

# Index-Based Weather Derivative

An index-based weather derivative is a financial contract designed to provide compensation for financial loss to an entity affected by weather volatility. Weather contracts are based on measurable weather events such as excessive or insufficient rainfall, temperatures (extreme heat or cold), and tropical storms, hurricanes, cyclones, and typhoons. The World Bank offers index-based weather derivatives as part of a broad spectrum of disaster risk financing instruments designed to assist member countries in planning efficient responses to natural disasters.

## Exposure to Weather Risk

Adverse weather conditions can substantially affect public finances by damaging housing and other assets, or by negatively affecting agriculture production. Countries with limited access to market tools designed to manage these risks are often forced to reallocate budgetary resources to meet immediate needs or depend on humanitarian appeals. These countries can use weather hedging products to manage the financial risks associated with adverse weather events in the context of a wider risk management framework.

A weather derivative contract can, for instance, help a country transfer a portion of the risk of severe drought to the international financial markets by using rainfall as a proxy for loss. Many countries with a significant agricultural sector use index-based weather models to monitor commodity production risk and forecast production. This data can often be used to create a weather derivative. Hydroelectric power plants can also benefit from weather derivatives, using the contracts to mitigate the risk of rainfall dropping below a certain level.

## Key Features

An index-based weather derivative is a financial instrument that is used to manage weather risk based on an index of weather-related data. The index is designed to reflect losses or liquidity needs caused by an adverse weather event. A country that wishes to hedge a specific weather risk purchases a derivative contract by paying a premium upfront. The seller of the derivative contract accepts the risk of the adverse event occurring in exchange for the premium, similar to an insurance contract. The buyer receives a payout if the index crosses a specified threshold before the end of the contract period.

These derivative contracts can be customized according to a country's specific needs based on the

## At a Glance

- The MultiCat Program helps member countries issue catastrophe bonds to insure themselves against the risk of natural disasters.
- Supports wide variety of structures, including the pooling of multiple risks in multiple regions.
- The World Bank acts as arranger: assists in formulating disaster risk management policy; offers off-the-shelf documentation; supports preparation of legal and operational framework; selects service providers.

type of weather hazard, desired level of protection, and the estimated financial loss associated with the event.

In general, weather derivatives are most cost-effective for covering low-probability events with severe impacts, such as drought. Unlike traditional insurance schemes, index-based weather derivatives allow for rapid disbursements as there is no need for an assessment of loss incurred. Weather derivatives thus help countries plan and implement responses to adverse weather events before they occur.

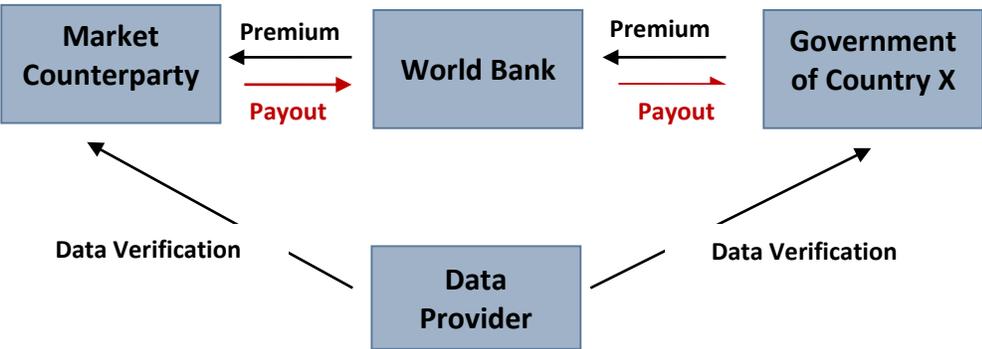
## World Bank as a Counterparty

The World Bank can intermediate on behalf of countries, providing its expertise and comparative advantage in financial markets transactions. The Bank and the member country sign a Master Derivatives Agreement, which serves as the contractual basis for the execution of the financial derivative. The Bank and the country enter into a derivative contract which specifies the risks to be covered, the agreed-upon trigger that would initiate a payout, the amount of the payout, and the premium. The Bank then enters into an offsetting contract with a financial market participant, thus transferring the risk to the international financial markets. If the index value hits the pre-determined trigger, the Bank receives a payment from the market counterparty and the same amount is paid to the client country.

The World Bank also works with countries to help build their capacity to engage in such transactions, so that countries are eventually able to continue implementing similar risk management strategies independently.

## Sample Weather Derivative Contract

- Real-time weather data is collected through Country X's national meteorological services. The data is verified and validated on an ongoing basis.
- Country X designs a Maize Index linking rainfall and maize production, so that if precipitation falls below a certain level, the index will reflect the projected loss in maize production. The level of rainfall is the only variable in the index.
- Country X and the World Bank agree on a contract (an "options contract") that specifies the payout trigger (maize production falls by a certain percentage below the historical average as estimated by the index) and the payout amount. The availability of the derivative to Country X is dependent upon the availability of a market counterparty (options counterparty) for the World Bank.



- Country X pays a premium to the World Bank.
- The World Bank enters into an offsetting agreement with a market counterparty.
- If the index hits the pre-determined trigger, Country X receives a payout from the World Bank. If the index does not hit the pre-determined trigger, the contract expires at maturity.

### For Information:

Miguel Navarro-Martin, Head of Banking Products, [mnavarromartin@worldbank.org](mailto:mnavarromartin@worldbank.org), +1 (202) 458-4722