

# Creating Climate Resilience by Increasing Flexibility

Governmental Fiscal Performances after Hurricanes in CCRIF-Insured Countries

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## Short-term Fiscal Shocks: Induced by Climate Disasters, Counteracted by Parametric Insurance

- Caribbean and Central American countries suffer from hurricanes
- The short-term fiscal stress:
  - Damaged tax bases : Revenue ↓
  - Disaster relief : Expenditure ↑
  - Liquidity gap : Debt ↑
- Fast** financing sources are needed to counteract these fiscal shocks (World Bank Group, 2014)

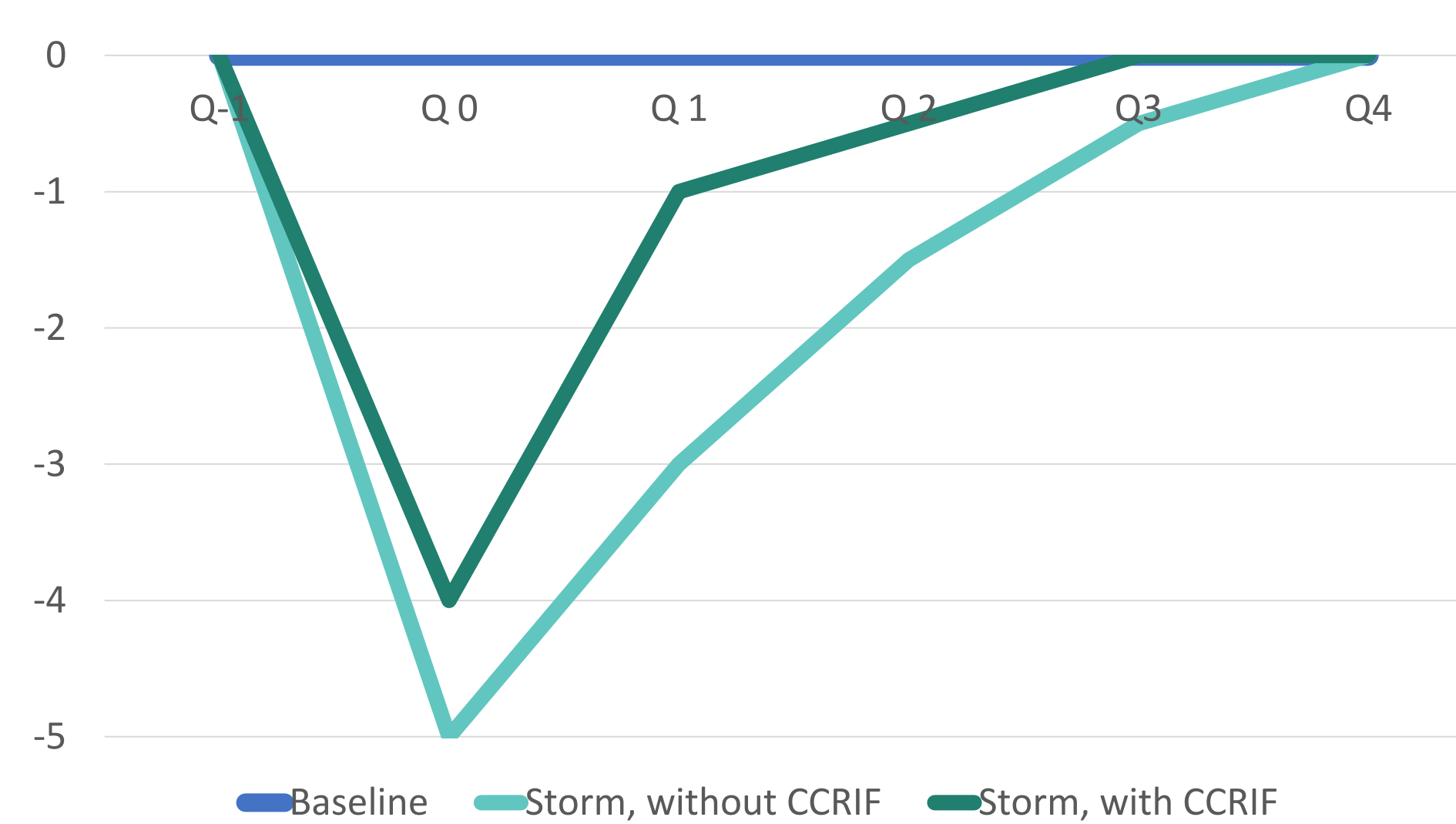


Fig 1. Illustration of revenue loss (storm in Quarter 0)

- Caribbean Catastrophe Risk Insurance Facility (**CCRIF**) provides fast payout for member countries hit by disasters
- As a parametric insurance, CCRIF payout is based on physical indices of the disaster (e.g., wind speed, precipitation etc.). Hence, the payout is made within a month after the disaster.
- Yet, the **effectiveness of CCRIF** on reducing fiscal shocks remain unclear

## Did CCRIF successfully reduce the fiscal shocks caused by cyclones?

- When a cyclone hits a country, the shocks to fiscal variables could still be observed 4 quarters after the disaster.
- CCRIF payout **lowered** the loss of revenue, and **brought down** the reliance on debt
- The CCRIF fast payout accelerated economic recovery, hence functioning more than merely an external funding

	Change of Revenue in Q0 (\$)	Change of Revenue in Q1 (\$)	Change of Revenue in Q2 (\$)	Change of Revenue in Q3 (\$)	Change of Revenue in Q4 (\$)	Sum
Every Thousand \$ damage	-9.41	-10.8**	-19.1	-4.23	8.42**	-2.38
Every Thousand \$ Payout	-389	-837***	491	2178***	11.4	1341
	Change of Debt in Q0 (\$)	Change of Debt in Q1 (\$)	Change of Debt in Q2 (\$)	Change of Debt in Q3 (\$)	Change of Debt in Q4 (\$)	Sum
Every Thousand \$ damage	15.4***	42.2**	42.0***	43.9***	34.8***	175
Every Thousand \$ Payout	-635***	-1537**	-1857***	-1939***	-1646***	-7614

Tab 1. Impact of every thousand \$ hurricane damages and CCRIF payout on governmental revenue and debt each quarter (compared to baseline) after the disaster

## How to test the effects of CCRIF

- Panel Autocorrelation regression model
- Quarterly fiscal data and hurricane damage estimated with CLIMADA (Bresch, D.N. et al., (2021))
- 19 CCRIF member countries from 1997 to 2018, 35 payout issuance
- Ratio of fiscal variables/damages/payout to GDP were used in the model

## Would CCRIF be equally effective should the losses become worse?

- The **Storyline Approach** is introduced to stress test the performance of CCRIF
- In each storyline as given in Table 2 and Figure 3, storms became stronger, more often, and caused more damages
- CCRIF would fail to provide sufficient payout so that the government could maintain its historical fiscal performance

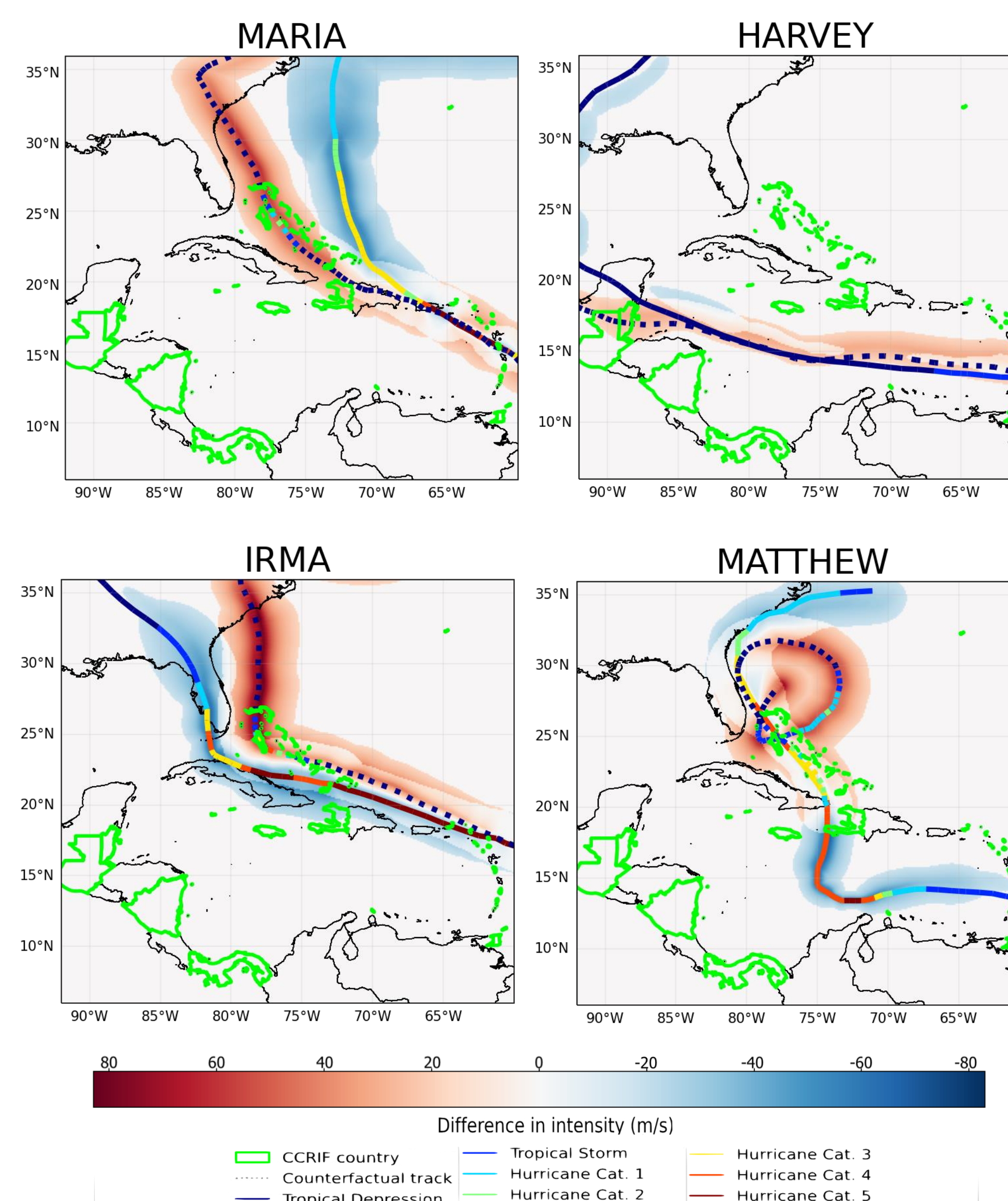


Fig 2. Downward counterfactuals of selected hurricanes

	Time	Damage (billion \$)
History	3rd quarter of 2017	12.87
	3rd quarter of 2016	0
	4th quarter of 2016	31.88
Extreme Quarter Storyline	3rd quarter of 2017	60.04
Extreme Quarter Storyline + Climate Change	3rd quarter of 2017	89.54
Consecutive Quarter Storyline	3rd quarter of 2016	8.69
	4th quarter of 2016	64.24
Consecutive Quarter Storyline + Climate Change	3rd quarter of 2016	11.18
	4th quarter of 2016	82.69

Tab 2. Damages of storms in various storylines (composition of each storyline given in Fig 2)

## What is Storyline Approach

- Self-consistent unfolding** of past events, or of plausible future events (Shepherd T.G. et al., (2018))
- Historical forecasts of past hurricanes are used to guarantee consistency
- Various RCPs and SSPs are considered when estimating damages under future climate and development scenarios

## Policy indications

- CCRIF helped countries to meet their most pressing liquidity gap after storms
- CCRIF is not able to cover catastrophic damages in worse climate conditions
- Risk reduction measures have to be prioritised in climate change scenarios

### References:

- World Bank Group. 2014. Financial Protection Against Natural Disasters : An Operational Framework for Disaster Risk Financing and Insurance. Washington, DC. © World Bank. <https://openknowledge.worldbank.org/handle/10986/21725> License: CC BY 3.0 IGO
- Bresch, D. N. and Aznar-Siguan, G., 2021: CLIMADA v1.4.1: Towards a globally consistent adaptation options appraisal tool, Geosci. Model Dev., <https://doi.org/10.5194/gmd-2020-151>
- Shepherd, T.G., Boyd, E., Calel, R.A. et al. Storylines: an alternative approach to representing uncertainty in physical aspects of climate change. Climatic Change 151, 555–571 (2018). <https://doi.org/10.1007/s10584-018-2317-9>