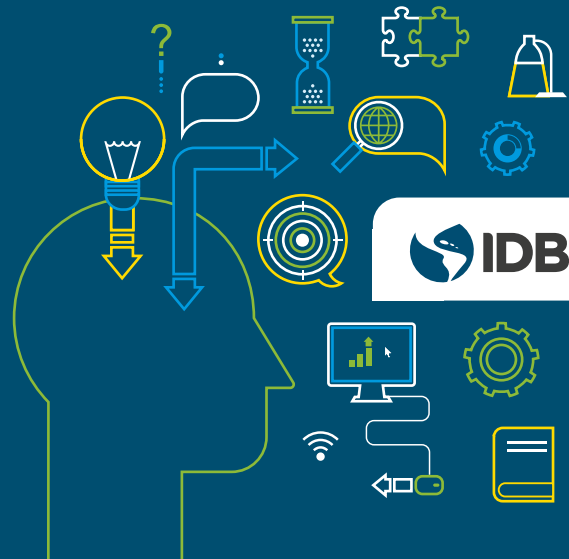


# How Do Climate Change-Induced Hurricanes Affect Sovereign Debt in the Caribbean?

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Authors: Eduardo A. Cavallo, Santiago Gómez, Ilan Noy, and Eric Strobl.



A survey of relevant literature identifies a direct link between anthropogenic climate change and increased hurricane intensity, notably through a 10% increase in rainfall and associated damages.



Caribbean countries are particularly vulnerable, as severe hurricanes lead to notable increases in public debt, compounded by climate change impacts.



The study underscores the urgency of integrating climate change considerations into economic and fiscal policies because the impact of climate change is pronounced and immediate.



## CONTEXT

The Caribbean region's vulnerability to hurricanes poses a significant disaster risk, with **scientific projections indicating further intensification as a result of climate change**. Additionally, the Caribbean population's concentration along the coasts, coupled with the region's heavy reliance on sectors like agriculture and tourism, exacerbates its susceptibility to hurricane damages. In the resulting complex dynamic, increased hurricane intensity translates directly into increased economic damage.



## PROJECT

The study analyzes historical data on Caribbean hurricanes and their aftermath to examine how **climate change and increased hurricane intensity affect the region's sovereign debt, providing insights into the specific challenges faced by Caribbean nations**. Econometric models are used to measure the impact of hurricanes on public debt, considering factors like storm severity and climate change attribution. The validity of the findings is confirmed through statistical tests to rule out the possibility that the observed effects are due to random chance or other shocks coincidental with the storms.

### Key Concept

#### SOVEREIGN DEBT



The total amount of money owed by a country's government.

## RESULTS

The study's main results focus on the short-term and medium-term effects of the top 10, 20, 30, and 40 storms with the highest intensity on sovereign debt stocks in the Caribbean region. The short-term effect is calculated as the difference between the actual debt levels and the counterfactual debt levels at the time of the storm. The medium-term effect, more significant in its implications, measures the difference between post and pre-storm debt stock trends. For the top 10 storms, while there is no significant impact on debt levels in the short run, the medium-term effects are substantial. Three years post-storm, debt levels are 17.9 percent higher than what would have been expected if the disaster had not occurred, marking a significant acceleration in debt accumulation of 10 percent from the pre-storm trends (see [Figure 1](#)).

### Key Concept

#### CLIMATE CHANGE ATTRIBUTION



Linking specific weather events, like hurricanes, to broader climate change trends.

The impact that is directly attributable to anthropogenic climate change based on a conservative estimate that relies on the minimum increase in hurricane intensity from the attribution literature, amounts to an increase of 3.8% of the debt stock relative to the level of debt at  $T=0$ . For specific hurricane events, for example, the storm experienced by the Bahamas in 2016—the median storm in the top-20 group—the increase in debt that is attributable to climate change was USD 180 million (USD of 2022) out of a much larger increase in borrowing. **These results highlight the significant financial strain hurricanes impose on Caribbean nations, especially considering the increasing intensity and frequency of such storms due to climate change.**

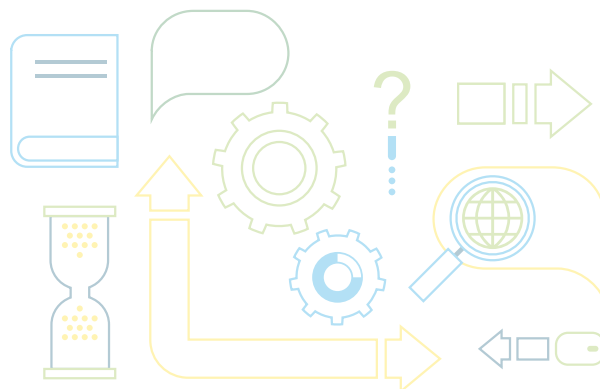


## POLICY IMPLICATIONS

The findings have profound policy implications, particularly for developing countries, which face challenges like underdeveloped risk-sharing markets and political resistance to investing in risk mitigation. The surge in foreign aid typically observed post-disasters is insufficient, amounting to only 0.25 percent of a country's GDP and less than 3 percent of total estimated damages. A significant portion of this aid is reallocated from other sectors, such as infrastructure development to humanitarian assistance, which does not provide additional funding but shifts resources from other critical areas.

Given these findings, policy implications extend beyond immediate disaster response to encompass broader economic and financial strategies. There is a need for more robust and diverse risk-sharing options to manage the aftermath of climate-induced disasters. This includes developing insurance markets and alternative risk-sharing options, increasing the availability and flexibility of international aid, and encouraging investment in preventative measures. Policies must also address rising dependency on external debt to promote sustainable domestic financial solutions and economic resilience.

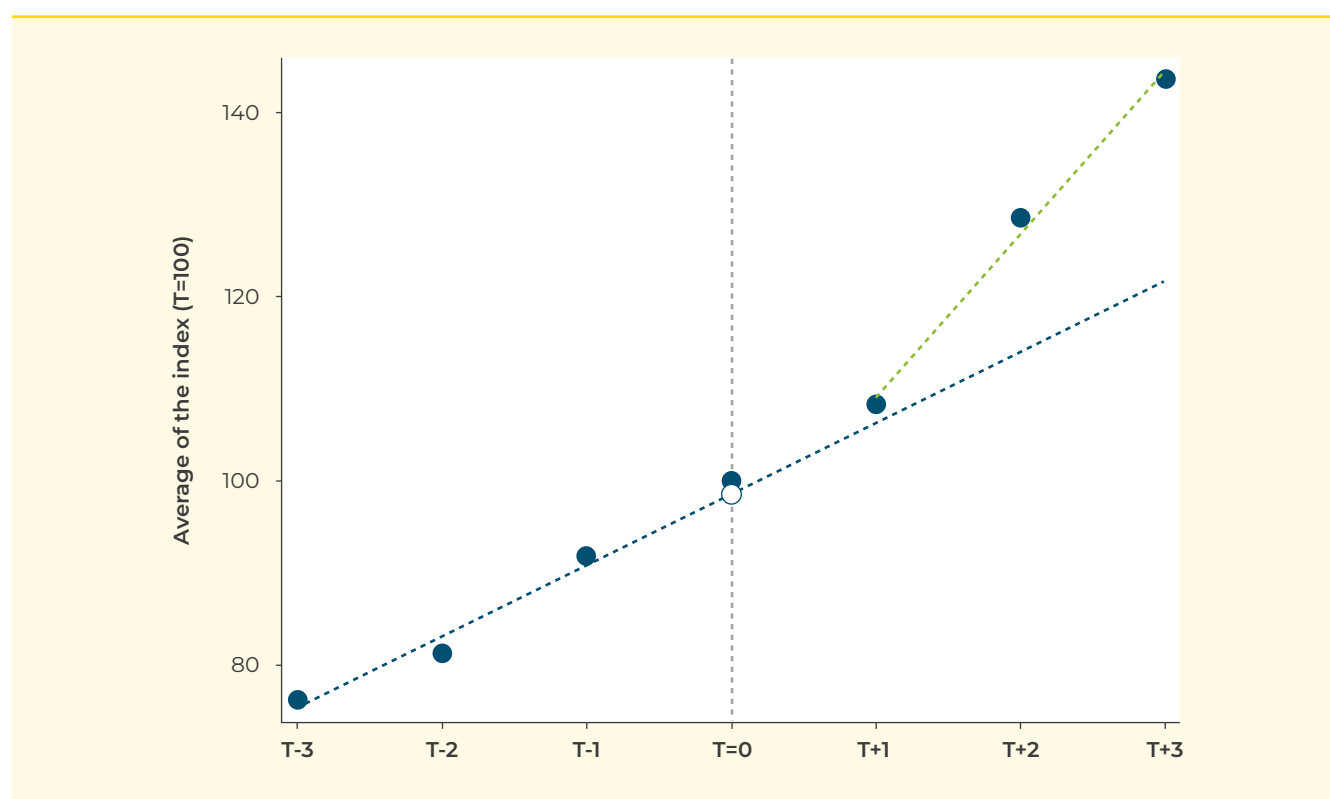
The study underscores the urgency of integrating climate change considerations into economic and fiscal policies, especially for regions like the Caribbean Basin, where the impact of



climate change is pronounced and immediate. Policymakers should prioritize strategies that not only address the immediate aftermath of disasters but also build long-term resilience against future climate-induced events. This requires a coordinated effort among international organizations, national governments, and local communities to develop comprehensive and sustainable financial mechanisms that can withstand the challenges posed by a changing climate.



**FIGURE 1. Increase in Debt Levels before and after Storms**



Source: Authors' compilation based on International Disaster Database (EM-DAT) and IDB Standardized Public Debt Database.

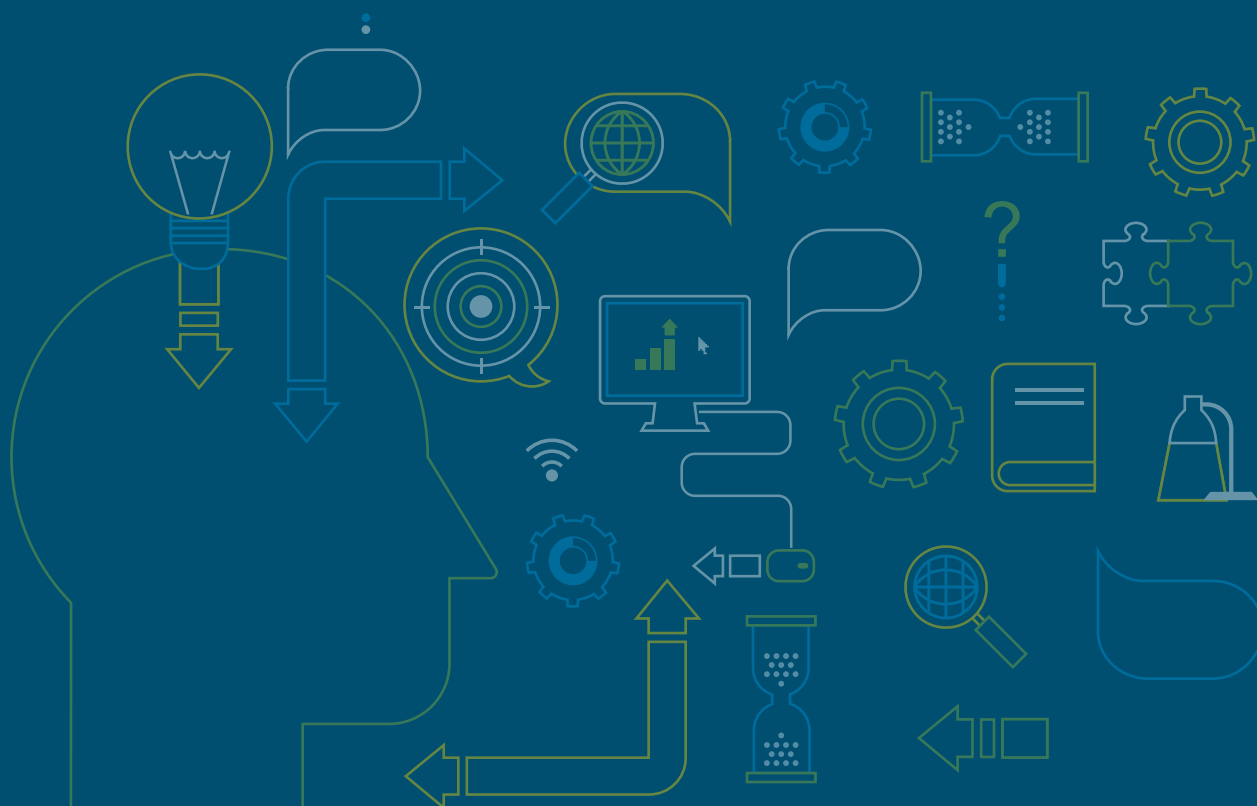
Note: The sample comprises the 10 storms with the highest direct damage in the Caribbean basin. T=0 is the year that the storm hit. Debt levels at T=0 are indexed to 100. For the rest of the years around T, the index is the simple average that traces the evolution of debt stocks across the countries in each group. Each blue dot corresponds to the (simple) average of the indexed debt level on that period for the 10 storms included. The dashed blue line is the trend before the onset of the storm. The green dashed line is the trend after the storm.

## FULL STUDY

Cavallo, Eduardo A., Santiago Gómez, Ilan Noy, and Eric Strobl. 2024. "Climate Change, Hurricanes, and Sovereign Debt in the Caribbean Basin." IDB Working Paper No. 1551. Washington, DC: Inter-American Development Bank. <https://doi.org/10.18235/0005496>.

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