Climate Risk Insurance – Data and Modelling
Climate Disasters: a threat to economies

- IDF is an unprecedented public-private partnership bringing together the insurance industry, the World Bank, the UN, civil society and multiple other actors

- IDF’s goals are aligned to InsuResilience Vision 2025, to provide climate risk insurance for 500 million more vulnerable people by 2025

- IDF is supporting the growth and development of insurance-related financial mechanisms and associated risk management capabilities to help achieve the objectives of:
  - The Sustainable Development Goals (SDGs)
  - Related UN Agreements of 2015-2016:
    - Sendai (Disaster Risk)
    - Addis Ababa (Finance for Development),
    - Paris (Climate)
    - Istanbul (Humanitarian System)
Climate Risk Insurance and Data

- **Parametric**
  - Agrees to make a payment upon the occurrence of a pre-defined triggering event, e.g. flood, windstorm of specific strength
  - Enables rapid payments as no loss adjusters are required after the event to assess the actual damage/loss
  - Basis risk means that events can occur which produce significant losses but no payout or vice versa

- **Indemnity**
  - Compensation for the actual losses or damages sustained
  - Requires independent assessment of the loss/damage after the event
  - Complex claims assessment process based on loss adjuster assessment
  - Closer connection between policy pay out and the actual damage/loss incurred
Data Requirements – Parametric Schemes

- Trigger for payout is when a pre-specified index or parameter is exceeded

- The event could be an earthquake, tropical cyclone, or flood where the parameter or index is the magnitude, wind speed or amount of precipitation

- Pre-agreed pay-out if the parameter or index threshold is reached or exceeded, regardless of actual physical loss sustained
  - e.g., USD 10 million if a magnitude 7.0 earthquake occurs in a defined geographical area, or USD 30 million if a category 5 tropical cyclone occurs in a defined area, or USD 50,000 for every millimetre of cumulative rainfall above a certain threshold

- The parameter or index is an objective measure that is correlated to a defined risk e.g. rainfall or drought and crop growth

- Any parameter or index that is used as the basis for a parametric solution must be objective (ie. independently verifiable), transparent, and consistent

- Need to have real-time data, close to where the risk is to reduce basis risk
Hazard Data Availability
Risk Pricing and Risk Modelling

- Risk pricing requires an estimate of average expected losses which may be paid out, and probability of large losses (extreme events) which may bankrupt the scheme for capital management.

- Catastrophe risk models give a probabilistic estimate of potential losses to a given set of exposures for a specific type of peril in a defined area, e.g., earthquakes or cyclones hitting the Philippines or a specific province within the Philippines.

- Models are a way of robustly extrapolating from limited data using statistical techniques to simulate all possible events affecting any given area, and their probability of occurring.
Data Requirements for Risk Modelling

- **Hazard**
  - The probability and severity of events, e.g. flooding, cyclone, sea-level rise, drought etc.
  - Use historical data to estimate the probability of events in specific areas
  - Use output of climate modelling for future projections

- **Geo-physical data**
  - Elevation, topography, soil type, land-use& land-cover, drainage, flood-defences etc. can all influence the hazard experienced at any location

- **Exposure**
  - The people, assets, buildings, infrastructure etc. that are affected
  - Where are they, what are their characteristics and value
  - Can be crops, people, livelihoods as well as physical structures and the costs to repair or rebuild them

- **Vulnerability**
  - The impact, damage, loss caused by the event to the exposure of interest
  - What damage and loss will be caused by different events of different severities
  - Usually expressed as a % of the total value
Key Challenges

- Data availability – quantity, length of historical record, density of observation networks, quality, availability of geo-physical data, especially at the local level

- Data access and openness, concerns about profiteering and sensitivity of data

- Multiple repetitive and redundant efforts are going in to producing static risk analysis reports - the models themselves are not being made available to others
Benefits of Open Data and Modelling

- Understanding risk is critical for the management of extreme events and natural disasters
  - Quantifying the benefit of investment in adaptation
  - Determining *ex ante* disaster risk financing mechanisms and priorities
  - Delivering metrics for risk transfer that can be understood on all sides

- RMSG promotes open-source risk data and modelling to:
  - Democratise risk insight by governments, public-sector decision makers, private market
  - Increase the transparency of the data, assumptions, models for all stakeholders and understanding of uncertainty
  - Share data and models, reduce redundant and repetitive work, increase efficiency and reduce costs for all
  - Collaboration and partnership brings local knowledge into the system and redresses the balance of risk understanding
Oasis Open Source Loss Modelling Platform

- A not-for-profit organisation
  - Created in 2012
  - Funded by insurance industry + public sector
- Plug and play hazard, vulnerability, exposure
- Calculate probabilistic risk and loss metrics for risk pricing and capital management
  - EP curves, Average Annual Loss, uncertainty
- Curate open standards and interoperability
- Free to use by anyone
- Downloadable from https://github.com/OasisLmf
Oasis Climate and Catastrophe Risk Platform for Asia

- 3-year project funded by German Government started in June 2018
- Co-Development of robust, open and transparent risk models in Bangladesh and the Philippines
- Public-private partnership – bring together business, academia, national agencies to solve the problem
- Embed local knowledge into the system
- Improve in-country understanding of risk and conversation with international markets and finance
- Create end-user ownership and long-term sustainability in-country to understand and manage risk on an ongoing basis
Economics of Climate Change Adaptation

San Salvador Case Study Released November 2019

1. By 2040, economic development and climate change could more than double annual expected damage to 7.4 million USD.

2. More than 27 million USD of potential losses from flooding could be prevented by implementing the two most cost-effective physical adaptation measures in residential housing.

3. If implemented, insurance premiums can be reduced by 35%.