

RenaissanceRe

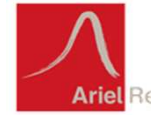
Parametric Insurance Discussion for NAIC

July 21 2021

Introduction & About ABIR

- **ABIR has nearly 30 years of collective advocacy & education for Bermuda's leading insurers & reinsurers**
- **The Original Disruptor – post Hurricane Andrew in Florida. Addressing political and natural catastrophe uncertainty.**
- **Bermuda is a global leader in natural catastrophe risk management and climate risk reinsurance capacity**
- **Bermuda market provides over 50% capacity for US mortgage reinsurance, helping to facilitate home ownership for all Americans**
- **Why Bermuda: Pooling uncorrelated global risks to help keep insurance affordable and accessible in all markets**

ABIR Members – Bermuda's Leading Insurers & Reinsurers



PartnerRe



ABIR Broker Advisory Cabinet



Bermuda's Leading Role in Climate Risk

Bermuda plays a critical role in developing **innovative adaptation solutions**, in measuring and pricing climate risks to inform risk management.

ABIR's Climate Committee is Chaired by Jeffrey Manson of **RenaissanceRe** with active participation from leading global industry climate risk **thought leaders**.

In tandem with Earth Day 2021 announced on April 21, 2021, Bermuda publicly set out its **commitment to address climate change issues**. This reinforces the focus on being a positive contributor on key global issues.

It also announced an initiative to establish and promote the jurisdiction as the world's **climate risk finance capital**.

Bermuda's international re/insurance industry has significant, **world leading expertise in natural catastrophe risk management**, a logical extension to climate risk finance

By reaffirming Bermuda's commitment to one of the world's top priorities, the initiative also generally reinforces Bermuda's global relevance and appeal to investors, businesses, and capital allocators alike.

Climate change is increasing many risks

Anticipating the effects of climate change is very difficult, but the following **global themes** are well supported by recent experience and research...

- ❶ Winter storm tracks are expected to shift to higher latitudes; possibly less frequent and more intense
- ❷ Severe inland flooding events are expected to become more frequent
- ❸ Rising sea-levels will steadily increase the risk of damaging coastal storm surges
- ❹ Hurricane winds and rain are expected to intensify
- ❺ Severe droughts are expected to increase wildfire propensity and intensity
- ❻ The impact of climate on severe convective storms is difficult to quantify

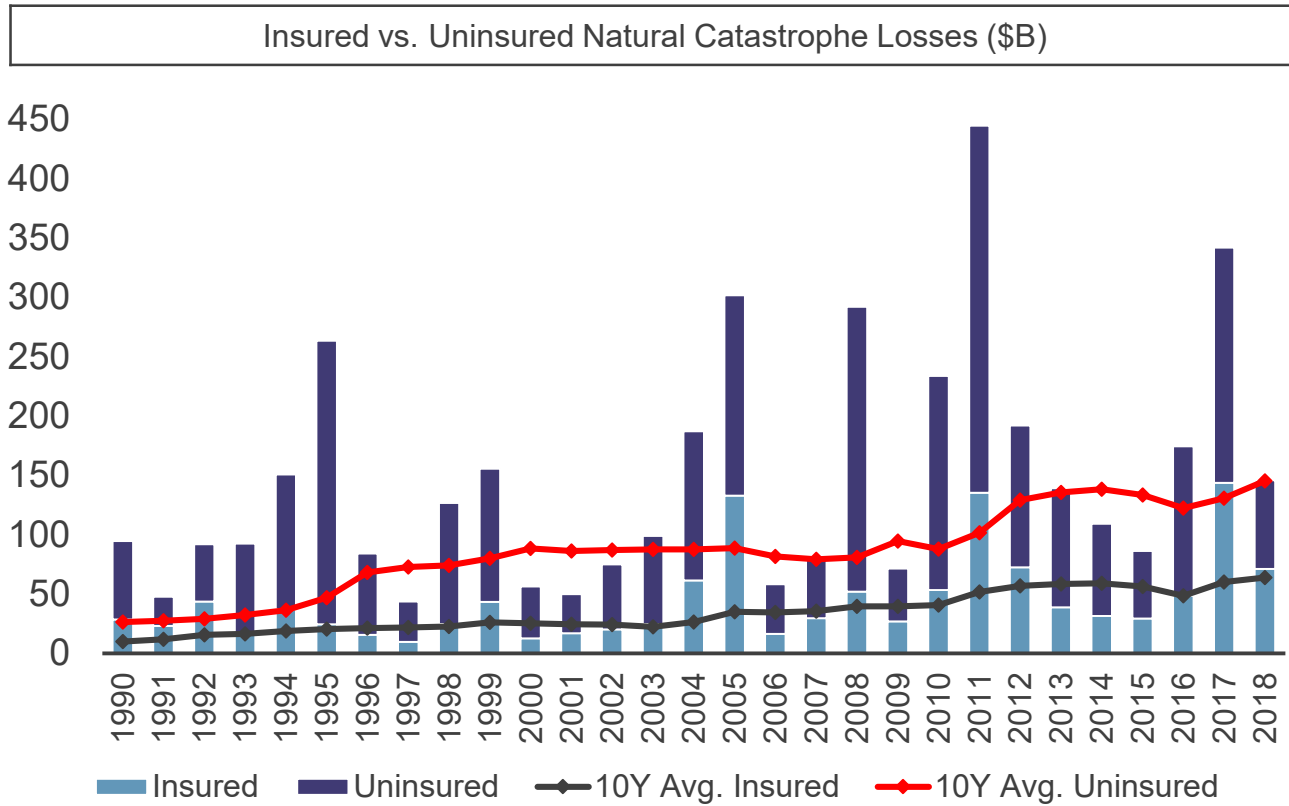


Post-event studies of Harvey conclude that Harvey's total precipitation was increased from **15-38%** by climate change

Risser and Wehner (2017) Geophysical Research Letters
Oldenborgh et al. (2017) Environmental Research Letters

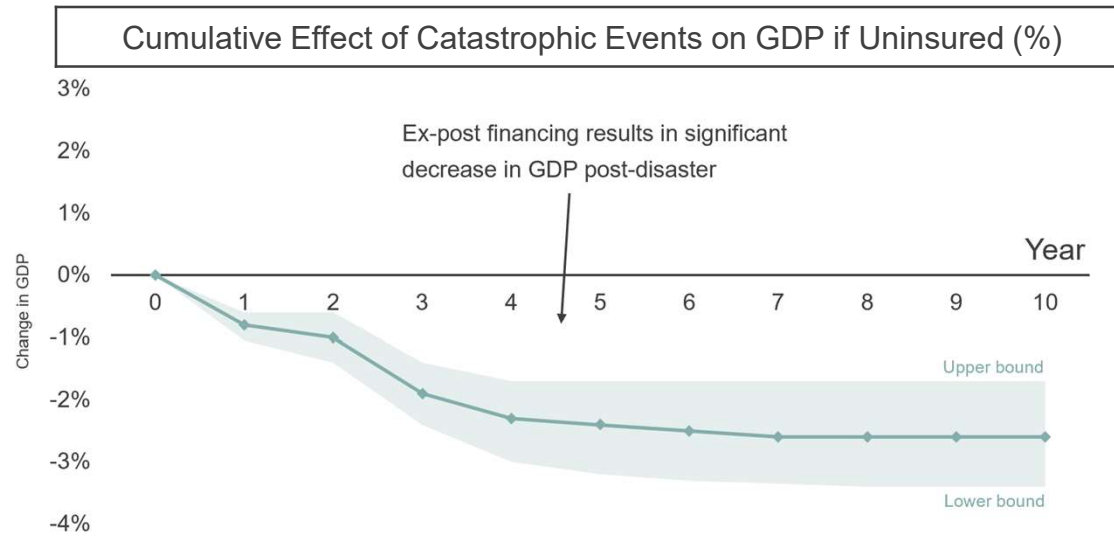
Source: RenaissanceRe Risk Sciences

As risk increases, the protection gap has widened and will continue to do so



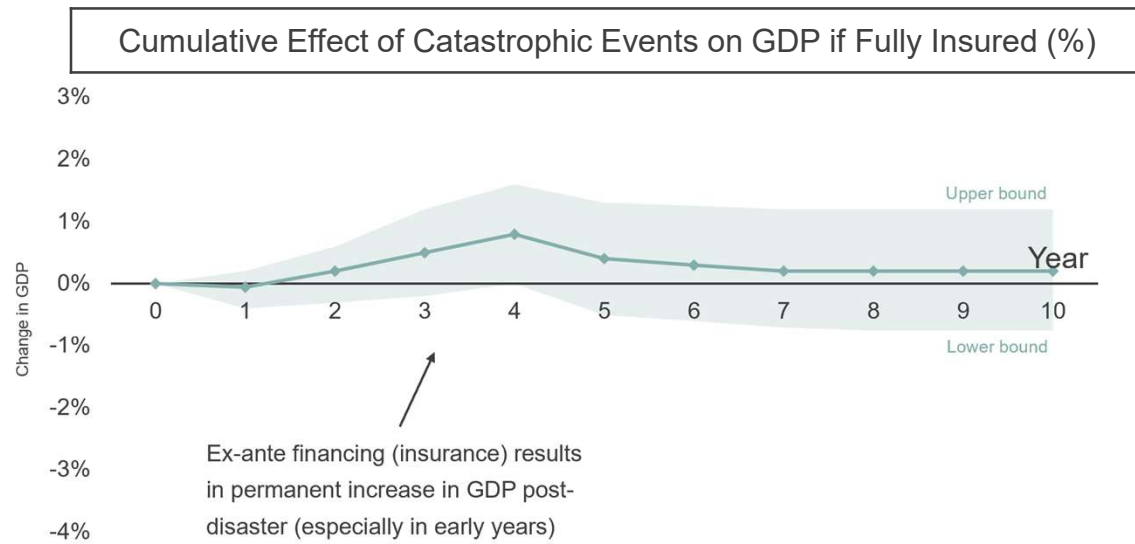
Source: Swiss Re Sigma Data Explorer

... Which carries a high economic burden on societies



Finding ways to decrease the uninsured loss from catastrophes will reduce the protection gap

Source: Bank for International Settlements, *Unmitigated Disasters*



Source: Bank for International Settlements, *Unmitigated Disasters*

Parametric Triggers

- A parametric trigger is met when an objective number is measured and verified. This allows for quick payment of claims.

- Parametric triggers are typically
 - Wind speed readings from anemometers for hurricane winds
 - River or tidal gauge readings for flooding
 - Magnitude at the epicenter of an earthquake as measured by the USGS

- Basis Risk can be caused from multiple sources
 - Basis risk is the difference between the actual loss and the payout

- Unless the risk you are insuring is at the location of the anemometers, river gauge or at the direct center of the earthquake, the wind, flood or shaking could be different at the insured location than the measurement
- Models can be used to estimate the windspeed between anemometers.
 - Any use of a model vs actual readings adds another element of basis risk
 - This could delay payments if the model doesn't automatically generate windspeeds after an event
- Anemometers and flood gauges do not always work in large events. The contracts are usually written to average estimates from the next closest measurements in the event of failure

Map of River Gauges



Map of WindX Anemometers



<https://www.npuins.com/ipp>

Basis risk from measurements - Earthquakes

- Quake triggers are based on the epicenter falling within a defined geographic areas
- When the insured risks are in multiple geographic areas, each area will typically have a unique magnitude that will need to be exceeded for payout



Quake Counties Magnitude Thresholds		
State	County	Magnitude
California	Alameda	6.9
California	El Dorado	6.0
California	Humboldt	6.7
California	Los Angeles	6.7
California	Monterey	6.8
California	Orange	6.8
California	San Bernardino	6.8
California	San Diego	6.4
California	San Francisco	6.9
California	Sonoma	6.9
Missouri	New Madrid	5.2
Montana	Gallatin	6.1
Nevada	Washoe	6.6
Oklahoma	Oklahoma	5.9
Oregon	Multnomah	5.5
Utah	Salt Lake	5.8
Washington	Clallam	6.1
Washington	Grays Harbor	5.9
Washington	King	6.3
Washington	Whatcom	5.9

Basis risk from differences in structural losses

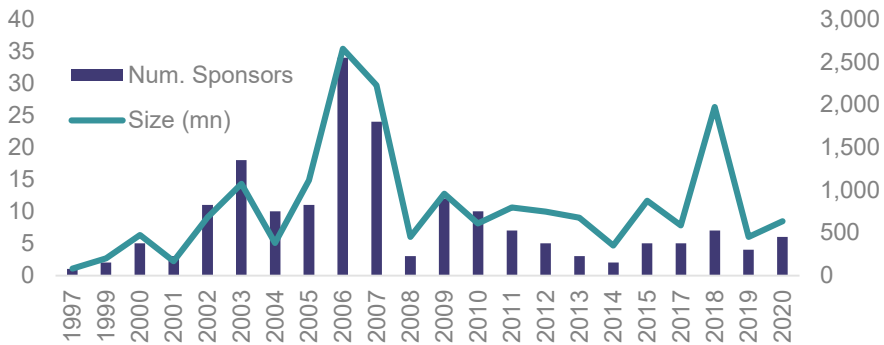
- Losses will vary even with similar windspeeds, inundation and shaking
- Parametric triggers do not take into consideration the variability of losses. They just take into account if the hazard has exceeded a certain threshold
- For businesses and communities that are insuring larger areas and larger numbers of buildings, the basis risk is minimized due to the law of large numbers



<https://www.pnj.com/story/news/2020/09/29/hurricane-sally-damage-escambia-county-309-million-estimates/3575062001/>

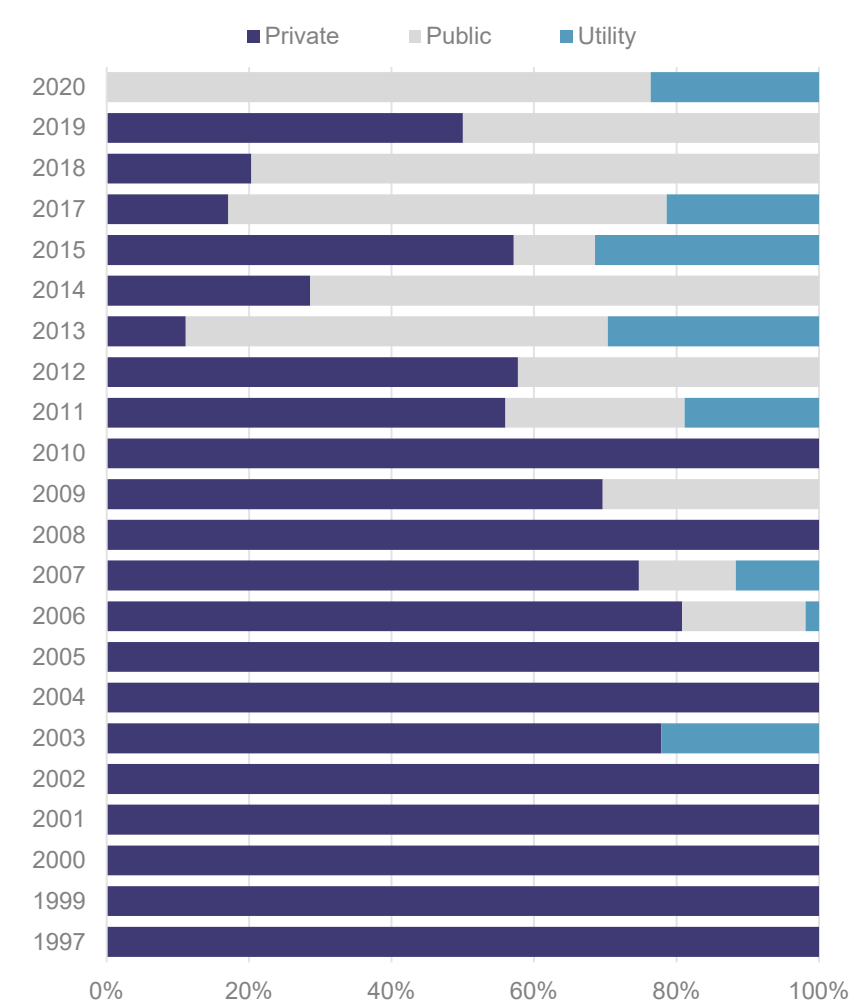
Parametric Cat Bond Issuance History (144A)

Issuance by Year



- Parametric triggers were popular in early cat bond days as private issuers worked to bring their risk to the market through a simple, transparent structure.
- Parametric triggers began to lose popularity in 2008 coinciding with the withdrawal of hedge funds from the market and the growth of dedicated ILS funds that were more willing to accept indemnity triggers.
- In recent years, we have seen a resurgence of parametric triggers, through public entity and utility company issuance. 100% of cat bonds in 2020 were issued by these types of companies, compared to 0% in 2005.

Sponsors by Entity Type



Parametric Cover Examples

MetroCat Cat Bond

- Insures the NYC subway
- \$200 million of coverage
- Triggered by surge heights at tidal gauges around Manhattan



PennUnion Cat Bond

- Insures Amtrak
- \$275 million of coverage
- Triggered by tidal measurements, wind measurements and USGS data

Post Hurricanes Create a Loss of Revenue and Increased Expenses

In addition to structural damage, catastrophes generate losses to businesses, communities and government. Parametric insurance recoveries can be targeted to help support priorities such as mitigation efforts, extra expenses associated with evacuation and recovery efforts, infrastructure, lost revenue etc. The speed of parametric payments helps fund the recovery efforts when it is needed.

Figure 5. Total changes in the employment sector of New Orleans after Katrina (Source: Dolfman and Bergman (2007))



Figure 15. Trends in house supply and rents before and after Katrina (Picture source: Axiometrics)

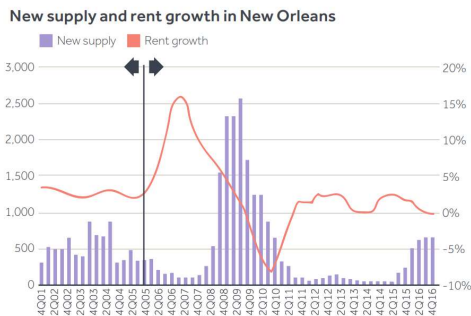
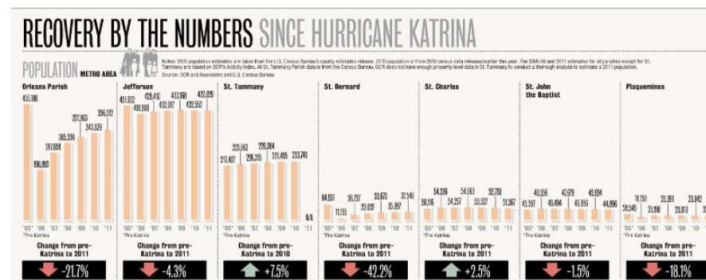


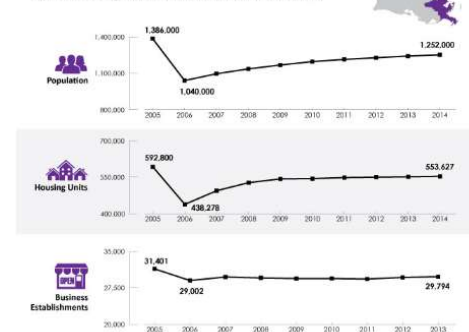
Table 3. Loss estimates and vital figures on the tourism sector in the Gulf States (Sources: Travel Industry Association of America and Travel Business Roundtable)

Table 3: Estimated impact of Hurricane Katrina on local travel and tourism				
	No. of counties affected	Spending on tourism in 2004	Daily spending losses	No. of jobs supported
Total	50	\$18.3 B	\$50 M	260,000
Alabama	3	\$2.0 B	\$5.5 M	30,000
Mississippi	15	\$2.8 B	\$7.7 M	38,000
Louisiana	32	\$13.5 B	\$37 M	191,000

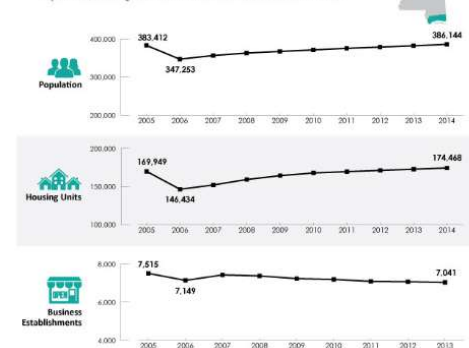
Figure 14. Population trends in Katrina affected counties, after the event (Source: NOLA)



New Orleans Metro Area Rebounds from Hurricane Katrina
Population, housing units and business establishments since 2005

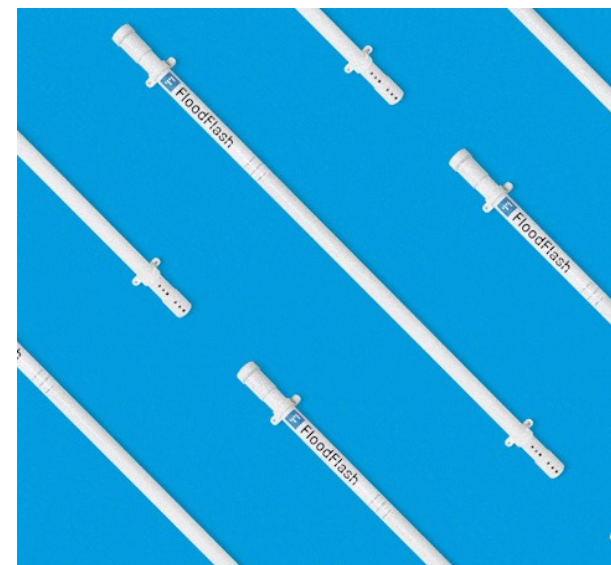


Mississippi Coastline Counties Rebound from Hurricane Katrina
Population, housing units and business establishments since 2005



- After Hurricane Ivan (2004), CARICOM countries approached the World Bank for assistance in creating a cost-effective risk transfer program
- The Caribbean Catastrophe Risk Insurance Facility (CCRIF) was created in 2007 to provide coverage to Caribbean governments against hurricanes and earthquakes
- CCRIF provides payments in 14 days or less after an eligible event based on a parametric trigger
- Basis risk is minimized through a modelled loss approach (calibrated to governments' exposure)
- It is an efficient way to cover liquidity shortfalls arising after a disaster
- In case of a disaster, a country could receive up to 20 times the amount of premium paid
- There are no restrictions on what CCRIF payout funds can be used for
- Examples of how the CCRIF funds have been used in the past include:
 - Government salaries after an event disrupted normal operations
 - Infrastructure repair (including bridges and roads)
 - Supplements to the general budget
 - Mitigation measures to increase resilience

- Companies are working to reduce the basis risk for the individual insured
 - FloodFlash is a UK based company
 - developed a mobile sensor that gets attached to your building.
 - The sensor measures the amount of flood and transmits it to the company.
 - When the inundation gets above a certain point, a payment is made to the insured.
 - <https://floodflash.co/>
- Individuals in addition to governments and businesses incur expenses beyond what is covered from a standard insurance policy.
Parametric coverage can help bridge that gap.
- A parametric cover that is meant to replace a standard insurance policy should come with the full knowledge of the basis risk



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