



Closing the protection gap  
**Disaster risk financing:  
Smart solutions for the  
public sector**







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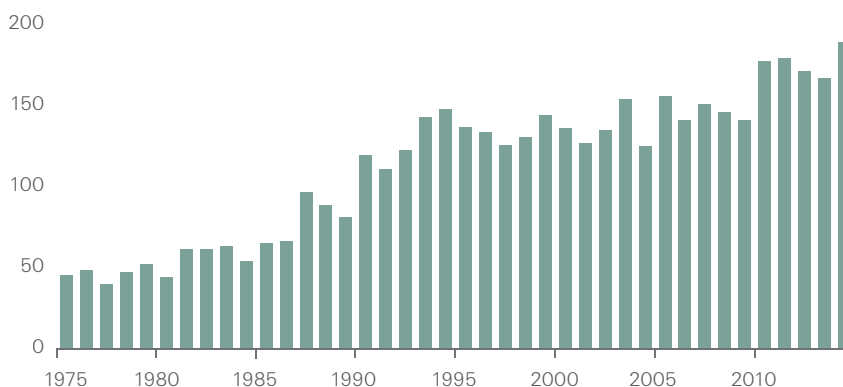
Natural catastrophes are increasing in frequency and severity. What is more, the gap between economic and insured losses has remained stubbornly large. The consequences are especially severe in emerging markets, which are both the worst hit and the least prepared.

Tools exist to narrow that gap using innovative solutions that can help countries, cities and individuals preserve hard-won development gains – even in the face of floods, earthquakes, adverse weather and other setbacks.

# Disaster risks are growing

The economic cost of natural catastrophes has increased markedly. In the 1980s, the inflation-adjusted cost of natural catastrophes averaged about USD 30 billion per year. In the 1990s this increased to USD 104 billion per year. Over the last decade, economic damage grew to an annual inflation-adjusted average of USD 182 billion.

## Number of natural catastrophes 1975–2014



Source: Swiss Re Economic Research & Consulting and Cat Perils

The human cost is equally staggering. Many millions of people are impacted by earthquakes, droughts, floods, storms and other natural catastrophes each year. Moreover, a growing share of the world's population live in regions considered highly exposed to extreme weather and natural disasters.



## Economic cost of natural catastrophes

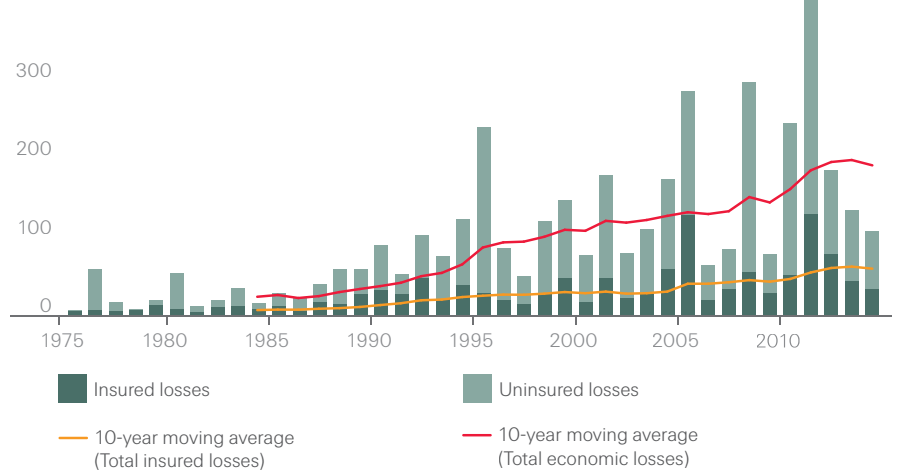
# USD 182 bn

(annual inflation-adjusted average 2004–2014)<sup>1</sup>

The increased risk is mainly due to economic development and population growth, a higher concentration of assets in exposed areas and also, increasingly, climate change. For the first time in human history more people live in urban centres than in rural areas. Many cities are on the coast and are threatened by floods and storms, while the vital agricultural sector remains exposed to weather-related events such as drought. But insurance has not kept pace. In fact, the gap between economic and insured losses has remained stubbornly large. And as a percentage of GDP, economic losses from natural catastrophes have actually gone up.<sup>2</sup> One way for governments to bridge this gap is to use insurance solutions to reduce their contingent liability from natural catastrophes and thereby protect their budgets.

## Natural catastrophe losses: Insured vs uninsured losses, 1975–2014

400 (in USD billion in 2014 USD)



Source: Swiss Re Economic Research & Consulting and Cat Perils

<sup>1</sup> *sigma* database

<sup>2</sup> *sigma* 5/15, Underinsurance of property risks: closing the gap, Swiss Re





## Disaster risks are growing

### Containing the cost of disasters

During 2010 and 2011, both Haiti and New Zealand were struck by powerful earthquakes. In fact, New Zealand was rocked by three seismic events in the Canterbury region during this period, the most damaging of which was in February 2011. The earthquakes in these countries released energy equivalent to a moment magnitude of up to 7.0. Moreover in all cases the epicentre was located near a densely populated area. In Haiti, the economic costs were at least USD 8.5 billion and in New Zealand the total economic costs of all three events amounted to around USD 31 billion.

### Starkly contrasting consequences

At that point, the experiences diverged more sharply. Haiti suffered more than 200 000 fatalities compared to only around 185 casualties in New Zealand. The damage in Haiti was tantamount to roughly 120% of its GDP, a colossal blow even for a prosperous country, let alone a highly vulnerable nation such as Haiti. In New Zealand on the other hand, the earthquakes' impact was equivalent to about 18% of its GDP. Economic growth in Haiti plunged from 3.5% to minus 5.1% in 2010 alone. And exports contracted sharply in the wake of severe damage to the country's airport, harbour, other infrastructure and manufacturing base. With insurance covering less than 1% of the losses, Haiti was almost completely dependent on foreign aid.

In New Zealand, the quakes caused disruptions to a major airport, seaports and trunk roads. Facilities for food processing and the manufacture of textiles, machinery and transportation equipment were also hit. Many service providers were adversely affected as well. While its wealth suffered as resources were used to rebuild the capital stock, economic activity rebounded quickly as a result of the rebuilding efforts. Reconstruction, inventory adjustment and a large increase in local government spending helped compensate for the disruption to economic growth. Most notably, 80% of the resulting direct losses in New Zealand were covered and reimbursed by insurance.



### Resilience through insurance

The contrast makes two points. The first point is that countries are more or less vulnerable to natural disaster risks according to their levels of preparedness and ability to absorb losses.

The second point is less obvious and concerns the years following a catastrophe. By facilitating investment and reconstruction, insurance can minimise the negative impact of natural catastrophes on economic growth, as in New Zealand. In a poorly insured catastrophe, as in Haiti's case, uninsured losses were the driver of an output decline over several years. This is consistent with the findings of a 2012 study by the Bank of International Settlements (BIS)<sup>3</sup>, which looked at nearly 2 500 major natural catastrophes that occurred between 1960 and 2011. In countries with high insurance penetration, the study concluded, the indirect costs of a natural catastrophe event are lower, the overall economic impact is lower, and these countries recover faster from catastrophic events than less-insured countries.

The rating agency Standard & Poor's (S&P) also emphasises the positive role of disaster insurance arrangements on sovereign financial resilience. The economy with higher insurance coverage recovers more quickly and suffers from a lower cumulative GDP damage than in absence of insurance coverage. For a sample of 48 countries and a hypothetical natural disaster shock equivalent to 5% of a country's capital stock, S&P estimates that credit ratings would on average decline between two and three notches if there was no insurance protection at all. This compares to a decline of only about one notch, if 50% of the damage was insured.<sup>4</sup>

<sup>3</sup> BIS Working Papers, no 394, von Peter et al (2012)

<sup>4</sup> Standard & Poor's, Storm Alert: Natural disasters can damage creditworthiness, 2015

## Similar quakes, contrasting consequences

### What do the earthquakes in Haiti and New Zealand reveal?

The key factor following a natural catastrophe is not the scale of economic losses in absolute terms but rather the impact relative to insurance coverage and GDP.

Countries are more or less vulnerable to natural disaster risks according to their levels of preparedness and ability to absorb losses.

For an underdeveloped, under-insured country such as Haiti a major earthquake can be a colossal blow, seriously hampering its ability to bounce back.

Insurance can minimise the negative financial impact of natural catastrophes and help countries recover more quickly as in New Zealand's case.

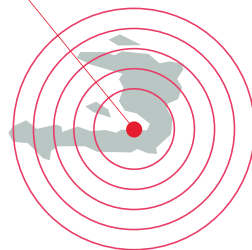
Healthy catastrophe insurance coverage with only a narrow protection gap between insured and economic losses is a key contributor to a country's financial resilience.

\*United States Geological Survey (USGS)

Source: Swiss Re

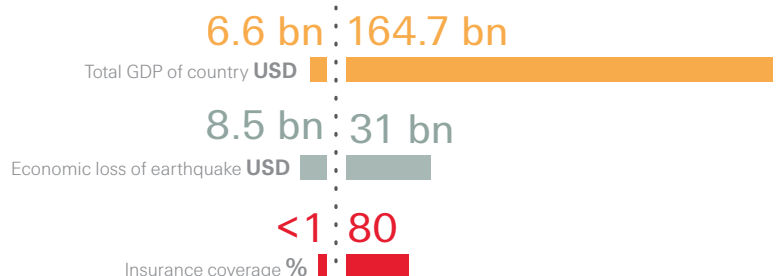
### Haiti

Date: 12 January 2010  
Magnitude\*: 7.0  
Casualties: ~200 000



### New Zealand

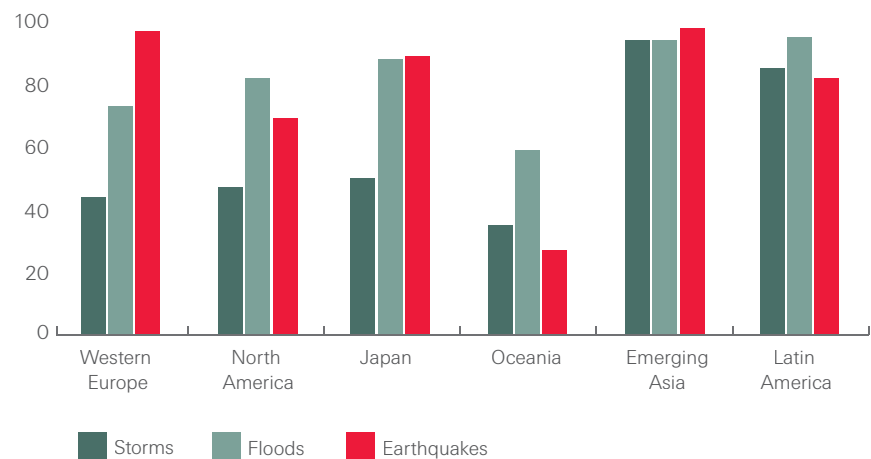
Date: 4 September 2010, 22 February 2011, 13 June 2011  
Magnitude\*: 7.0 6.1 6.0  
Casualties: ~185



# A major strain on governments

On average, over the last 10 years, only about 30% of catastrophe losses were covered by insurance. That means that about 70% of catastrophe losses – or USD 1.3 trillion – have been borne by individuals, firms and governments.

**Natural catastrophe uninsured losses as a % of economic losses, by region, 1975–2014**



Source: Swiss Re Economic Research & Consulting and Cat Perils; based on events from which insured and economic losses were known and for which total losses were larger than USD 500 million at 2014 prices.

## Natural catastrophe losses covered by insurance

# 30%

(Swiss Re estimate for the last 10 years)

## Governments can be hit in multiple ways

Governments are uniquely exposed as they not only have to shoulder the cost of relief and recovery, but also have to pay for the reconstruction of public infrastructure. And when individuals and firms are underinsured, which is generally the case in many developing economies, the government is often expected to support private rebuilding efforts by providing transfer payments as well. Closing the financial gap between insured and uninsured losses is thus in the public sector's vital interest.

Most governments seek the funds to pay for recovery only after a catastrophic event has taken place. Measures typically include reallocating budget positions, increasing taxes, accessing domestic and international credit markets, borrowing from multilateral financial institutions or (as in Haiti) soliciting international aid. All have drawbacks and take time to arrange (see table on page 7). Budget reallocation is a fast remedy, but available funds are usually small. Raising taxes can hurt an already fragile economy and people battered by a natural disaster. Borrowing can come at high cost or even be unavailable, particularly for countries with an already high debt burden and a poor credit rating. Moreover aid is often slow and unreliable.



### Pre-event vs post-event financing instruments

Pre-event measures	Advantages	Disadvantages
Indemnity insurance	Insurance payout matches loss	Needs loss assessment
Parametric insurance	Quick disbursement, low administrative cost	Basis risk <sup>5</sup> of insured
Contingent financing	Small payment upfront, guaranteed access and pre-defined pricing	Repayable and costs interest
Reserve funds	National measure, positive-ly impacts financial strength	Costly, takes many years to attain critical size
Post-event instruments	Advantages	Disadvantages
Budget	Governments can allocate funds autonomously	Limited funds, diverts resources
Raising taxes	Governments can act autonomously	Limited funds, politically sensitive, may dampen economic recovery
Debt <sup>6</sup>	Standard instrument, proven	Potentially slow and costly, often requires credit rating
Donor aid	Inexpensive	Can be slow, and amounts are uncertain

<sup>5</sup> The risk that the actual payout to the insured party in a specific loss event is lower or higher than the actual loss incurred.

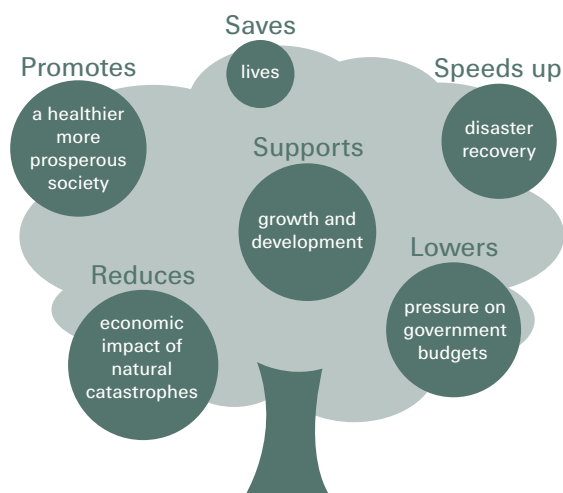
<sup>6</sup> Only available to countries with good credit standing

Based on 40 years of historical data for Latin America, the Inter-American Development Bank concluded that on average a country can expect international assistance to cover only about 8% of direct disaster losses.<sup>7</sup>

Financial preparedness, by contrast, helps to reduce the burden on the government after a disaster. It lowers the volatility of the state budget and improves planning certainty for the public sector. Today there are a variety of instruments to help close the financial gap – tools that compensate for lower crop yields when there's too much rainfall, for example, or for lower hydroelectric power generation when there's too little. Good pre-event arrangements provide certainty that funds will be quickly available and that affected parties, from governments to individuals, can bounce back.

<sup>7</sup> Swiss Re, "Natural Disasters Financial Risk Management", 2011

### Effective disaster risk management...



Source: Swiss Re



# More than one way to close the protection gap

Risk prevention and mitigation must be the first priority in managing natural disasters. Hazard mapping and comprehensive building codes, for example, serve this purpose. Such measures also save lives and protect infrastructure.

But no organisation or country can fully insulate itself against extreme events. Transferring catastrophic risk to enable and sustain growth must therefore be a key element in the financial strategy of every disaster-prone country or region – and should ideally be part of an integrated risk management approach (see box below). The G20 and OECD have recognised that “financial resilience is a critical component of disaster management”<sup>8</sup> because the immediate availability of funds to finance the necessary disaster response and recovery is critical to take appropriate action, not only for individuals and businesses, but also for governments.

In addition, the G7 Climate Risk Insurance Initiative (G7 CRII) acknowledges the role insurance can play in effective climate risk management. As a risk transfer instrument, climate risk insurance can contribute to building resilience to adverse consequences of extreme weather events.<sup>9</sup>

## Integrated risk management –

### Questions for decision-makers

Financial risk transfer is part of a comprehensive risk management approach. Integrated risk management follows four stages: from **risk identification** and **assessment** to **risk mitigation** and **adaptation**.

An integrated risk management process should include a thorough analysis of the risk landscape, including environmental, political, social and health aspects. It enables political and public sector decision-makers to determine their priorities in advance and protect communities from the financial costs of peak risks. These large risks stem not only from natural catastrophes but also from pandemics, the unanticipated impact of people living longer lives as well as from man-made disasters such as terrorism and cyber risk. A comprehensive approach allows governments to minimize risks wherever possible and transfer the costs where necessary.

Decision-makers in governments face a number of important issues on managing disaster risks. Key questions include:

1. Which potential catastrophic events is the country or region exposed to? How will these be affected by climate change and future development?
2. In which areas can disaster risk prevention be improved to reduce the potential loss (eg zone planning rules, building codes)?
3. What portion of the loss would be absorbed by the insurance sector and which by governments (at the municipal, state and national level)?
4. What are the (financial) resources that can be made available in case of an event? How quickly can they be deployed? What would be the impact of a catastrophe on a state's fiscal budget and GDP growth?
5. How can the public sector benefit from partnerships with the private insurance sector to transfer financial risks and help absorb the increasing burden of natural disaster relief?

<sup>8</sup> G20/OECD, Disaster Risk Assessment and Risk Financing

<sup>9</sup> G7 Summit 2015, Annex to the Summit Declaration



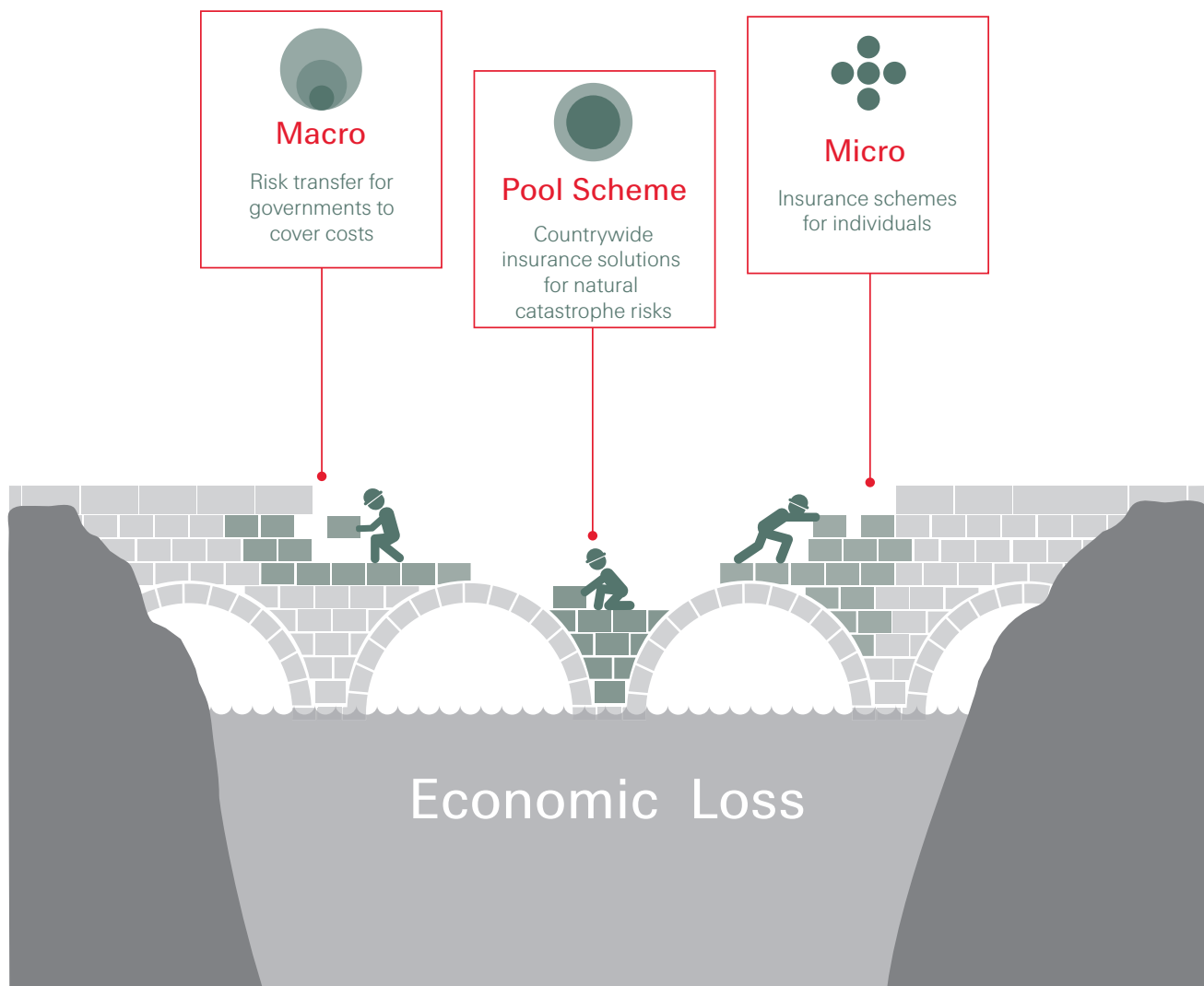




## More than one way to close the protection gap

Today there are a variety of innovative risk-transfer partnerships that can act as models for other countries yet to embark on risk financing strategies. These range from macro-level solutions to individual countries, pool schemes that bring together those facing a similar risk, sub-national solutions to provinces and cities, as well as schemes to make insurance directly available to individuals.

### Ways and means to close the gap



Source: Swiss Re



Macro

Mexico, for example, is a pioneer of macro solutions to transfer risk. Faced with natural perils from earthquakes to storms (not to mention man-made risks such as sudden changes in the oil price), Mexico now has a world-class integrated risk management strategy. At the centre is FONDEN, its federally-supported fund for natural disasters. FONDEN works with the private sector to secure standard reinsurance cover for damage to infrastructure, as well as catastrophe bonds to transfer USD 315 million of earthquake and hurricane risks to capital markets. Under this structure the government anticipates paying for recovery from its “ordinary” disaster experience through FONDEN, and leveraging its partnerships with the private sector to bolster protection against remote but costly (“fat tail”) risks.

### Increased affordability

In three different parts of the world – Africa, the Caribbean and the Pacific Islands – groups of countries have collaborated to jointly transfer part of their weather and disaster risks to the international re/insurance and capital markets. Each solution is based on so-called parametric or index insurance (see box on page 14), with the ultimate result that payouts are quicker and ‘premiums’ are less expensive than they would be if each country approached international markets individually.



Pool Scheme

Another approach to relieve governments’ budgets of the contingent liabilities related to natural disasters is to promote insurance solutions for homeowners, farmers, and other under-insured groups.

### Customised solutions

There is no single ideal or universally applicable solution for such insurance schemes. Each country must find and adapt a model that best fits its exposures, risk carrying capacity, existing insurance market, institutional set-up and political acceptability. The solutions range from comprehensive compulsory natural disaster covers offered by government-sponsored insurance entities (like in France or Spain) to privately organised voluntary disaster insurance products (like in Germany). The Turkish Catastrophe Insurance Pool provides risk-based disaster insurance for close to 7 million homeowners and has become one of the largest catastrophe insurance pools in the world. It also serves as a model for many countries in terms of how the public and private sectors can cooperate to finance disaster risks<sup>10</sup>.



Micro

### Insurance for the most vulnerable

Insurance solutions are not outside the reach of very low income groups either. The Bangladesh Flood Insurance scheme is a good example. Given that large-scale flooding is one of the primary drivers of widespread poverty in Bangladesh, more than 1 500 households now seek to manage this risk through the scheme, which uses pre-defined measurements of water level and flooding duration to offer emergency compensation in the case of floods. The scheme was launched in 2013 by the international development agency Oxfam GB with support from the Swiss Development Cooperation (SDC), in collaboration with Swiss Re. The programme is the first index-based insurance scheme for flooding in Bangladesh. A key characteristic of the scheme is that the policy holder is a local non-governmental organisation working with village level community-based organisations and individual households on disaster risk reduction. This simplifies the distribution of payouts to households that are within the compensation criteria.

<sup>10</sup> Turkish Catastrophe Insurance Pool, <http://www.tcip.gov.tr>



# What should be done?

As a first priority, governments should enable a functioning insurance market. This will help absorb a major part of disaster losses suffered by individuals and businesses. Pre-event financing solutions can alleviate the remaining financial burden on governments. Post-disaster financing (such as debt financing or donor aid) should only come into play to cover residual losses once all other risk transfer solutions have been exhausted.

Public and private sectors can cooperate to finance disaster risks. Such partnerships do not just exist in theory. Real, innovative solutions have been developed and tested over the past few years which can be replicated and adapted to other countries and regions.

## Why sovereign risk transfer is smarter than post-disaster financing

**Because no nation or region can fully safeguard against natural disasters, insurance coverage for catastrophe risk should be a central plank of the financial strategies of all countries exposed to such events. Country risk coverage of this kind, known as sovereign risk transfer, is preferable to post-disaster financing for numerous reasons. The benefits for the insured governments include:**

**Guaranteed access to funds for recovery**, up to agreed cover limits

**Diversified funding** to cope with the impact of natural catastrophes

**Speedy delivery**, for example through parametric solutions

**Budget planning certainty** (pre-determined premiums vs highly volatile disaster expenses)

**No payback obligation** (in contrast to debt financing)

**Reduction of a country's contingent liabilities** to acceptable levels (positive implications for sovereign rating and currency)

**Reduced need to divert own funds** from other projects to affected areas

**Price tag on risks** allowing for comparison of different risk management measures







### Glossary of pre-event financing tools

**Indemnity insurance** is an insurance policy which pays out based on the actual economic losses incurred, up to a specified limit.

**Parametric insurance** uses measured or modelled parametric data to determine payouts. The payout model aims to closely mirror the actual damage on the ground and is usually based on physical parameters such as wind speed, geographic location of a hurricane or earthquake magnitude. Parametric insurance enables a more rapid payment than indemnity insurance because it requires no loss adjustments to assess the actual damage after an event. In respect to flood solutions, the basis risk, i.e. that the payout could be larger or smaller than the actual loss incurred, can be addressed through the use of flood footprints that outline those areas that are actually inundated.

**Weather insurance** is an example of a parametric insurance cover that protects buyers against the impact of adverse weather conditions on their business or property. The underlying index for such a product could be, for instance, meteorological data. The market for weather products is split into standardised products and customised products. Standardised products are traded at the Chicago Mercantile Exchange, for example. They are based on daily temperature changes, frost or precipitation. Since they are standardised and do not cover a specifically defined risk, they leave the client with a substantial amount of basis risk. This is why, in parallel, an over-the-counter market for tailor-made products seeking to minimise basis risk has developed.

**Derivative instruments** and **insurance-linked securities** (such as catastrophe bonds) are a means of ceding insurance-related risks to the capital markets. These tools also usually rely on index-based payout mechanisms. Since the first cat bond in 1997, insurance-linked securities (ILS) have been used to transfer a wide range of risks from natural catastrophes to life insurance risks.



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Title:

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the public sector

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Corporate Real Estate & Logistics/  
Media Production, Zurich

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The country case studies complementing this publication showcase the broad range of risk-transfer partnerships already in operation. Although these are necessarily highly customised insurance solutions, they can provide guidance for other countries still undecided as to how best to address the risk of natural catastrophes. The case studies highlight schemes for individual countries, insurance pools for those facing similar risks, solutions for regions and urban centres, as well as mechanisms that make insurance directly accessible for individuals.

## Case studies



## Different solutions to narrow the insurance gap



Macro

Insurance solutions enabling governments to cover the costs of natural catastrophes



Pool Scheme

Countrywide solutions to insure groups such as homeowners and farmers against natcat risk



Micro

Insurance coverage enabling individuals to protect their income and livelihood



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