and so it cannot be assumed that the full amount of funds is available for each individual event, particularly in countries that experience multiple disaster events each year.

of a disaster relative to the fiscal calendar should also be built into the analysis. Should a disaster occur at the beginning of a fiscal year, some governments may have to wait a year or more before significant funding can be disbursed for reconstruction.<sup>18</sup>

### 3. Performing a funding gap analysis in data-constrained environments

Various funding gap metrics can be calculated from relatively limited data to provide a useful first approximation of the funding gap for initial discussions with governments. Two metrics are discussed below: (i) a short-term funding gap analysis to assess the government's readiness to finance immediate and near-term emergency relief and early recovery costs; and (ii) a longer-term funding gap analysis to assess a country's ability to finance potential reconstruction needs. The note also discusses short- and long-term funding gap estimates based on (i) ex post analysis of individual past events, and (ii) analysis of hypothetical events with varying return periods derived from historical data.

#### 3.1. Short-term funding gap analysis

Past data on per capita relief and early recovery spending can serve as the basis for estimating the potential future short-term cost of responding to various types of hazard. Multiplying past emergency relief per person by the number of people a hypothetical event affects (after adjusting for growth and inflation over time) will yield an estimate of emergency relief costs.

A funding gap analysis based only on emergency relief and early recovery costs may be useful for an initial conversation with government counterparts. However, it is important to emphasize that a comprehensive funding gap analysis is required to determine the full extent of the funding gap and to provide sufficient basis for an in-depth examination of disaster risk finance options.

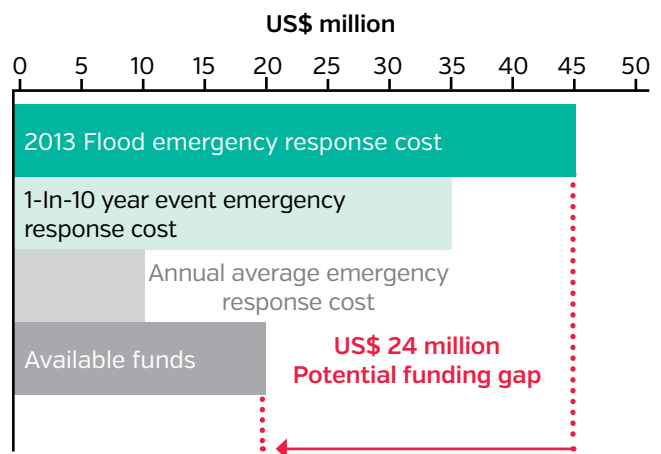
#### 3.2. Long-term funding gap analysis

To estimate longer-term funding gaps, post-disaster reconstruction needs have to be considered. If detailed data on contingent liabilities are not available, data on historical damages and on related government reconstruction spending can serve as a basis to estimate longer-term reconstruction needs. Costs can be adjusted to reflect likely increases in exposure in the intervening period (due to economic expansion) by multiplying the losses incurred in year X by a factor equivalent to  $\text{GDP}_{\text{current year}}/\text{GDP}_{\text{year X}}$ , which would also control for inflation if nominal GDP figures are used. Future levels of exposure should be based on GDP and capital asset forecasts.

#### 3.3. Funding gap estimates based on individual past disasters

Funding gap analyses based on an individual past disaster, or on several individual past events, and associated information on impact can serve as an alternative starting point for conversations with officials on the current state of financial protection against disasters. Depending on the available data, both the short- and long-term funding gaps can potentially be estimated. As discussed above, inflation and changes of exposure due to population growth and economic growth should be accounted for.

**Figure 3: Post-disaster emergency funding gap**



18. It is also important to keep in mind that funding gaps at the local level may be felt particularly acutely, even if funding gap analyses can be difficult to conduct at that level due to data constraints.



### 3.4. Funding gap estimates based on hypothetical events with varying return periods

If statistical estimates of the impact of past disasters with varying return periods are available, an analysis of funding gaps associated with events of different return periods should also be presented. A simple graphical presentation of the post-disaster emergency funding gap for events with varying return periods (i.e., with different probability of occurrence) is illustrated in figure 3. Both short-term and long-term funding gaps associated with events of varying return periods should be presented if possible.

## 4. Key output

There is one key output, a funding gap analysis graph.

## 5. Resources

Resources include the following:

- United Nations Office for the Coordination of Humanitarian Affairs (UN OCHA)

<http://www.unocha.org/>

- Financial Tracking Service (FTS)

<https://fts.unocha.org/>

FTS records all reported humanitarian aid contributions, with a special focus on humanitarian response plans and appeals.

- Global Facility for Disaster Reduction and Recovery (GFDRR) Disaster Aid Tracking

<http://gfdrr.aiddata.org/dashboard>

- See sections A, B, and C for other potential data sources.



# E. Summary and options for consideration

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## 1. Objective

This section of the diagnostic should summarize the current status of the disaster risk finance framework in the country, identify gaps, and briefly outline possible next steps the government could take to advance the disaster risk finance agenda.

## 2. Summary and gaps

The following building blocks characterize a well-functioning disaster risk finance framework:

1. Availability of relevant data and risk assessments
2. A sound legal and institutional framework for disaster risk finance
3. Financing solutions to manage disaster risk
4. Mechanisms to deliver funds to targeted beneficiaries and the ability to execute relief, recovery, and reconstruction activities in a timely and efficient manner

This subsection should briefly summarize key information gathered and presented in the previous sections, and discuss gaps in the existing disaster risk finance framework. Based on the identified gaps, possible next steps and options for consideration can be presented to the government.

## 3. Options for consideration

The purpose of a disaster risk finance diagnostic is to help governments understand their current level of financial protection against disasters, relevant legal and institutional gaps, and the limitations of their current basket of disaster

risk finance instruments. The diagnostic should also help practitioners engage with governments on policies and specific instruments to improve financial protection.

The diagnostic note should therefore conclude with recommendations and potential next steps for improving the country's disaster risk finance framework. The diagnostics will often recommend further analysis to close identified knowledge gaps and the development of a disaster risk finance strategy that sets out key reforms in a prioritized, sequenced, and comprehensive way. In general, but especially in low-capacity environments, it is important to clearly prioritize potential reforms, and to develop a realistic sequence and time frame for implementing them. Recommendations should account for contextual factors such as government capacity, relevant political economy factors, and overall government priorities.

Finally, it is worth recalling that the diagnostic is only a small step in the overall dialogue with the government on disaster risk finance. The diagnostic should help structure the dialogue and anchor it in the best initially available data and analysis. Eventually, deeper engagement can lead to a disaster risk finance strategy, which in turn will need to be followed by an implementation plan. Throughout, technical assistance may be necessary depending on the country's capacity and needs. As mentioned at the outset, the diagnostic may be most useful if treated as a living document that is updated as new information emerges, rather than a document that is published and then shelved.



# Glossary<sup>19</sup>

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**annual expected loss (AEL).** Expected loss per year when averaged over a very long period (for example, 1,000 years). Computationally, AEL is the summation of products of event losses and event occurrence probabilities for all stochastic events in a loss model.

**captive insurance.** The arrangement whereby a subsidiary company provides insurance or reinsurance for its parent.

**catastrophe bond (CAT bond).** A high-yielding, insurance-linked security providing for payment of interest and/or principal to be suspended or cancelled in the event of a specified catastrophe, such as an earthquake of a certain magnitude or above within a predefined geographical area.

**catastrophe model.** A computerized model generating a set of simulated events to calculate losses arising from a catastrophe.

**exposure.** Measure of vulnerability to loss, usually expressed in terms of sum insured, dollars, or units.

**indemnity insurance.** An insurance policy that pays claims based on the actual economic losses incurred by the policyholder.

**index insurance.** An insurance policy that pays claims based on an index. Indexes are typically chosen to be a good proxy of the economic losses incurred by the policyholder.

**insurance endorsement.** An amendment to an insurance contract which modifies the terms or scope of the original policy.

**parametric insurance.** A form of insurance that makes indemnity payments based not on an assessment of the policyholder's individual loss, but rather on measures of a parametric index that is assumed to proxy actual losses.

**probable maximum loss (PML).** The largest loss believed to be possible for a certain type of event in a defined return period, such as 1 in 100 years or 1 in 250 years.

**return period.** A statistical estimate of the average recurrence interval of a particular event—that is, the average length of time in which a particular event can be expected to occur once.

**risk layering.** The process of separating risk into tiers to allow for more efficient financing and management of risks.

**stand-alone policy.** An insurance policy that a business or individual purchases to cover a specific risk or cost. It is the opposite of an insurance policy with broad coverage that applies to a number of risks in different scenarios. For example, a standard homeowner's insurance policy covers most common sources of damage, including fire, wind, and hail. But homeowners who want protection against earthquake (for example) can purchase stand-alone earthquake insurance to cover their homes in such an event.

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19. Several of the definitions in this glossary are from Clarke and Dercon (2016) and from World Bank (2012).



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# Annex I: Disaster risk finance diagnostic— Questionnaire

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This questionnaire is designed to (i) assess a country's preparedness to manage disaster-related fiscal risks; and (ii) identify potential challenges to developing disaster risk finance strategies (e.g., legal and regulatory barriers).

The three sets of questions are intended to be directed toward three key government agencies:<sup>20</sup>

1. Questions on disaster risk management policy and strategy and disaster data should be directed to the national disaster management agency.
2. Questions on fiscal management of disasters should be directed to the ministry of finance.
3. Questions on domestic catastrophe insurance markets should be directed to the insurance regulator.

The questions listed below can be addressed (separately) both to central and local governments. The link between central and local governments in the financing of disaster relief, early recovery, and reconstruction should be carefully discussed in meetings with government counterparts.

## A. Questions for national disaster management agency on DRM policy and strategy and disaster data

1. Concerning the national DRM strategy,
  - a. Does the country have such a strategy?
  - b. If so, what is the legal status of this strategy (i.e., is it a law or advisory)?
  - c. To what extent are the actions/policies outlined in this strategy being implemented by the government?
  - d. Does the strategy mention financial arrangements for post-disaster response, including contingency budgets, reserves, and/or insurance at any scale?<sup>21</sup>
  - e. If yes to question d, how well developed are these arrangements (e.g., country is investigating options, country is developing reserve funds, country is using financial/insurance instruments)?

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20. This does not mean, however, that the questions should be directed exclusively at those three agencies. Depending on the context, some of the questions could also be directed at entities such as the central bank or securities regulator.

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21. See section B3 for information on disaster risk finance instruments.

2. Concerning the legal framework for emergency declaration,
  - a. Which government entities are vested with the authority to declare states of emergency and disaster, including regional and national declarations?
  - b. What criteria must be satisfied before declarations can be made?
3. Concerning disaster response,
  - a. What government entities execute the government's efforts in (i) disaster relief; (ii) early recovery; and (iii) reconstruction?
  - b. In cases where the government uses ex ante risk financing instruments, is there a defined process by which the receiver of funds transfers them to the entity executing the government's disaster response?
4. Concerning damage and loss data,
  - a. Is there a central database on historical damage and loss? If so, how complete are the records and how can the database be accessed?
  - b. What methodologies and systems are in place to assess and record damage and losses? Are these applied?
5. Concerning disaster response funding requirements, are records on historical disaster relief, early recovery, and response funding requirements available? If so, who holds the data?
6. Concerning disaster risk assessment and modeling,
  - a. Has any risk assessment and modeling been done in the country?
  - b. If so, (i) by whom; (ii) when; (iii) focusing on what types of natural hazard; (iv) focusing on what unit of analysis; and (v) at what level of resolution?
  - c. Which national and/or regional bodies are involved in the monitoring and collation of data on natural hazards?
  - d. Are networks in place to monitor activity (e.g., ground motion recorders, anemometers, river gauges)?

## B. Questions for ministry of finance on fiscal management of disasters<sup>22</sup>

### Assessment of fiscal shocks associated with disasters

1. Concerning contingent liability of the government,
  - a. What are the government's legal, stated contingent liabilities associated with disasters (public assets, low-income housing, guarantees, etc.)?
  - b. Historically, what implicit (i.e., socially/economically enforced) contingent liabilities has the government assumed (i.e., approved expenditure for) in the event of a disaster?
  - c. How much has the government spent annually on post-disaster response over the past 10 years or other relevant period (ideally broken down according to humanitarian relief, early recovery, and reconstruction)?
2. Concerning fiscal risk assessment of disaster shocks,
  - a. Does the government have data on historical fiscal revenue loss as a consequence of disasters?
  - b. How are losses estimated by the government and communicated to relevant authorities?
  - c. What data are included in these records?
  - d. For how many years (and/or for how many disaster events) are records available?
3. Concerning public disclosure of disaster-related fiscal exposure,
  - a. Does the government assess and disclose its fiscal exposure to disasters in its fiscal risk assessment, either voluntarily or because it is required to? If so,

22. In countries with significant devolution of post-disaster financing responsibilities, many of the questions within this section are also relevant for the highest tier of local government.

- Does the government conduct this analysis by sector (e.g., agriculture, transport infrastructure, hydraulic infrastructure, education, health, etc.)?
  - Does the government consider short-term and long-term fiscal risk from disasters?
  - Does the government account for potential fiscal shocks related to disasters?
  - Has the government identified any funding gaps in its post-disaster response (i.e., funding shortfall during relief, recovery, or reconstruction phases)?
3. Concerning a dedicated disaster reserve fund,
    - a. Does the government maintain such a fund?
    - b. If so, what is the current balance?
    - c. What amounts have been allocated to this fund over the last five years, and from what source(s) (e.g., government budget, private donations, development partners)?
    - d. For what purposes can the fund be used (e.g., disaster risk reduction, preparedness, relief, early recovery, reconstruction)?
    - e. Historically, how often has this fund been exhausted at or before the end of the year?
    - f. Please provide data on actual use of the fund over the past five years (or other relevant period).

### Ex ante disaster risk finance

1. Concerning the annual contingency budget,
  - a. What portion of the government's annual national/federal budget is allocated to a contingency line for unforeseen events?
  - b. Do local governments maintain annual contingency budgets?
  - c. Are allocations set in statute?
  - d. For what purposes can the resources be used (including any non-disaster-related purposes)?
  - e. Who manages/controls access to these budget lines?
  - f. Who can access them?
  - g. How long does it take for allocations from the contingency budget to be approved and disbursed?
  - h. Can any remaining funding be rolled over across budget years?
  - i. Please provide data on actual use of the national/federal contingency budget over the past five years (or other relevant period).
2. Is there a dedicated budget line for disaster risk reduction (as opposed to a contingency line for disasters, which was covered under question 1)?
3. Concerning a dedicated disaster reserve fund,
  - a. Does the government maintain such a fund?
  - b. If so, what is the current balance?
  - c. What amounts have been allocated to this fund over the last five years, and from what source(s) (e.g., government budget, private donations, development partners)?
  - d. For what purposes can the fund be used (e.g., disaster risk reduction, preparedness, relief, early recovery, reconstruction)?
  - e. Historically, how often has this fund been exhausted at or before the end of the year?
  - f. Please provide data on actual use of the fund over the past five years (or other relevant period).
4. Concerning line agency funding,
  - a. Do line ministries have a dedicated budget line for disasters?
  - b. Are related budget allocations set in statute?
  - c. For what purposes can the funds be used (e.g., risk reduction, preparedness, relief, early recovery, reconstruction)?
5. Concerning contingent credit,
  - a. Does the government use any contingent credit instruments for disaster response purposes?
  - b. If so, what are the terms, conditions, and loan periods (including trigger type/level) of these instruments?
  - c. What are the return periods of the events that these funds are designed to cover?
  - d. Have the contingent credit instruments ever been triggered? If so, when and releasing what amount of funding?

6. Concerning insurance for public assets, does the government purchase any disaster insurance for public assets? If so,
  - a. Are line ministries and local governments legally required to purchase insurance for their public assets? If so, are they required to purchase cover based on replacement value?
  - b. Who is responsible for purchasing insurance (i.e., are risks pooled and insured aggregately or insured by individual managers)?
  - c. Is there any central entity that coordinates purchase of cover and provides line ministries and local governments with technical assistance in this regard?
  - d. What are the current amounts of insurance cover, premium rates, and associated premium payments? Are data available on specific assets insured?
7. Concerning other insurance, does the government purchase any other forms of insurance (e.g., sovereign parametric cover)? If so,
  - a. Who is responsible for purchasing cover?
  - b. What are the terms (including triggers) and amount of the cover?
8. Concerning risk transfer through capital markets, does the government utilize any capital market instruments to transfer risk directly to the capital markets (e.g., catastrophe bonds)? If so,
  - a. Who is responsible for purchasing cover?
  - b. What are the terms (including triggers) and amount of the cover?
- c. How long does it take to pass a supplementary budget, and if such budgets can be passed only according to fixed schedules, how often and when can they be passed?
- d. Are historical data on the scale of post-disaster reallocations readily available and, if so, from where?
- e. Has the government faced any major hurdles or delays in determining and approving post-disaster budget reallocations?
2. Concerning external assistance,
  - a. How much external assistance has been provided in response to recent disaster events (over the past 10 years or other relevant period)? Please provide data for each relevant disaster event and donor, if available.
  - b. What proportion of this assistance has been in the form of (i) grants; (ii) loans; and (iii) technical assistance?
  - c. Approximately what portion of the disaster response financing has international assistance provided?
  - d. What portion of external assistance is targeted directly at beneficiaries in the form of cash transfers or in-kind assistance?
  - e. What are the targeting mechanisms through which cash or in-kind assistance is delivered to beneficiaries?
  - f. What are the delivery mechanisms for cash transfers (e.g., the payment mechanisms of existing social protection programs) or in-kind assistance?
3. Concerning other ex post mechanisms,
  - a. What other ex post financing sources has the government used to finance disaster response (e.g., domestic and/or external borrowing, tax increases, etc.)?
  - b. How much financing has each relevant mechanism generated each time it has been used?
  - c. Approximately what portion of the disaster response financing has each relevant source provided?

## Ex post disaster risk financing

1. Concerning post-disaster budget reallocation,
  - a. Are there any regulations regarding the reallocations within existing budget lines at the discretion of the budget line holder (e.g., a line agency), including any limits on amounts?
  - b. Are there any regulations (including approval processes) regarding reallocation between budget lines and government agencies, including any limits on amounts?

## Post-disaster expenditure

1. Are historical data available on government expenditure on post-disaster relief, early recovery, and reconstruction?
2. If so, how complete is this information and how can it be accessed?

## Budget execution

1. Is there a special (streamlined) budget execution system in place for use in the event of disasters (e.g., regarding abbreviated procurement procedures)?
2. What are the key steps in the budget execution process?
3. Have any challenges or impediments in post-disaster execution been experienced? If so, of what nature and with what consequences?

## Sharing of responsibilities between federal/ national and local governments

1. What are the legal financial responsibilities of central and local governments with regard to disaster relief, early recovery, and reconstruction?
2. Does the national government have formal rules on sharing risk with local governments (e.g., on providing funding when disaster damage and losses exceed a predetermined percentage of the local budget)?
3. If so, what is the formal process for requesting national government support?

## C. Questions for insurance regulator on the domestic catastrophe insurance market

1. What is the non-life insurance penetration rate in the country in terms of premiums as a percentage of GDP?
2. Do insurance companies report on their property premium separately by personal and commercial lines? Yes or no?
3. If yes, what is the amount of property premiums written for households? For businesses? For small and medium enterprises?
4. How many personal fire (FLEXA) policies exist today in the country?
5. How many of those policies have catastrophe coverage endorsement? Which perils are covered by endorsements?
6. Concerning catastrophe insurance cover for property,
  - a. Can catastrophe insurance coverage be bought as a stand-alone policy?
  - b. Are there any requirements for catastrophe insurance imposed by law and/or regulation (e.g., compulsory catastrophe insurance for mortgages in disaster-prone areas, compulsory insurance requirements for all property dwellings)?
7. Concerning the regulatory and tax environment,
  - a. Are insurance regulations set domestically, or are they set by a regional regulatory body (e.g., West African CIMA)?
  - b. Does the country's insurance regulation permit the sale of index-based insurance products (parametric and aggregate output)?
  - c. Are premiums tax deductible?
  - d. Are premiums subject to a sales tax?

8. Concerning agricultural insurance,
  - a. Is agricultural (crop, livestock, forestry, aquaculture) insurance offered? If so, for what specific types of production, and applying what type of insurance instrument (indemnity/parametric)?
  - b. What are the levels of uptake (number of policies written) and penetration?
  - c. Does the government support this insurance in any way—for instance, via
    - Premium subsidies?
    - Co-sharing of losses?
  - d. What is the annual budget appropriation, if any, in support of agricultural insurance?
9. Concerning disaster microinsurance,
  - a. Is disaster microinsurance offered?
  - b. What is the level of uptake and penetration?
  - c. Does the government support this insurance in any way—for instance, via
    - Premium subsidies?
    - Co-sharing of losses?
  - d. What is the annual budget appropriation, if any, in support of disaster microinsurance?

# Annex II: Template outline for a disaster risk finance country diagnostic

The outline below, which follows directly from the guidance note, is the recommended structure for the disaster risk finance diagnostic. However, depending on the type and quantity of available information, not all subsections (e.g., 1.1–1.3) need to be reproduced separately, i.e., with their own subheadings. The important point is that the relevant information is presented and discussed.

## EXECUTIVE SUMMARY

## INTRODUCTION

### A. Impacts of past disasters

1. Basic facts of past disasters
  - 1.1 *Hazard profile and history of disasters*
  - 1.2 *Human toll of past disasters*
  - 1.3 *Geographical distribution of impacts*
2. Existing disaster risk assessments
3. Economic impact
  - 3.1 *Impact of past disasters by sector*
4. Fiscal impact
  - 4.1 *Contingent liabilities*
  - 4.2 *Foregone revenue*
5. Impact of past disasters on the poor

### B. Existing legal and institutional framework and financial instruments for disaster risk finance

1. Objective
2. The legal and institutional framework for disaster risk finance
  - 2.1 *Laws governing the budget process and current practice*
  - 2.2 *Post-disaster budget execution*
  - 2.3 *Law(s) on disaster risk management and disaster risk finance*
  - 2.4 *Institutional setup for disaster risk management and finance*
  - 2.5 *Local government*
3. Existing disaster risk finance mechanisms and instruments
  - 3.1 *Risk layering*
  - 3.2 *Ex ante vs. ex post disaster risk finance instruments*
  - 3.3 *Ex ante disaster risk finance instruments*
  - 3.4 *Ex post disaster risk finance instruments*

**C. Domestic insurance market review**

1. Objective
3. Insurance penetration and insurance market
2. Regulatory environment
4. Property catastrophe insurance
5. Agricultural insurance
6. Microinsurance

**D. Funding gap analysis**

1. Objective
2. Estimating funding gaps
3. Data
4. Short-term funding gap analysis
5. Long-term funding gap analysis

**E. Summary and options for consideration**

1. Objective
2. Summary and gaps
2. Options for consideration

**GLOSSARY****REFERENCES**



# Annex III: Risk data and models in developing countries

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Disaster risk finance solutions are only as reliable as the risk models that support them, and the latter are only as good as the data used to develop them.<sup>23</sup> Unfortunately, developing countries often lack adequate data to build and validate risk assessment tools, not least because gathering the necessary data sets requires large investments. Exposure data—such as information on public and private assets—are the hardest and most expensive to gather and organize. Use of satellite imagery is often the only way to gather up-to-date exposure data, but the cost of acquiring such images can be prohibitive for developing countries, unless companies such as Google provide information already in their possession free of charge for disaster risk management and other development purposes. Insofar as data on exposure exist, they may be scattered among different government ministries and other organizations that do not readily share data with each other, and they may not be backed up in a way that ensures their safety.

Where financial risk models exist, they are usually not tailored to answer governments' specific disaster risk finance questions and information needs, such as those regarding the scale of collapsed buildings or fatalities, impact on crops and food security, or consequences for the homeless population. Almost always developed for the insurance industry, these models often assess only the impact on “insurable” assets, excluding, for example, low-income housing. Exposure data may also rely heavily on official census data that often exclude infrastructure and public buildings, and that disregard unofficial settlements (such as shantytowns or squatter towns), which regularly suffer the most damage in a disaster. Even where countries can access risk modeling tools, these tools go out of date quickly; some are even born obsolete or inaccurate. For example, many models rely on census data from 10 or more years ago.

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23. This annex is adapted from World Bank and GFDRR (2014, box 11, p. 53).

# Annex IV: Undertaking a basic financial risk assessment using historical data

A basic risk assessment can be undertaken with limited historical information. The steps involved in undertaking a basic risk assessment are as follows:

1. Data collection
2. Data scaling
3. Basic statistical analysis
4. Basic risk assessment presentation
5. Advanced statistical analysis

## 1. Data collection

Information from historical disaster events that can be used in a basic risk assessment include

- Estimates of the number of people affected
- Estimates of the total damages (in monetary terms)

Databases such as EM-DAT contain information on historical disaster events. EM-DAT records events across the world that satisfy at least one of the following criteria:

- Ten or more people reported killed
- One hundred or more people reported affected

- Declaration of a state of emergency
- Call for international assistance

Data on recent major disaster events can also be drawn from Post-Disaster Needs Assessments; these data can complement or substitute for the data available from EM-DAT (or other data sources). The EM-DAT database is the best available database on historical losses, but its records are not complete (there are particular gaps in data on total damage in monetary terms), so they should be supplemented by information in national databases and DesInventar where available.

The data can be collected and presented as an *initial data series* in several ways, depending on the user requirements and on the amount and quality of available data. For example, the *initial data series* could be presented as follows:

- On a per event basis or on an annual basis. For an annual basis, the historical data estimates for all individual events in the same calendar year are summed. Note that when annual data are presented, years with zero events should also be included in the *initial data series*.
- On an individual peril basis or on an all-perils basis, e.g., flood risk only or flood, tropical cyclone, and earthquake risk. Often, where limited records are available (e.g., for only 20–50 events), more useful statistical insights can be gained by initially looking at the data on an all-perils basis.

## 2. Data scaling

The *initial data series* should be scaled to allow for an increase in population, inflation, or exposure over time, as follows:

When the *initial data series* is based on the number of people affected by a disaster, the series should be recalibrated relative to national population in the year of each event:

- For each data point, a corresponding total population figure should be assigned. For example, if the data point reflects events from the year 2000, the 2000 total population number will apply to this data point.
- Each data point in the data series should be adjusted by a factor of  $\frac{\text{Total Population}_{\text{Current year}}}{\text{Total Population}_{\text{Event year}}}$ . This adjusts for the increase in population between the date of the event and the current date.

When the *initial data series* is based on the total damages caused by a disaster, the series should be recalibrated relative to GDP in the year of each event:

- For each data point, a corresponding GDP figure should be assigned. For example, if the data point reflects events from the year 2000, the 2000 GDP will apply to this data point.
- Each data point in the data series should be adjusted by a factor of  $\frac{\text{GDP}_{\text{Current year}}}{\text{GDP}_{\text{Event year}}}$ . This adjusts for inflation and the increase in exposure between the date of the event and the current date.

Historical total population and GDP statistics can be found at <http://databank.worldbank.org/data/home.aspx>.

It may be the case that total population and GDP statistics are available for a shorter time period than the available data points. For example, disaster events could be recorded from 1963 but total population or GDP statistics available only from 1990. In such a case, the user may choose to ignore the earlier data points for which no population or GDP statistics are available (the data points between 1963 and 1989 in the example above) and remove them from the data series. The resulting series of new data points is called the *scaled data series*.

## 3. Basic statistical analysis

A number of basic statistical measurements can be made using the *scaled data series*. These can be calculated in Microsoft Excel using simple inbuilt formulas as set out in table 6.

Table 6. Basic statistical measurements

Measure	Description	Excel function
Mean (average)	The central tendency of the data points in question. Determined by adding all the data points in a series and then dividing the total by the number of data points.	AVERAGE()
Median	A simple measure of central tendency that is determined by arranging the observations in order from smallest to largest value. If there is an odd number of observations, the median is the middle value. If there is an even number of observations, the median is the average of the two middle values.	MEDIAN()
Standard deviation	A statistic used as a measure of the dispersion or variation in a data series, equal to the square root of the arithmetic mean of the squares of the deviations from the arithmetic mean.	STDEV()
Minimum	The smallest value in a data series (this could be zero).	MIN()
Maximum	The largest value in a data series.	MAX()

## 4. Basic risk assessment presentation

The results of the basic risk assessment can be presented in the form of various economic measures depending on the requirements of the user. Some suggestions for presentation of results are as follows:

- Costs in monetary terms. Results based on the number of people affected by a disaster can be converted into a monetary amount by applying a cost per person assumption to the number of people affected. For example: *Average number of people affected annually by flood \* Cost of emergency response per person following a flood event = Average annual emergency response cost for flood risk.*
- Damage costs as a proportion of total GDP. For example: *Annual average damage cost / Current year GDP.*
- Population affected as a proportion of total population. For example: *Annual average number of people affected / Current year population.*

## 5. Further statistical analysis

When sufficient data are available, a more technical statistical analysis can be completed to create a *simulated risk profile*. This could include the fitting of a distribution to the *scaled data series* using a suitable software program. Once a distribution is fitted to the scaled data series, 10,000 years of events (or more) can be simulated. Advanced statistical measurements can then be determined based on this *simulated risk profile*. *Probable maximum loss* measurements for events of different severity and frequency can be determined—e.g., losses from events with a 1-in-10-year return period (that is, events that occur once every 10 years on average and so have a 10 percent probability of occurrence in any one year).

Note that an advanced statistical analysis should be undertaken by someone with a background in statistics and experience in fitting distributions to data series.

# Annex V: Contingent liabilities—Key concepts and good practice

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## 1. Objective

Governments do not bear full responsibility for disaster risk or for the implied post-disaster relief, early recovery, and reconstruction costs should a disaster occur. Instead, both disaster risk and related responsibilities and costs are shared across government, the private sector, and civil society. A key step in assessing disaster-related fiscal risk is therefore to determine national and subnational government roles, responsibilities, and implied public contingent liabilities in the event of disasters of varying magnitude.

## 2. Forms of liability

Governments face both explicit and implicit disaster-related liabilities. They can also experience a decline in revenue as a consequence of a disaster-related slowdown in economic activity,<sup>24</sup> which they must manage simultaneously with the disaster.

Explicit contingent liabilities include the costs of repairing and reconstructing damaged public assets and infrastructure, such as roads, bridges, hospitals, schools, and power and water infrastructure. They also include sovereign liabilities linked to the public backing of catastrophe insurance schemes and institutions, and, indirectly, to government guarantees in support of other entities that could be called as a consequence of a disaster—for instance, liabilities relating to a publicly guaranteed bank that finds itself under pressure

as a consequence of large-scale loan defaults in the aftermath of an earthquake.

Implicit contingent liabilities relate to moral or commonly recognized but nonlegal public obligations. In the context of disasters, governments are widely regarded as having a moral and ethical imperative to provide search and rescue services and humanitarian relief to affected populations. Governments are also perceived as insurers of last resort, often leading them to provide further support, in particular to poorer households, to rebuild homes, replace productive assets, and provide compensation for injury and loss of life. Such support can be crucial in minimizing welfare losses and keeping government poverty reduction targets on track. Other government actions are driven by economic growth concerns, leading to measures to support the recovery of the private sector, such as tax holidays and breaks and the bailout of private institutions as a consequence of disaster-triggered near failure. Such actions can help speed up the pace of economic recovery, in turn leading to a faster recovery of fiscal revenue.

Governments sometimes choose to absorb significant implicit contingent liabilities in the aftermath of a disaster. For instance, following the 2011 Tōhoku earthquake and tsunami, which caused \$360 billion in economic losses, the government of Japan spent more on economic and social support to affected communities and businesses than it did on the repair and reconstruction of public infrastructure.

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24. It is also conceivable that a disaster can lead to a short-term decline in tax administration capacity, leading to lower revenues after a disaster.

### 3. Measuring liabilities

To develop appropriate country-specific disaster risk financing strategies, it is important to determine the nature and scale of disaster-related explicit and implicit liabilities and of the fiscal consequences of disaster-related macroeconomic instability.

The measurement of explicit contingent liabilities stemming from a disaster is straightforward in theory. National and local governments maintain updated lists of liabilities. These lists, including information on guarantee ceilings, can be reviewed to determine liabilities that could be called in either directly or indirectly as a consequence of a disaster. Contingent liabilities relating to the loss of public assets and infrastructure can also be calculated relatively easily in countries where a detailed inventory and comprehensive disaster risk assessment of public property and infrastructure are available, although the calculation is slightly more complicated where the private sector is heavily involved in basic services provision. Disaster risk assessments should take into account both the location of public assets relative to potential natural hazard events and the vulnerability of public assets. Implied potential levels of damage should be valued in terms of repair and replacement costs. These cost estimates should also reflect build-back-better principles and the precise nature of specific actions required to strengthen resilience to future natural hazards (e.g., relocation of public assets), since these will also affect the cost of reconstruction. Critical infrastructure that might undergo both temporary repairs to restore service and longer-term reconstruction should also be identified; this two-step process will have additional cost implications.

A significant share of contingent liabilities can be directly determined in countries where governments have defined their roles and responsibilities in relation to disaster-affected communities and businesses. Many governments have established statutory levels of compensation under different disaster scenarios, in particular relating to death or injury and loss of homes. However, political pressure often pushes governments to go beyond the statutory requirements in providing compensation. Expectations of compensation payments can therefore constitute an important implicit liability. An analysis of statutory requirements provides a basis to estimate the explicit contingent liability from

compensation. Past levels of compensation payments, including payments not required by law, indicate likely levels of total compensation. For other purposes—e.g., support for the recovery of livelihoods and businesses—examination of past behavior provides an indication of likely levels of compensation.

Further implicit contingent liabilities can be monitored via regular assessments of potentially vulnerable institutions. These liabilities should be addressed first and foremost through efforts to reduce the fiscal risk posed to government (for instance, via industry regulations requiring proper risk pricing of insurance premiums, adequate reserves, and insurance of mortgaged properties), rather than simply by making appropriate provision for potential bailouts.

### 4. Enhancing measurement of liabilities

Governments can enhance the measurement of contingent liabilities by passing legislation and regulations regarding post-disaster compensation to both households and businesses (and related conditionalities). This approach has the additional indirect benefit of clearly signaling the extent and limitations of public support in the event of a disaster, thereby encouraging households and businesses to recognize, and take action to manage, their share of responsibilities.

### 5. Disclosing liabilities

Governments should be encouraged to disclose their explicit disaster-related contingent liabilities. Disasters will inevitably occur; disaster risk can be estimated with increasing accuracy; and governments in more hazard-prone countries will periodically incur substantial related expenditure. The disclosure of explicit contingent liabilities thus constitutes a key step in strengthening fiscal resilience. It highlights the extent of disaster risk and the associated potential fiscal burden for which the government is explicitly liable, in turn strengthening accountability, encouraging governments to establish disaster risk financing strategies, and improving the quality and robustness of those strategies. Disclosure also forces an articulation of the forms and levels of contingent liabilities accepted by government, encouraging other

stakeholders to acknowledge and take responsibility for their own liabilities.

A government may be reluctant to disclose its explicit contingent liabilities because of concerns regarding long-term confidence in the country's economy. However, if the government releases information on its disaster risk financing strategy along with information on explicit contingent liabilities, it can assuage concerns and limit adverse market reactions.

Governments may be more circumspect about disclosing implicit disaster-related contingent liabilities, as such disclosure may create or exacerbate moral hazard. While it is important for fiscal planners to take the likely absorption of implicit contingent liabilities into account when assessing disaster-associated fiscal risk, they may prefer not to disclose this information.

# Annex VI: Example of information on contingent liabilities due to disaster found in public documents

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The text below (box 2) is taken from the IMF's July 2016 Article IV consultation report on St. Vincent and the Grenadines. The report provides no disaggregated information on past fiscal costs due to explicit and implicit disaster-related contingent liabilities. However, it mentions that about three-quarters of annual damages from disasters have been the responsibility of the government in the past. It also mentions that average annual damages from disasters triggered by natural hazards are equivalent to 1.2 percent of GDP. From these two facts, we can infer that, on average, the government has faced annual fiscal costs associated with disaster reconstruction of around 0.9 percent of GDP, with additional humanitarian response costs roughly equivalent to an additional 0.2 to 0.3 percent of GDP.

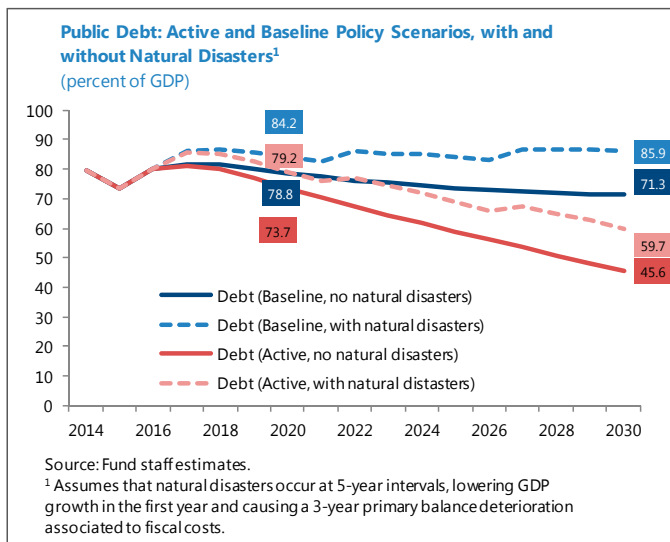


Box 2: Example of publicly available information on disaster-related contingent liabilities: St. Vincent and the Grenadines

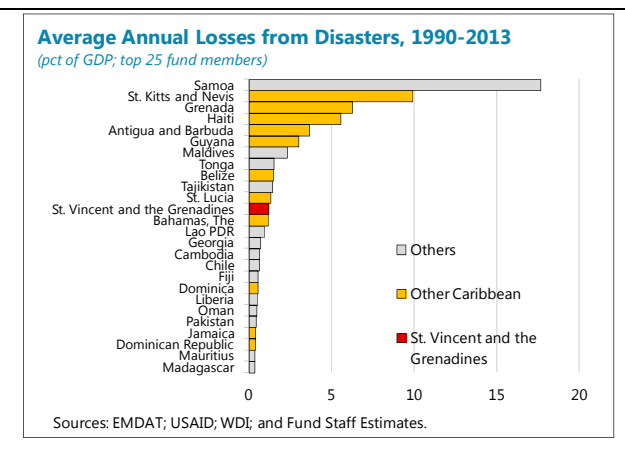
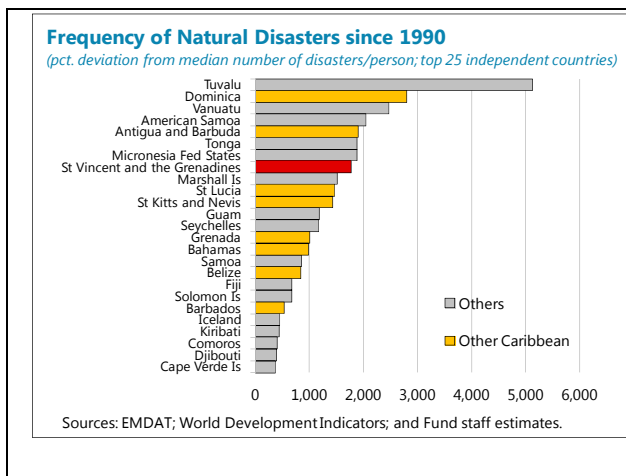
### Medium-Term Fiscal Framework

#### 14. More ambitious fiscal consolidation is needed over the medium-term to meet the authorities' public debt target of 60 percent of GDP by 2030.

- The baseline scenario is projected to result in the public debt overshooting the target. The medium-term primary surplus is projected to reach 1.6 percent of GDP by 2019 and result in a debt to GDP ratio of 71.3 percent of GDP in 2030. This reflects the projected full year impact of current revenue measures, and assumes continued expenditure restraint and no more natural disasters.



- Furthermore, if natural disasters materialize at their historical magnitude and frequency, staff projects that public debt would be even more elevated, at 85.9 percent of GDP in 2030. This is based on historical data indicating that average annual damages from natural disasters in St. Vincent and the Grenadines are 1.2 percent of GDP, of which about ¾ have typically been the responsibility of the government.



Source: IMF 2016b, 12.





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