

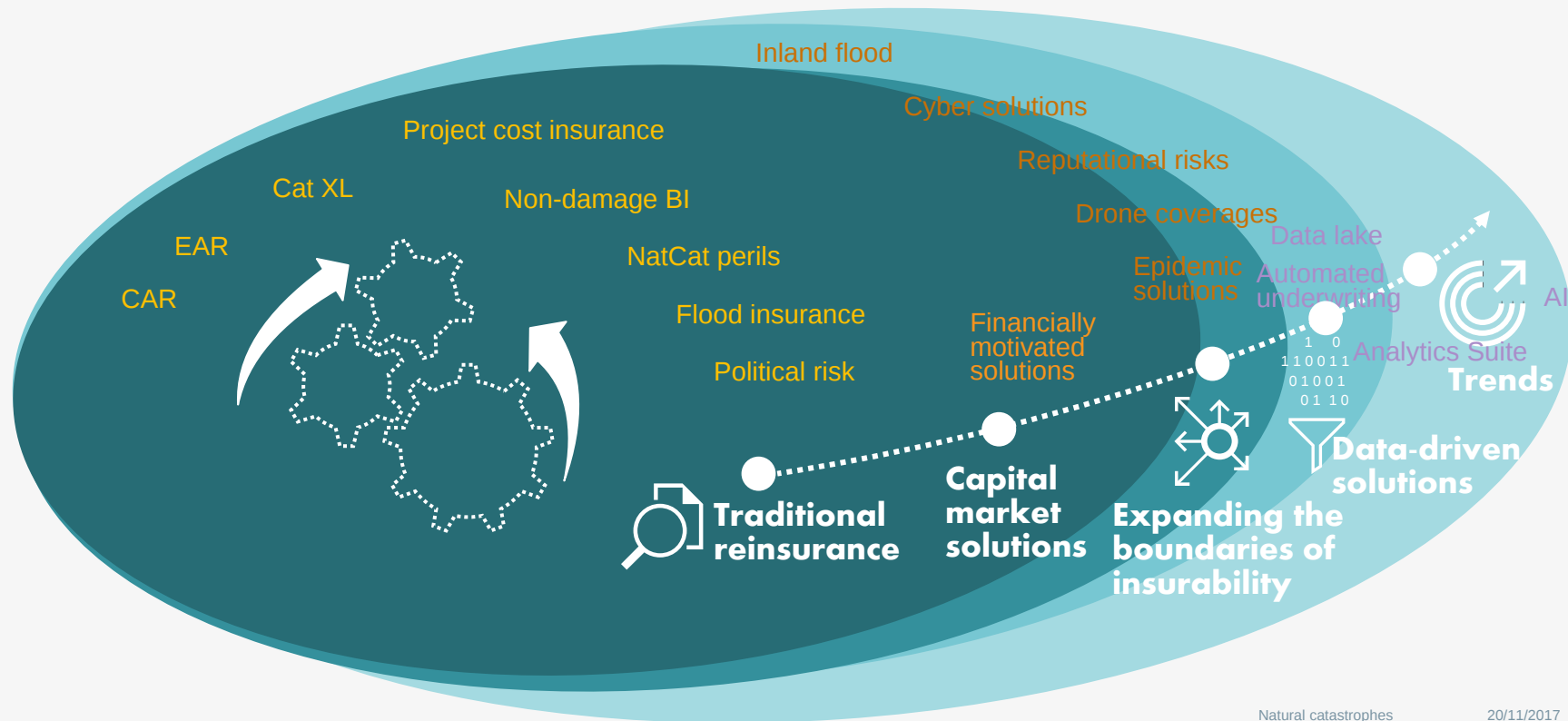
Economic consequences of natural catastrophes and the role of (re)insurance

Observatorio de Catástrofes Naturales
20 Noviembre 2017
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Munich RE 



Climate change and its consequences is Munich Re's core business

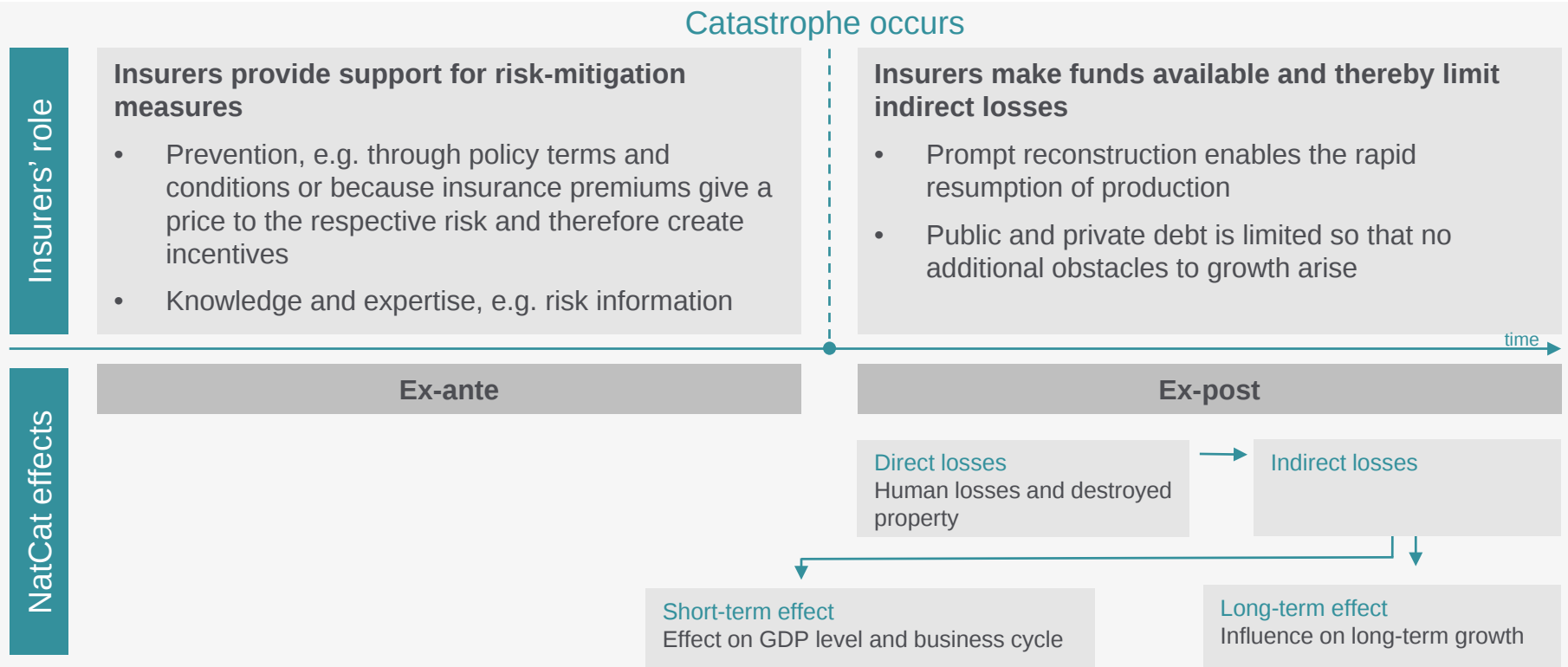


1. Economic consequences of natural catastrophes
2. Emerging economies are particularly at risk
3. Hurricanes 2017: Harvey, Irma, Maria
4. Role of the (re)insurance industry

1 Economic consequences of natural catastrophes



Insurers help to limit the losses, both before and after the catastrophe



Natural catastrophes affect the economy through direct losses



Direct losses

- Damage to physical capital and resources
- Death and diseases



Not directly evident
from GDP development

Indirect effects on the economy are also relevant



Indirect losses

- Any effect not caused directly by the natural catastrophe, but by its direct losses
- Indirect effects are changes of GDP compared with the hypothetical development in the absence of a natural disaster

Indirect effects can be negative ...

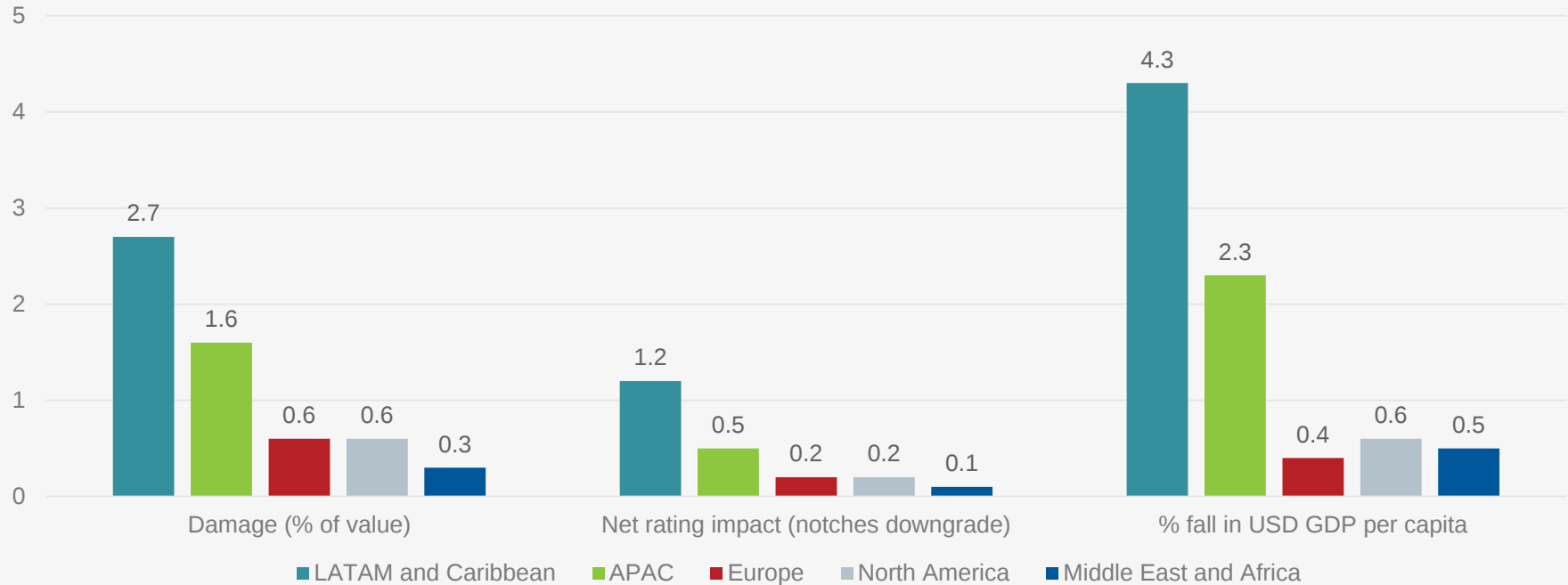


Negative indirect effects, e.g.:

- Loss of production due to destroyed installations
- Destroyed infrastructure
- Inflation

... and may have an impact on sovereign risk ratings

Average impact of natural catastrophes by region



However, natural catastrophes can also have positive indirect effects on economic activity

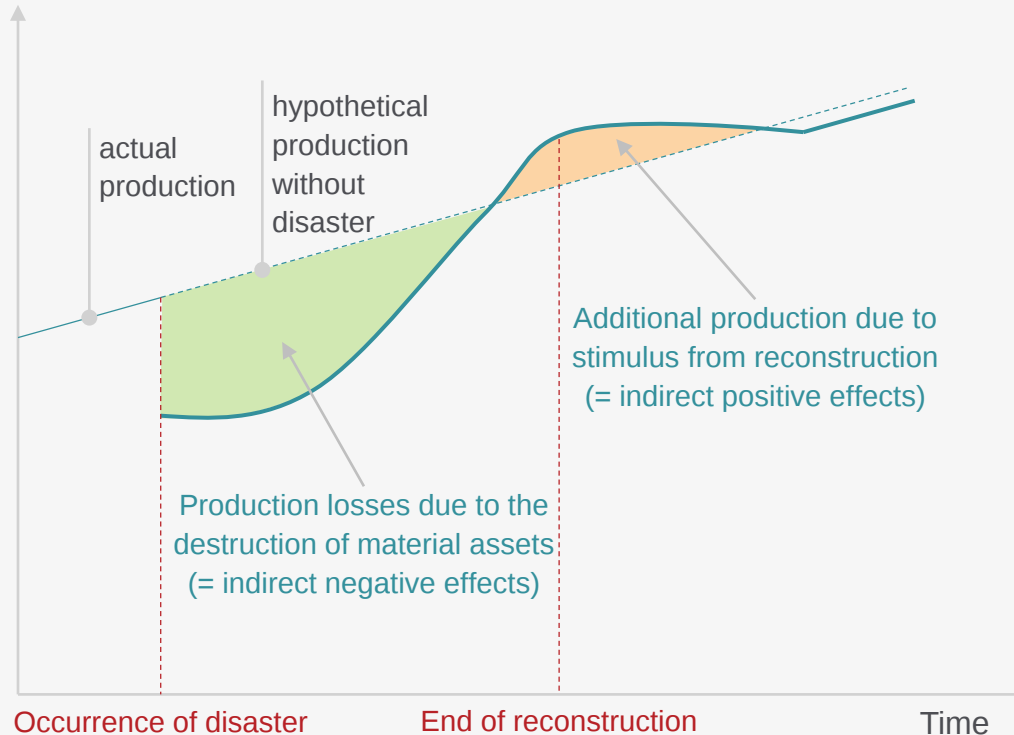


Positive indirect effects

- Reconstruction
- Wealth creation incentives
- Investments in modern technologies
- “Creative destruction”

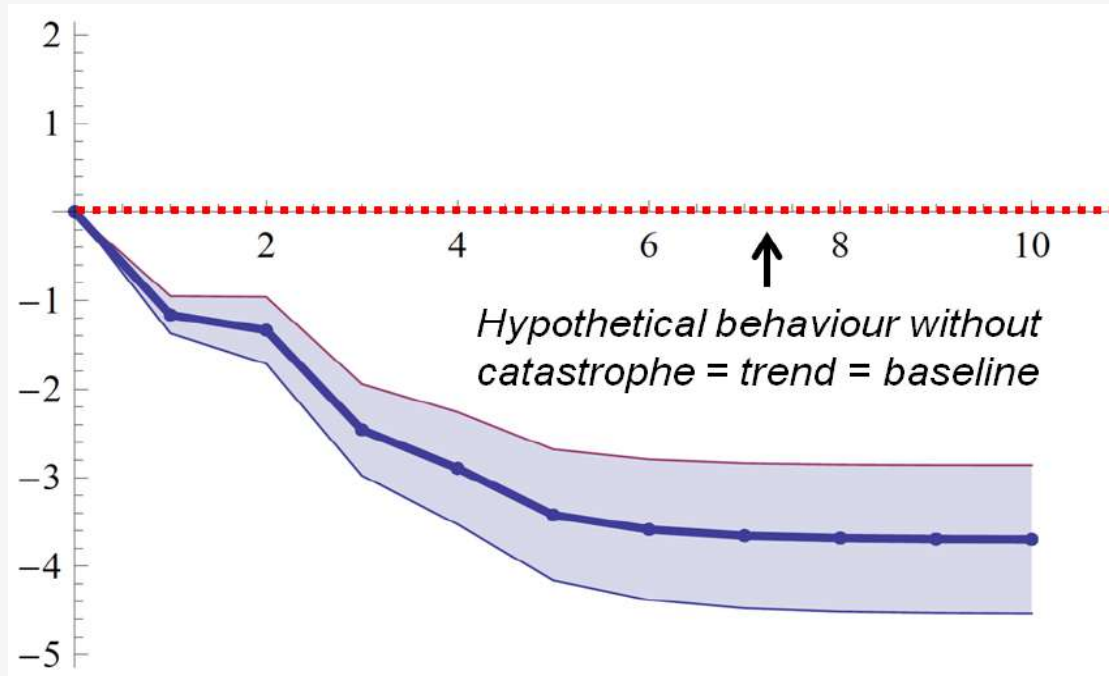
Natural disasters lead to production losses but can also trigger “positive” effects

GDP level



Wealth gains through recovery cannot compensate for losses ...

Cumulative effect on GDP (%)



- Empirical studies show that indirect positive effects on overall prosperity do not compensate for the indirect losses
- “Major, devastating and great” natural catastrophes lead to a statistically significant reduction in GDP of nearly 4% after five years, compared to the level of GDP without the catastrophe

... and natural catastrophes affect public finances



Image: Shutterstock.com

- In case of a natural catastrophe, a state usually has little alternative but to provide generous support to the affected regions
- A future increase in the loss potential from natural hazard events could place a strain on the national budget and jeopardize the competitive advantage of countries with low public debt

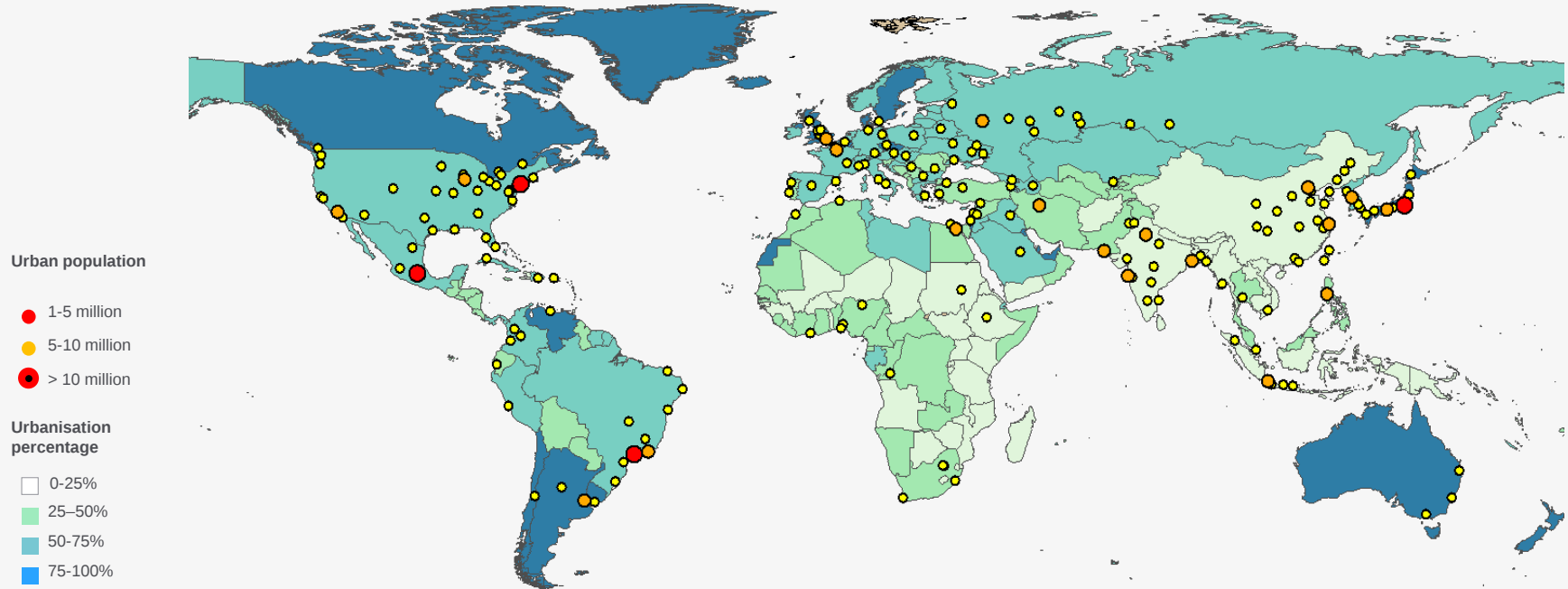
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Emerging economies
are particularly at risk



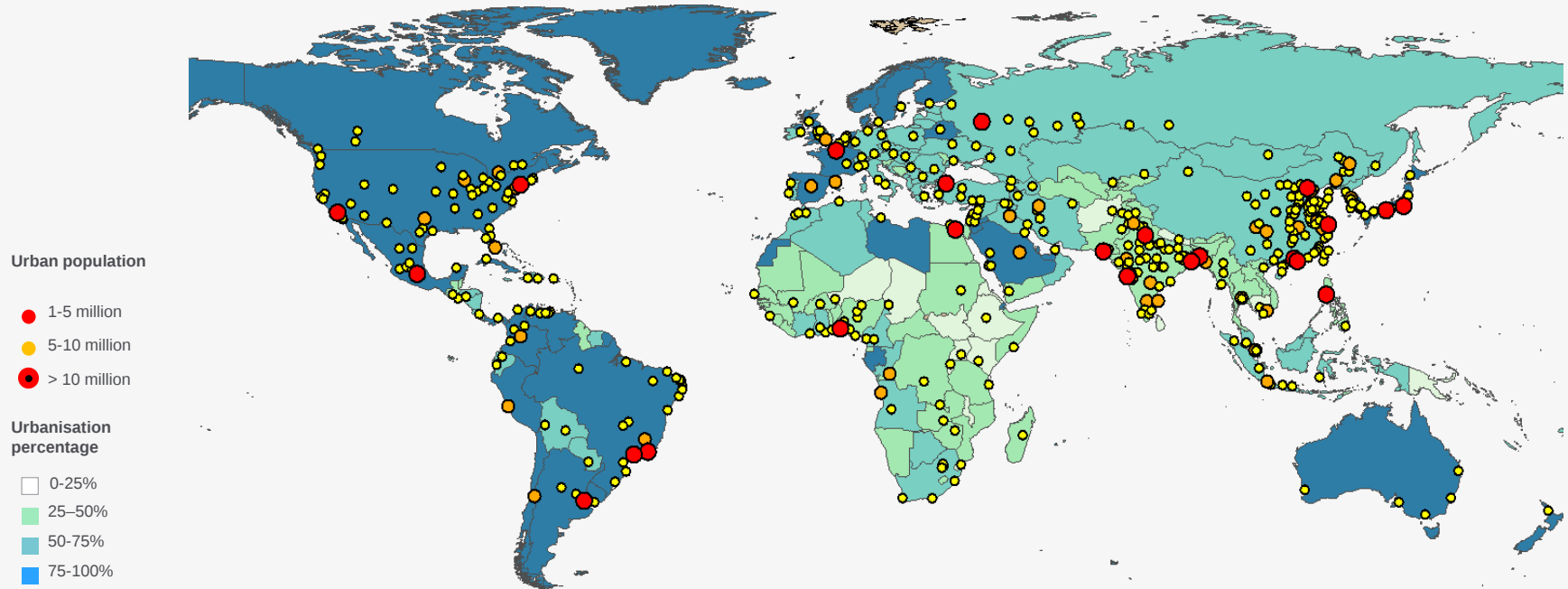
Emerging economies are particularly at risk, in part due to rising urbanisation (1/3)

Global conurbations in 1980



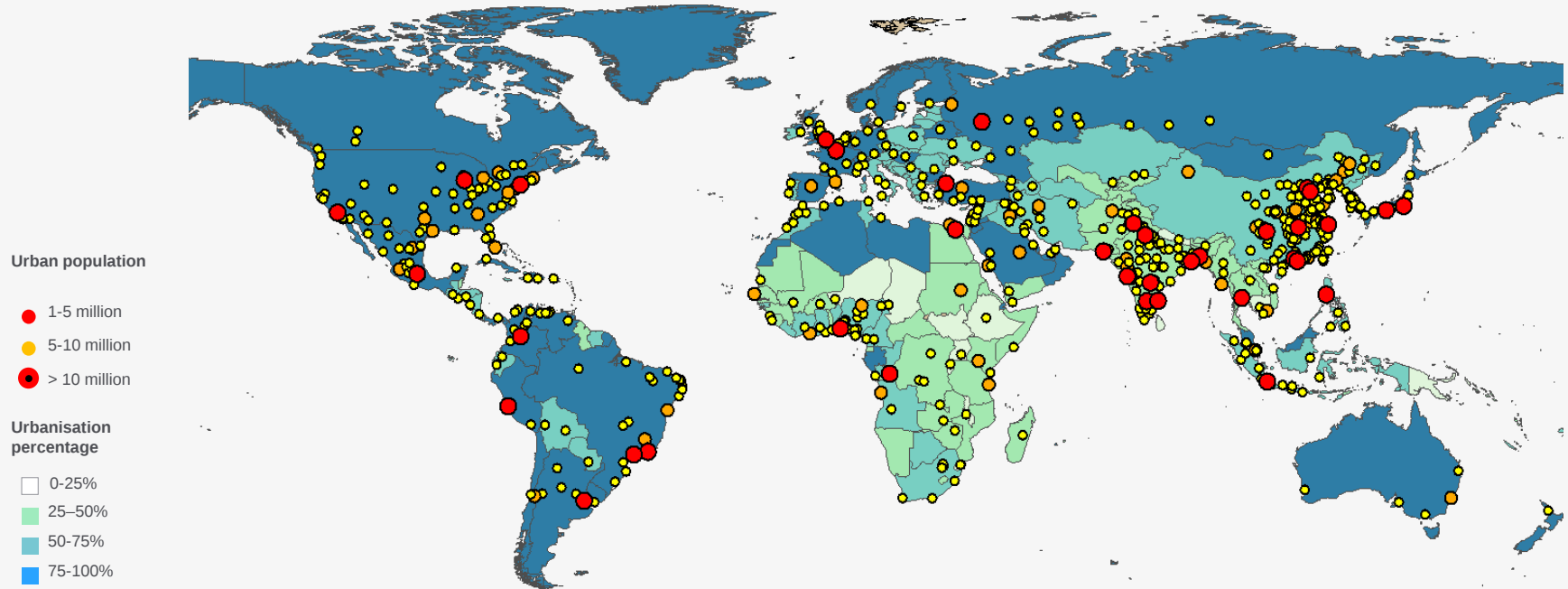
Emerging economies are particularly at risk, in part due to rising urbanisation (2/3)

Global conurbations in 2011



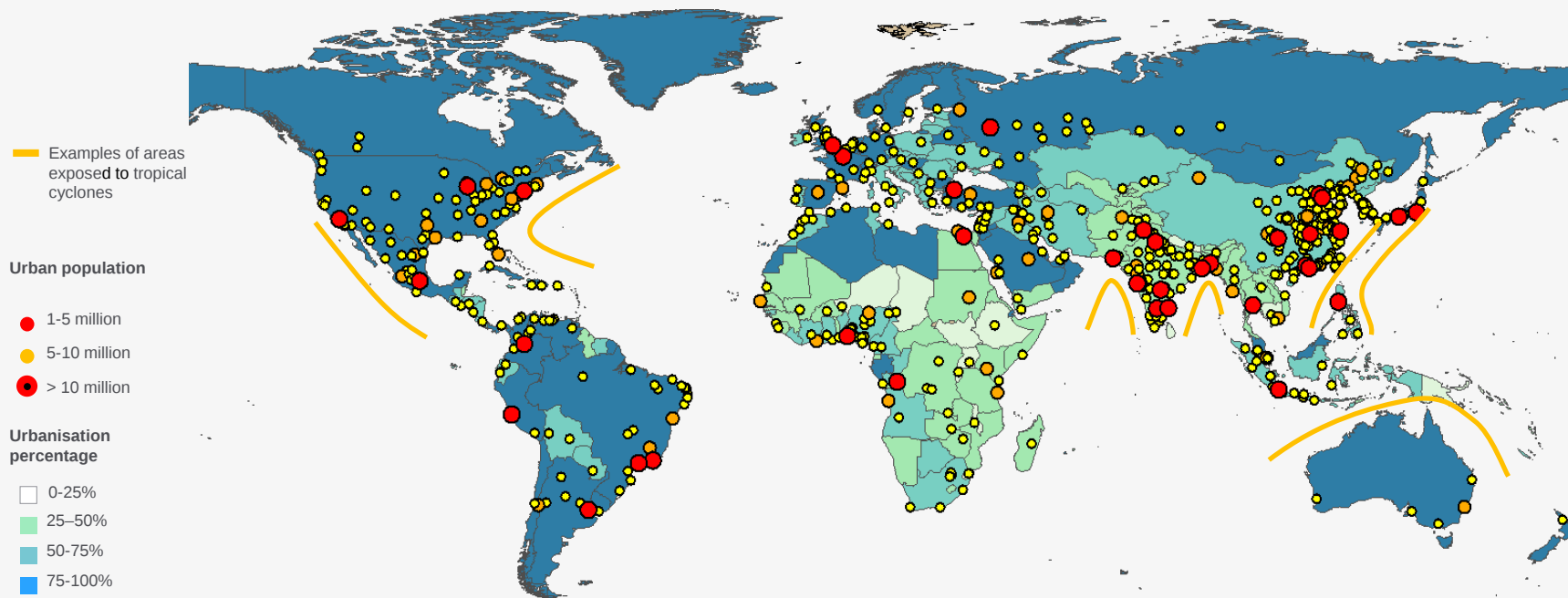
Emerging economies are particularly at risk, in part due to rising urbanisation (3/3)

Global conurbations in 2025



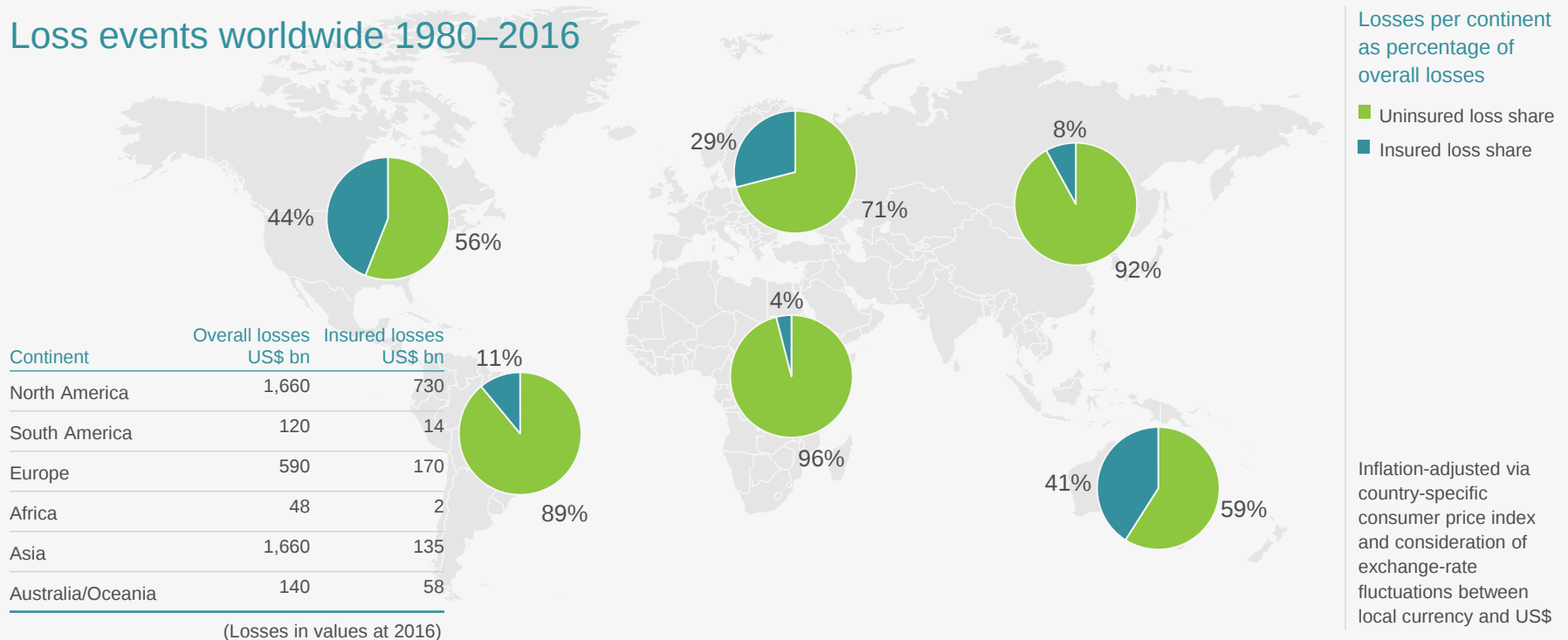
Many conurbations develop in regions that are exposed, for example to tropical cyclones

Settlement and industrialisation of heavily exposed regions in 2025



Protection gap still very large after NatCat events

Loss events worldwide 1980–2016



The factors driving the trends of the past will also influence those of the future

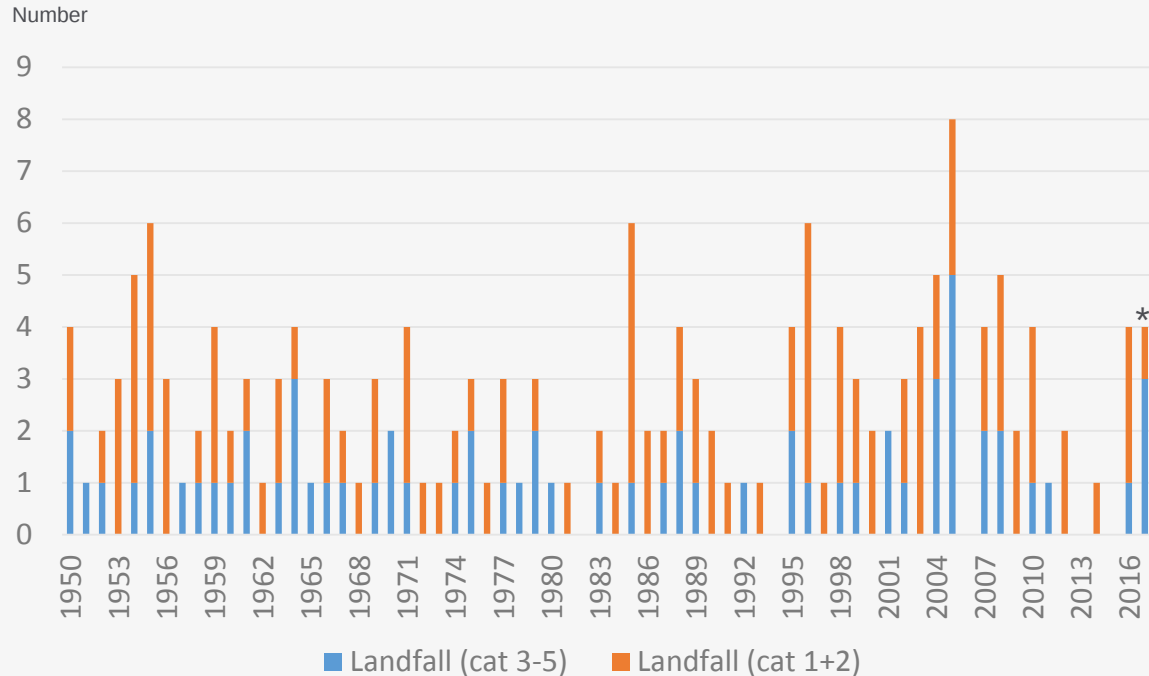
- 1 Population growth
- 2 Rising standard of living
- 3 Concentration of population and assets in conurbations (“urbanisation”)
- 4 Settlement and industrialisation of heavily exposed regions
- 5 Regional increase in loss-relevant and extreme events
- 6 Increasing insurance penetration (of particular relevance for the trend in insured losses)

3

Hurricanes 2017 Harvey, Irma, Maria



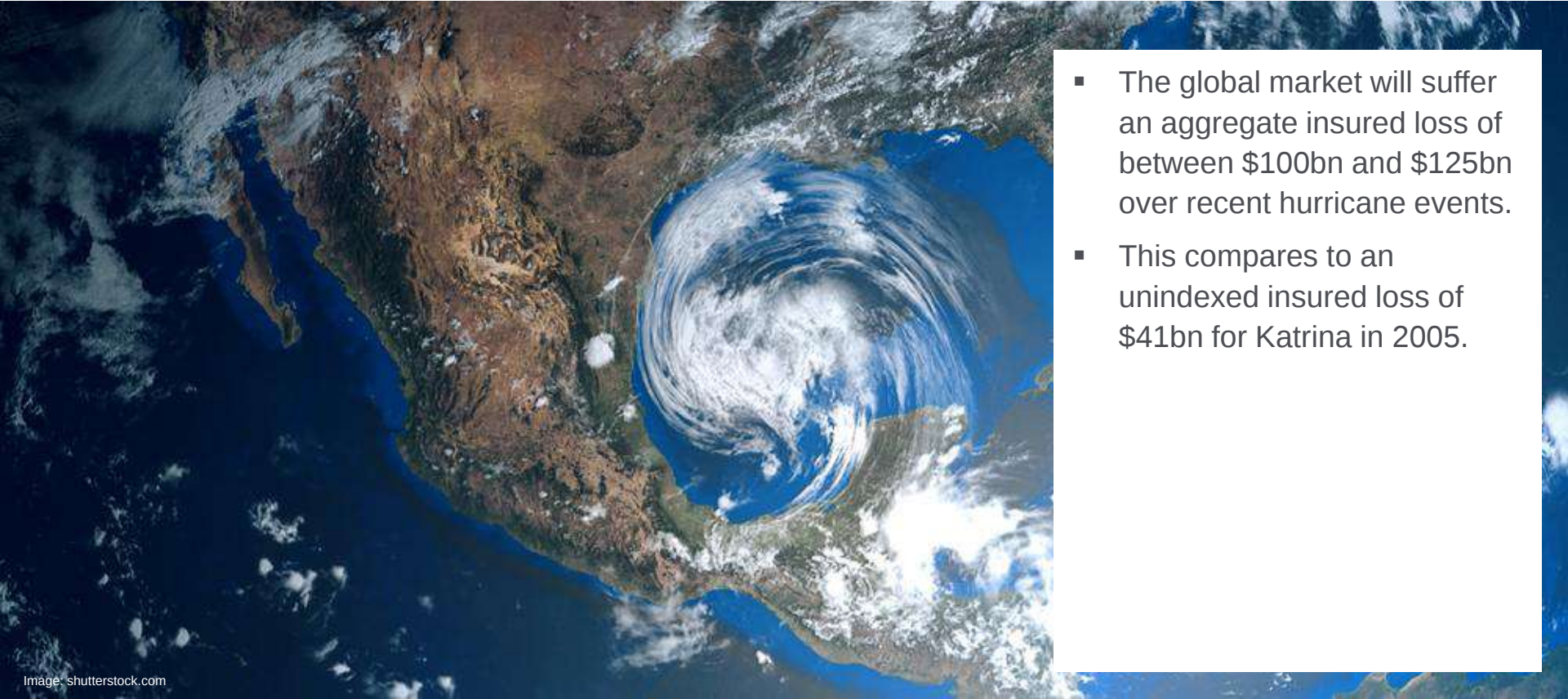
After a series of benign years, the hurricane season 2017 has been quite active



- The hurricane season 2017 by now has been quite active, especially in respect to strong storms, above average
- The series of very strong major hurricanes is unusual, but not totally out of scope compared to other years
- On the long run, climate change will intensify hurricanes due to more evaporation; climate research does not see an increase in frequencies though

▶ 2017 was the fourth year since 1950 with at least 3 major hurricanes making landfall in the US

Reasons why 2017 has reshaped the (re)insurance market

- 
- A satellite image of a hurricane, likely Hurricane Harvey, over the Gulf of Mexico. The image shows the characteristic spiral structure of the storm, with a dense eye and surrounding cloud bands. The landmasses of North and Central America are visible in the background.
- The global market will suffer an aggregate insured loss of between \$100bn and \$125bn over recent hurricane events.
 - This compares to an unindexed insured loss of \$41bn for Katrina in 2005.

Reasons why 2017 has reshaped the (re)insurance market



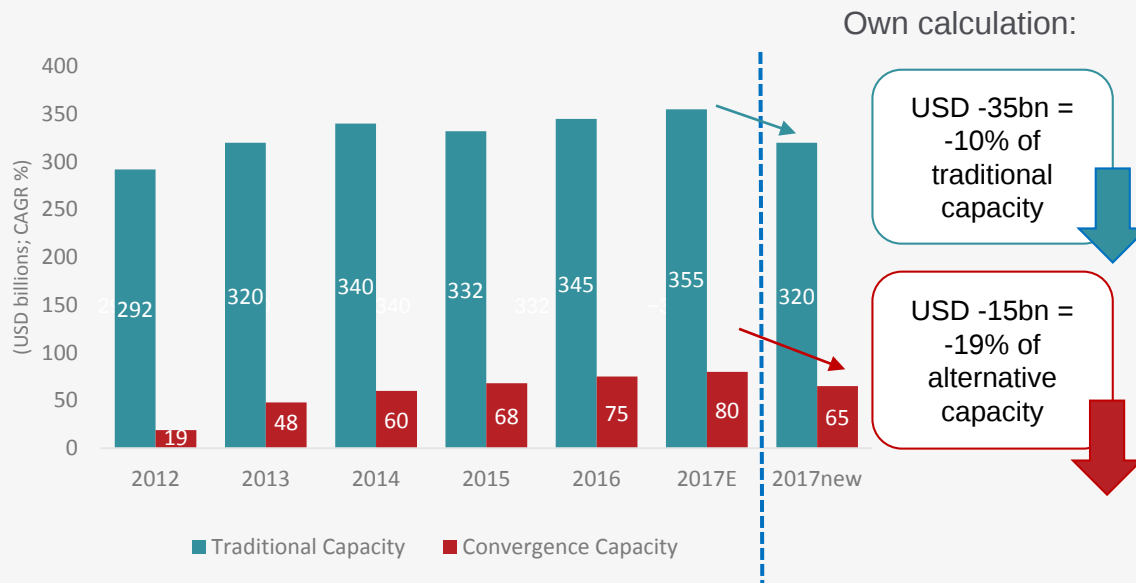
- Non-traditional capital has been severely impacted
- This capital will only “reload” if modelled returns increase significantly, this will involve very material increase in rate.
- A huge divergence amongst the modelling companies will lead to capital requiring additional margin.

Reasons why 2017 has reshaped the (re)insurance market



- Impacted lines see significant adjustment in rates, the effect will lead to all lines of business to secure their capital requirements to continue trading.
- In short order, this will certainly have tremendous implications on prices and conditions, also in many other parts of the world (though not to the same extent).

Overall, hurricane losses will have a substantial impact on reinsurance capital that is available to the market



- Analysts (e.g. JP Morgan) estimate that ~50% of insured losses will be covered by the reinsurance industry
- Depending on the exact loss figures, this would be approx. USD 50-60bn
- It is assumed that this would be shared among ILS (USD ~15bn) and reinsurers (USD ~35bn)
- Last year's RI profits have been USD ~20bn → consequently, a reduction of 35bn means that **>1.5 years of industry profits have been destroyed**

Source: Total reinsurance capital by AM Best / Guy Carp & own calculation for 2017 (new)

▶ Current hurricane losses have destroyed the reinsurance industry's profits of more than 1.5 years.

4

Role of the (re)insurance industry



Before the occurrence of a disaster: Insurers provide the right incentives



Incentives for risk-minimising behaviour
(e.g. through terms and conditions)



Incentives for entrepreneurial action and thus for
growth (by covering threats to continued existence)

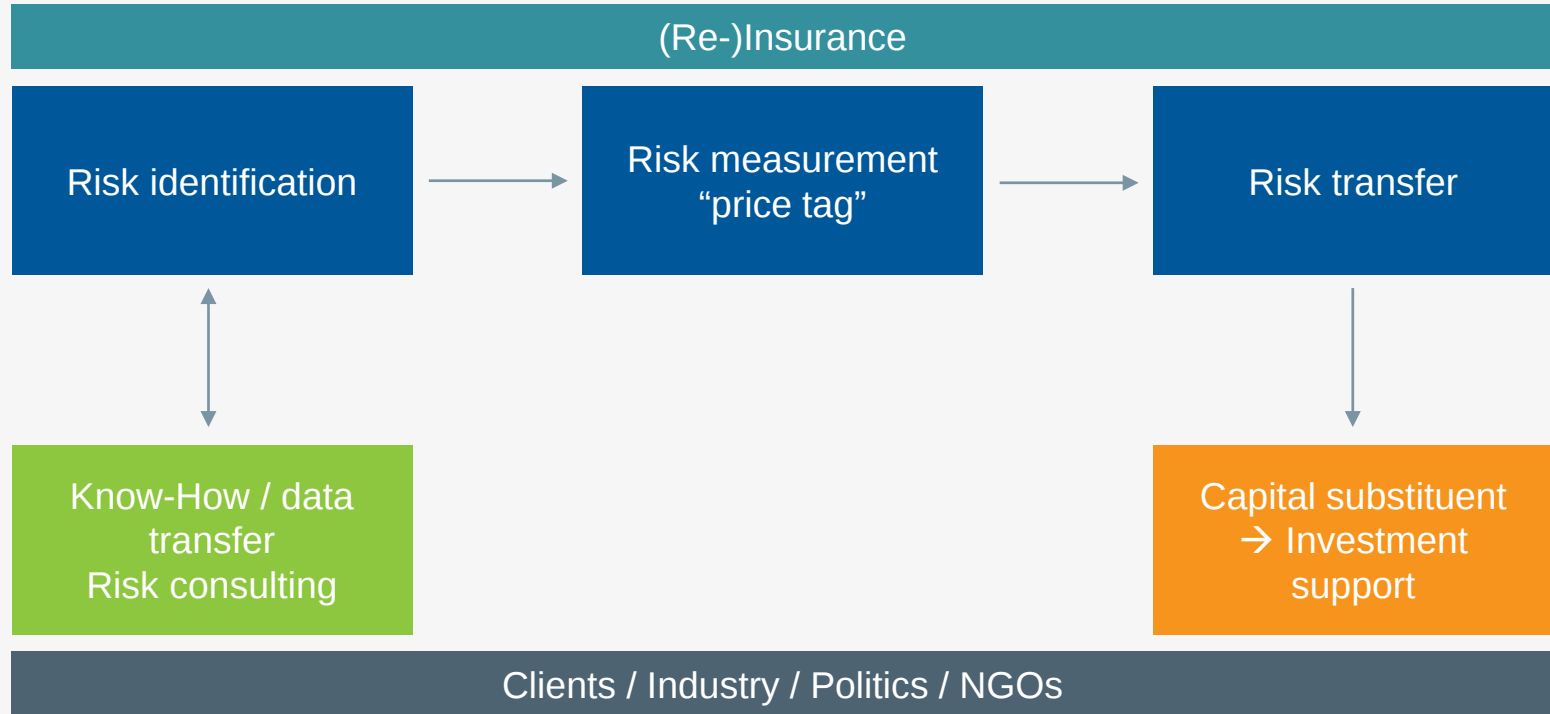
After the occurrence of a disaster: Insurers make funds available and thereby limit indirect losses



Fast reconstruction allows production to be resumed quickly



State and private indebtedness are limited, so no additional obstacles to growth arise



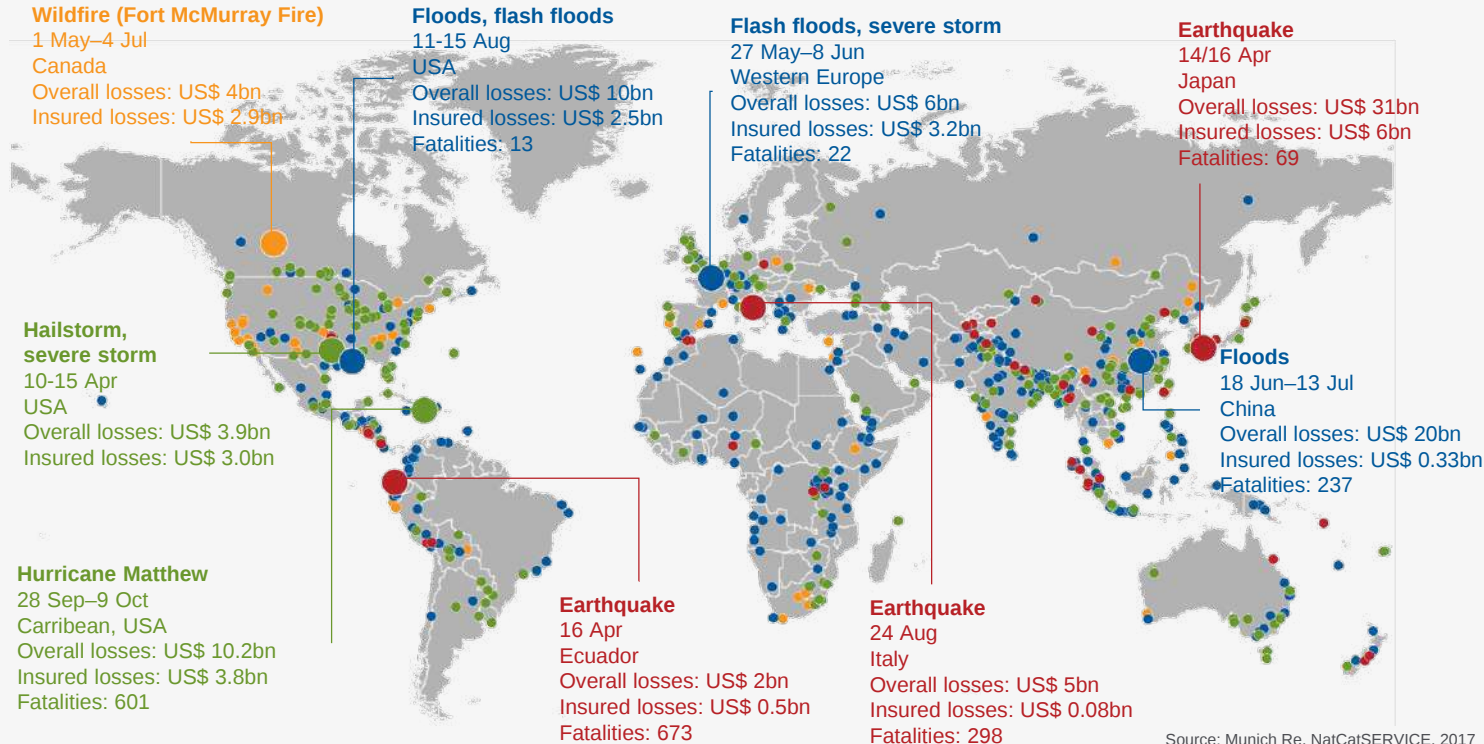
Risk consulting: Contingency Planning to guarantee after a catastrophe event



- Continuity of business
- Quick assessment of the magnitude of the event
- Effective communication with the press and other stakeholders
- Optimisation and immediate activation of available resources
- Fast, precise recording and processing of claims
- Implementation of loss minimisation measures
- Devising of acceptable solutions for insureds
- Providing adequate advanced payments
- Indemnification according to the original intention of the policy

Risk identification: Relevant loss events 2016

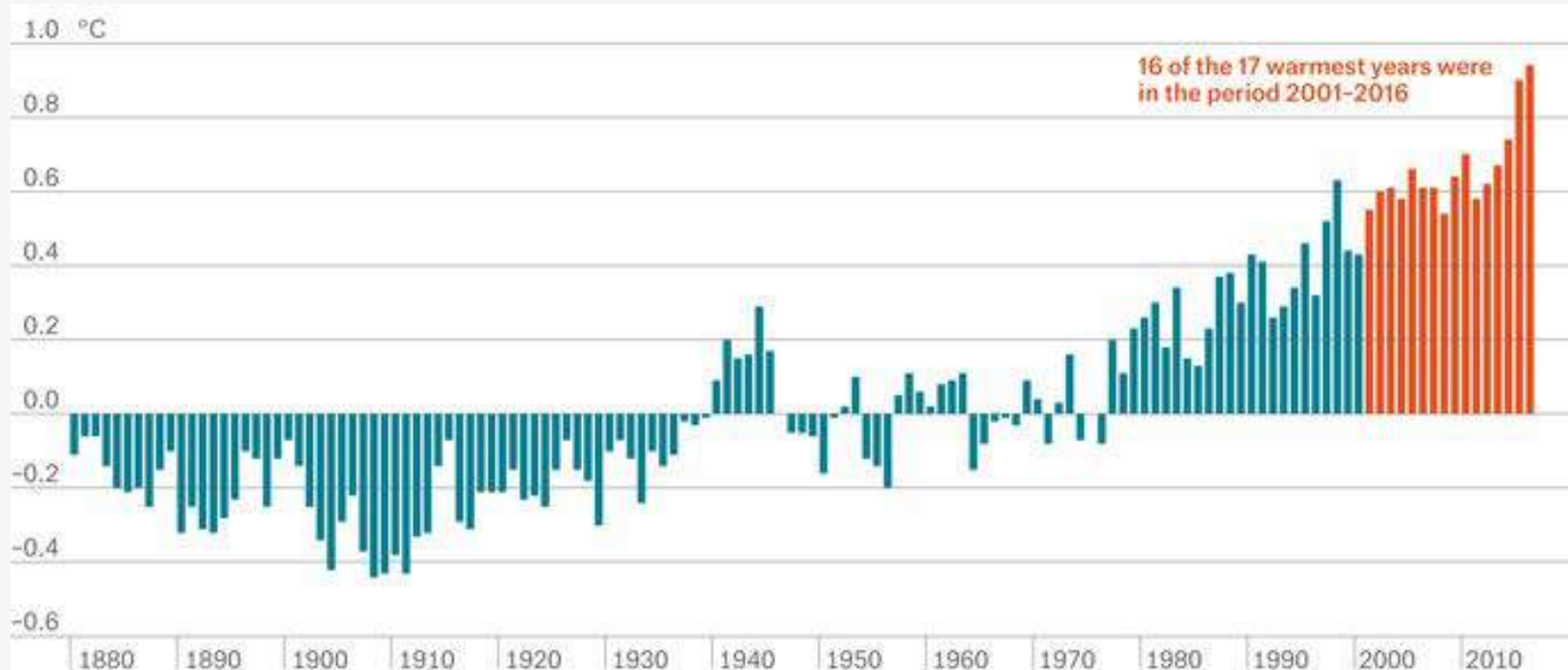
from natural hazards



Source: Munich Re, NatCatSERVICE, 2017

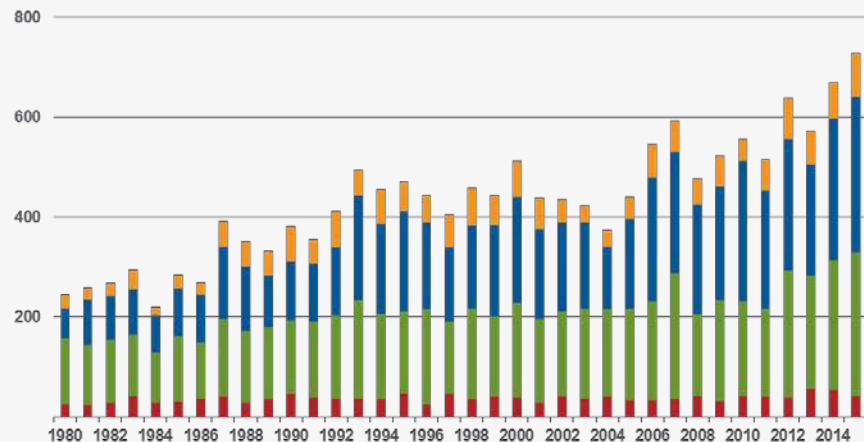
- **Geophysical events**
(Earthquake, tsunami, volcanic activity)
- **Meteorological events**
(Tropical storm, extratropical storm, convective storm, local storm)
- **Hydrological events**
(Flood, mass movement)
- **Climatological events**
(Extreme temperature, drought, wildfire)
- **Loss events**
- **Selection of catastrophes**

Risk identification: All 16 years since 2001 rank among the 17 warmest since measurements began



Risk identification: Relevant loss events worldwide 1980-2015

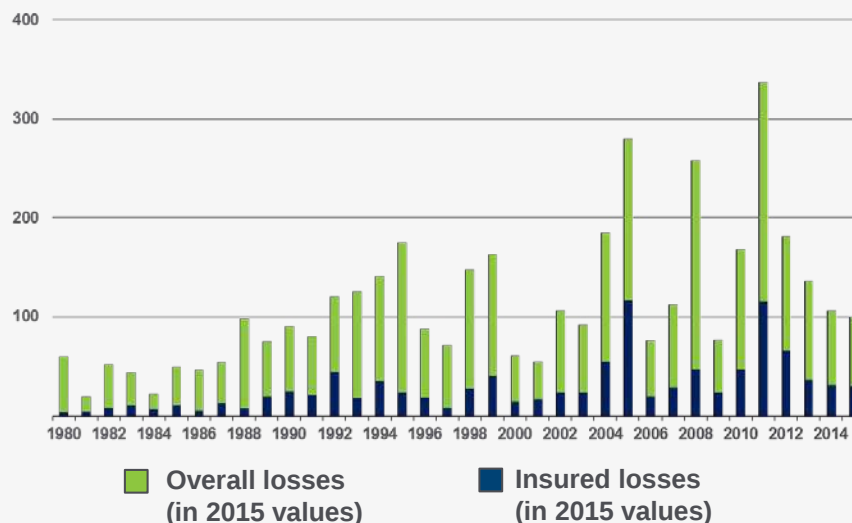
Number of loss events



- **Geophysical events** (Earthquake, tsunami, volcanic activity)
- **Meteorological events** (Storm: tropical, extratropical, convective, local)
- **Hydrological events** (Flood, mass movement)
- **Climatological events** (Extreme temperature, drought, forest fire)

Accounted events have caused at least one fatality and/or produced normalized losses $\geq$ US\$ 100k, 300k, 1m, or 3m (depending on the assigned World Bank income group of the affected country).

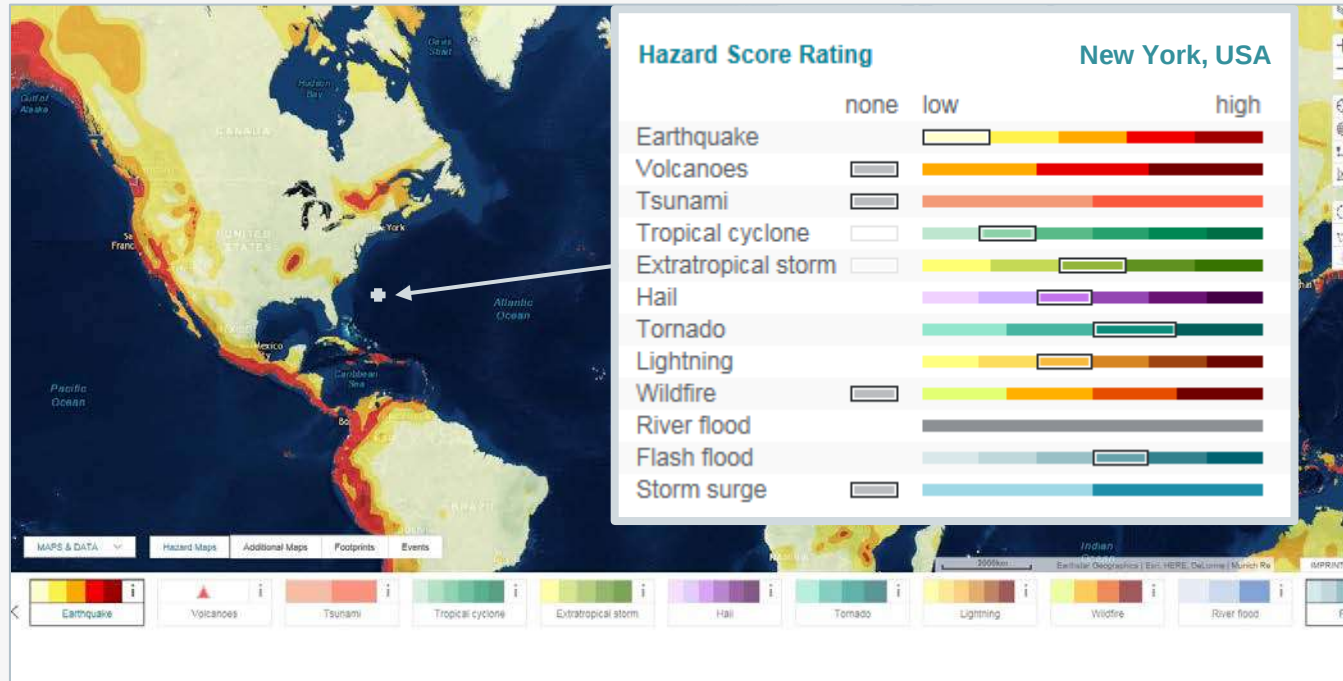
Overall and insured losses (US\$ bn)



Inflation adjusted via country-specific consumer price index and consideration of exchange rate fluctuations between local currency and US\$.

Risk identification: From global/regional hazard zoning schemes to high resolution hazard information

Munich Re NATHAN Risk Suite



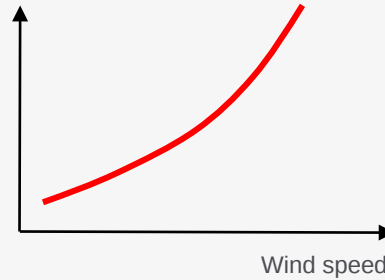
- Natural hazard exposure analysis tool
- Combining client risk data with Munich Re natural hazard zoning system
- Creating risk transparency / information

Risk measurement: Risk modelling of natural catastrophes

Historical and / or
simulated events



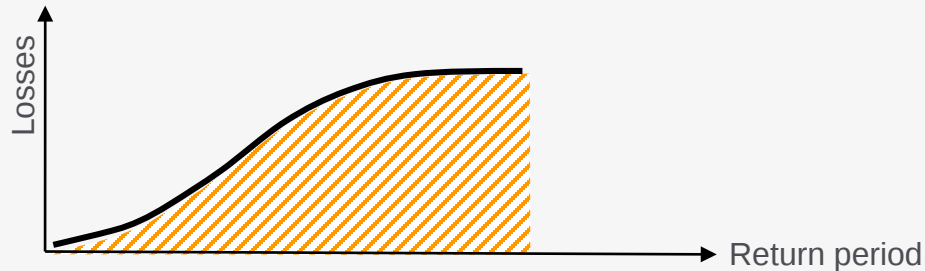
Munich Re vulnerability
function / damage sensitivity



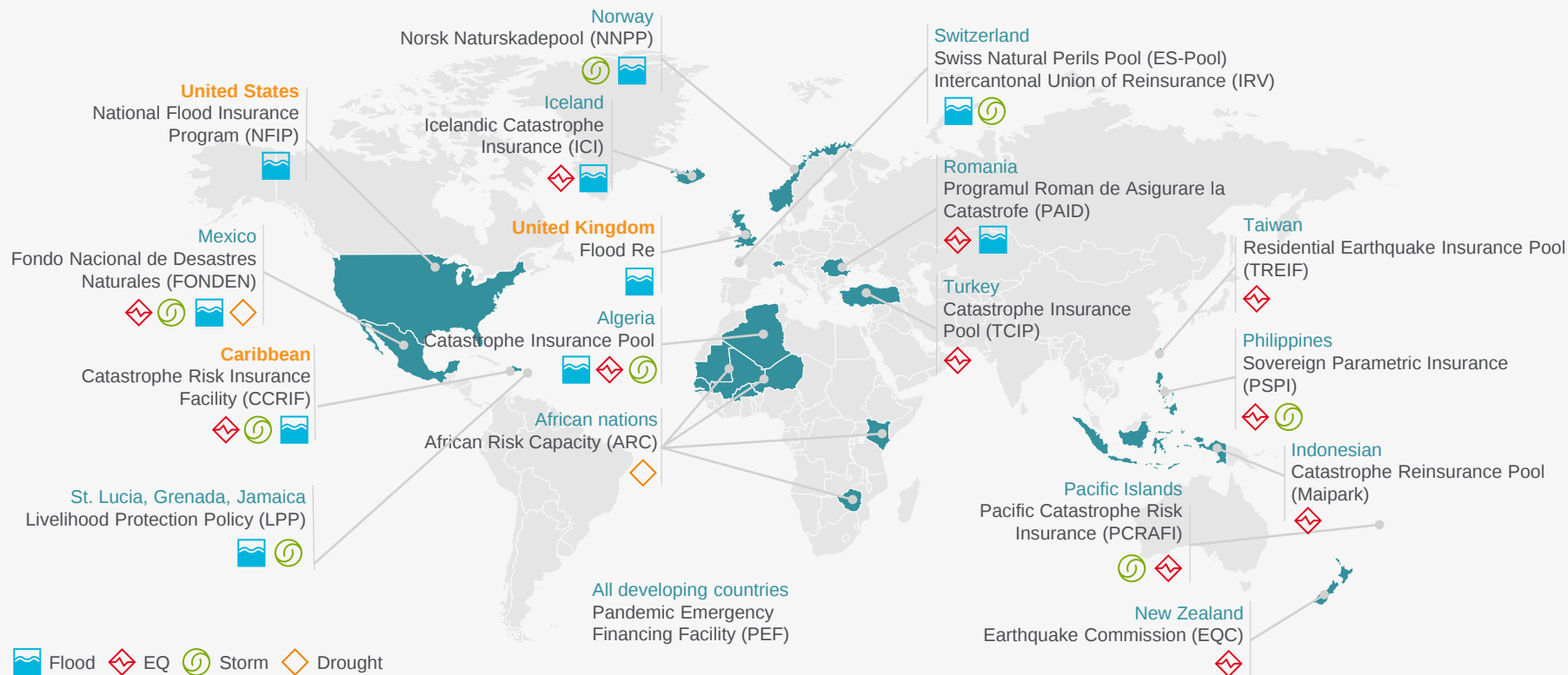
Exposure data



Risk curve



Risk transfer: Examples of sovereign and public-private NatCat risk transfer schemes





¡Muchísimas gracias!

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