6

Dealing with Natural Disaster Risks

As shown in chapter 2, developing countries—especially small developing countries—are significantly more exposed than developed countries to natural disaster risks. Natural disasters are more frequent and of higher intensity in developing countries, and their economic cost, as a proportion of GDP, is several times larger than for developed countries. These higher economic costs are to a large extent a consequence of the weaker zoning and building codes, and of the greater difficulties in enforcing such regulations, that are found in poorer countries, but they are also a consequence of substantially lower levels of catastrophic insurance penetration.
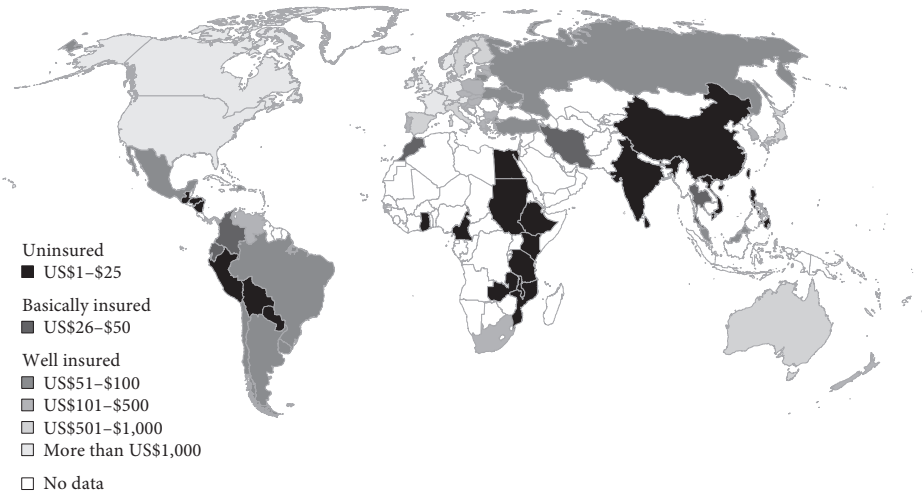
Gurenko and Zelenko[1] have estimated that while there has been a significant increase in the fraction of expected economic loss for natural disasters that is insured in industrial countries, from around 20 percent in 1980 to about 40 percent in 2006, the corresponding figure for the average of developing countries has stayed at a very low 3 percent. Data from Geo Risks Research for 2006 indicate that very few developing countries have average property insurance premiums higher than US$50 per capita while the corresponding figures for developed countries are above US$500.[2] See map 6.1.

There are several reasons behind these major differences. Property insurance in general and catastrophic insurance in particular are highly sensitive to price,

1. Gurenko and Zelenko 2007.
2. Geo Risks Research 2006.

## Map 6.1. Global distribution of insurance premiums per capita

Uninsured
■ US$1–$25

Basically insured
■ US$26–$50

Well insured
☐ US$51–$100
☐ US$101–$500
☐ US$501–$1,000
☐ More than US$1,000

☐ No data

Source: Courtesy of Munich Re Foundation.

especially in low-income settings. In addition, catastrophe reinsurance fees are not only high but also very volatile. Figure 6.1 shows how these fees skyrocketed in the United States in the years following major hurricanes or floods, notably after Hurricane Katrina. Similarly, table 6.1 shows the huge increases that took place in insurance premiums along the coasts of Mexico after the major hurricane damage in Cancún in 2005. Such increases actually paralyzed investment in tourism development for a while because private investors did not want to go uncovered and could not find insurance at reasonable premiums for several months after the hurricane season.

This impressive volatility of catastrophic insurance fees has been explained primarily by the fact that when a high-cost, low-probability event occurs, reinsurance companies see a large chunk of their capital washed out because their risk capital is normally only about 30 to 50 percent of maximum economic losses.[3] It has taken from six months to a couple of years to replenish capital to previous levels after a major natural disaster has depleted the reinsurance companies' capital base. To avoid this problem, many governments have agreed to be residual risk takers in those upper tails of the probability distribution of natural disasters and, as a consequence, have achieved higher insurance penetration in their jurisdictions.[4] In these cases,

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3. Gurenko and Zelenko 2007.

4. Examples include the State of Florida (which, after a highly successful experience, has recently encountered financial problems as a consequence of an excessive increase in government subsidies) and Turkey. In the latter case, the World Bank supported the government in an integrated program that included a government-sponsored Turkish Catastrophe Insurance Pool, which was partially financed by the World Bank. The program led to an increase in penetration to around 20 percent, which is an unusually high figure for a developing country.

Figure 6.1. U.S. catastrophe reinsurance price indices
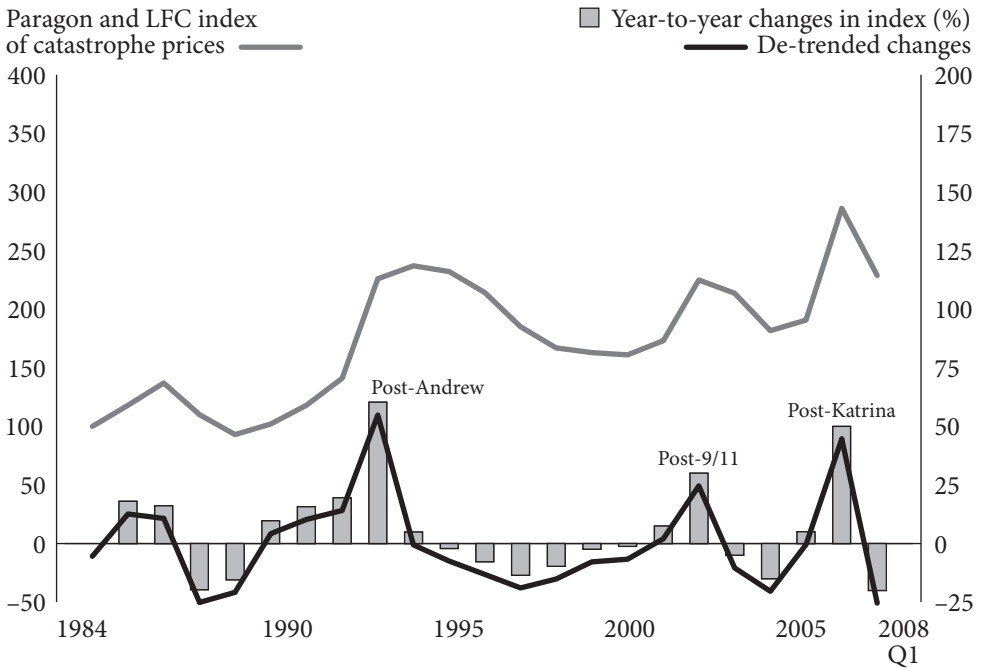
Source: From Cordella and Levy Yeyati 2007; Lane Financial 2007.

government support is normally triggered automatically when the underlying physical event exceeds pre-specified parameters.

In addition, high and volatile fees are also the consequences of low risk diversification by reinsurance companies, precisely because catastrophic insurance is still basically concentrated in industrial countries. In this area, as happens in the case of currency and GDP risk, global reach is key to adequate risk diversification, but achieving global reach represents a formidable problem of market coordination.

High reinsurance premiums are also the result of the fact that, given the high capital exposure of reinsurance companies, syndication is a common practice in the industry. Generalized syndication practices help spread risks among reinsurance companies but significantly reduce competition and therefore result in higher fees.

Obviously, another major reason for low penetration of catastrophic insurance in developing countries has to do with their poorer prevention policies. As discussed in chapter 2, well-designed market insurance requires fees proportional to risks and eligibility criteria that are related to compliance with minimum-security norms. Thus, deepening catastrophic insurance penetration requires a well-integrated prevention and government insurance support program.

Table 6.1. Insurance premiums for hydrometeorological risk before and after major hurricane damage in Cancún, Mexico, 2005 (Premiums as a percentage of insured values)

|		Zoning (insured property location)			
		Yucatán Peninsula	South Pacific	Gulf of Mexico	Interior
Homes	2004	0.35	0.12	0.15	0.08
	2006	0.60	0.30	0.30	0.08
Buildings	2004	0.35	0.13	0.15	0.12
	2006	1.40	0.50	0.50	0.12
Industrial property	2004	0.60	0.25	0.30	0.14
	2006	1.60	0.80	0.80	0.14

Source: From Cordella and Levy Yeyati 2007.

However, in most developing countries today, governments are far from being able to support private catastrophic insurance penetration by taking on part of the burden of high cost events, because they themselves are not adequately insured against these casualties. Thus, for example, in spite of the rapid development of the catastrophic bond ("cat" bond) markets (figure 6.2), very few developing countries have issued bonds in these markets, and they have done so in small amounts and at high costs.

It is instructive to analyze Mexico's issuance in 2006 of the first emerging market catastrophe bond. Although it was one of the cheapest issuances at the time because it provided significant diversification benefits for investors until then fully concentrated in industrial countries, it was still quite costly (the premium was equivalent to 2.5 to 3 times the expected covered loss)[5] and quite small. Why pay so much for so little coverage? Mexican authorities wanted to cover just short-term expenditure needs arising from a natural disaster because they knew that those are the most difficult to finance, given budgetary rigidities and lead times to obtain additional debt financing or aid flows from existing IMF Emergency Facilities,[6] emergency loans from multilateral development banks,[7] and bilateral aid, which take less time than normal facilities and loans to be disbursed but nonetheless take on average from 4 to 12 months to be

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5. Cordella and Levy Yeyati 2007.

6. The IMF has an Emergency Assistance Policy for Low-Income Countries that includes the possibility of augmenting resources under a Poverty Reduction and Growth Facility agreement when an exogenous shock occurs, or else accessing the Emergency Natural Disaster Assistance Facility, the Compensatory Financing Facility, or the Exogenous Shocks Facility. Approvals and disbursements from these facilities are relatively fast, but still take typically a few months.

7. Multilateral development banks usually have faster procedures for approval of emergency, as opposed to regular, loans, but lead times between the occurrence of a disaster and disbursements still are over four months in general.

Figure 6.2. Total catastrophe transactions

Billions of U.S. dollars
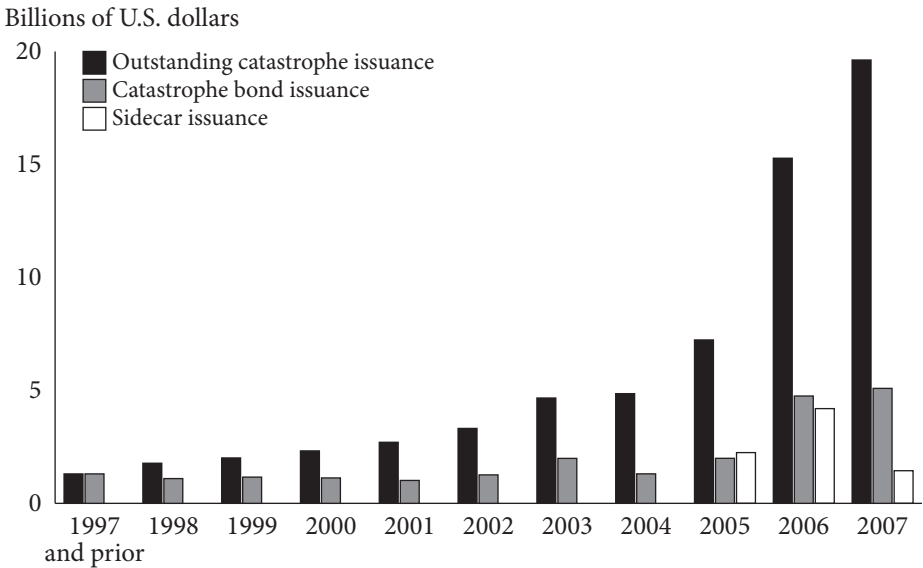
Source: *World Development Indicators* (World Bank 2007b).

disbursed.[8] They were thus willing to pay a high price to cover the risk of being cash starved during the first months after the occurrence of a major disaster.

This case illustrates some important problems associated with government access to and use of catastrophic insurance. It also indicates an additional potential role for multilateral development banks that is behind some recent initiatives. First, the need to cover short-term liquidity needs arising from natural disasters currently can be met either through financially costly self-insurance (emergency funds large enough to cover short-term cash needs associated with costly but low-probability events) or through costly catastrophe bonds and insurance of government assets. An obvious role for multilateral institutions in these circumstances is thus to offer contingent credit lines that would be triggered by a catastrophic event and would disburse automatically. The World Bank and several regional development banks have moved to offer such contingent lines, though there are still few actual approvals.

It should be clear, however, that a contingent credit line is a second-best solution because it is not generally well advised to burden a disaster-stricken country with additional debt. The best solution would be an insurance solution, and multilateral development banks can help in reducing the cost and volatility of insurance premiums by using their convening power to overcome coordination problems and achieve global, or at least regional, diversification benefits for their clients.

8. See Ghesquiere and Mahul (2007) for a more general treatment of this point.

A recent initiative sponsored by the World Bank, the Caribbean Catastrophic Reinsurance Facility, does precisely that for a group of 16 Caribbean countries. The World Bank contributed to the capital of the facility, and several donors contribute to finance the premiums paid by participating countries. The facility retains some risk, which is significantly reduced by pooling, and diversifies the rest either through reinsurance or the issuance of catastrophe bonds. The World Bank estimates that through a combination of reduced cost of capital, risk pooling, and partial risk retention, premiums were reduced by approximately 68 percent (of which about 35 percentage points were attributable to a lower cost of capital and the rest to risk-diversification benefits) compared with individual country solutions.[9] In principle, reinsurance and catastrophe bond premiums not only may be lower but also become less volatile thanks to the retention capacity of the facility. The facility operates on a parametric basis and has already made its first disbursements to countries hit by a hurricane.

This successful example could be replicated in other regions, through World Bank or regional development bank sponsorship, or preferably through joint sponsorship. Moreover, a Global Catastrophic Reinsurance Fund could achieve much higher risk-diversification benefits, but creating it would have to overcome significant coordination problems. The World Bank would be well placed to promote such an initiative. Alternatively, or as a complement, regional development banks could join in a fund with global reach, establishing principles of operation similar to those of the TCX discussed above with respect to the global diversification of developing country currency risks.

Another alternative for global risk pooling being promoted by the World Bank is that of issuing a Global Catastrophe Mutual Bond, which would cover a variety of natural disaster risks for several countries. The World Bank would pay debt service to investors out of fees paid by countries corresponding to the amounts and types of events they want to insure against. Donors would be encouraged to pay for specific poor countries' fees. Disbursements to countries would be based on parametric coverage, estimated as a fraction of the expected government loss for events exceeding the preestablished parameters, thus allowing for automatic disbursements that would cover expected short-term cash needs. Country coverage would depend on three additional design parameters: (a) the attachment point, which determines the minimum level of losses that the member country will need to absorb before coverage payments are received (the deductible); (b) the exhaustion point, which determines the maximum level of losses after which coverage will be exhausted; and (c) the ceding percentage, which is the percentage of each dollar of loss between the attachment point and the exhaustion point that the member country will retain.[10] The World Bank has estimated that savings in expected premiums, as compared with stand-alone country catastrophe bond issuance, would be around 50 percent

9. See Ghesquiere and Mahul (2007) for a more general treatment of this point.
10. World Bank 2007a.

on average for a group of 10 representative countries[11] covering two types of risks (earthquakes and hurricanes). Adding more countries and disaster risks would achieve even higher diversification gains. It is expected that the Global Catastrophe Mutual Bond will also achieve significant fee stability compared with present high market premium volatility.

Both the Mexican and the Caribbean Catastrophic Reinsurance Facility examples signal another important issue. Governments usually consider insuring only for short-term cash needs following a natural catastrophe, and not for the more significant expenditures related to reconstruction, to a large extent because they count on emergency relief funds (from IMF Emergency Facilities, emergency loans from multilateral development banks, and bilateral aid). Because these take some time to be disbursed, normally between 4 and 12 months, governments still see the need to insure against liquidity risks associated with urgent short-term cash needs but not to cover longer term reconstruction financing needs as they can "cope" with this risk through the use of emergency relief funds. Thus, despite all the benefits of emergency relief funds, they have the serious drawback of reducing the incentives for governments to take market insurance (which normally requires adopting some prevention actions) against natural disaster risks, something they should do, given the high potential diversification gains that could be obtained through global insurance pools. It would be so much better if aid would concentrate on supporting integrated prevention and insurance solutions, as in the case of the Caribbean Catastrophic Reinsurance Facility where donors are paying for the fees of participating countries, because the theoretically optimal solution for this type of risk is an integrated combination of prevention and pooling of risks through efficient market insurance, instead of costly and inefficient coping after events have occurred. A shift of aid flows from ex post coping to ex ante prevention and insurance would have the additional benefit of eliminating, or at least reducing, the high level of politicization of aid flows. Such a shift, however, can be accomplished only through the convening power of multilateral institutions, as was the case for the Caribbean Catastrophic Reinsurance Facility. It should be stressed that this principle also applies to other forms of exogenous risks, such as terms of trade risks: it would be much better if aid would help to "insure" ex ante (for example, by covering premiums or development costs of indexed debt), rather than come ex post to the rescue of shock-stricken poor countries.

The discussion above suggests a potentially more ambitious role for multilateral development banks in helping developing countries to achieve higher catastrophic insurance penetration. The diversification benefits that could be achieved through a global pool of both public and private risks could be very substantial. Gurenko and Zelenko (2007) estimate that, on average, premiums for a single country might be about 4 times the expected loss and that they can be reduced to 3.3 times in regional

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11. Six in Latin America (Chile, Colombia, Costa Rica, Dominican Republic, Mexico, and Peru), two in Asia (Indonesia and the Philippines), and two in Europe and Central Asia (Albania and Turkey).

Table 6.2. Potential gains from risk diversification in a Global Catastrophic Reinsurance Facility

	Premium	Premium/ expected loss	Premium/total sum insured
Sum of countries	140.84	4.03	3.80%
Region 1	27.17	3.17	3.10%
Sum of regions	115.68	3.32	3.10%
Portfolio	79.27	2.27	2.20%

Note: Region 1 covers Mexico and Central America. Portfolio covers 22 developing countries in Latin America and the Caribbean, Asia, and Europe and Central Asia.

Source: Gurenko and Zelenko 2007.

pools and to 2.3 times in global pools[12] (table 6.2). Given these significant savings, the Mexican authorities requested that the World Bank study the viability of establishing a Global Catastrophic Reinsurance Facility to which both governments and private insurers could have access. The significant reduction in premiums that could be achieved, plus an expected reduction in volatility of fees, might result in important increases in catastrophic insurance penetration in participating countries. The facility would benefit from seed capital contributions from the World Bank and other multilateral development banks, but it has been envisioned that it would eventually be a fully private endeavor. Initial studies suggest the financial viability of the proposal.[13]

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12. The corresponding figures for fees (premiums over sums insured) would be 3.8 percent, 3.1 percent, and 2.2 percent, respectively.
13. Gurenko and Zelenko 2007.