

# **Catastrophe Insurance Market in the Caribbean Region: Market Failures and Recommendations for Public Sector Interventions**

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# **Catastrophe Insurance Market in the Caribbean Region: Market Failures and Recommendations for Public Sector Interventions**

## **Abstract**

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The Caribbean region suffers from a high degree of economic volatility. A history of repeated external and domestic shocks has made economic insecurity a major concern across the region. Of particular concern to all households, especially the poorest segments of the population, is the exposure to shocks that are generated by catastrophic events or natural disasters.

This paper develops a conceptual framework for risk management and shows that the insurance market for catastrophic risk in the Caribbean region remains a “thin” market characterized by “high” prices and “low” transfer of risk. It analyzes the possible market failures which could explain the lack of development of the catastrophe insurance market. Finally, the paper outlines a set of recommendations for public sector interventions.

## Outline

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- B. The Insurance Market for Catastrophic Risk in the Caribbean
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    - “Low” quantities of risk transfer and “high” prices
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    - The Presence of Market Failures?
- C. Recommendations for Public Sector Interventions

# **Catastrophe Insurance Market in the Caribbean Region: Market Failures and Recommendations for Public Sector Interventions**

The Caribbean region suffers from a high degree of economic volatility. A history of repeated external and domestic shocks has made economic insecurity a major concern across the region. Of particular concern to all households, especially the poorest segments of the population, is the exposure to shocks that are generated by catastrophic events or natural disasters.

This paper develops a conceptual framework for risk management and shows that the insurance market for catastrophic risk in the Caribbean region remains a “thin” market characterized by “high” prices and “low” transfer of risk (Section A). Section B analyzes the possible market failures which could explain the lack of development of the catastrophe insurance market. Finally, Section C concludes by summarizing the market failures that prevail in the Caribbean region and outlines a set of recommendations for public sector interventions.

## ***A. Risk Management: A Conceptual Framework<sup>1</sup>***

**Risk management** means reducing risk to an acceptable level and coping with the consequences of risk once it materializes (Figure 2.1). Risk management can be broadly divided into **risk-reduction activities** (that focus on reducing the effects of disasters should they occur) and **risk-coping activities** (that focus on reducing the negative effects of natural disasters once they have occurred).<sup>2</sup> **Risk-reduction activities** include risk identification, mitigation and preparedness. **Risk identification** is the most important component of risk management, since risk mitigation and preparedness directly depend on the original assessment of risk. Risk identification involves a risk assessment, which quantifies the spatial and time evaluations of natural hazards and whose objective is to forecast the location, frequency, duration and magnitude of natural hazards.<sup>3</sup> **Risk mitigation measures** involve reducing human and asset vulnerability to risks. They include the construction of dams or re-channeling of rivers to regulate river flows and to limit probabilities of floods downstream while reforestation of watersheds and stabilization of unstable slopes can prevent the occurrence of landslides and floods. Risk mitigation measures also include investing in hazard-resistant technology such as retrofitting of infrastructure using hazard-resistant techniques, building mitigation infrastructure such as retaining walls, and resettling population at risk. This may be complicated by the fact that many households in high-risk areas have low income and limited relocation alternatives. Risk mitigation measures also include non-structural instruments such as land-use planning, building codes and other regulatory instruments. Risk mitigation also includes the diversification of income sources through diversification of the types of crops cultivated in terms of harvest seasons, resistance to flood, strong winds and other natural

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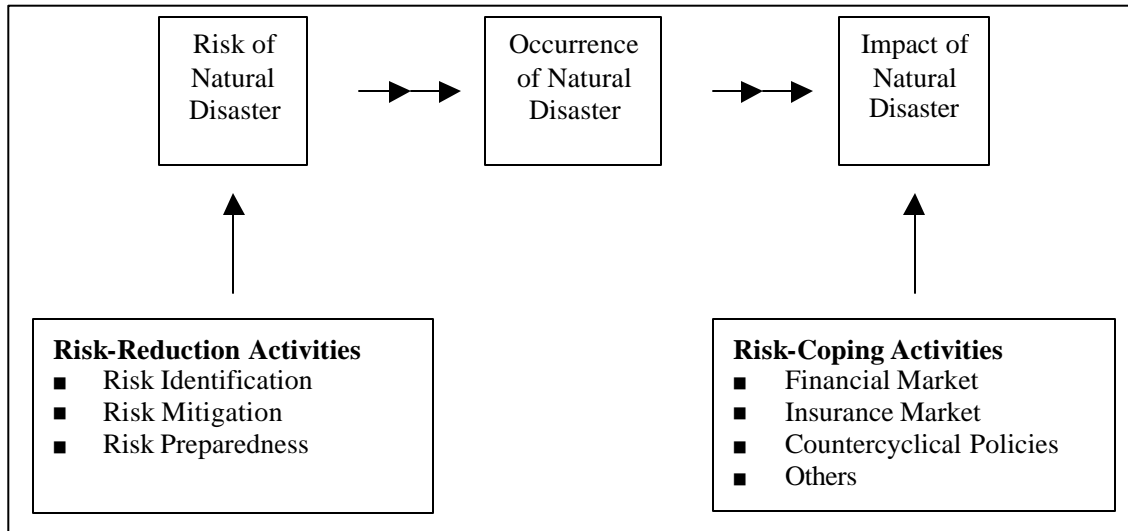
<sup>1</sup> This Section draws on Charveriat (2000), Chapter 3.

<sup>2</sup> Some authors use the term risk-transfer instead of risk-coping but both terms refer to the same phenomenon. See for example, World Bank, 2002(b).

<sup>3</sup> Risk-identification can be complemented with vulnerability assessments which are based upon information about the presence of population and assets exposed in the hazardous zones as well as their vulnerability to damages.

disasters. Marriage to out-of-area spouses for the sake of the communities' children is another risk-diversification strategy used by traditional societies. **Preparedness** consists of lessening the impact of disasters by structuring in advance the ability to respond to an emergency. Preparedness activities include hazard monitoring, forecasting, early warning systems, evacuation plans and shelters, specialized networks of responders and contingency plans in critical sectors. They focus on short-term damage control rather than reduction of vulnerability.

**Figure 2.1: A Conceptual Framework for Risk-Management**



**Risk-coping activities** reduce the negative effects of natural disasters once they have occurred. They do not intend to reduce the amount of physical damages, but focus on reducing the consequences on welfare by smoothing the shocks over space and time. Saving and resorting to the **financial market** are coping mechanisms. Households can accumulate savings and assets in the absence of disasters and reduce them in the aftermath. They may have to deplete their asset base by selling livestock, for example, in order to cope with the shock. Migrating with the intent of sending private remittances when shocks arise is another coping mechanism. At the aggregate level, public transfers in the form of food, shelters and emergency employment programs can play a key role in smoothing the shock for the most vulnerable segment of the population. Access to financing in the form of grants or loans help alleviate the negative shocks. This includes contingent financing from bilateral and multilateral assistance in the form of grants and concessional or non-concessional lending. Aid can also come as debt relief while countries with better access to international private markets may resort to private financing on the international markets. **Insurance** is another coping mechanism. Traditional insurance may be available as an instrument to protect against natural events. Households and firms pay a premium to cover natural hazards and are reimbursed for the damages if a disaster occurs. New financial instruments such as catastrophe bonds may also provide an alternative to traditional insurance for reinsurers, Governments and large companies. Box 2.1 illustrates the importance of risk management by analyzing the example of Hurricane Georges which hit the Dominican Republic in October 1998. Two new regional initiatives, the development of a proposed Strategy and Results Framework for Comprehensive Disaster Management in the Caribbean (CDM) and the establishment of the Disaster Mitigation Facility for the Caribbean (DMFC) within the Caribbean Development Bank, may enhance the potential for coordination and integration of risk management activities in the region (Box 2.2).

The objective of risk-management is to find the policy mix which maximizes welfare among the risk management options available, while the objective of public policy is to intervene when market failures prevent the private sector from maximizing society's welfare on its own.

### **Box 2.1: Risk Management: The Case of Hurricane Georges in the Dominican Republic**

The lack of national emergency management capability was clearly manifested after Hurricane Georges hit the Dominican Republic in October 1998. The population was not appropriately forewarned about the imminent hurricane, and the preparation measures taken were vastly inadequate. The Government relies primarily on three agencies to respond to natural disasters: the Red Cross, the Civil Defense, and the National Meteorology Office. The Red Cross tried to warn the population about the hurricane in the days before it touched down, but had limited resources and support to do so. However, it was quite effective in coordinating the emergency relief effort in the aftermath of the hurricane, marshalling support from NGOs and international branches of the Red Cross. The Civil Defense, a Government agency, is poorly staffed and has very weak institutional capacity. It did not forewarn the population about the hurricane and, in the aftermath, was unable to play a significant role in the relief effort. The National Meteorology Office (ONM), a government entity that depends on the Ministry of Agriculture, was also ill-equipped and poorly staffed. While it provided accurate information in the days preceding the hurricane, it was hampered by deficient communications technology. The impact of the hurricane was greatly exacerbated by the lack of preventive capabilities of the Government, as evidenced by the fact that the hurricane hit other countries like Puerto Rico equally hard but caused minimal damage and no fatalities.

In the Dominican Republic, the *Asociacion Dominicana de Mitigacion de Desastres* (ADMD) and a coalition of NGOs have championed disaster preparedness and prevention among the most vulnerable communities, conducting workshops in over 700 communities since 1995. At these workshops, local participants prepare a community emergency plan, which is built on an assessment of local hazard vulnerabilities and of locally available resources to address those vulnerabilities. During Hurricane Georges (1998), communities that had established emergency committees through this program successfully evacuated people from flood prone areas, established shelters, organized clean-up brigades, and requested and distributed assistance without incident. In addition, these communities have identified and implemented small risk reduction projects and actions. Projects, such as the construction of containment walls and drainage ditch embankments, are designed to address local health and environmental contamination problems as well as reduce and mitigate the constant floods and landslides, which are a daily concern for these communities. The positive effect of these initiatives was demonstrated by the reduced impact of Hurricane Georges on the participating communities.

The authorities declared a state of emergency the day after the hurricane and immediately requested assistance for reconstruction from the international community. Soon after, the Government created the Solidarity Fund for Reconstruction, in order to pool the emergency resources from the state, public and private donations, as well as loans from bilateral and multilateral organizations. The authorities acknowledged the serious shortcomings of their emergency management capability and announced a program for the restructuring and modernization of the institutions responsible for disaster management. The Puerto Rico offices of the US National Weather Service (NWS) and the US Federal Emergency Management Agency (FEMA) provided technical assistance to the Government of the Dominican Republic to elaborate such a program. The main components of the program include: (i) specialized early warning equipment for the ONM; (ii) technical and logistical support for disaster preparedness and response; and (iii) training for national-level ONM staff in disaster preparedness, and for local staff in helping local governments and rural communities to prepare for and respond to emergencies arising from recurring natural disasters.

Source: From Hurricane Georges Emergency Recovery Project, World Bank, December 1998 and World Bank, 2002(b).

### **Box 2.2: Developing a Regional Risk Management Strategy**

**Disaster Mitigation Facility for the Caribbean (DMFC).** In 2001, with support from the USAID Office of Foreign Disaster Assistance, the Caribbean Development Bank (CDB) established the Disaster Mitigation Facility for the Caribbean, marking an important step toward the promotion and coordination of risk management within the region. The CDB assists borrowing member states, across a broad range of activities and sectors, including poverty reduction, infrastructure development and environmental management, placing it in a strong position to promote and coordinate activities in sectors that have not traditionally addressed directly hazard risk management. The DMFC will focus on the incorporation of hazard risk management into development decision making within the internal operations of the CDB, its borrowing member countries and regional institutions. Activities of the DMFC include support for strengthened building standards and enforcement mechanisms and assistance to member countries with the development of national-level risk management policies and plans.

**Comprehensive Disaster Management Strategy (CDM).** Also in 2001, a working group, representing regional and national disaster management organizations, the private sector, regional technical institutions and multi- and bi-lateral donors and lending institutions developed a proposed *Strategy Results Framework for Comprehensive Disaster Management in the Caribbean*. Funding for the development of this strategy was provided by USAID and UNDP. This strategy was undertaken with the objective of integrating comprehensive disaster management into the development process within the region, providing an important framework for strengthening and coordinating risk management efforts. The proposed CDM strategy emphasizes hazard risk reduction. Within this framework, the institutional capacity and role of the Caribbean Disaster Emergency Response Agency (CDERA) to promote CDM at the regional level will be strengthened. At the national level, consultations are being held to encourage governments to develop national strategies within the CDM framework and to identify champions for hazard risk management at the ministerial level and within the private sector.

Source: World Bank, 2002(b).



## ***B. The Insurance Market for Catastrophic Risk in the Caribbean***

Based on an in-depth review of the insurance market for catastrophe risk in the Caribbean region (Box 2.3), this Section seeks to answer the following questions:

- Is the Caribbean catastrophe insurance market efficient at transferring catastrophic risks?
- What market failures could explain the lack of development of the catastrophe insurance market?

### **Box 2.3: Insurance Classification : Where Does Catastrophe Insurance Fit In?**

The provision of insurance is classified into life insurance and non-life insurance with the former insuring against the loss of life. Although it varies slightly across countries, the classification of non-life insurance may be divided into six classes: (1) property; (2) marine, aviation and transport; (3) motor vehicle; (4) pecuniary loss; (5) liability; and (6) personal injury. Insurance against natural hazards like earthquakes and hurricanes are usually covered under the first four classes. Coverage against catastrophic perils are bundled and sold together with other perils such as fire, explosion, riots and strikes, aviation and motor vehicle collision. Motor vehicles, buildings and contents, other assets, infrastructure, and income derived from some productive assets are typically insured against hurricanes, earthquakes and other perils under motor vehicle, property and other types of insurance policies, and pecuniary losses.

It is estimated that about 45 percent of total non-life premiums corresponds to insurance against natural hazards. In Trinidad and Tobago and the Dominican Republic, premiums are split between natural hazards and other risks. In these countries, under property insurance, the premiums that correspond to coverage for catastrophic events account for about 45 percent of total premiums. However, most Caribbean insurance companies do not routinely split the catastrophe elements of their premiums. Earthquake and hurricane premiums are bundled with the premiums of other perils. Premium splits are available from re-insurance companies, which indicates that on average about 25 percent of the premiums in the property class correspond to insurance against earthquake, 20 percent against hurricanes and the remaining 55 percent against other perils including fire.

### ***B.1. Characteristics of the Caribbean Insurance Market for Catastrophic Risk: “Low” quantities of risk transfer and “high” prices.***

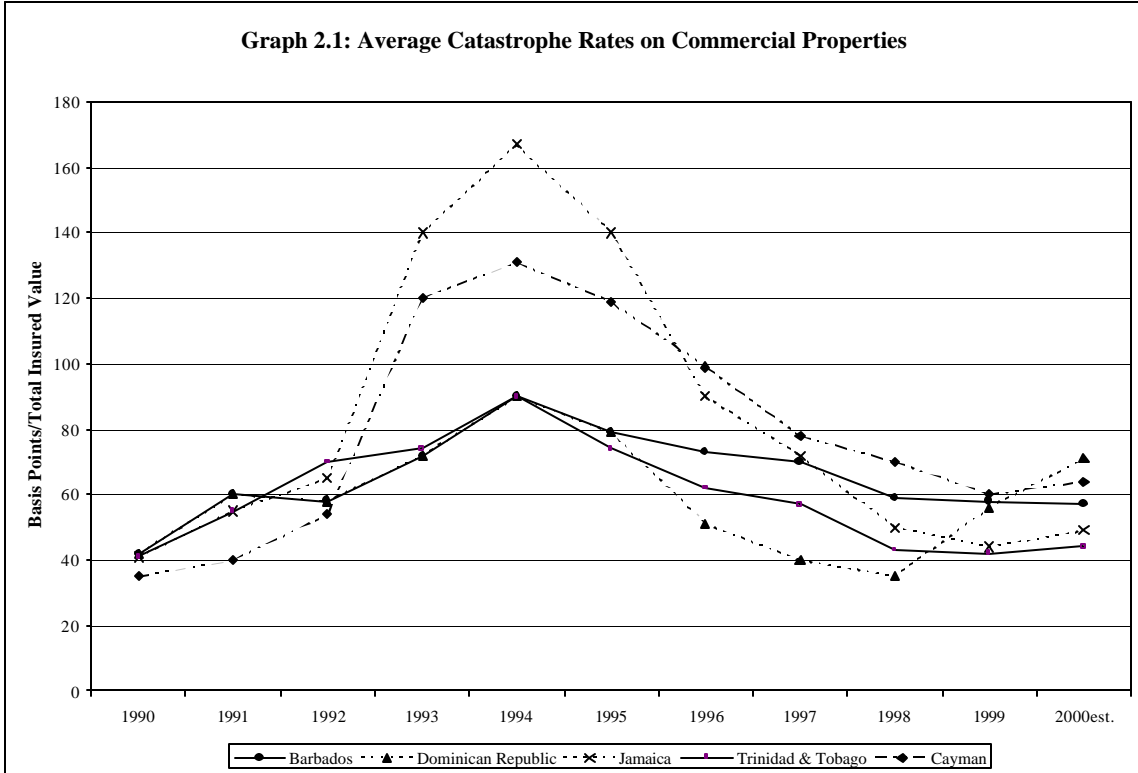
Disaster insurance coverage in the Caribbean region increased in the second half of the 1990s. There was a severe tightening of the world catastrophe reinsurance markets following Florida’s Hurricane Andrew (1992) and California’s Northridge Earthquake (1994), whose damages exceeded US\$45 billion in 1997 dollars, with the insured component running to almost US\$30 billion.<sup>4</sup> This caused some stress on the capital base of the insurance and reinsurance companies which, together with an increase in the risk assessment of catastrophic events,<sup>5</sup> led to a steep increase in insurance and re-insurance prices and a decline in insurance availability (Graphs 2.1 and 2.2).<sup>6</sup> Only relatively minor insured catastrophic losses occurred after 1994 which, together with the creation of some public/private partnerships (Box 2.9), allowed the insurance and reinsurance companies to progressively restore their capital base. As a consequence, rates started to fall and risk transfers increased. The cost of catastrophe insurance is currently approximately at the same level as it was in the early 1990s.

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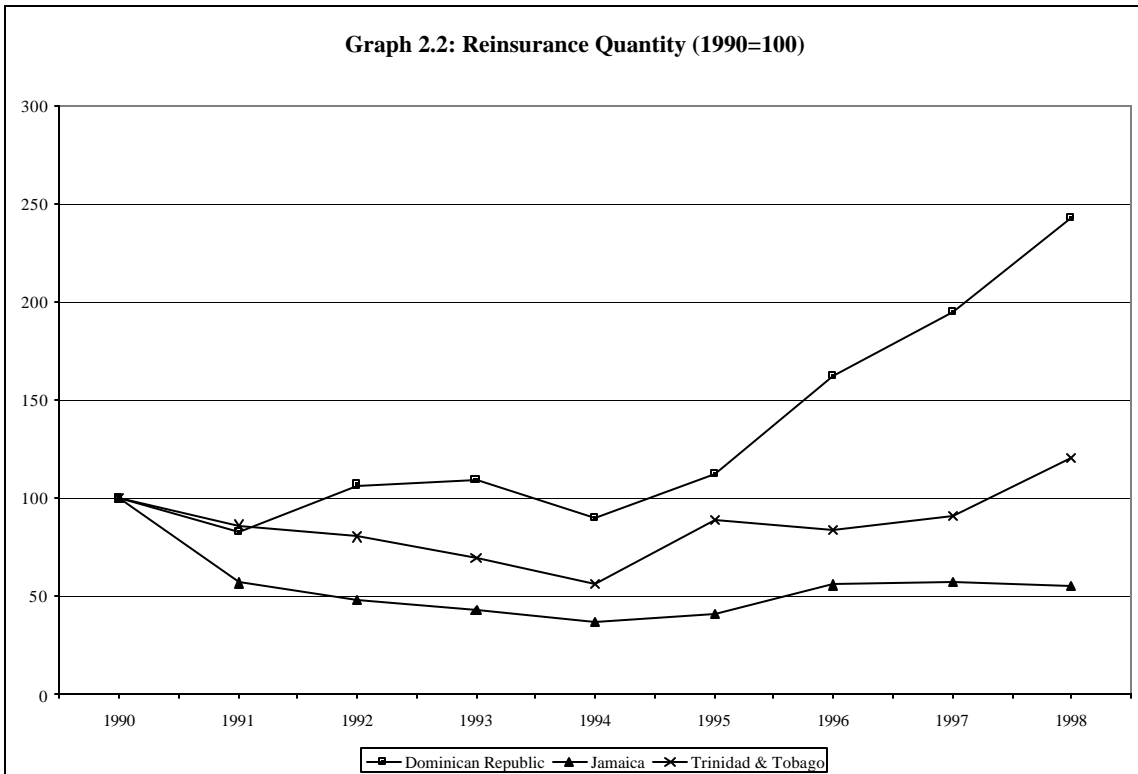
<sup>4</sup> Froot, 1997, p. 2.

<sup>5</sup> There were few such large storms between 1970 and 1992 so the probability of occurrence was estimated to be low.

<sup>6</sup> Eleven insurers in Florida were declared insolvent as a direct result of the hurricane; many others required capital infusion from their parent companies. By May 1995, 93 percent of the insurers in the California market had either stopped underwriting earthquake insurance or imposed restrictions on existing policies.



Source: Pollner, 2001, p.25.



Source: Background papers and catastrophe insurance prices from Pollner, 2001, p.25.

Quantities of risk transfer remain “low”. The catastrophe insurance market does not cater to all segments of the economy. The proportion of residential and commercial properties covered by insurance is significant in the Caribbean region.<sup>7</sup> However, the vast majority of insured properties are hotels, tourism-related properties, large and medium-size private industrial and commercial businesses while many dwellings and small businesses remain uninsured. Fragile dwellings constructed in hazard-prone, low-lying coastal areas, deep river basins or valleys and along steep slopes are generally not insured. For example, a large segment of the population in Barbados, Jamaica and Trinidad and Tobago lives in vulnerable, uninsurable properties (lacking dug-in foundations, secured frames or bolted roofs) which could be easily dislodged in the event of flooding or strong winds.<sup>8</sup> In Santo Domingo, the Dominican capital, about 300,000 people live in the high-risk, flood-prone and highly polluted Ozama River Basin with no insurance against flood either. In addition, crop insurance is not generally available in the Caribbean region, which makes farmers (especially poor farmers) particularly vulnerable to natural disasters. Two companies in Barbados offer coverage on standing sugarcane crops and the produce of larger plantations. However, their coverage options do not benefit small- or medium-size farming operations. About two decades ago, Trinidad and Tobago’s sugar industry purchased crop insurance on the international market but this initiative was discontinued due to few claims results and to escalating premiums. The Dominican Republic established the now defunct crops insurance program through *Banco Agrícola de la República Dominicana* (BARD), twenty years ago. For small-scale farm workers or owners, state institutions and agencies may be the sole resort for debt relief and financial assistance in case of catastrophic occurrences. International experience suggests that crop insurance initiatives have generally been unsuccessful and that new initiatives like the creation of weather-indexed securities may not be more promising especially in developing countries (Box 2.4). In addition, the public sector does not generally insure public assets against catastrophic events under the prevailing insurance market conditions (Box 2.5).

**Box 2.4: Weather-Indexed Securities as an Alternative to Crop Insurance?**

Many observers have argued that mechanisms can be developed to bring catastrophic exposures directly to the international capital market. One such mechanism includes the development of catastrophe-indexed securities which make payments to the holders based on the trigger of an index. Such index may be based on the magnitude of a hurricane using the Saffir-Simpson scale as declared by the National Hurricane Center located in Miami, Florida, or indices compiled by Property Claims Service (PCS), the authoritative insurance industry statistical agent that reports on catastrophes. The World Bank is also considering the development of weather-indexed securities to protect agricultural producers located on the hurricane-prone East coast of Central America.

Indexed-based instruments have not taken off as expected. The Chicago Board of Trade (CBOT) introduced futures and options linked to the PSC index in 1992. However, the future contracts failed to generate sufficient interest and were withdrawn in 1995. Option contracts based on nine indices currently trade on the CBOT: a national index, five regional indices, and three state indices (for California, Florida and Texas). The Bermuda Commodities Exchange (BCE) currently trades contracts based on a US homeowners catastrophe index developed by Guy Carpenter. However, the development of these markets has not generated the interest that had been initially expected. The main reason seems to be that the existing indexes remain poorly correlated with individual losses. Hurricanes typically hit the areas of a country very differently and have different impacts depending on landscape characteristics, for example. To serve as good insurer hedges, indices will need to be developed for small geographic areas, ideally at the level of the farm owner. However, establishing such indices would pose considerable technical difficulties, especially in developing countries.

<sup>7</sup> In most Caribbean countries, property owners are required to purchase a catastrophe insurance to access mortgage financing. However, once outstanding mortgages have been paid off a large number of property owners either underinsure or do not insure their properties at all. The requirement to buy catastrophe insurance only applies to those who have access to the formal mortgage market, leaving out the poor. See also Pollner, 2001, p. 37

<sup>8</sup> These are called “Chattel” houses; they are properties made of timber and generally moveable.

**Box 2.5: Should Governments Insure Public Assets?**

The public sector does not generally insure public assets against catastrophic events. It does not carry basic catastrophe insurance on public buildings, infrastructure and other public assets. State-owned enterprises are not insured either, with the exception of Trinidad and Tobago where state-owned enterprises do have some catastrophe insurance.

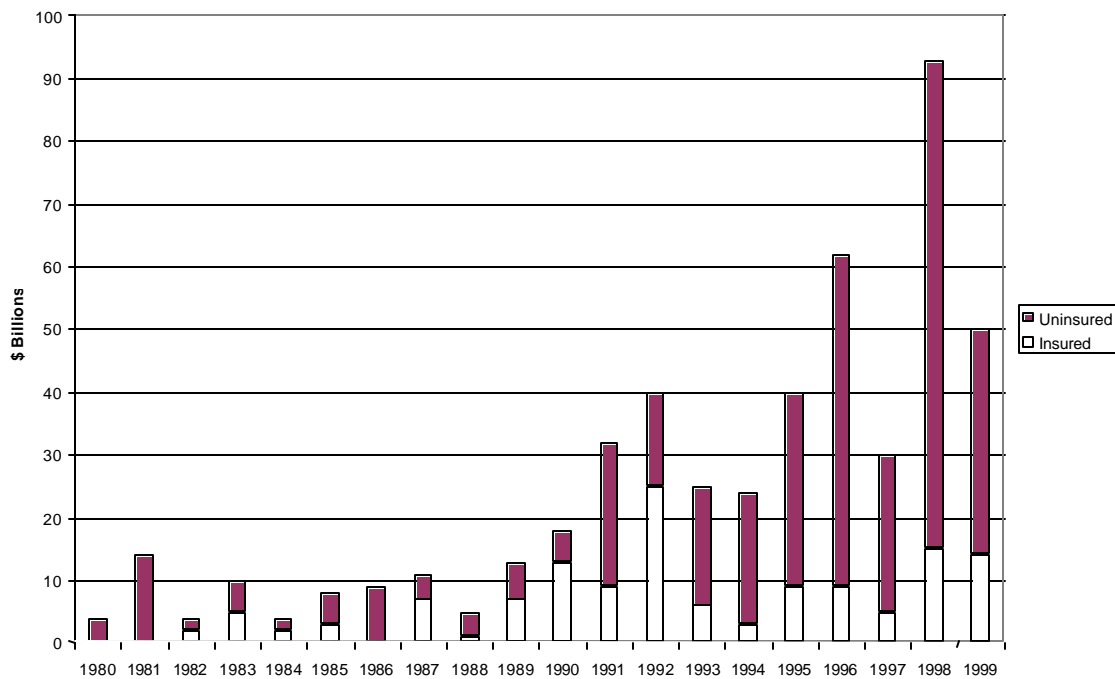
This behavior may be optimal given prevailing insurance market conditions. Indeed, the public sector may be able to secure external financing, in the form of a line of credit, to cope with disasters. Such a line of credit needs to be secured before the occurrence of a natural hazard since the natural hazard may impair public finance and limit the Government's access to international financing. This option may be better than insuring public assets and paying "high" insurance premiums. To mitigate moral hazard problems at the insurer level (Governments may decide not to engage in risk-reduction activities once the line of credit is secured); international financial institutions could consider providing a line of credit contingent upon the implementation of a set of risk-reduction measures including risk identification, mitigation and preparedness.

Another alternative is to create a natural disaster fund to reduce dependency on external funds for coping with disaster risks. In 1996, Mexico created a federal calamity fund (*Fondo para Desastres Naturales*) of US\$200 million whose funds come from federal and state fiscal resources and are earmarked for the repair of uninsured infrastructure, immediate assistance to restore the production of subsistence farmers and relief to low-income disaster victims. The Assembly of Puerto Rico in 1994 voted for the creation of a Reserve for Catastrophe Losses under which a portion of property insurance premiums is passed, with tax deduction, to a trust. It is anticipated that this mechanism will improve the availability and affordability of catastrophe insurance and reduce the dependency of Puerto Rican insurers on foreign reinsurance. In Colombia, the federal government, regions, and localities are all obliged by law to pay a part of their budget into a natural disaster fund. In October 1999, Costa Rica and Nicaragua reformed their institutional disaster management systems and created national funds to finance future emergencies. Honduras also announced its intention to create a similar fund.

Source: Country examples are from Charveriat, 2001, p. 89.

Comparing insured losses to total losses that result from catastrophic events further evidences the “low” quantities of risk transfer at both the international level and that of the Caribbean region. Graph 2.3 shows that a small portion of total losses are effectively insured. As already mentioned, Hurricane Andrew and the Northridge Earthquake totaled over US\$45 billion in 1997 dollars, with the insured component amounting to US\$30 billion. In terms of insurance coverage, only 3.8 percent of the damages from natural catastrophes between 1985 and 1999 in Latin America and the Caribbean were insured, ranking it last among the regions of the world.<sup>9</sup>

**Graph 2.3: Insured and Uninsured Losses from Weather-Related Natural Disasters**



Source: Munich Re; Guy Carpenter; World Bank. Reported in Pollner 2001, p. 33.

Prices of catastrophe insurance are “high”. Non-life insurance penetration (written premiums as a share of GDP) in the Caribbean region is comparable to that of industrialized countries (Table 2.1). In the Caribbean region, it is estimated that about half of non-life premiums (equivalent to 1.5 percent of GDP) corresponds to coverage against natural hazards (Box 2.3). However, as shown above, the quantity of risk transfer is “low” in the Caribbean region. High insurance penetration and “low” quantities of risk transfer indicate that the prices of catastrophe insurance in the Caribbean region are “high”. The fact that catastrophe insurance premiums are estimated to represent about 1.5 percent of GDP while average (insured and uninsured) losses per annum accounted for only about 0.5 percent of GDP during the period 1970-99 (whereas they would be equal under “fair” pricing) further confirms this finding.

<sup>9</sup> Insured losses in other regions during the same period were North America, 34.5 percent; Europe, 26.7 percent; Africa, 8.9 percent and Asia 4.3 percent. Data are from Swiss Re. Reported in Charveriat, 2000, p. 41.

**Table 2.1: Insurance Penetration for Selected Countries  
(Gross Written Premium as Percentage of GDP, 1998)**

Countries/Regions	Insurance Penetration					Average Economic Losses (% of GDP) <sup>1/</sup>
	Life	Non-Life			Total	
		Catastrophe	Other	Total		
Trinidad & Tobago	0.89	1.80	2.20	4.00	4.89	0.01
Dominican Republic	0.21	0.68	0.83	1.50	1.71	0.58
Jamaica	3.43	1.13	1.38	2.50	5.93	0.98
Barbados	1.18	2.07	2.53	4.60	5.78	0.21
<b>Average</b>	<b>1.43</b>	<b>1.42</b>	<b>1.73</b>	<b>3.15</b>	<b>4.58</b>	<b>0.44</b>
<b>Memo:</b>						
<b>Latin America</b>	<b>0.20</b>			<b>1.41</b>	<b>1.61</b>	<b>0.35</b>
United States	6.63			4.30	10.93	
Japan	6.40			2.30	8.70	
France	3.76			2.80	6.56	
United Kingdom	8.72			3.10	11.82	
<b>Industrialized Economies<sup>2/</sup></b>	<b>4.52</b>			<b>2.95</b>	<b>7.60</b>	

<sup>1/</sup> The figure for average economic losses is derived by dividing total economic losses reported in Table 1.6 for the period 1970-99 by 30 years.

<sup>2/</sup> Includes 12 industrialized economies.

Source: Swiss-Re, Economic Research & Consulting and Background Papers.

***B.2. Prices of catastrophe insurance are “high” and quantities of risk transfer are “low”: The Presence of Market Failures?***

This Section articulates eleven different explanations that may help account for the “low” transfer and “high” prices which characterize the Caribbean catastrophe insurance market (Box 2.6).

**Box 2.6: The Insurance/Reinsurance Market for Catastrophic Risks: How Does it Work?**

Protection against natural hazards is usually available from international or local insurance companies. In general, local companies do not directly underwrite policy but instead use a network of agents (brokers) or subagents. Agents can be individuals, corporate entities or institutions appointed by the insurers to solicit or negotiate insurance coverage on behalf of the insurer and, as authorized, to provide riders and countersign contracts. However, they are not insurers’ employees. Subagents are authorized appointees of agents who can solicit or negotiate insurance transactions through that agent, or may be an individual designated by the sub-agent to solicit or negotiate insurance business through the sub-agent. They are not agents’ employees.

Primary insurers are vulnerable to catastrophic events that affect the small-territory Caribbean economies where they are located although claim deductibles (around 5 percent for earthquakes and between 1 and 2 percent for hurricanes) limit possible losses. Usually, they turn to the international reinsurance market to reinsure themselves against possible catastrophic losses. Most reinsurance is written on a “treaty” basis. There are two types of “treaty” reinsurance: proportional reinsurance or quota share, and excess-of-loss (XOL). With proportional reinsurance, reinsurers assume a specific portion of insurers’ risk in exchange for that particular share of the premiums. In the Caribbean region, the ceding company currently retains between 20 and 30 percent of the original risk. Proportional reinsurance is the most popular form of protection among primary insurers in the Caribbean region, with about three-quarters of property premiums ceded in proportional contracts. With XOL reinsurance, the ceding company retains risk up to a certain amount of losses while reinsurers insure losses in excess of this amount and generally up to a layer. For example, an insurer can purchase reinsurance to protect itself against 20 percent of losses between US\$100 million and US\$200 million, which is called a layer of protection. This means that, during the tenure of the contract, the reinsurer would cover all events that result in the insurer’s losses in excess of US\$100 million, but only until insurer’s losses reach US\$200 million. Should insurer’s losses be US\$300 million, the reinsurer will pay 20 percent of the difference between US\$200 million and US\$100 million or US\$20 million. In the Caribbean region, insurers use XOL reinsurance to protect between 15 and 20 percent of the retained exposure. The fact is that insurance companies buy reinsurance coverage from reinsurance companies in order to protect against probable maximum losses (PML) which have been estimated at 15 to 20 percent of the total exposure. Insurance companies spend about half of their retained premiums to pay for the cost of XOL reinsurance. Excess-of-loss reinsurance is often purchased in up-to three layers; standard contracts are for one year.

**Explanation 1: Prices of catastrophe insurance are “high” and quantities of risk transfer are “low” because the provision of risk identification and of forecasting is insufficiently developed**

Forecasting the location, frequency, duration and magnitude of future catastrophic events is a key element of preparedness. Indeed, risk identification is the most important component of risk management, since risk-reduction and preparedness policies directly depend on the original assessment of risk. This is particularly important in the case of natural disasters which are characterized by their low frequency and difficult predictability.<sup>10</sup> In the agriculture sector, long-term climate forecasts are essential to switching crops and reducing losses. In several Latin American countries, such as Peru and Brazil, meteorological forecasts and agronomic research into versatile hybrid crops have combined to significantly reduce crop destruction during drought years.<sup>11</sup>

Risk identification and forecasting of future catastrophic events require the use of costly techniques which include the study of historical records, topographical information, remote-sensing imagery and aerial photography and the development of highly sophisticated forecast models. However, institutions in charge of research and prevention of disasters are inexistent or grossly under-funded in the Caribbean region (Charveriat, 2000, p. 93), although this may be changing with the recent creation of two regional risk management institutions (Box 2.2).<sup>12</sup> In addition, the private sector may not find it profitable to invest in technologies with high fixed costs for the sake of providing catastrophe insurance/reinsurance to the somewhat limited market of small Caribbean economies. As a consequence, insurance and reinsurance companies are likely to under-invest in risk modeling technology in the Caribbean region. Although an increasing number of Caribbean-based companies are promoting the use of technology by allocating significant portions of their budgets to acquisitions and upgrades, most of them do not as yet have access to the relevant tools and equipment.

Forecasting the location, frequency, duration and magnitude of future catastrophic events is also a key element in pricing catastrophic risks. In the absence of the appropriate technology that can identify and forecast risk in the Caribbean region, international reinsurers have set catastrophe premiums in the Caribbean region close to those that apply in developed countries — primarily on the basis of losses experienced in the large, diversified economies of the United States, Europe and Japan where most of their exposure is concentrated. To substantiate, while there was no major catastrophic event in the Caribbean in the early 1990s, reinsurance premiums more than doubled in the region because of losses experienced by insurance and reinsurance companies in the aftermath of Hurricane Andrew and the Northridge Earthquake.

Private markets, by themselves, do not provide high quality, publicly available information on risk, which lowers the level of preparedness and increases the damages of catastrophic events. Consequently, low preparedness contributes to explain the “high” costs of and “low” demand for catastrophe insurance/reinsurance. In the Caribbean region, the public sector, possibly as a regional initiative, could provide incentives to the private sector, including universities,<sup>13</sup> to foster

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<sup>10</sup> For instance, when the Soufriere Hills volcano in Montserrat became active again in 1996, its last eruption had occurred 250 years before. In the case of El Niño, the frequency is higher: there have been three recognized episodes of El Niño over the last twenty years: 1982-83, 1991-92 and 1996-97.

<sup>11</sup> Mjelde, Hill and Griffiths (1998, p. 1093) reported in Charveriat, 2000, p. 73.

<sup>12</sup> For more on this issue see also World Bank, 2002 (b) and (c) which provide an in-depth analysis of the institutional shortcomings in natural risk management in the Caribbean region.

<sup>13</sup> For example, Professor William Gray of Colorado State University makes publicly available forecast regarding the occurrence of hurricanes. Some information is also available from specialized departments of insurance companies.



scientific research and improve technology.<sup>14</sup> It could also ensure the dissemination of results to the agencies in charge of national emergency management.

**Explanation 2: Prices of catastrophe insurance are “high” and quantities of risk transfer are “low” because insurers do not discriminate by zone of risk or the implementation of risk-reduction measures, which amplifies adverse selection and moral hazard.**

Even though conditions of housing stock and investment in mitigation differ among clients, insurance companies do not systematically discriminate by either zone of risk or implementation of risk-reduction measures. Catastrophic risk insurers in the Caribbean region do not systematically discriminate between areas that are considered high risk for natural catastrophes and those areas where risks are lower. In Jamaica, for example, there is no differentiation in the rates charged for insuring against earthquake in the coastal regions of Kingston, where the risk is greater, and Montego Bay in the interior, where the risk is lower. Theoretically, the Dominican Republic is divided into five risk zones but there is no rate discrimination among them. In addition, insurers do not provide rate credits or premium abatements for risk-reduction features that reduce the extent of catastrophic damages. In fact, local insurers have been consistently averse to offering discriminatory pricing to consumers for catastrophic risks, even in instances where steps have been taken to reduce the size of probable losses. It is estimated that an expenditure of 1 percent of property value on vulnerability reduction measures can reduce the estimated maximum loss from a category 3 hurricane by at least 30 percent. Anchoring walls into well-dug foundations, reinforcing wall segments with pillars, fusing walls into roof supports and fixing roof sheeting into roof supports provide effective resistance to high winds. In Barbados and Trinidad and Tobago steps are being taken toward rate discrimination by offering concession rates to structurally sound buildings; however, current policyholders do not as yet benefit from such preferential treatment.

The absence of price discrimination by risk zones and the presence of risk-reduction measures lead invariably to adverse selection and moral hazard which, in turn, lower the quantity of risk transfers.<sup>15</sup> Adverse selection refers to the fact that individuals who live in high-risk areas are likely to buy more insurance than those in low-risk areas. This practice increases the insurers' exposure to risk, reduces the supply of catastrophic transfer and, ultimately, leads to higher prices. Moral hazard refers to the fact that once insured, individuals are not likely to engage in risk-reduction activities that would reduce the negative effects of potential natural disasters. Moral hazard leads to high premiums which further depress risk transfers.

Moral hazard can be reduced through deductibles or supply of insurance cover conditioned upon the adoption of mitigation techniques. Adverse selection can be alleviated by the implementation of compulsory insurance schemes and premium differentiation by level of risk. However, the origins of these market failures are likely to lie in the low provision of risk identification and forecasting (Explanation 1) and the deficient land-use regulation and building codes (Explanation 4). Indeed, it is reasonable to expect that once these more fundamental causes are resolved, catastrophe insurance and reinsurance companies will offer contracts that will mitigate moral hazard and adverse selection, as they do in more developed economies.

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<sup>14</sup> World Bank, 2002(b), p. vii makes identical recommendations.

<sup>15</sup> In fact adverse selection may lead to a complete disappearance of the market for catastrophe insurance (Akerlof, 1970).

### **Explanation 3: Demand for catastrophe insurance is “low” because people are not rational**

Given the low frequency risk of natural disasters and their complexity, individuals are less susceptible to be rational: they under-invest in mitigation and under-insure. Moreover, collective memory might not be a reliable basis on which to gauge the risk of a natural disaster. A case in point: the Dominican Republic was hit by Hurricane Georges in 1998 but had not been affected by a significant catastrophe since 1979. In fact, many hurricanes have made landfall on the island since the late 1970s but none had a significantly negative impact on the economy. The Dominican Republic also straddles five tectonic plates which make it very vulnerable to seismic activities; however, the last earthquake occurred some two generations ago in 1946. Hurricane Gilbert in 1988 was Jamaica’s first major catastrophic shock since the earthquake of 1907. In the current collective memory of the Dominican Republic and Jamaica, therefore, the probability of serious damage from an earthquake is extremely remote.

Public interventions may help correct this market failure. The public sector may engage in information campaigns to provide accurate information on catastrophic risk. However, experience shows that even if the benefits of insuring are identified and disseminated, people will continue to under-invest in mitigation and to under-insure. Public interventions to rectify this market failure could be in the form of providing incentives to those who invest in risk-reduction measures. Individuals and firms who purchase insurance could also be granted tax credits or deductions, for example. Although this might be difficult to enforce in poor and marginal areas that are most at risk, consideration could be given to legislating mandatory catastrophe insurance coverage.

### **Explanation 4: Prices of catastrophe insurance are “high” and supply of catastrophe insurance is “low” because land-use regulations and building codes are inexistent or not enforced**

In many Caribbean countries, the lack of enforcement of existing land-use regulations and of building codes limits access to catastrophe insurance or makes catastrophe insurance unaffordable. The presence of properties in high-risk areas either prevents insurance companies from offering comprehensive coverage to those who most need insurance protection or places the cost of insurance out of reach of those who cannot afford high premiums. Dwellings are constructed in hazard-prone, low-lying coastal areas, deep river basins or valleys and along steep slopes. In Santo Domingo, the Dominican capital, about 300,000 people live in the high-risk, flood-prone and highly polluted Ozama River Basin. “Chattel” houses in Barbados, Jamaica and Trinidad and Tobago are another example of vulnerable, uninsurable properties (lacking dug-in foundations, secured frames or bolted roofs) which could be easily dislodged in the event of flooding or strong winds. Compliance with building codes ensures minimal damage and some structural survival in the event of a catastrophe. It also lowers the costs of catastrophe insurance. In the Caribbean region, however, houses are not built in compliance with engineering requirements or location restrictions.<sup>16</sup> Even if they exist, legal codes and provisions in the region tend to be outdated or inadequate. Jamaica adopted building codes and earthquake hazard mitigation policies after its last earthquake in 1907. There are currently no official building codes or standards in Trinidad and Tobago, although substantial work has been done in the field. Barbados’s first building code was drafted in 1992 but is yet to pass into law. The Dominican Republic has a uniform building code (UBC), similar to the California building code, but only a

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<sup>16</sup> For an in-depth review of this issue see World Bank, 2002 (b) and (c).

handful of construction projects comply with its provisions. It is important that the public sector adopt and enforce land-use regulations and building codes.

**Explanation 5: Demand for catastrophe insurance is “low” because insurance payments are delayed.**

There is a general perception that insurers are quick to collect premiums but very slow to settle claims or meet other customer needs. This is particularly the case with catastrophic events which may generate at once a large number of claims that may exceed the response capacity of most insurers and lead to lengthy appraisals of damages. However, there is little evidence that this factor is perceived differently in the Caribbean region than in developed economies.

**Explanation 6: Supply of catastrophe insurance is “low” because of distortions brought about by the existence of public insurance/reinsurance companies.**

International experience indicates that public provision of catastrophe insurance or reinsurance has not proved successful (Box 2.7). The public provision of catastrophe insurance discourages the development of a private market. For example, the creation of a public flood insurance program in the United States in the 1930s displaced the existing private market. Under such conditions, the public sector has to bear the costs of damages or contingent liabilities which can, in turn, have unexpected negative impacts on the country’s fiscal deficit. Public sector interventions have been more successful when they aim at helping to restore a private catastrophe insurance market whose capital base has been stressed because of the occurrence of particularly devastating catastrophic events. The public sector can then provide insurance at the highest layers of risk (see Explanation 9).

With one exception, no insurance or reinsurance company in the Caribbean region is publicly owned. The Insurance Corporation of Barbados (ICB) was established in 1978 to insure assets of the state and of certain statutory boards, as well as to underwrite and manage all classes of risk in Barbados. The government of Trinidad and Tobago attempted to create a public insurance company in the 1970s but shelved the idea in favor of setting up a reinsurance company in 1978 with private sector share participation of 40 percent. This company was privatized in the 1990s. In Jamaica and the Dominican Republic, catastrophe insurance is sold exclusively by the private sector.

### **Box 2.7: Examples of Public Provision of Disaster Insurance or Reinsurance**

The mix between private and public arrangements to provide catastrophe insurance varies widely among developed countries. In some countries the public sector has traditionally kept a leading role in providing coverage against catastrophic events. This box reviews the roles played by both private and public sectors and the rationale for public sector intervention in some developed countries (e.g.: Spain, France, New Zealand, U.S., Japan) and make recommendations regarding the mix between private and public interventions feasible in the Caribbean region.

#### **United States**

The National Flood Insurance Program provides insurance coverage against floods in eligible communities that have flood risk assessments and mitigation programs. By the end of 1997, an amount of US\$430 billion (or 30 to 35 percent of assets in risk areas) was covered by the NFIP throughout flood risk areas. The NFIP does not seek reinsurance in international markets. Supported by the Federal Emergency Management Agency, this mechanism is currently indebted to the tune of US\$800 million. Should the Federal Government declare an area a national disaster zone (50 percent of disasters), disaster victims will be eligible for grants and loans at subsidized interest rates. This type of government assistance discourages property owners from purchasing insurance coverage directly from private insurance companies.

#### **Spain**

Insurance coverage for natural hazards are covered by the *Consortio de Compensacion de seguros*, a public corporation which receives a fixed proportion of every premium of property insurance contracted by insurance companies. If the insurance industry experiences an excessive loss as the result of a natural disaster, the government will be responsible for any associated liabilities that the industry experiences. In essence, insurance companies are guaranteed that no catastrophic event shall wipe them out completely because the government will cover all losses above a certain limit. For most Spaniards, this arrangement means that securing disaster insurance is relatively easy; for the insurance industry it has enhanced a deeper market penetration.

#### **France**

The French system, CCR, was created in July 1982 after serious flooding in the Saone Valley in southwestern France in late 1981. The system provides cover for losses from natural disasters (flooding, earthquakes, droughts, etc.). The French system is based on the solidarity concept and hence provides for compulsory coverage for all real estate property and movables (including vehicles). Policyholders are subject to an additional flat percentage of the policy premium. The state guarantee operates at the reinsurance level and provides for the cost of direct damage to the property up to the value specified in the insurance contract (real estate property and movables, including motor vehicles). The insurers are responsible for loss adjustment and settling claims.

The premiums ceded to the state-owned reinsurance company (CCR) is the primary source of capital for the system. This system operates at two levels. First, compulsory inclusion in all underlying policies against natural disasters for an extra-premium. Second, unlimited reinsurance coverage for natural disaster risks, offered by state-owned CCR, with an explicit state guarantee to insurance. The range of companies' cession rates is between 40 percent and 90 percent, with the average cession rate being 45 percent.

#### **Brazil**

Brazil's Instituto de Resseguros, which wielded a monopoly in the country's reinsurance industry, has recently been transformed into a joint stock company whose majority shares are held by the Government. Fire risks (which include floods, the main hazards in Brazil) are the company's major line of business and account for 33 percent of the total retained premium volume.

Source: Charveriat, 2000, p. 78 and Kalavakonda, 2002.

**Explanation 7: Prices of catastrophe insurance are “high” and risk transfers are “low” because the structure of contracts for insurance/reinsurance is inefficient.**

Available evidence suggests that “high” prices and “low” transfers do not derive from inefficient insurance and reinsurance contracts. In fact, in the wake of Hurricane Andrew (Florida, 1992) and the Northridge Earthquake (California, 1994), insurance/reinsurance contracts have introduced new clauses and have become more efficient over time at transferring catastrophic risk.<sup>17</sup> Reinsurance companies have introduced event and cession limits which have allowed them to place a ceiling on the aggregate amount for which they could be exposed.<sup>18</sup> They have set deductibles that limit their own exposure and that of insurers. To prevent underinsurance, they also introduced more stringent conditions like the average clause which stipulates that the claim payment would be reduced by the underinsured amount of the property in the event of a partial loss. Consequently, “high” prices and “low transfers” are unlikely to derive from the inefficiency of the structure of insurance/reinsurance contracts.

**Explanation 8: Quantities of risk transfer are “low” because insurance and re-insurance companies have market power.**

Although there has been a general consolidation of the reinsurance and insurance industry over time, the general view is that “high” prices and “low” risk transfers are not associated with greater market power. The evidence indicates a secular consolidation of insurance and reinsurance companies in the Caribbean region and worldwide. The number of insurance companies in the Caribbean region is on the decline. In Jamaica, the number of insurers decreased from 19 in 1988 to 14 in 1998, while in Trinidad and Tobago it declined from 30 to 18 during the same period. In Barbados, 15 general insurance companies were operating in 1998 versus 25 in 1972. More than 40 insurance companies were operating in the Dominican Republic in 1998 compared to over 50 in 1984. Clearly, the industry is consolidating. The five most important insurance companies in Trinidad and Tobago controlled 81 percent of the market in 1997 (compared to 65 percent in 1992) while the five largest insurance companies in the Dominican Republic underwrote about 81 percent of total property premiums in 1998 compared to about 63 percent in 1990. Mergers and acquisitions have also reduced the number of reinsurers worldwide. The market share of the four most important reinsurance groups increased from 23 percent in 1991 to 33 percent in 1998. However, these trends do not necessarily reflect increased market power. Consolidation leads to a structure that optimizes the catastrophe reinsurance/insurance industry’s ability to finance the large fixed costs associated with risk identification, forecasting and systems technologies (see Explanation 1). In addition, entry of new capital into the Bermudan reinsurers, beginning in 1993, suggests that barriers to capital entry are not overwhelming, which leads to the conclusion that the incumbents’ market power is not itself overwhelming.

Also agents and sub-agents have not increased their market power. Competition at the agent and sub-agent level has increased in the 1990s. First, the number of agents has increased in most countries including the Dominican Republic, Trinidad and Tobago and Jamaica (where the number of local intermediaries increased from 62 in 1989 to 72 in 1998). Second, commissions earned by local agents have declined substantially, which would not have been the case if these

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<sup>17</sup> Box 2.6 provides a description of catastrophe insurance/reinsurance contracts.

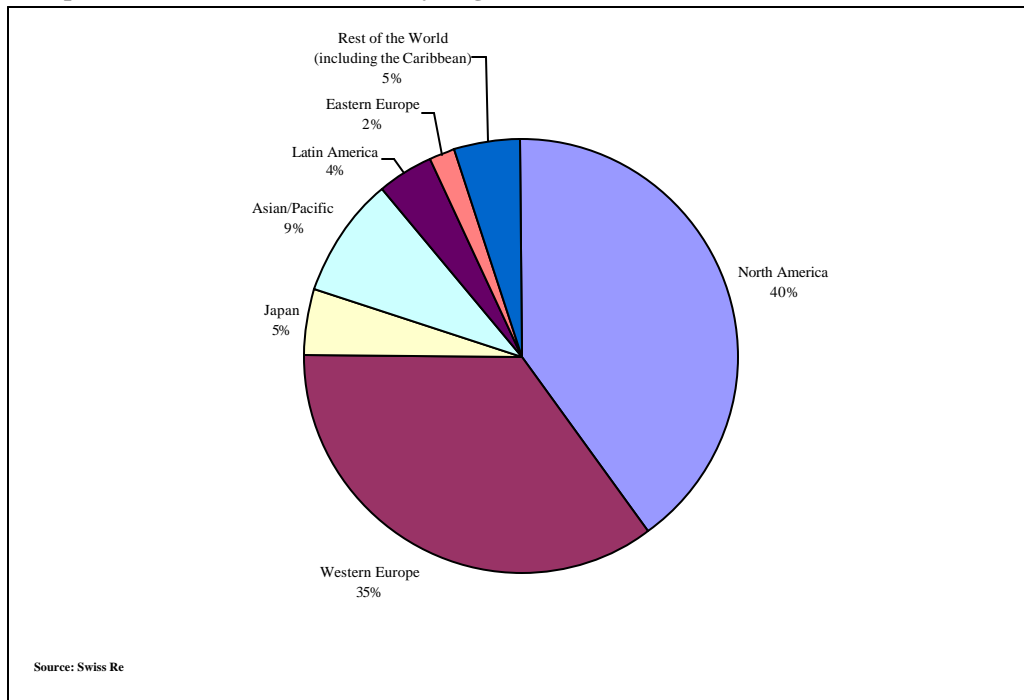
<sup>18</sup> These contracts are very important for developed countries like the United States where damages can be substantial. However, in the Caribbean, loss limits were set above the full replacement value of probable maximum assets which decreases their relevance for the region.

agents had market power. For example, in the Dominican Republic, the commissions paid to local agents for property insurance transactions declined from 14 percent of total property insurance premiums in 1990 to about 10 percent in 1998.

**Explanation 9: Prices of catastrophe insurance are “high” and risk transfers are “low” because there is insufficient reinsurance capital.**

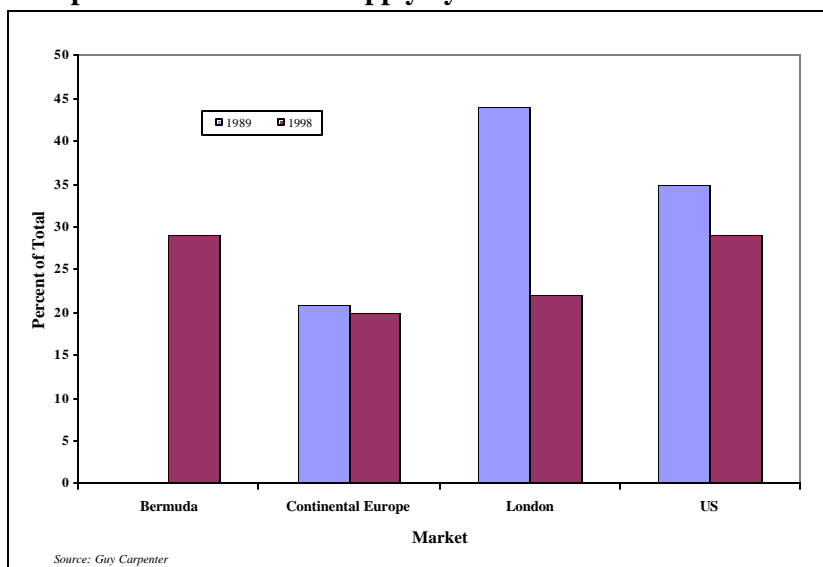
“High” prices and “low” risk transfers in the Caribbean cannot be explained by insufficient reinsurance capital. First, insurance losses from a large catastrophic event in the Caribbean would not stress the reinsurers’ capital base. Indeed, the economic costs of large catastrophic events in the Caribbean region are in the order of a few billion dollars and most damages are uninsured, while estimates of total capital and surplus of US insurers alone approximated US\$350 billion in 2000. In fact, it is estimated that only about 2 percent of global demand for reinsurance originates from the Caribbean (Graph 2.4). Thus, at present levels of capital, the worldwide reinsurance industry is largely capable of coping with a catastrophic event that is limited to the Caribbean region.

**Graph 2.4: Reinsurance Demand by Region, 1998**



Second, following Florida’s Hurricane Andrew (1992) and California’s Northridge Earthquake (1994) reinsurance capacity for the Caribbean catastrophic exposures market was contracted through withdrawals by some reinsurers, even though there were no major crises in the Caribbean region. This led to the emergence of the Bermuda market with its additional capacity so that, today, the worldwide supply of reinsurance originates in four primary markets: Bermuda, continental Europe, London, and the United States (Graph 2.5), which provides further evidence that reinsurance capital is sufficient in the Caribbean region.

**Graph 2.5: Reinsurance supply by market**



“Cat” bonds (Box 2.8) and the creation of a public-private partnership (Box 2.9) are mechanisms that aim at restoring a stressed capital base. Their relevance for the Caribbean region is thus limited.

**Box 2.8: Catastrophe Bonds: An Option for the Caribbean Region?**

The damages from Hurricane Andrew (Florida, 1992) and the Northridge Earthquake (Los Angeles, 1994) alone exceeded US\$45 billion, with the insured component running into US\$30 billion. The losses are comparable to cumulative insured losses from natural catastrophes in the previous decade of about US\$25 billion. These two events led to the collapse of several property and casualty insurers.

The capitalization of the US insurance industry (estimates of total capital and surplus were about US\$350 billion at end-2000) may not be sufficient to cover a series of catastrophic events of the same magnitude as Hurricane Andrew, the Northridge Earthquake or a remake of the 1906 San Francisco Earthquake. Essentially, the “big one” could wipe out the entire capital base of the insurance industry.

In response, the insurance industry has issued Catastrophe (“cat”) bonds designed to spread the industry’s catastrophic risk to the capital markets rather than keeping it on insurers’ own balance sheets, thereby reducing exposure to major catastrophic events. This also reassures policyholders that they would be protected against even the largest of losses. The first “cat” bonds came to market in 1994, and many more have since been issued. Aside from spreading huge losses more widely, the bonds may bring more stability to a reinsurance market known for fluctuating rates and for developing sudden aversions for certain types of risks.

However, “cat” bonds have little relevance for the Caribbean region. Indeed, international reinsurance exposures to the region is extremely limited (estimated at 2 percent of total premiums), which little justifies the transfer of such risk to the capital market.

### **Box 2.9: Public/Private Partnerships in Catastrophic Risk Insurance**

In 1992, Hurricanes Andrew (Florida) and Inicki (Hawaii) generated considerable damages. Payments for insured damages distressed the insurance/reinsurance industry's capital base. As a consequence, many insurers and reinsurers reevaluated their exposure to catastrophic events and decided to stop providing catastrophe risk policies, mostly in Hawaii, Florida and California. The Governments of the three states decided to intervene and led initiatives with the private sector to restore the catastrophe insurance market.

Since insurance and reinsurance companies were reluctant to provide catastrophic insurance based on the possibility that another event would deplete their capital base, the state decided to create private/public partnership and to provide contingent funding at the highest layers of risk<sup>1</sup> (thereby offering protection against a depletion of the insurance and reinsurance industry capital base). In case a catastrophic event generates damages above the level that insurance/reinsurance companies could afford, the partnership could issue bonds and use the proceeds for reinsurance. Private insurers and reinsurers would pay back interests and principal on the bonds from future premiums. The mechanism could be discontinued once the absence of another catastrophic event has allowed the insurance/reinsurance companies to restore their capital base. Private/public partnerships have been successful at reviving a moribund catastrophic insurance market, including the Hawaii Hurricane Relief Fund (now defunct), the Florida Hurricane Fund and the California Earthquake Authority.

#### **Florida Hurricane Fund (FHF)**

The FHF provides insurance coverage against hurricanes for residential property. It is controlled by Florida's State Board Administration (SBA) and structured as a state trust fund without sovereign guarantee. All authorized insurers are required by Florida statutes to enter into a reinsurance contract with the SBA. FHF funds come from the payment of reinsurance premiums.

Unlike private companies which must accumulate sufficient capital reserves to pay for possible anticipated losses, the SBA can issue public bonds in the aftermath of an event. As of end-1997, FHF's fund balance was estimated at US\$2.0 billion while its bond capacity was estimated at US\$6 billion.

#### **California Earthquake Authority (CEA)**

The CEA is a privately funded and publicly managed entity which provides earthquake insurance policy for residential property with more restrictive covenants than those offered by the traditional market. Its policy does not set a limit on the insured value of the basic structure but includes a 15 percent deductible. Also, the policies do not provide coverage for damage to buildings, fences, walls, driveways, pools and other non-residential structures. Funds come from reinsurance premiums from the participating insurance companies, which can provide additional coverage to supplement the CEA's basic coverage.

The capital of the CEA is structured in six sequential layers. The highest layers of risk envisage a recourse to credit facilities and issues to finance the damages from catastrophic events.

<sup>1</sup> See Box 2.7 for a definition of layers of risk.  
Source: The Economist, February 28<sup>th</sup>, 1998.



**Explanation 10: Prices of catastrophe insurance are “high” and risk transfers are “low” because regulation is inadequate.**

The regulation of the industry is broadly adequate in the Caribbean region with the important exception that regulatory prescription of investments by the insurance companies reduces their overall profitability, which contributes to the observed “high” prices and “low” transfer of risk.<sup>19</sup> For example, with the exception of the Dominican Republic, there is no regulatory barrier limiting the access of foreign firms and protecting the local insurance industry (Tables 2.2 and 2.3).<sup>20</sup> However, the presence of regulatory guidelines which restrict investments, together with the presence of underdeveloped financial markets, limits insurance companies’ profitability. Restrictions to invest on the international financial markets also prevent the insurance companies from buffering their assets against a possible fallout from catastrophic occurrences (their assets may be heavily concentrated in housing, which an earthquake could damage). This leads insurance companies to set prices above those that would prevail if they could diversify their investments. “High” prices lead to “low” level of risk transfer. It is reasonable to think that limitations to assets diversification together with the underdeveloped capital markets are at the core of the “thin” catastrophe insurance markets observed in the Caribbean region.

To correct these deficiencies, governments in the region could take a series of measures. First, they could allow the insurance industry to diversify assets internationally. Second, they could foster the emergence and liquidity of equity markets by eliminating stamp duty fees, usury clauses (limiting the yields on corporate fixed income securities) and non-dematerialization of securities. Easing restrictions on foreign assets and highly regulated securities would expand the base for investment financing.

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<sup>19</sup> For more on insurance regulation in the Caribbean region, see Pollner, 2001, for the OECS countries and the Background Papers for Barbados, Jamaica, Trinidad and Tobago. For the Dominican Republic, see the recent Financial Sector Stability Assessment, IMF Board document, June 2002 and the Financial Sector Assessment, World Bank Board document, June 2002.

<sup>20</sup> The Dominican Republic has the highest discrimination for foreign companies with higher minimal capital requirements and corporate tax liabilities. The 25 percent income tax rate is identical for local and foreign companies. However while net profit constitutes the tax base for local companies, the net profit of foreign companies is assumed to be 10 percent of total underwritten premiums which leads to higher tax liabilities.

**Table 2.2: Insurance Sector Regulatory Characteristics in the East Caribbean Markets (US\$)**

	Antigua and Barbuda	Barbados	Dominica	Grenada	St. Kitts and Nevis	St. Lucia	St. Vincent & the Grenadines	Trinidad & Tobago
Minimum Capital Requirement (US\$ million)	0.07	1.5	0.07	0.09	0.07	Local: 0.10 Foreign: 0.20	0.07	0.16
Solvency Margin (Assets – Liab.) above premium income	Minimum capital or 10% of premium income	\$0.25m or 25% of premium income	Minimum capital or 10% of premium income	\$0.06m or 10% of premium income	Minimum capital or 10% of premium income	\$0.07m or 20% of premium income	Minimum capital or 10% of premium income	Minimum capital or 20% of premium income
Reserve Requirement	na	40% of annual premium income	30% annual premium income	na	10% of annual premium	40% of annual premium	na	40% of premium income
Premium Tax (%)	na	5	None	na	5	Local: 3 Foreign: 5	3	6
Corporate Tax (%)	40	40	30	30	38	33.3	40	35

<sup>1</sup> na = not available

Source: Pollner, 2001, p. 37

**Table 2.3: Structure of the East Caribbean General/Property Insurance Market (1998)**

	Antigua and Barbuda	Barbados	Dominica	Grenada	St. Kitts and Nevis	St. Lucia	St. Vincent and the Grenadines	Trinidad and Tobago	Total
No. of General Insurance Companies	16	22	13	19	9	21	12	29	141
Foreign Companies as Percentage of Total <sup>1</sup>	88	45	95	76	67	86	85	12	66
Property Insurance Premiums (Gross US\$ million)	10.6	43.0	5.8	8.6	6.3	11.9	9.6	52.1	148
Gross Premiums % of GDP	1.8	3.0	2.4	2.7	2.4	2.1	3.3	0.9	--

<sup>1</sup> Approximately 75% of these companies are companies from Barbados, Guyana and Trinidad & Tobago

Source: Pollner, 2001, p. 37

**Explanation 11: Quantities of risk transfer are “low” because of the availability of ex-post international assistance.**

Ex-post financing occurs when third parties intervene to finance the losses incurred by the victims of a natural disaster. International organizations like the World Bank and the Inter-American Development Bank (IDB) play major roles in providing disaster-related assistance in response to victims of natural disasters.<sup>21</sup> However, international emergency assistance is largely unconditioned on the implementation of risk-reduction measures and may thus provide a disincentive for countries to adopt risk-reduction policies towards disasters.<sup>22</sup> Ex-post financing should be viewed as a form of market failure since neither the Governments (nor apparently the international organizations) can credibly commit not to fund disasters after the fact, since the political incentives to do so ex-post are overwhelming. This reduces the incentives to buy private insurance contracts against disasters or invest in risk-reduction activities. It also creates an incentive for some segments of the population (mostly poor, mostly illegal) to settle in risk-prone areas since they know that the Government will bail them out eventually.

International organizations could have a larger impact on development by switching their role from providers of disaster-related assistance to initiators of the implementation of risk-reduction measures. They could also provide disaster-related lines of credit contingent upon the implementation of some preliminary risk-reduction measures. As an incentive, these lines of credit would have to be above the level of assistance that is normally provided in the aftermath of a disaster.

***C. Recommendations for Public Sector Interventions***

Table 2.4 summarizes the market failures that help explain the “thin” catastrophe insurance market observed in the Caribbean region and outlines a set of recommendations for public sector interventions that would contribute to the development of this market.

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<sup>21</sup> Both multilateral organizations have substantially increased their assistance to natural disasters over the last decade.

<sup>22</sup> It is interesting to note that Cuba, which receives little international assistance for reconstruction, has an excellent preparedness system and prevents most fatalities from hurricanes.

**Table 2.4: Market Failures and Recommendations for Public Sector Interventions in the Caribbean Region**

<i>Market Failures</i>	<i>Recommendations for Public Sector Interventions</i>
1. The provision of risk identification and forecasting is insufficiently developed	<ul style="list-style-type: none"> <li>• Foster scientific research</li> <li>• Improve available technology</li> <li>• Ensure the dissemination of results to risk -management agencies and end-users</li> </ul>
2. Insurers do not discriminate by zone of risk or the implementation of risk -reduction measures	Same as market failures 1 and 4
3. People are not rational	<ul style="list-style-type: none"> <li>• Engage in information campaigns to provide accurate information on catastrophic risk</li> <li>• Provide tax credit for the purchase of catastrophe insurance</li> <li>• Provide incentives to invest in risk-reduction measures</li> </ul>
4. Land-use regulations and building codes are inexistent or not enforced	<ul style="list-style-type: none"> <li>• Establish land-use regulations and building codes where inexistent</li> <li>• Enforce land use regulations and building codes</li> </ul>
5. The insurance industry takes time to process payments → Not a constraint	
6. Existence of public insurance companies → Not a constraint	
7. Inefficient structure of contracts for insurance/reinsurance → Not a constraint	
8. Insurance and re-insurance companies have market power → Not a constraint	
9. Insufficient reinsurance capital → Not a constraint	
10. Inadequate regulation	<ul style="list-style-type: none"> <li>• Eliminate restrictions on foreign insurance companies</li> <li>• Eliminate restrictions on international diversification of assets</li> <li>• Develop domestic capital markets</li> </ul>
11. Availability of ex-post international assistance	<p>International organizations could:</p> <ul style="list-style-type: none"> <li>• Switch their role from providers of disaster-related assistance to initiators of the implementation of risk -reduction measures</li> <li>• Provide disaster-related lines of credit contingent upon the implementation of some preliminary risk -reduction measures.</li> </ul>

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