



## A FRAMEWORK FOR MANAGING CATASTROPHIC RISKS<sup>1</sup>

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### THE CONTEXT

The costs of disasters—natural and manmade—average hundreds of billions of dollars each year and are growing. These rising costs have commensurately increased governments' liability for disasters. Absent greater investment in protective measures, losses will keep climbing due to many converging trends: ever more capital in risky locations, climate change increasing the likelihood of many extreme events, rapid technological change, and greater global mobility of a growing population.

In this Issue Brief, we pose three questions to guide the development of a framework for catastrophe risk management:

- How do we harness the strengths of the private sector in financing disaster risk?
- What are the complementary roles of the public and private sectors in promoting greater resilience?
- How do we effectively integrate risk reduction and risk transfer to provide effective protection against catastrophes?

### KEY PRINCIPLES

We propose six guiding principles for catastrophe risk management:

- All parties have a stake in the outcome.
- The private sector bears as large a share of disaster risk as they can comfortably manage.
- Financing for catastrophic damages is assisted by the public sector.
- The public sector assists low income families and communities with insurance and risk reduction.
- Risk management involves investments in risk communication and risk reduction by all parties.
- Systems are designed to accommodate changing risks.

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## THE CHALLENGE

Our current approach to financing disasters is failing families, communities, businesses, and governments. Losses are primarily financed after an event occurs. Government aid for rebuilding damaged property is often limited, substantially delayed, and ill-matched to needs. Debt and drawing down savings to finance repairs leave those impacted—particularly low and middle-income families or small businesses—financially strained.

Insurance is, therefore, an essential component of commercial, household, and community resilience: it protects those at risk financially, has the potential to encourage investments in cost-effective mitigation measures, and facilitates the rebuilding of property and long-term recovery following a disaster via timely claim payments. Yet, a large percentage of families and businesses in risk-prone areas are uninsured or underinsured against disasters. More research is needed on how to more effectively link risk transfer and risk reduction, increase take-up rates of disaster insurance, and guarantee protection for lower income households, communities, and small businesses.

The same forces that make insurance critical for those at risk also increase the challenges for supplying coverage due to the potential for extreme and correlated losses. To meet regulatory and rating agency requirements, insurers must hold sufficient capital to manage large losses. This can make disaster insurance expensive, more than those at risk are willing or able to pay for coverage. In response, the public sector has intervened in disaster insurance markets due to concerns about availability and affordability of coverage. Government involvement has taken a wide variety of forms across countries and perils: writing of first-line policies, government reinsurance and backstops, state residual markets and pools, and various regulations.<sup>3</sup>

To build resilience we not only need financing strategies that efficiently and equitably distribute the cost of catastrophes, we also need to lower the costs of future disasters through investments in cost-effective risk reduction measures. Mitigation can be complementary, increasing the insurability of the risk. Unfortunately, many individuals, firms, and communities are not well prepared for today's risks, or how they may be changing. Society thus faces the twin challenges of too few protected by insurance and too few cost-effective risk reduction measures being adopted: the *disaster insurance gap* and the *disaster mitigation gap*.

There are multiple reasons for an insurance gap and a mitigation gap:

- Relevant risk information is often unavailable or poorly communicated.
- Homeowners, businesses, and communities often don't know how to identify and prioritize risk reduction measures that are appropriate for them.
- Mitigation measures can require large upfront costs and have long payback periods and financing models may be absent or hard to access.
- Disaster insurance literacy is limited.
- There is a tendency to be overly optimistic when the sun is shining.
- Disaster insurance is sometimes unavailable by either the private or public sector or is too expensive.

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<sup>3</sup> A recent special issue of *Risk Management and Insurance Review* included a collection of papers examining disaster insurance programs: <https://onlinelibrary.wiley.com/toc/15406296/2018/21/1>

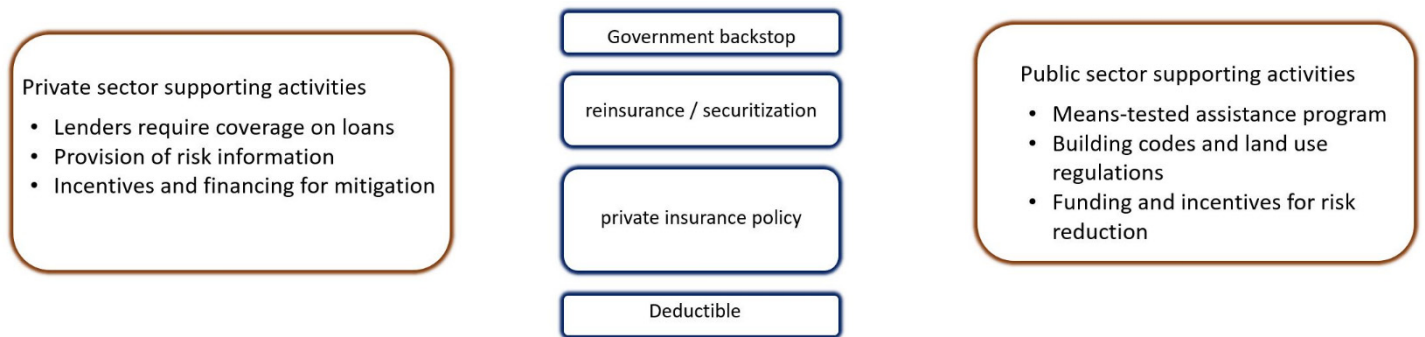
- There is a disconnect between those who benefit from economic development in hazard-prone areas and those who pay the costs following a large-scale disaster.
- Politicians are divided on how much of disaster costs should be borne by everyone and how much should fall on the shoulders of those living in hazardous areas.

This long list of confounding challenges calls for innovative policy solutions.

## THE WAY FORWARD

Figure I depicts a model for layering the financing of catastrophe losses and supporting this financing with risk modeling, risk communication, and risk reduction efforts by both the public and private sectors.

**FIGURE I. CATASTROPHE RISK MANAGEMENT FRAMEWORK**



*Note: the size of the boxes is not necessarily proportional to the amount of coverage in each layer. Figure adapted from Kousky and Kunreuther (2018).<sup>4</sup>*

The property owner or commercial enterprise at risk would be responsible for the first layer of losses through a deductible, which reduces moral hazard and creates an incentive to reduce losses. Higher deductibles would lower insurance premiums for those able to self-insure a higher portion of losses. The second layer of losses, including those from disaster perils, could be covered by private insurance with premiums reflecting risk. Banks and financial institutions could require this coverage as a condition for a loan or mortgage. The public sector could provide assistance to those in need.

The next layer of losses would be covered through private reinsurance or other forms of risk transfer. The top layer of losses that would be too large for the private sector to absorb would be covered by the public sector. Protection by the public sector could involve some degree of ex ante premiums or ex post assessments to recoup some or all of the public expenditures. The attachment point for public sector payments would need to be carefully determined so the private market is encouraged to bear as much risk as feasible. This would require a detailed market evaluation and ongoing adjustment over time.

As shown in the right-hand and left-hand boxes in Figure I, the public and private sectors would both need to engage in supportive activities to ensure comprehensive risk management. This includes planners, developers,

<sup>4</sup> Kousky, C. and H. Kunreuther (2018). "Risk Management Roles of the Public and Private Sector." *Risk Management and Insurance Review*. 21(1): 181-204.

lenders, real estate agents, local governments, and other stakeholders. They can help create a culture of risk awareness by improving risk communication and providing economic incentives for investments in cost-effective risk reduction measures.

## GUIDING PRINCIPLES

This approach is based on the following guiding principles:

- *All parties have a stake in the outcome.* All entities with an ability to influence the magnitude of a risk should bear a portion of the cost and must work together to promote a culture of risk awareness.
- *The private sector bears a larger share of disaster risk than it does today.* Due to improvements in our ability to understand, model, measure, and diversify disaster risk, the private sector can now shift to active engagement in dealing with catastrophic risks. This will create a profit opportunity for them, open new markets, and allow deployment of excess capital.
- *The public sector assists in financing catastrophic damages.* Catastrophes pose numerous challenges for insurance due to correlated losses and fat-tailed damage distributions. For risks to be insurable by the private firms, the public sector may need to cover a portion of the damages from the most extreme events. The public sector may also need to assist in closing the mitigation gap by financing risk reduction efforts for the riskiest properties. This involves integrated work with property owners and communities.
- *The public sector assists low income families and communities.* Means-tested assistance for mitigation and insurance should be made available to financially vulnerable families, small businesses, and communities located in risky areas.
- *Risk management involves investments in risk communication and risk reduction by all parties.* There is a need for relevant and transparent risk communication, risk modeling, well enforced regulations/ standards, and other cost-effective risk reduction initiatives.
- *Risk management systems are designed to accommodate changing risks.* Disaster risk management systems need to actively acknowledge changing risk and adapt and plan accordingly.

## NEXT STEPS

The challenges in operationalizing the above framework lie in the ability to adapt it to local institutional contexts and political realities. Long-term strategies need to be linked to short-term financial incentives. Decision-making biases such as myopia, amnesia, optimism, inertia, simplification, and the herding effect will need to be recognized, and communications tailored to generate understanding and appreciation of the risk. Internalizing costs for risk-taking will need to be balanced with concerns for affordability and equity.

The Wharton Risk Center's Policy Incubator will be focusing its efforts on designing specific policies and programs that promote greater resilience to evolving disaster risks. We will work closely with stakeholders and research partners to develop implementable solutions to help close both the insurance and mitigation gap.