Commentary

Catastrophe Bonds: Another Tool to Raise Preparedness for Fiscal Pressures Stemming From Natural Disasters

DBRS Morningstar
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Key Highlights

- The fiscal cost of natural disasters—such as earthquakes, hurricanes, wildfires, and floods—could be significant, especially for small countries with historically large exposure to these events.
- The use of CAT bonds to insure against natural disasters as a pre-financing tool can alleviate the ensuing fiscal pressures after such events.
- The market for public-sector CAT bonds remains relatively shallow and faces some challenges that could prevent it from scaling-up at the moment.

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Summary

Natural disasters can generate significant losses in terms of both human lives and destruction to physical assets, potentially resulting in considerable and sudden fiscal costs for the public sector. In this commentary, we explore the potential advantages and challenges of using catastrophe bonds (CAT bonds) to mitigate post-natural disaster stress on public finances that can be overwhelming in some countries. While the potential occurrence of such natural events will be negative for a sovereign's credit profile, especially for smaller countries and islands highly exposed to these types of catastrophe, the use of funding mechanisms such as CAT bonds, issued prior to, rather than public debt issued in the midst of a crisis, provides a useful tool for raising fiscal preparedness. In our view, while CAT bonds could be an effective risk management tool for low- and middle-income countries with high exposure to natural disasters, they are unlikely, in isolation, to materially improve the credit profile of a country today, since its use is still marginal.

Natural disasters can inflict significant fiscal pain

The fiscal cost of natural disasters—such as earthquakes, hurricanes, wildfires, and floods—could be significant. Governments may need to rapidly increase spending to finance post-disaster economic recovery and reconstruction while tax revenues may be lower, as underlying tax bases may be impaired temporarily or permanently. The specific legal and policy frameworks in each jurisdiction, which can differ greatly, generally outline the public-sector's obligations with respect to their responses to natural disasters. Governments may also decide, based on political or moral considerations, to provide additional support for disaster-affected households and businesses as well as more broad support to the economy. Generally, governments will intervene to speed up the recovery and mitigate scarring effects on growth prospects, provided there is sufficient fiscal space.

Exhibit 1 Average Fiscal Cost of Contingent Liability Realizations

Type of Contingent Liabilities	Number of Episodes	Number of Episodes with Identified Fiscal Costs	Average Fiscal Costs (% of GDP)	Maximum Fiscal Costs (% of GDP)
Financial Sector	91	82	9.7	56.8
Legal	9	9	7.9	15.3
Subnational Governments	13	9	3.7	12.0
State Owned Enterprises	32	31	3.0	15.1
Natural Disaster(s)	65	29	1.6	6.0
Private Non-Financial Sector	7	6	1.7	4.5
Public Private Partnerships	8	5	1.2	2.0
Other	5	3	1.4	2.5
Total	**230**	**174**	**6.1**	**56.8**

Source: IMF Working Paper: *The Fiscal Costs of Contingent Liabilities: A New Dataset,* January 2016.

The International Monetary Fund (IMF) calculated the fiscal cost associated with contingent liabilities from a sample of 80 countries between 1990 and 2014. According to this study, natural disasters had an average fiscal cost of 1.6% of GDP and a maximum of 6.0% of GDP (Exhibit 1). The fiscal risk caused by natural disasters is modest compared with that caused by the financial sector (9.7% of GDP on average and 56.8% of GDP in extremis). However, the frequency and impact could be higher than these averages suggest in small countries that are highly exposed to natural disasters not included in this sample, such as various Caribbean countries.

Managing fiscal risks from natural disasters and the role of CAT bonds

Once authorities have identified and quantified the fiscal risks stemming from natural disasters, they might decide to implement measures to reduce related contingent liabilities, such as limiting building activities, and physical structure preparedness. In addition, mandating private insurance in high-risk areas is sometimes but not always possible and significant fiscal risks will likely remain for the public sector. Policy makers have tools to "pre-finance" part of these fiscal risks, such as purchasing insurance/CAT bonds, defining contingency budgets, or setting up natural disaster funds (earmarked buffer funds). Available fiscal headroom will likely have to absorb any residual fiscal risk once the disaster occurs. For low- and middle-income countries, financial aid from other countries or international institutions may at least partially compensate for more limited fiscal space.

The use of CAT bonds to insure against natural disasters as a pre-financing tool can alleviate the immediate fiscal pressures after such events. Effectively, the occurrence of a disaster would trigger a "contingent asset" for the insured entity. Under certain conditions, the insured sovereign/public-sector entity will receive the partial or full amount paid by investors in triggered CAT bonds[1]. From an investor perspective, this asset class has been particularly attractive for traditional and alternative asset managers, including insurance-linked securities funds, as well as insurers, reinsurers and pension funds, particularly in Europe. CAT bonds have traditionally catered to institutional investors due to their relatively uncorrelated returns with mainstream financial markets and the higher yields offered to compensate for the catastrophe risks involved in these transactions.

We note that CAT bonds have some peculiarities linked to their legal structure. CAT bonds will generally be issued by a special-purpose vehicle (SPV), which will store the cash paid by the investors and disburse the cash to the public-sector entity (cedent/insured) if the conditions are triggered. Therefore, if a natural disaster does not occur, the public-sector entity will not receive any funds or be able to tap or repurpose the funds ringfenced in the SPV. From a statistical point of view, the fact that CAT bonds are issued by an SPV means that this will not increase the public-sector entity's debt numbers. The premiums periodically paid to the SPV will affect the fiscal deficit. From a credit ratings perspective, the SPV is isolated from the insured public-sector entity and, therefore, each entity's credit rating/credit quality could differ.

The public-sector's use of CAT bonds has been increasing over time (Exhibit 2 and Appendix). In terms of cedents, government-related entities or entities fulfilling a public-sector mandate (such as the California Earthquake Authority or the Turkish Catastrophe Insurance Pool) have been the

1 For a detailed explanation on the structure and functioning of CAT bonds, please see Catastrophe Bonds May See Increased Interest Amid Rising Reinsurance Costs.

largest players in CAT bonds accounting for a cumulative USD 7.2 billion, followed by central government/sovereign states with USD 3.2 billion. From a geographic perspective, the United States is the largest player with a cumulative USD 6.1 billion, followed by Mexico with USD 1.6 billion, Chile with USD 650 million, and Turkey with USD 500 million (Exhibit 3 and Appendix). The significant increase in issuances in 2020 is mostly linked to insurance against earthquakes.

Exhibit 2 CAT Bonds Issued by Public Sector (USD Billions)

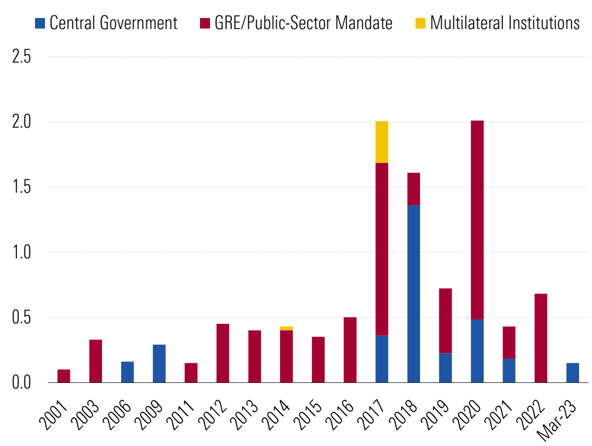
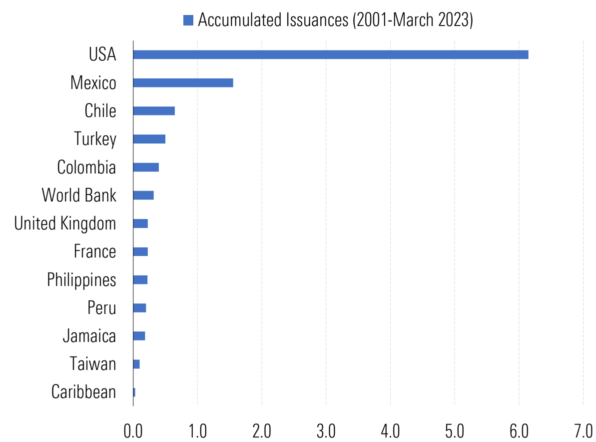


Exhibit 3 CAT Bonds issued by Geographies (USD Billions)



Source: Artemis.bn, IMF, DBRS Morningstar. Note: The risks/perils included are earthquakes, hurricanes, tropical cyclones, windstorms, wildfires, terrorism risk, and pandemics. Includes USD 150 million IBRD - Chile 2023 not yet issued at the time of publication of this commentary.

The development of the CAT bonds market faces some challenges

Notwithstanding the increasing popularity of CAT bonds over the years, the market for public-sector CAT bonds remains relatively shallow. Currently, this market faces some challenges that could prevent it from scaling up. The IMF considers the main barriers to be high transaction costs, complicated underlying catastrophe models, and a narrow investor base (which might be a consequence of the first two factors). The catastrophe risk modelling of expected losses, which is performed by third-party risks modelers, is a noteworthy difference between CAT bonds and plain vanilla bonds.

The World Bank's role as an intermediary for public-sector CAT bonds

Through its Capital at Risk Notes program, the International Bank for Reconstruction and Development (IBRD; widely known as the World Bank) plays a crucial role in mediating the transfer of risk from a sovereign to the capital markets. The World Bank's intermediation simplifies the procurement process as it eliminates the need to establish an offshore SPV which, in some cases, may not be legally possible for sovereigns and/or may constitute a significant cost that could prevent small sovereigns/public entities from using CAT bonds. The World Bank is responsible for issuing a CAT bond, investing the proceeds, and managing payments to the sponsor and investors.

Since 2016, the World Bank (through its IBRD notes) has intermediated all sovereign CAT bonds in the dataset compiled by Artemis. Thus far, sovereigns with insurance against catastrophes, have mostly procured protection against earthquakes, including the Republic of Colombia, the Republic of Peru, and the Republic of Chile. However, the Republic of Philippines has also used CAT bonds to protect against earthquakes and tropical cyclones while the Government of Jamaica has done the same to protect against tropical storms. The Republic of Chile is the latest use case example, and is finalizing preparations with the World Bank for a CAT bond transaction of USD 150 million or more as part of a comprehensive catastrophic risk management strategy that includes the creation of a fund for natural disasters, under discussion in Congress.

Despite the hurdles, DBRS Morningstar sees further scope for CAT bond use

We take the view that there is significant scope for development in the public-sector CAT bond market in the coming years, although its size is likely to remain relatively small in the near term. In fact, sovereigns can leverage the World Bank's Capital at Risk Notes program, expertise, and track record in CAT bonds to enter into an insurance or derivative contract against natural disasters.

Low- and middle-income countries, especially those exposed to natural disasters, could benefit the most from buying insurance in the form of CAT bonds for the following reasons:

1. These countries usually have weaker credit fundamentals than advanced economies and therefore face higher pressure from capital markets after a natural disaster occurs;
2. These countries usually have high current investment needs that could boost potential output. Using CAT bonds, while relatively expensive, could free up resources that would otherwise have to be left unused in a reserve fund with a high opportunity cost; and
3. Several countries in this group face high disaster risks, such as small countries/islands in the Caribbean.

We take the view that for low- and middle-income countries with high exposure to natural disasters, CAT Bonds can, if used appropriately, be a useful tool for financial planning, but are unlikely per se to materially improve a country's credit profile given its limited current usage. Should the market grow, CAT bonds could reduce general government debt refinancing risks in the immediate aftermath of a natural catastrophe. For now, international aid and support mechanisms will remain the most important supportive factors.

Appendix: List of Public-Sector Catastrophe Bonds

Government-Related Entities/Entities Fulfilling Public-Sector Mandates

Issuer	Cedent	Risks/Perils Covered	Size (USD Millions)	Date	Cedent Country
Western Capital Ltd.	California Earthquake Authority	California earthquake risks	100	Feb-01	USA
Formosa Re Ltd.	Taiwan Residential Earthquake Insurance Pool	Taiwan earthquake	100	Aug-03	Taiwan
Pylon Ltd.	Électricité de France S.A.	European windstorm	228	Dec-03	France
Embarcadero Re Ltd. (Series 2011-1)	California Earthquake Authority	California earthquake	150	Aug-11	USA
Embarcadero Re Ltd. (Series 2012-1)	California Earthquake Authority	California earthquake	150	Jan-12	USA
Embarcadero Re Ltd. (Series 2012-2)	California Earthquake Authority	California earthquake	300	Jul-12	USA
Bosphorus 1 Re Ltd.	Turkish Catastrophe Insurance Pool	Turkey earthquake	400	Apr-13	Turkey
Ursa Re Ltd. (Series 2014-1)	California Earthquake Authority	California earthquake risks	400	Dec-14	USA
Bosphorus Ltd. (Series 2015-1)	Turkish Catastrophe Insurance Pool	Turkey earthquake	100	Aug-15	Turkey
Ursa Re Ltd. (Series 2015-1)	California Earthquake Authority	California earthquake	250	Sep-15	USA
Ursa Re Ltd. (Series 2016-1)	California Earthquake Authority	California earthquake	500	Nov-16	USA
Ursa Re Ltd. (Series 2017-1)	California Earthquake Authority	California earthquake	925	May-17	USA
Ursa Re Ltd. (Series 2017-2)	California Earthquake Authority	California earthquake	400	Nov-17	USA
Ursa Re Ltd. (Series 2018-1)	California Earthquake Authority	California earthquake	250	Sep-18	USA
Baltic PCC Limited (Series 2019)	Pool Reinsurance Company Limited (Pool Re)	Terrorism risk	97	Feb-19	UK
Ursa Re Ltd. (Series 2019-1)	California Earthquake Authority	California earthquake	400	Nov-19	USA
Sutter Re Ltd. (Series 2020-1 & 2020-2)	California Earthquake Authority	California earthquake	700	May-20	USA
Ursa Re II Ltd. (Series 2020-1)	California Earthquake Authority	California earthquake	775	Oct-20	USA
Power Protective Re Ltd. (Series 2020-1)	Los Angeles Department of Water and Power	California wildfire	50	Dec-20	USA
Ursa Re II Ltd. (Series 2021-1)	California Earthquake Authority	California earthquake	215	Mar-21	USA
Power Protective Re Ltd. (Series 2021-1)	Los Angeles Department of Water and Power	California wildfire	30	Oct-21	USA
Baltic PCC Limited (Series 2022-1)	Pool Re	Terrorism risk	131	Mar-22	UK
Ursa Re II Ltd. (Series 2022-1)	California Earthquake Authority	California earthquake	245	Jun-22	USA
Ursa Re II Ltd. (Series 2022-2)	California Earthquake Authority	California earthquake	305	Dec-22	USA

Source: Artemis.bn, IMF (*Sovereign Climate Debt Instruments: An Overview of the Green and Catastrophe Bond Markets*, July 2022), DBRS Morningstar.

Sovereign/Central Government

Issuer	Cedent	Risks/Perils Covered	Size (USD Millions)	Date	Cedent Country
CAT-Mex Ltd.	Fund for Natural Disasters (FONDEN)	Mexico earthquake	160	May-06	Mexico
MultiCat Mexico 2009 Ltd.	FONDEN	Mexico hurricane, Mexico earthquake	290	Oct-09	Mexico
IBRD/FONDEN 2017	FONDEN/Agroasemex S.A.	Mexico earthquakes, Mexico named storms	360	Aug-17	Mexico
IBRD CAR 117	Republic of Colombia	Colombia earthquake	400	Feb-18	Colombia
IBRD CAR 120	Republic of Peru	Peru earthquake	200	Feb-18	Peru
IBRD CAR 118-119	FONDEN/Agroasemex S.A.	Mexico earthquake	260	Feb-18	Mexico
IBRD CAR 116	Republic of Chile	Chile earthquake	500	Feb-18	Chile
IBRD CAR 123-124	Republic of the Philippines	Philippine earthquakes and tropical cyclones	225	Nov-19	Philippines
IBRD/FONDEN 2020	FONDEN/Agroasemex S.A.	Mexico earthquakes, Mexico named storms	485	Mar-20	Mexico
IBRD CAR 130	Government of Jamaica	Jamaica named storms	185	Jul-21	Jamaica
IBRD – Chile 2023	Republic of Chile	Chile earthquake	150	Mar-23	Chile

Multinational Institutions

Issuer	Cedent	Risks/Perils Covered	Size (USD Millions)	Date	Cedent Country
World Bank – CCRIF 2014-1	Caribbean Catastrophe Risk Insurance Facility	Caribbean hurricane and earthquake	30	Jun-14	Caribbean
IBRD CAR 111- 112 – World Bank pandemic catastrophe bond	Pandemic Emergency Financing Facility	Pandemics	320	Jul-17	World Bank

Source: Artemis.bn, IMF (*Sovereign Climate Debt Instruments: An Overview of the Green and Catastrophe Bond Markets*, July 2022), DBRS Morningstar. Note: Includes USD 150 million IBRD - Chile 2023 not yet issued at the time of publication of this commentary.

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