

Building Sovereign Financial Resilience in Middle-Income Countries

**Disaster Risk Financing
& Insurance Program**



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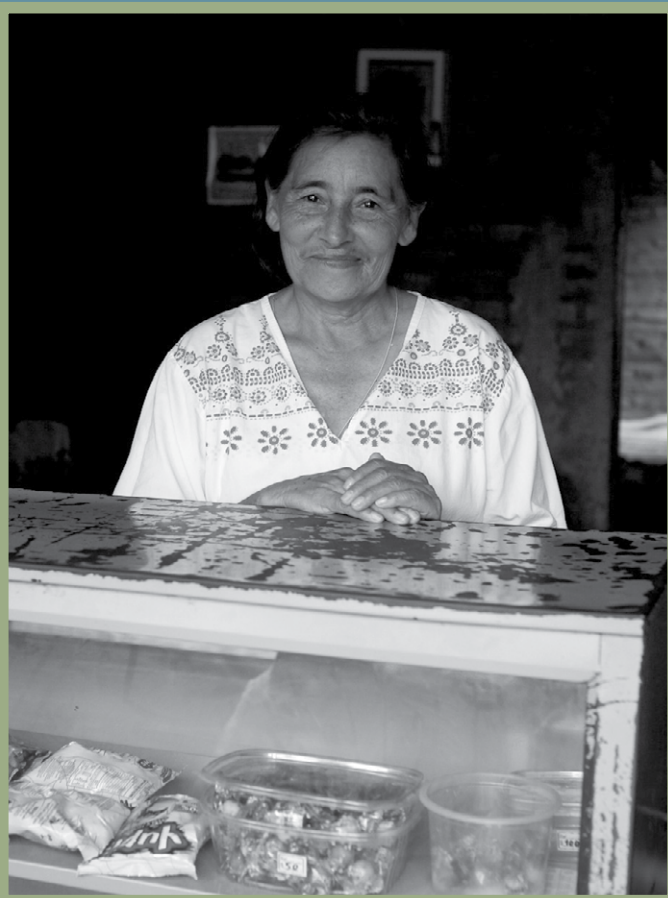
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Component 2: Instruments for Financing Disaster Response

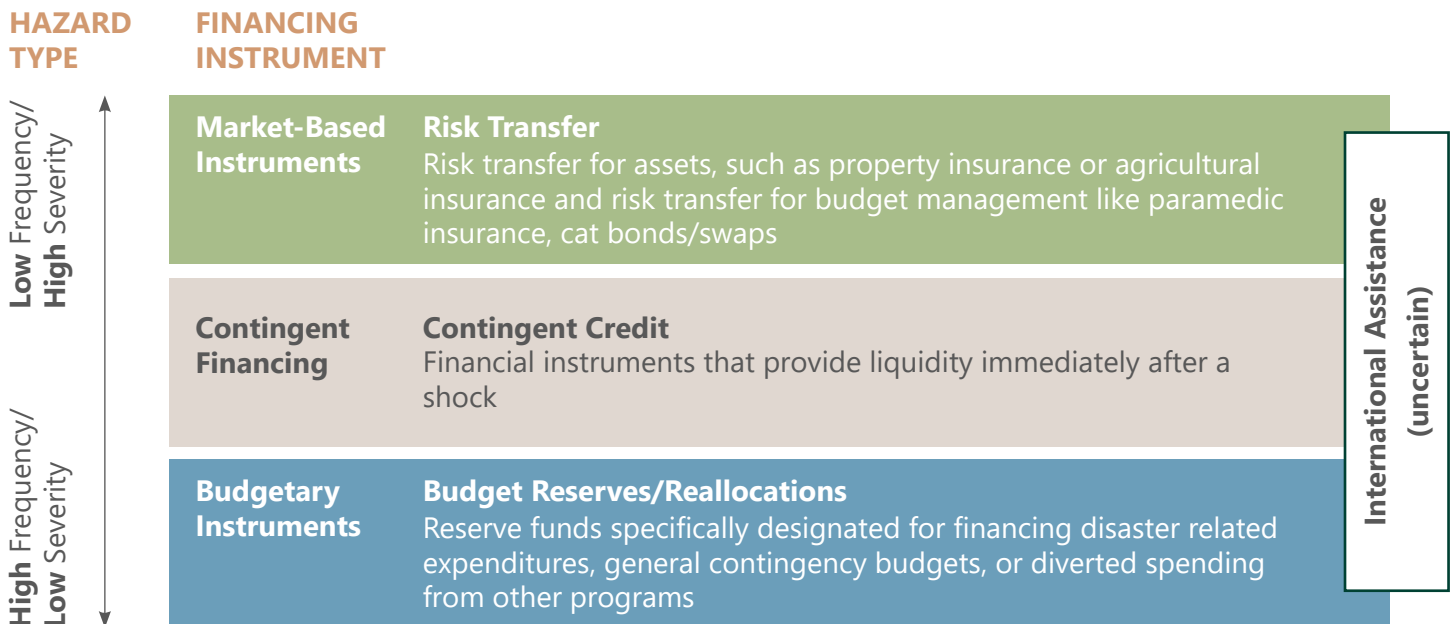
Topic 5: Using Catastrophe Bonds for Disaster Risk Transfer

OVERVIEW

This Fact Sheet continues the discussion of Component 2 by focusing on financial instruments to manage disaster-related contingent liabilities, in this case, by exploring catastrophe (CAT) bonds. The World Bank has been supporting member governments with CAT bond transactions for over 10 years. Since 2014, it has supported the transfer of more than US\$ 3.6 billion of disaster risk to CAT bond investors.

As countries seek to strengthen financial protection against disaster and climate shocks, they can implement a suite of policies and deploy financial instruments to pre-arrange funding in advance of such shocks. Such instruments are best combined in a risk-layering approach, which helps governments to match the instruments against the frequency and severity of expected disaster events, as illustrated in Figure 1. CAT bonds are generally used to cover higher risk layers. This Fact Sheet will introduce CAT bonds, describing how they can be used for sovereign disaster risk transfer.

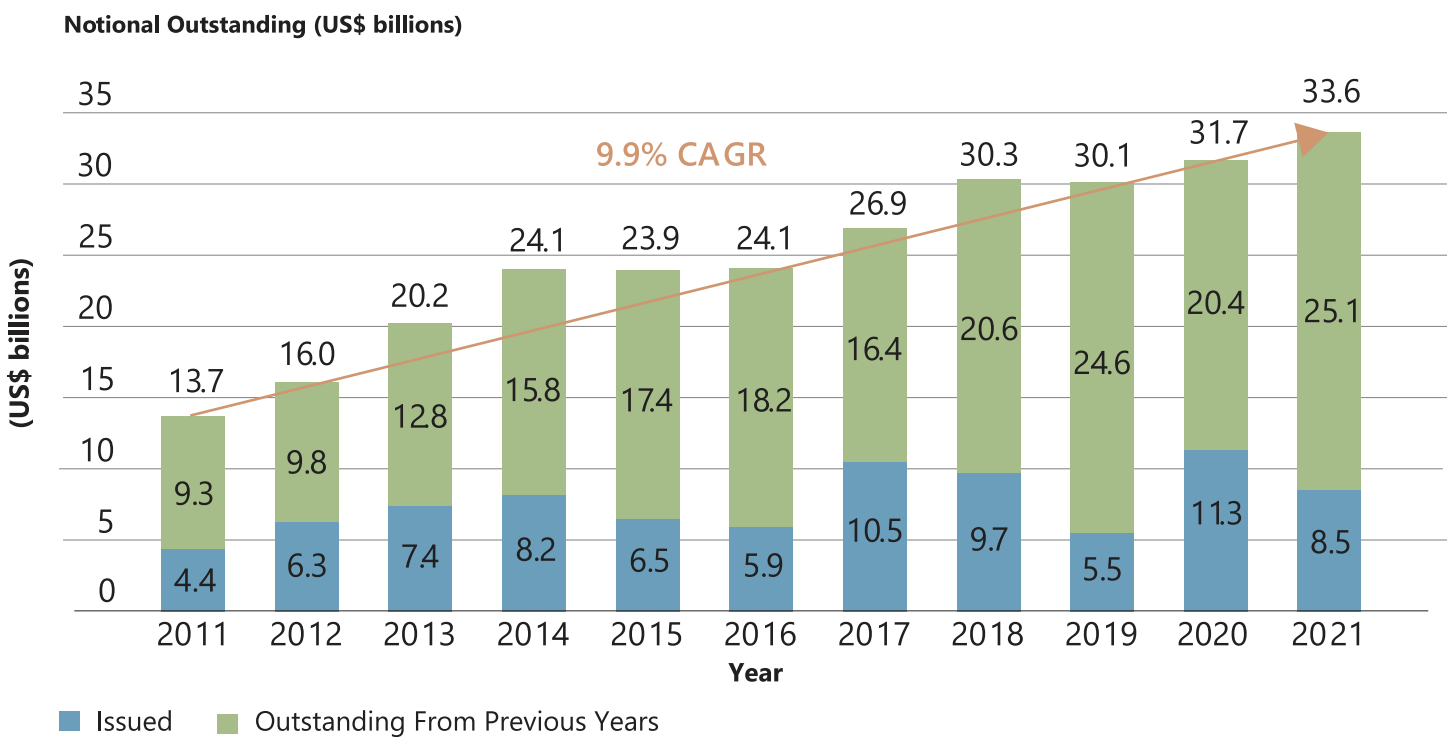
FIGURE 1: LAYERED APPROACH TO RISK FINANCING



Source: The World Bank Disaster Risk Finance and Insurance Program
 Note: CAT= catastrophe.

During the past 20 years, capital market instruments, such as CAT bonds, catastrophe swaps and collateralized reinsurance, have become an increasingly important part of the global reinsurance market. These instruments now represent around 15 percent of the total volume of global catastrophe reinsurance¹. Indeed, CAT bonds have grown at a rapid pace since their introduction in the 1990s. The first successful CAT bond was issued by Hannover Re in 1994 for US\$ 85 million. The first CAT bond issued by a non-financial firm was in 1999 by the owner of Tokyo Disneyland (Oriental Land Company), covering earthquake losses in the Tokyo region. Since then, the CAT bond market has grown significantly. As of the end of 2020, the outstanding CAT bond market had reached a new high of US\$ 31.7 billion. Indeed, the amount of CAT bonds issued has increased exponentially in recent years (Figure 2), with new issuances in 2020 reaching US\$ 11.3 billion.

FIGURE 2: CATASTROPHE BOND MARKET ISSUED VERSUS OUTSTANDING NOTIONAL (SHOWING 10.5-YEAR COMPOUND ANNUAL GROWTH RATE [CAGR] OF 9.9 PERCENT



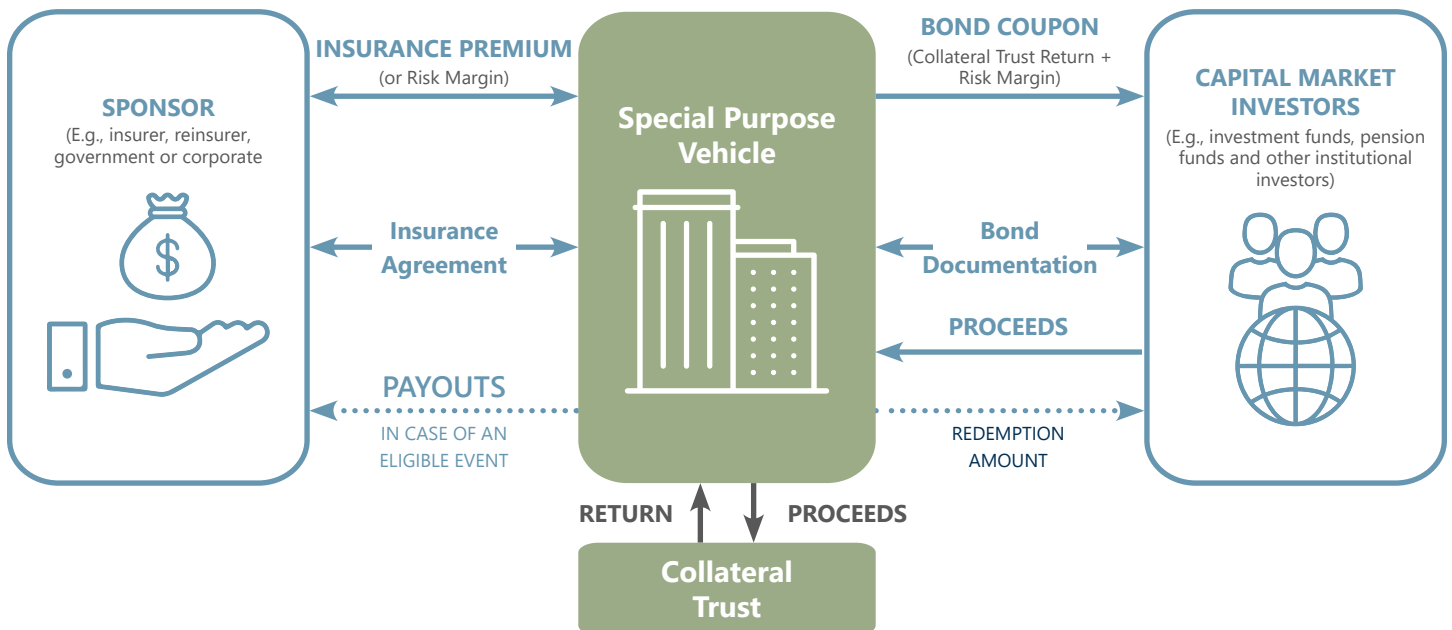
Source: Swiss Re Capital Markets Deal Database, as of June 30, 2021

¹ As of the end of 2018, total global reinsurance capacity was approximately US\$ 595 billion, of which alternative capital, such as catastrophe bonds, amounted to almost US\$ 100 billion.

What is a Catastrophe (CAT) Bond?

A CAT bond is an insurance-linked security (ILS) that allows entities exposed to natural disaster risk, such as insurance companies, to transfer a portion of that risk to bond investors. In a typical CAT bond structure, the entity exposed to the risk (known as the “sponsor” of the bond) enters into an insurance agreement (or other risk transfer agreement) with a special purpose vehicle (“SPV”) that issues the bonds to the investors. The SPV invests the proceeds of the bond issuance in highly rated securities that are held in a collateral trust. It then transfers the return on this collateral, together with the insurance premiums received from the sponsor, to the investors as periodic coupons on the bond. If a specified natural disaster occurs during the term of the bond, some or all of the assets held as collateral are liquidated. That money is then disbursed to the sponsor as a pay-out under its insurance contract with the SPV. If no specified event occurs, the collateral assets are liquidated on the maturity date of the bonds, and the money is paid to the investors. In other words, investors risk losing some or all of their principal if a natural disaster occurs; in exchange, they receive a coupon that reflects the insurance premium for such risk. (See Figure 3)

FIGURE 3: CAT BOND TRANSACTION STRUCTURE



Source: World Bank



Sponsors of CAT bonds include insurance or reinsurance companies, governments, and/or corporate entities. Similar to insurance, CAT bonds can provide governments with a payout in exchange for a premium when a disaster event meets certain pre-defined criteria. Governments have used CAT bonds to provide financial protection against natural disaster and weather-related risks such as earthquakes, tropical cyclones, and wildfires. However, CAT bonds could also be used to insure against pandemics, as well as cyber security and terrorism risks.

Similar to insurance, a CAT bond is not a debt instrument for the sponsor; as such, there is no sponsor obligation to repay any amount received, since the sponsor only enters into an insurance agreement (or other risk transfer agreement) and is not the issuer of the bond. The sponsor does not receive any funds unless an insured event triggers the risk transfer. The risk is transferred by the SPV to investors who receive a coupon as a compensation for taking the risk of potential losses.



How do Catastrophe Bonds benefit Sponsors and Investors?

CAT bonds benefit sponsors by allowing them to access a large pool of capital (that is, the trillions of dollars held by bond investors) and generally for longer coverage periods than conventional insurance.

CAT bonds typically provide coverage for periods of one to five years and eliminate counter party credit risk concerns for the sponsor. In a conventional insurance transaction, the insured party is exposed to a potential default by its insurer. By contrast, CAT bonds are fully funded transactions, that is, the investors advance all their money upfront by purchasing the bonds. Therefore, there is no risk to the sponsor of default by the investors. Since CAT bonds are tradable securities and syndicated to a large number of global investors, they benefit from efficient price discovery and observable pricing in the secondary market. CAT bonds can provide quick payouts - often within weeks of an event - when designed with a parametric or modeled loss trigger structure.

For investors, however, the attractions of CAT bonds are the relatively high returns (given the degree of risk) and the low level of correlation with other asset classes, such as equities and conventional bonds.

Increasingly, credit rating agencies recognize that a comprehensive disaster risk financing strategy improves fiscal resilience. As such, CAT bond transactions can improve the credit rating of a sovereign sponsor. According to Standard & Poor's, natural disasters can weaken sovereign credit ratings. One way to mitigate the economic and rating impacts is through the acquisition of Catastrophe insurance (Standard & Poor's 2015). More recently, Fitch Ratings analyzed Jamaica's sponsored CAT bond issued by the World Bank. It notes that it "significantly strengthens the country's natural disaster risk-mitigation strategy." It also remarked that "this bond does not add to the national debt"(Fitch Ratings 2021a; 2021b). This demonstrates that CAT bonds can positively impact credit ratings. This can, in turn, translate into lower and more stable funding costs for countries. However, it is important to note that sovereign credit ratings do not impact the pricing of government-sponsored CAT bond transactions since investors are not exposed to sovereign risk.

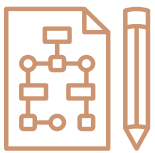


Who Invests in Catastrophe Bonds?

Given the level of risk, CAT bonds are marketed solely to sophisticated institutional investors capable of evaluating the risk adjusted returns of these securities. Most CAT bonds are purchased by specialist ILS investors (which include insurance and reinsurance companies, pension funds and multi-strategy asset managers) either in a dedicated fund or as a dedicated team within a larger asset manager. Other institutional investors participate in the ILS market by allocating money to specialist funds. Most of the investors are domiciled in Bermuda, Europe, Japan and North America.

What Other Institutions are Involved in Catastrophe Bond Transactions?

CAT bonds are relatively complex financial instruments, and a variety of institutions are involved in CAT bond issuances, including:



Risk modeling firms that produce the risk metrics that form the basis of CAT bond pricing



CAT bond dealers/lead managers that structure and underwrite the issues



CAT bond brokers that facilitate secondary market trading in the issues



Administration companies that provide corporate directors and other administrative services to SPV issuers



Collateral agents and custodians that manage the collateral underlying the SPV issues



Law firms that provide legal advice and document the issues



Stock exchanges that list the issues



Rating agencies that rate the issues²

² Not all CAT bonds are rated.

Catastrophe Bond Trigger Structure






There are four common types of triggers that determine a payout in a CAT bond transaction: indemnity, industry loss, modeled loss and parametric. The CAT bond market is predominantly comprised of transactions sponsored by insurance or reinsurance companies. Therefore, the most commonly used trigger in the CAT bond market is indemnity. For an indemnity trigger, the triggering event is the actual loss incurred by the sponsoring insurer following the occurrence of a specified catastrophic event in a specified geographic region for a specified line of business. For example, a CAT bond might be structured to trigger if the sponsoring insurer's residential property losses from a single hurricane in the U.S. state of Florida exceed US\$ 300 million in a calendar year.

Most government sponsored CAT bonds use a parametric trigger since they can provide quick and transparent payouts based on independent, observable data. A parametric transaction uses the physical characteristics of a catastrophic event as the trigger. For example, a parametric CAT bond might trigger if an earthquake with a magnitude greater than 7 occurs within a 50-kilometer radius of Tokyo. As event parameters are available shortly after an event occurs, parametric transactions are settled much more rapidly than other trigger types. However, parametric triggers carry the highest exposure to basis risk because actual damages are not measured in the field.



Table 1 includes an overview of the characteristics of the four different CAT bond trigger types.

TABLE 1: CAT BOND TRIGGERS: PROS AND CONS

	TYPE OF TRIGGER			
	Indemnity	Industry Loss Index	Modeled loss	Parametric ³
 <p>Payout trigger</p>	Actual loss incurred (for example, damages to buildings, crop losses, livestock deaths, and so on).	Estimate of the total indemnity losses experienced by the insurance industry in the region insured.	The CAT model's estimate of the incurred losses based on actual event parameters (for example, earthquake magnitude and depth).	Payouts are based on objective measurements, such as a hurricane's maximum wind speed and landfall location, or the ground motion measured by multiple seismometers after an earthquake.
 <p>Claim process</p>	Loss adjusters estimate damages through the inspection of the assets, which can be complicated.	A calculation agent has an agreement with insurance companies and reports on the estimated damage to the industry.	Parameters from the event are entered into the CAT model algorithm to estimate losses.	Transparent and based on rules agreed in the contract (no loss adjustment is required).
 <p>Speed of payout</p>	It can be slow.	It can be slow.	Quick payouts (once the parameters of the events are available).	
 <p>Use of payout</p>	Intended for asset replacement (recovery and reconstruction).	Can be targeted to emergency relief or asset replacement.	Usually targeted to emergency relief, but no restrictions on use.	
 <p>Basis risk</p>	No risk, as payout is based on incurred losses.	Reduced basis risk, as the incurred loss from the industry is the trigger.	Moderate to high, depending on the CAT model.	High, as the index might not be well correlated with actual losses.

³ Most sovereign transactions involve this type of trigger.

Parametric CAT bonds often include stepped payout functions, that is, they provide a partial payout if an event of a certain severity happens, and a full payout when a more severe event happens. The point at which any payout is made is referred to as the attachment point. Any payout reduces the CAT bond principal, including the insurance cover from that point forward. Therefore, the sponsors may also consider purchasing reinstatement cover to ensure coverage for a certain pre-defined period.

The Cost of Catastrophe Bonds

The CAT bond sponsor costs come predominantly from the insurance premium (or risk margin), which is the cost required to compensate investors for the risk they assume, plus some transaction costs (structuring fees, legal fees, risk modeling fees, and so on). The risk margin is based on the estimated model loss and a risk premium. The expected loss is the average loss that the CAT bond investors can expect to see over a certain period, divided by the principal invested. Modeled expected losses are just estimates of the true expected losses. The modeled expected loss is typically calculated by a third-party risk modeling entity, such as AIR Worldwide, EQECAT, Milliman, RMS, and so on. The risk premium is determined by the market (the ILS investors) and is a function of the peril, the region, the modeled expected loss, market conditions, investor preferences, and so on.



What is the World Bank's Role in the Catastrophe Bond Market?

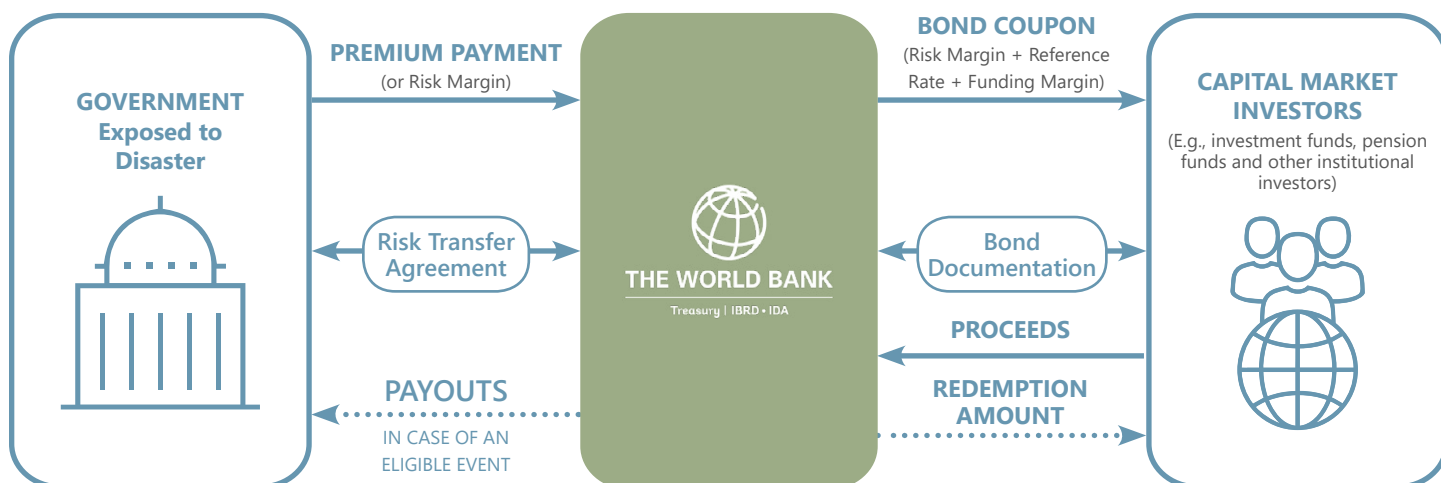
The World Bank is an effective issuer of CAT bonds for the benefit of its sovereign members because of its experience and reputation in the capital markets, its AAA credit rating, and its uniquely flexible Capital at Risk (CAR) Notes Program. When the World Bank issues a CAT bond on behalf of a government, it stands between the government and the markets. The World Bank enters into a risk transfer agreement (insurance or derivative) with the government. As such, the World Bank agrees to provide a pay-out to the government upon the occurrence of a specified natural disaster. In exchange, the government agrees to make periodic premium payments to the World Bank.

Simultaneously, with the execution of the risk transfer agreement, the World Bank issues a CAT bond to investors with terms that mirror those of the risk transfer agreement. The CAT bond provides a hedge to the World Bank for its obligations under the risk transfer agreement. If the World Bank is required to make a pay-out to the government under the risk transfer agreement, it will be entitled to deduct the same amount from the principal amount of the bond. The World Bank uses the premium payment it receives from the country to pay a portion of the bond coupon.

Since the World Bank catastrophe bond structure does not involve a SPV or any collateral arrangements, the structuring of the issue is streamlined, thus reducing transaction costs. In addition, the proceeds of the issue are used by the World Bank for its developmental purposes. This makes the bonds a socially responsible investment (SRI) for the investors, thereby increasing the potential demand for the securities.



FIGURE 4: WORLD BANK CATASTROPHE BOND STRUCTURE



Since 2014, the World Bank has supported US\$ 3.6 billion in CAT bond transactions, as outlined in Table 2. Due to the World Bank's experience and reputation in the capital markets, there is strong demand for World Bank-issued CAT bonds. The bonds are priced below the market average, reflecting at least partially the fact that World Bank CAT bonds bring diversification to an ILS market dominated by North American wind risk.

TABLE 2: WORLD BANK CAT BOND TRANSACTIONS

World Bank Member	Year	Peril	Amount (US\$ million)
Caribbean Catastrophe Risk Insurance Facility	2014	Earthquake & Tropical Cyclone	30
Mexico*	2009, 2012, 2017, 2020	Earthquake and Hurricane	1,450
Global	2017	Pandemic	320
Pacific Alliance: Chile, Colombia, Mexico and Peru	2018	Earthquake	1,360
The Philippines	2019	Earthquake & Tropical Cyclone	225
Jamaica	2021	Hurricane	185

Source: World Bank staff.

Note:* The World Bank was the arranger of the CAT bonds for Mexico in 2009 and 2012. It was the issuer of all other CAT bonds included in Table 2.

Some of the most recent CAT bonds issued by the World Bank include the following:

2018

In 2018, the **Pacific Alliance countries** (Chile, Colombia, Mexico and Peru) jointly sponsored a **US\$ 1.36 billion CAT bond** to reduce the fiscal vulnerability against the occurrence of natural disasters. It was the largest sovereign risk insurance transaction ever conducted, and the second largest issuance in the history of the CAT bond market. Peru received a US\$ 60 million payout in 2019 due to an event that triggered the instrument.

2019

In 2019, the **Philippines** sponsored a **3-year, US\$ 225 million CAT bond against natural disasters**. The CAT bond was issued in two tranches, with up to US\$ 75 million for earthquakes and US\$ 150 million against losses from tropical cyclones.

2021

In 2021, **Jamaica** issued a **US\$ 185 million CAT bond against major hurricanes**. Jamaica is the first island in the world to independently access to the CAT bond market. This CAT bond included an innovative triggering mechanism that can provide Jamaica with a payout within weeks of a hurricane.

Lessons Learned from World Bank Catastrophe Bond Transactions

Several lessons from the World Bank CAT bond transactions can be shared:



An instrument is most effective when it is a part of an integrated disaster risk financing (DRF) strategy. CAT bonds can be used to complement other financial instruments, such as reserve funds, contingent credit, and/or insurance.



Strong and continued policy dialogue concerning DRF with the Ministry of Finance is fundamental to the development and execution of CAT bond solutions.



Donor support enables developing countries to participate in DRF solutions. The preparation and execution of a CAT bond transaction can involve significant costs. Therefore, donor support can be important in the preparation and execution of CAT bond transactions.



Pre-arranged financial solutions require strong political support. A CAT bond transaction requires significant up-front investment, as well as the dedication of key government staff to understand the transaction.



Multi-country CAT bonds (such as the Pacific Alliance CAT bond) can provide advantages for countries who can benefit from the sharing of knowledge, political leadership, as well as the sharing of some fixed transaction costs.

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FACTSHEET 5: DEVELOPMENT OF CATASTROPHE BONDS FOR SOVEREIGN DISASTER RISK TRANSFER

Test your understanding and record your insights through this easy worksheet!

Activity 1: Identify which statements about catastrophe (CAT) bonds are true or false.

#	Statements	True	False
1.	A CAT bond is an insurance-linked security (ILS) that allows entities exposed to natural disaster risk to transfer a portion of that risk to bond investors.		
2.	CAT bond transactions can negatively impact the credit rating of a sovereign sponsor.		
3.	Unlike insurance, a CAT bond is a debt instrument for the sponsor.		
4.	CAT bonds benefit sponsors by allowing them to access a large pool of capital and in general longer coverage periods, than conventional insurance.		
5.	CAT bonds are marketed solely to sophisticated institutional investors capable of evaluating the risk adjusted returns of these securities.		
6.	Speed of payout for modeled loss and parametric trigger is slower as compared to indemnity and industry loss index triggers.		
7.	The CAT bond placement costs come only from the insurance premium.		
8.	A CAT bond transaction requires significant up-front efforts and investments, such as design of the instrument.		



Activity 2: Match the description for four types of CAT bond triggers that determine a payout in the transaction.

#	Types of Triggers			Role descriptions
1.	Indemnity			Parameters from the event are entered into the CAT model algorithm to estimate losses.
2.	Industry loss index			Loss adjusters estimate damages through the inspection of the assets, which can be complicated.
3.	Modeled loss			A calculation agent has an agreement with insurance companies and reports on the estimated damage of the industry.
4.	Parametric			Transparent based on rules agreed in the contract (no loss adjustment is required).

Activity 3: Identify which of the following statements describe the characteristics of indemnity and parametric CAT bond triggers.

#	Characteristics	Indemnity Trigger	Parametric Trigger
1.	Payouts are based on objective measurements, such as a hurricane's maximum wind speed and landfall location.		
2.	Speed of payout can be slow.		
3.	There is no basis risk, as payout is based on incurred losses.		
4.	There is basis risk, as the index might not be well correlated with actual losses.		

Activity 4: Will CAT bonds be useful for your country as a financial instrument to manage disaster-related contingent liabilities? Please list few reasons why.

Yes	
No	

Activity 4.1: Does your ministry have the requisite technical capacity to implement CAT bonds?

Please list the existing skills or gaps.

Yes	
No	

Activity 5: Reflections

[1] My Top 2 Takeaways from this Fact Sheet are:

[2] Two concepts/ideas I would like more information on are:

