

Alternative Risk Transfer Solutions

NORIMA, Oslo September 2022

Munich RE 

Munich Re – Capital Partners
Who we are – what we do

Who we are



100+ individuals across Munich Re

Origination & structuring of
tailormade solutions

Main Locations:

Munich, Zurich, New York

What we do

Bundling expertise to strengthen our value proposition



Our value proposition

Origination

Joint development of new business opportunities with business units



Analytics

Analyses of client needs & development of comprehensive solutions



Structuring

Structured prospective solutions

Retrospective solutions

Insurance-linked securities (ILS)

Parametric trigger solutions & Weather derivatives

Group-internal retrocession

Support of Munich Re's risk and capital management strategy through internal retrocessions



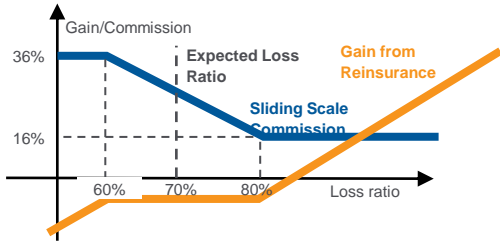
External retrocession

Placement of Munich Re's external retrocession



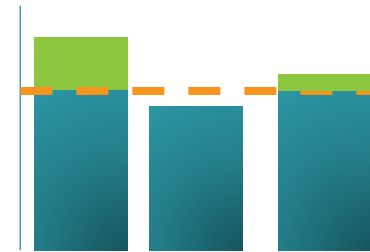
Munich Re can add value with various solutions

1 Structured Quota Share



In a growth or M&A situation, a structured quota share is a flexible and economic instrument to steer the capital requirements.

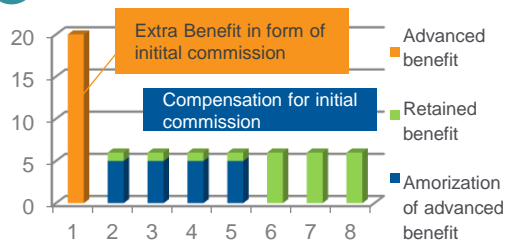
2 Aggregate XL/Stop Loss



An Agg XL / stop loss is a risk transfer contract which protects the result and capital of an insurance company.

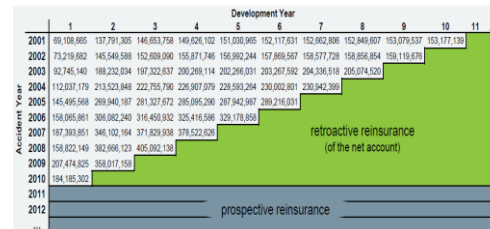
A Selection of Solutions

3 Financing Quota Share



Cover for immediate capital or liquidity need

4 Retrospective reinsurance



Retrospective reinsurance is an instrument that supports the financing of a transaction and can be used to transfer undesired reserve risk in the acquired portfolio.

Parametric Trigger Solutions

A parametric solution can be a response to risk management challenges

Increasing demand for new and innovative types of protection, especially **protection of non-indemnity losses**

Quick post-event liquidity for rapid repair programs (emergency response, liquidity gaps)

Parametric solutions can cover **risks** which are **excluded from traditional insurance**

General
Use
Cases

Detailed quantification of liability exposures is time-consuming and expensive

Coverage of secondary losses (e.g., disruption of services, clean-up costs, overtime expenses, emergency accommodation, etc.)

To avoid **capacity limitations** or “difficult” conditions for the coverage (i.e.: Business Interruption, Contingent Business Interruption, Loan Protection, Earthquake California)

Potential trigger events

Wind

Flood

Non
NatCat?

Earthquake

Tornado & Hail

Tailor made
triggers

Basics of parametric covers



Description

- Parametric transactions are based on specified metrics (i.e. triggered by, for example, wind speed of 100mph or by earthquake magnitude Mw 7.2, each within a specific geographic region)
- Parametric triggers can utilize a range of payoffs determined as a percentage of the full amount based on the severity of the triggering event
- Upon measurement of specified trigger, the structure would then payout accordingly
- Actual losses incurred is not a determinant of parametric payouts and actual losses may be more or less than the payout according to the parametric trigger



Quick Liquidity

- Immediate liquidity due to fast pay-out: only physical parameters such as intensities, km/h, pressure, etc. and location(s) are used to determinate the pay-out of the parametric cover. Upon on an event and sending an event notice, the beneficiary of the contract would receive a fast payout in case the physical parameters trigger the cover.
- After large events quick liquidity is needed to cover for disaster management and operational related cost e.g.,
 - Emergency response
 - Rapid repair programs
 - Costs incurred by business interruption



Complex Risk Landscape

- Risks which are excluded from traditional insurance
- Capacity limitations or “difficult” conditions for the coverage (i.e.: BI, CBI, Loan Protection)

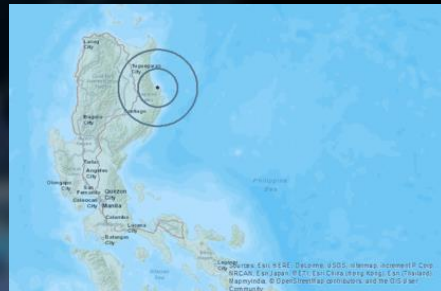
Example: Windstorm cover - The Philippines

Cat-in-a-Box based

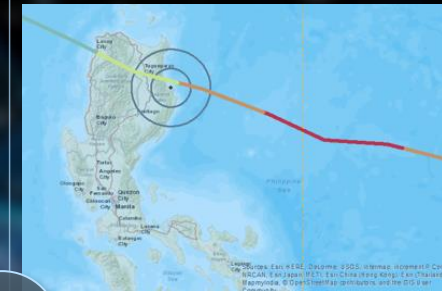


Case Study

Mechanism – Step by Step



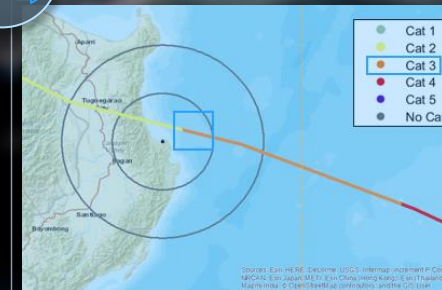
- „Cat in a box“ solution for Tropical Cyclones
- (Multiple) Circles as “boxes”
- Distance to certain location & wind speed work as parameters for a trigger
- Location has to be a valid „point of interest“ for the client



- Not only distance to the centre point, but also wind speed is used as parameter for the trigger
- Wind speed is classified in categories (e.g. Saffir Simpson Scale)
- → Consistency of data!



- Each storm intersecting with the defined circles is processed for further evaluation
- Raw Storm Track is interpolated to a distance of approx. 500m
- Each point within the circles might be triggering a pay-out



- Pay-out is set according the pay-out pattern (matrix)

	Cat.1	Cat. 2	Cat. 3	Cat. 4	Cat. 5
Radius 1	20%	40%	60%	80%	100%
Radius 2	0%	20%	40%	60%	80%

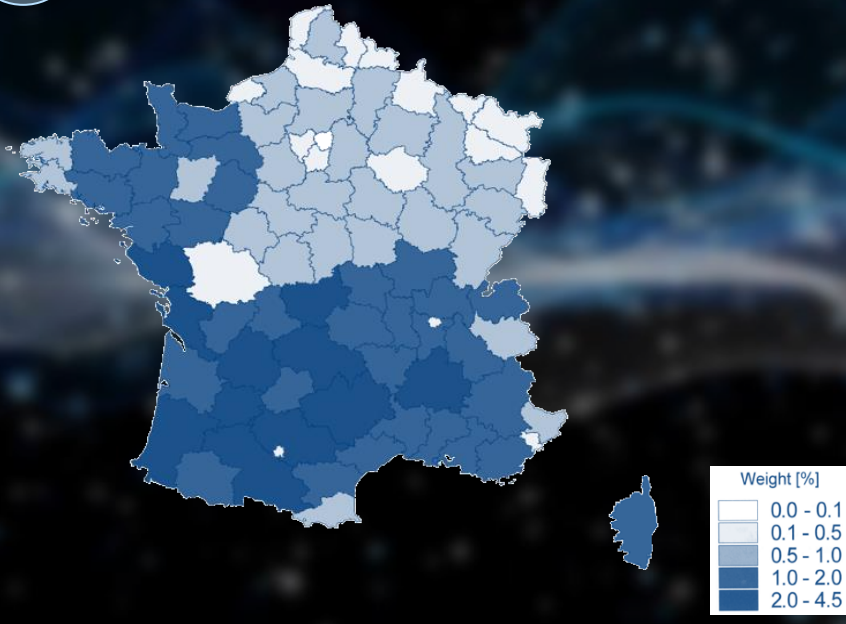
Example: Windstorm Cover - French T&D lines Index based



Case Study



Covered Area



Details on Cover

- French T&D lines heavily exposed to windstorm
- After Windstorms Lothar and Martin in 1989 almost no traditional capacity available
- Parametric cover clear substitute calibrated on historic data
- Trigger based on windspeeds measured on selected weather stations with weightings reflecting exposures:

$$\sum_{i=1}^n w_i [\max(v_i - 25, 0)]^2$$

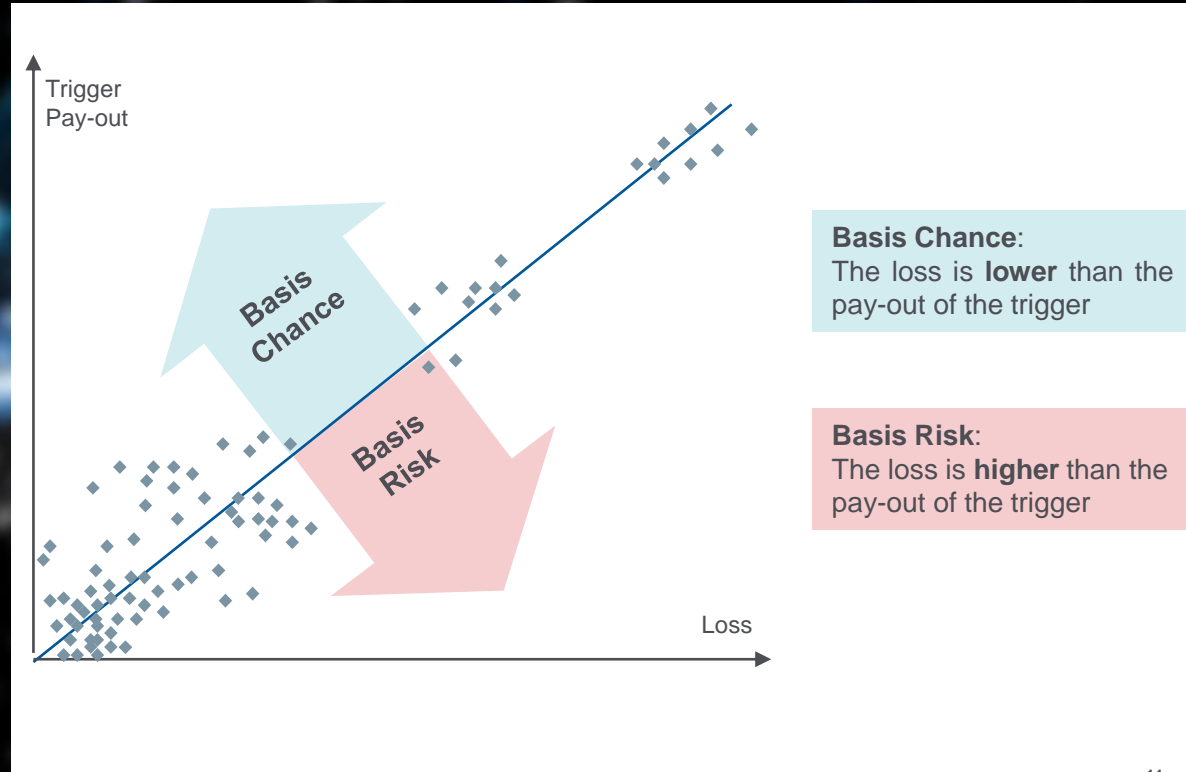
- Data provided by Meteo France

Deviations between trigger pay-out and actual loss: Basis Risk

The issue of **basis risk** needs to be fully understood by both, insurer and insured: In contrast to an indemnity-based product, many parametric products contain the risk that a loss has occurred, but no pay-out was triggered. This can happen if...

- ...the trigger definition is simply bad and not “problem-adequate”
- ...the uncertainty in the peril / trigger set-up is huge and cannot be overcome
- ...both of the above

The contrary is possible as well (called **basis chance**), triggering a larger pay-out than the actual incurred loss.



Different options for a parametric cyclone trigger



Cat in a Box	Parametric Index	Parametric Index on virtual measurement stations
<p>Description</p> <p>This trigger is based on the cyclone track record passing through a predefined area (box, circle) with predefined wind speeds</p> <p>Linear payout scheme or binary based on magnitude</p> <p>Characteristics</p> <ul style="list-style-type: none">• Trigger parameters are difficult to correlate with losses, especially for large regions (basis risk)• Very fast pay-out post event• Probabilities very sensitive to covered area (box, circle etc.)• Transparent trigger	<p>Description</p> <p>Utilizing wind speed observations from existing network of measurement stations</p> <p>Station weighted Index</p> <p>Characteristics</p> <ul style="list-style-type: none">• Pay-out in case of event subject to availability of observation data	<p>Description</p> <p>Weighted index design just like under “Parametric Index”; however, wind speeds are calculated based on virtual measurement stations via fixed formula</p> <p>A network of virtual stations is configured and weighted to reflect the exposure distribution of the sponsor</p> <p>Upon an event, measured value per virtual station is extrapolated based on an attenuation formula to the location of the event</p> <p>Characteristics</p> <ul style="list-style-type: none">• Very fast pay-out post event• Transparent trigger

Different options for a parametric earthquake trigger



	Cat-in-a-Box	Virtual Stations	Actual Stations	Modeled Loss
Method	The event of an EQ with a defined minimum magnitude within a given region (i.e. trigger box) triggers a payout	Weighted index design; however, ground motions are calculated based on virtual measurement stations. Upon an event, the value per virtual station is extrapolated based on a distance formula to the location of the event	A network of seismic measurement stations is defined and weighted to reflect the underlying exposure of the sponsor. After an event, measured ground motions per stations are plugged into a predefined index formula calculating the payout	A modeled loss trigger applies a cat model to the pre-defined exposure for the initial modeling probabilistic risk metrics of the cat bond and for the post-event loss calculation. Upon an event, the input parameters of the event are plugged into the same model to determine the loss amount
Source of measurement data	Date and time of the earthquake, moment magnitude, epicenter location, focal depth delivered by USGS/EMSC	Date and time of the earthquake, moment magnitude, epicenter location, focal depth delivered by USGS/EMSC	A network of seismic measurement stations deliver the source of measurement data (e.g. network serviced by the geophysical institute of Israel)	Date and time of the earthquake, moment magnitude, epicenter location, focal depth, rupture azimuth, dip azimuth, dip angle, slip angle, fault type and rupture plane
Strength	Transparent trigger Fast pay-out	Transparent trigger Fast pay-out Good fit to individual exposures	Transparent trigger Fast pay-out	Lower basis risk
Weaknesses	High basis risk	Basis risk	Quality of trigger depends on availability of network	Involvement of external modeler Less transparent

More Example Cases

Use Case 1

Parametric Hurricane for SME Commercial Facility



3m

AUD average limit

Parametric cover to assure otherwise non-insured losses in the event of a Hurricane / Cyclone



The client's motivation

- Gaps in traditional Property coverages especially for costs of clean up, business interruption and recovery for small hospitality, retail and real estate clients
- Initial pilot targeting Australia and French Caribbean utilising Lloyd's licencing



We provided the right answer

- Dual trigger policy based on standard Munich Re OneStorm wording
- Product choice of 3 cat in a circle structures starting at a cat 3+ trigger with stepped pay-outs to cat 5
- Sums insured offered up to 20% of total insured value to mitigate basis risk
- Data source based on NHC (Caribbean) and BoM (Australia) data



The client's benefits

- Streamlined purchasing options using local broker network and sold alongside traditional coverage to simplify purchasing options
- Fast liquidity in the event of a catastrophic windstorm event

Use Case 2

Multi Location Hurricane and Earthquake Parametric Cover



10m

USD aggregate limit

Parametric cover to assure liquidity after strong hurricane or earthquake



The client's motivation

- One of the biggest Spanish hotel chains wanted to assure fast liquidity after a strong Earthquake or Hurricane and protect own self-insured retention
- Coverage of additional costs, extra expenses, loss of income due to lack of guests because of damaged infrastructure or loss of attraction
- Important as well - one solution for different countries



We provided the right answer

- CAT in the box approach:
 - Payment under the policy requires an earthquake with an epicentre into the predefined region, according to the USGS or a Hurricane with track in predefined circle and confirmed by NHC
 - Payment amount will depend on the determination of strength, relative to specified thresholds (for hurricane 2 circles)



The client's benefits

- Quick claims payment in case of a strong earthquake 6,9 Richter or strong hurricane > Cat 1
- Munich RE as partner in different legal environments (3 different jurisdictions)
- Lean administrative processes and highly cost-efficient

Use Case 3

Parametric Earthquake Coverage for a Japanese Semicon



25m

USD aggregate limit

Parametric cover to assure non-damage CBI and Power outage after strong earthquake



The client's motivation

- Important Japanese flash memory manufactory wanted to insure exposure of service interruption resulting from an earthquake, volcanic eruption and tsunami
- Close gap to traditional property insurance with coverage of non-damage business interruption (NDBI)



We provided the right answer

- Dual trigger for 2 locations
 - Payment under the policy requires an earthquake +6 with an epicentre into the predefined 2 regions, according to the JMA (Japan Meteorological Agency) with 11 seismic stations in Mie and 36 stations in Fukushima prefecture **and** occurrence of service interruption
 - Payment amount depends on the determination of costs and loss of revenues in excess of a significant SIR



The client's benefits

- Quick claims payments in case of a strong earthquake (+ 6 Richter)
- Lean administrative processes and highly cost-efficient
- Alternative to a coverage which is very difficult to achieve in Japanese traditional Property market

Use Case 4 – FloodFlash (Flood parametric cover) IoT + Internet based Flood measurement at customer location

60m

GBP annual capacity
over 600 policies sold in
UK and growing into US
market



The client's motivation

- SME (and growing into Corporate) clients who look for Flood protection
- Flood cover might not be available traditionally or too expensive
- Client to decide trigger depth and settlement amount (also multiple triggers are possible)



We provided the right answer

- FloodFlash is a UK start-up (Lloyds Lab + Lloyds Coverholder + FCA approved)
- Munich Re Syndicate in a Box capacity provider for FloodFlash Binder
- Data sources: third party Flood hazard maps with elevation models
- Agreed pricing between FloodFlash and Munich Re Flood experts



The client's benefits

- Client chooses payout value, trigger depth and sensor location (via Internet / Broker)
- Proprietary IoT sensor installed with each client – data triggers insurance payouts
- Low basis risk due to measurement on site
- Faster recovery

Use Case 5

Weather down time protection for Offshore Construction Risk in the UK



5m

USD aggregate limit



The client's motivation

- Excessive wind speeds and wave heights can negatively affect or even stop offshore operations/construction
- Leading to work delays that cause increased costs for vessels and contractual penalties



We provided the right answer

- Weather cover based on wind speed and wave height triggers
- Data source: ECMWF ERA5 Hourly Wind Wave Reanalysis Data



The client's benefits

- Contractors bid on projects and include significant buffers for weather uncertainty in their bid calculation
- With the hedge, contractors can price their bids more competitively and have protection in case of bad weather

Use Case 6

Lack of precipitation in Columbia



200m

USD aggregate limit
over 4 year



The client's motivation

- The client is the largest utility of Colombia and provides electricity, gas, water, sanitation and telecommunications mainly in Colombia, but also in several other Latin American countries
- Their electricity generation is highly dependent on hydro-power and, consequently, on precipitation levels



We provided the right answer

- Parametric insurance based on precipitation data
- Data source: Precipitation data measured by weather stations (installed for settlement by a 3rd party)



The client's benefits

- personalized P&L protection
- Multi-year protection
- Low basis risk due to measurement on site

Thank you!

Your Contact:

Munich Re Capital Partners



Kim Andersen

Senior Manager
Origination

Tel : +41 79 79 339 27
kandersen@NewRe.com

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