Managing Disaster Costs

The increasing frequency and magnitude of climate-exacerbated hazards, coupled with the growing vulnerability of societies worldwide, are raising the financial costs of disasters. Governments finance a larger share of these costs through post-disaster measures. However, reducing risk and optimizing the allocation of pre-disaster resources can reduce the negative financial impact on governments.

By Simon Aebi

Scattered containers are seen at a devastated factory area after an earthquake and tsunami in Sendai, Japan in March 2011. *Kim Kyung-Hoon / Reuters*

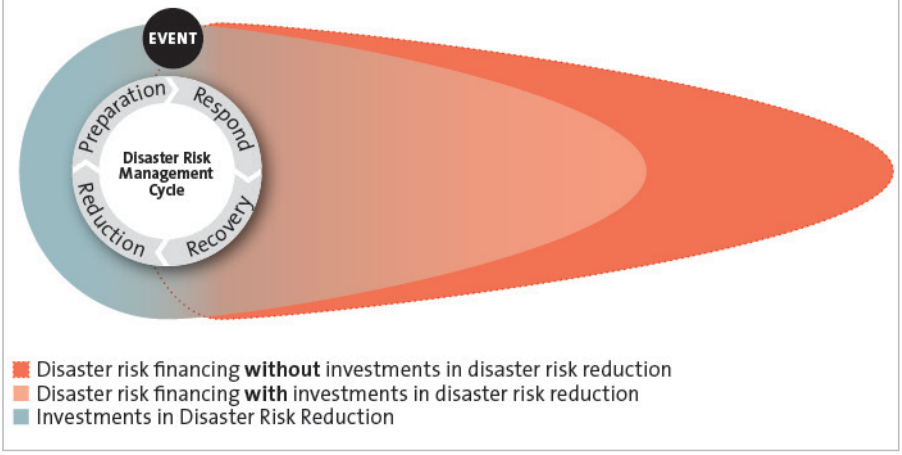
The Sendai Framework for Disaster Risk Reduction 2015–2030, adopted by UN member states in 2015, aims to reduce disaster risks and enhance resilience. The framework consists of voluntary and non-binding recommendations for disaster risk management, placing significant emphasis on the management of disaster costs. The issue of disaster risk costs has become an increasingly discussed topic within the international disaster risk community following the continuous rise in disaster costs. The reinsurer Swiss Re estimates that insured losses have increased by 5–7 per cent annually since 1992 and that global economic losses due to natural hazards have reached 275 billion USD in 2022. Disasters stemming from natural hazards have become increasingly costly, whereas population growth, urbanization, and economic growth are significant drivers of societies' higher susceptibility to financial losses. This trend is expected to continue, as the International Panel on Climate Change has again warned of global warming, which exacerbates the frequency and magnitude of climate hazards such as heat waves, storms, wildfires, and floods. Consequently, Sendai's third priority calls on governments to invest in disaster risk reduction measures to address the increasing costs of disasters. Additionally, the fourth priority highlights the importance of funding mechanisms to support the social and economic recovery after a disaster has occurred. The goal is to reduce risk to an acceptable minimum. Nevertheless, risks and their costs can never be fully mitigated, and some residual risk will remain. It is therefore crucial to understand how the financial management of disaster risks supports risk reduction and the management of the costs that arise.

Defining Disaster Costs

When a disaster occurs, costs begin to surge quickly. Responding to and recovering from a disaster requires financial means to cover the direct costs resulting from the event. Direct costs can result from emergency response, infrastructure damage, or recovery efforts and are linked directly to the event's impact. Yet, disasters can also

trigger indirect costs in the medium and long term. Indirect costs are economic and social outcomes that are not directly related with the impact of the disaster but are a consequence of it. Those costs are inherently difficult to anticipate and measure, often resulting in lost future economic output, disrupted supply chains, or impact on human well-being. Disasters and their costs affect individuals, communities, businesses, and governments. Households and businesses absorb as much of the financial impact as possible through insurance, savings, and community arrangements, while many national and sub-national governments often deal with financial implications that go beyond those capacities. Governments do so when explicitly required by laws and regulations or implicitly by moral obligation.

Allocation of Financial Resources to Disaster Risk Management



The impact of a disaster on a society or country can vary. Developing countries often experience comparably higher levels of human casualties and hard-to-overcome losses and damages, whereas more developed and industrialized nations are exposed to costly economic and infrastructure shocks. The Great East Japan Earthquake of magnitude 9 in 2011 and the Haiti earthquake of magnitude 7 in 2010 illustrate such differences. Swiss Re's Sigma Catastrophe Database estimates that the Japan earthquake claimed roughly 18,500 casualties and 250 billion USD in losses. Haiti experienced over 220,000 casualties and losses of about 10 billion USD. The difference in losses can be attributed to the reduced output of a strong economy and high asset values concentrated in Japan. While insurance covered only about 16 per cent of the losses in Japan, Haiti's losses were larger than its gross domestic product at the time. Both cases show that the costs of disasters can become staggering in a given country's context. The handling of such costs is, therefore, a paramount pillar in overcoming a disaster.

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Financing Disaster Costs

Disaster risks are managed according to the different phases of a cycle: reduction and preparation before an event occurs, and response and recovery after it does. Disaster costs surface during the response and recovery stage and require financial resources. The UN and the World Bank define the term "disaster risk finance" (DRF) as the strategies, instruments, and mechanisms that deal with these costs. The aim of a DRF strategy is to disburse the necessary financial means to the right beneficiaries at the right time. To achieve this, DRF instruments rely on two principles: risk transfer and risk retention, which are triggered when a disaster occurs. Risk transfer is the shifting of the financial risk away from the risk bearer. Insurance is the most common instrument for risk transfer and is applicable from households to governments. For governments, however, there are several different and newly emerging tools at their disposal, such as catastrophe bonds or risk pooling (see further reading). In contrast, risk retention is the absorption of costs incurred ultimately through one's own resources. For households, this could be using savings or taking out loans, while for governments, further instruments such as reserve funds or reallocating public budgets are also available.

Designing a financing strategy and implementing instruments that require pre-disaster considerations (e.g., taking out insurance or creating dedicated reserves) are essential disaster preparedness tasks that must be undertaken before an event occurs. The most referred-to approach for evaluating and designing DRF strategies is risk layering. Based on the probability and impact of hazards, risk layers are defined and adequate financing instruments are chosen to cushion the financial impact and finance the costs. In addition, instruments are chosen in a way that supports the overall disaster risk management strategy and is cost-effective by taking into consideration opportunity costs. Any DRF action taken after an event has occurred is considered post-disaster risk financing.

Post-disaster financing is used to overcome any incurred disaster costs that are not covered by or exceed pre-disaster financing. However, post-disaster financing by governments can also be the result of a lack of pre-disaster considerations or deliberate decisions. Reasons for deliberately relying on post-disaster finance include the inexistence of pre-disaster options (e.g., risks that are difficult to insure, such as a pandemic), unfeasible pre-disaster terms (too costly in terms of political will or limited public budgets), or lack of access to DRF instruments.

Reacting to Disaster Costs

Today, disaster costs are largely dealt with after a disaster has occurred and through post-disaster DRF. This is illustrated by the Organization for Economic Cooperation and Development's (OECD) estimate that between 2010 and 2019, over 95 per cent of official development assistance for disaster management was allocated to emergency response, relief, and reconstruction efforts. This assistance has mainly been attributed to developing countries and constitutes external finance enabled by international aid. Due to a lack of pre-disaster financing options and limited public budget maneuverability, developing countries rely on post-disaster financing supported by international assistance.

While developed and high-income countries tend to respond quickly to direct disaster costs, they often retain and react to the larger portion of a disaster's financial impact in the aftermath. Such countries rely on a stable political environment, strong institutions, and solid financial resources that allow easy and quick access to the needed funding. However, the large asset values and the hidden indirect costs, which are often complex or unacknowledged in the analysis, can accumulate over the medium to long term and have a significant fiscal impact, as the recent COVID-19 pandemic demonstrated. Whether it is a government's deficit or confidence in its financial resources, a dichotomy exists between managing and responding to costs. DRF plays a crucial role in transferring and retaining disaster risk costs. Nevertheless, the Sendai Framework highlights the importance of proactive risk reduction measures to address the increasing direct and indirect economic costs of disasters.

Reducing Disaster Costs

Risk reduction aims to decrease the vulnerability and exposure of people, infrastructure, and assets to hazards. Reducing risk also benefits the reduction of potential costs before they materialize. Risk reduction encompasses a wide range of approaches and can be structural or non-structural. Structural risk reduction involves modifying or constructing physical objects to better withstand hazards (e.g., building more earthquake-resistant housing or seawalls to protect coastal areas). In contrast, non-structural risk reduction includes any non-physical measures. They can entail laws, policies, education, or know-how that support risk reduction and increase resilience (e.g., policies incentivizing risk-averse behavior or offering mobile device-based hazard warning applications). Risk reduction is a cost-effective way to reduce disaster risk costs and provides multiple returns in the form of prevented financial damages when a disaster occurs. Reducing risks usually requires at least an initial monetary investment before a disaster hits. The mid-term review of the Sendai Framework, conducted in 2023, outlines that investments in disaster risk reduction are still inadequate and claims that, on average, less than 1 per cent of national budgets is used for investments in risk reduction. Therefore, parties are urged to keep reducing their reliance on post-disaster financing by increasing investments in risk reduction and preparedness.

In essence, funding needs to be available in two areas: DRF and investments in disaster risk reduction. Although the UN and the World Bank see DRF as a complementary but separate undertaking to investments in disaster risk reduction, the interdependence between the two is important. Investments in risk reduction should be ongoing in the pre-disaster stages, but this is a difficult task. Competing priorities for public budgets make it politically and economically less attractive to invest in pre-disaster risk reduction for an event that has not yet occurred. However, the question should not be whether a disaster will occur, but when and with it, recognizing that the allocation of financial resources along the disaster risk management cycle is imperative. Investments in disaster risk reduction will increase a society's overall resilience, reduce loss of life and damage, and therefore lower explicit or implicit financial liabilities that DRF needs to stem after an event. In addition, it accelerates response and recovery efforts, which, if prolonged, would create additional costs.

Furthermore, the two domains create conceptual overlaps that can be utilized for greater efficiency in overall disaster risk management. For example, DRF funding unlocked for reconstruction after a disaster should already be understood as an investment in risk reduction. The concept of "build-back-better", where damaged infrastructure is rebuilt in a way to withstand a future event better than it did in the recent one, underlines this overlap. Conversely, investing in strategies, policies, and mechanisms that strengthen the financial preparedness of households and businesses can be seen as DRF because it reduces the government's explicit or implicit exposure after an event. Moreover, the Sendai Framework emphasizes the importance of involving financial institutions and the private sector to increase financial resilience. Here, embedding (re)insurance companies and financial institutions in disaster risk reduction becomes crucial. So far, these organizations have been service providers for DRF. However, their risk expertise and central position in societies can make them essential partners in implementing risk reduction policies through private market solutions (e.g., incentivizing more risk-aware behavior through insurance premium pricing). Lastly, investments in disaster risk reduction can create spillover effects. In addition to reducing losses and damage, such investments can stimulate economic activity and support sustainable development when implemented consciously, also known as the "triple dividend of resilience".

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Earthquakes in Switzerland

In Switzerland, the Federal Office for Civil Protection considers earthquakes to be the natural hazard with the highest damage potential. The recently presented new earthquake model database of the Swiss Seismological Service estimates aggregated economic costs of building damage alone at 11–44 billion CHF over a 100-year period.

Today, only about 15 percent of buildings in Switzerland are covered by earthquake insurance (mostly voluntary). To date, there has been no political consensus between the federal government, the cantons, and the insurers to impose mandatory earthquake insurance. As a result, 18 (today 17) cantonal building insurers formed an earthquake insurance pool in 1978 that can cover up to 2 billion CHF per year for earthquake damage. However, an earthquake of magnitude 6 (statistical occurrence: once in 50–150 years) or higher could quickly exceed these capacities. For example, the magnitude 6.6 Basel earthquake of 1356 could cause more than 40 billion CHF in damage today, according to estimates by the Swiss Seismological

Further Reading

Chandan Banerjee et al., **"Natural Catastrophes and Inflation in 2022: A Perfect Storm,"** *Swiss Re Institute,* 22.03.2023.

Stefan Hochrainer-Stigler et al., **"Government Liabilities for Disaster Risk in Industrialized Countries: A Case Study of Australia,"** *Environmental Hazards* 17:5 (2018), pp. 418–435.

Conor Meenan / John Ward / Robert Muir-Wood, **"Disaster Risk Finance: A Toolkit,"** *Deutsche Gesellschaft für Internationale Zusammenarbeit Risk Management Solutions,* 2019.

Economist Impact / United Nations Office for Disaster Risk Reduction, **"Building Disaster Resilience: A Study of Disaster Events and Financial Lending Streams,"** 2023.

Service. This protection gap would most likely require subsidiary financial assistance by the federal government. In the past, several parliamentarian proposals have tried to regulate this issue, without success. The most recent and currently debated motion from 2020 calls on the Federal Council to assess a financing mechanism that does not rely on insurers and the cantons but on every building owner – namely, a contingent liability for every building owner (with certain exceptions) in Switzerland. In the event of a major earthquake, building owners would be required to pay a certain amount based on the value of their building in the reconstruction effort, underlining Switzerland's societal value of solidarity. While such an approach supports certain recommendations of the Sendai Framework, such as the promotion of funding mechanisms to respond to the financial impact of a disaster, it does not consider risk reduction.

A shift from reacting to reducing and preparing for disaster costs is needed now.

Risk reduction in the Swiss earthquake context is limited. Although there are norms for structural standards in buildings that originated in the 1970s and were updated by the Swiss Society of Engineers and Architects in the early 2000s, they are primarily aimed at saving lives and not necessarily at reducing costs. Because most buildings in Switzerland have been built before or only during this time frame, today, it is estimated that over 80 per cent of buildings have unknown or inadequate structural integrity towards earthquakes. However, no federal policy mandates these standards since building regulations are the cantons' responsibility. Recalling the benefits of risk reduction in terms of disaster costs, in addition to increased financial preparedness, could support the goal of managing earthquake risks and reemphasize the idea that both investments in disaster risk reduction and DRF must be considered to manage disaster costs.

Managing Disaster Costs

As climate change and other societal dynamics increase societies' exposure and vulnerability to the financial impacts of disasters, a shift from reacting to reducing and preparing for disaster costs is needed now. The following key points serve as a basis for managing rather than responding to disaster costs. First, investing in disaster risk reduction reduce not just the physical impact of a disaster but also its financial outcome in a more cost-efficient way than just relying on post-disaster DRF. Second, investments in risk reduction and financing the materialized costs of a disaster are interlinked and, in combination, provide the basis for managing disaster costs more effectively. Third, adequate disaster risk financing strategies and mechanisms need to be assessed and implemented before disasters occur in order to be adequate. In addition, assessing future disaster risk costs can provide a better understanding of investment opportunities in disaster risk reduction. Finally, although the Sendai Framework is primarily discussed in the context of natural hazards, managing disaster costs also applies to human-induced and man-made hazards. In order to be prepared for the financial consequences of any hazard, it is critical to incorporate disaster cost considerations into government decision-making today.

For more on perspectives on socio-technical resilience, see CSS core theme page.

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