Sea level rise, storm surge & reinsurance

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What is reinsurance?

- Reinsurance is insurance for insurance companies.
- Reinsurers pool risks on gigantic scales (global reach, individuals to governments, property and casualty, life and health, etc.)
- This results in better diversification and thus capital efficiency
- Swiss Re is one of the largest global reinsurers
How does sea level rise impact the reinsurance industry?

• Flood is the most common and expensive natural hazard in the United States

• Economic losses due to flood are on the rise.
  – Increasing property values
  – Concentration of risks in coastal areas
  – Changing hazards (climate change, sea level rise)

• Modeling and assessing storm surge risk are part of Swiss Re’s core business.

  How does sea level rise translate to large damages in regions with high concentrations of values?
Brief history of US flood protection & insurance

• 1927: Great Mississippi Flood
  – Most destructive river flood in US history
  – Federal government built a complex system of levees and floodways

• 1965: Hurricane Betsy
  – Storm surge event
  – Kick-started FEMA’s NFIP. Private insurers left the flood market.

• After Betsy
  – FEMA developed flood risk maps for 98% of the US population
  – Most residential and small commercial flood policies in the US have been written by the NFIP
  – NFIP worked well for moderate floods, but heavily in debt following large losses from Katrina, Ike, Sandy and Harvey
Today: US flood insurance market

- Before ~2010, private insurers were reluctant to write residential flood policies.
  - Flood risk is very hard to understand. Highly localized peril.
  - FEMA flood risk maps have low granularity (i.e. 100 / 500 year zones, or outside)
  - Floods occur frequently outside of designated flood zones

- Current state of the market:
  - Market is dominated by NFIP policies, but there’s a huge protection gap.
  - 88% of US homeowners do not have a flood insurance policy.
  - About half of single-family homes in high risk zones have NFIP policies
  - 2% insurance penetration in moderate / low-risk zones

- Now: Protection gap in the US is seen as a protection opportunity for private insurers. Why?
Private flood insurance: Why now?

1. Public appetite
   - Recent floods, particularly outside designated FEMA flood zones
   - Consumers are losing confidence in the NFIP (low limits, limited definition of flood, premiums are expensive for low-risk properties)

2. Regulatory encouragement
   - NFIP is heavily in debt; government seems to be losing its appetite for insurance

3. Opportunity for private insurers
   - Residential flood coverage is an opportunity; new markets to grow rather than trying to compete on already insured business
   - Better tools to understand coastal/inland flood risk
Improvements in flood risk modeling

What has changed?

1. Better understanding of physics behind flooding
2. Availability of high-resolution data
3. More powerful computing resources

Latest coastal/inland flood risk models:

- Delineate flood risk at a much higher spatial resolution than FEMA maps
- Account for more than just river flooding and storm surge
- Provide more than just flood zones
Modeling flood risk
Challenges and opportunities

• Policy terms and conditions
  – Can we develop insurance products that provide more comprehensive coverage?

• Mismatch in time scales
  – Sea level rise signals are remarkably clear over 50 or 100 year time scales
  – Lifetime of a reinsurance policy: 1-2 years
  – How can we apply signals in a meaningful way?

• Sea level rise changes the risk landscape of coastal flooding & storm surge.
  – Hard to quantify due to (1) uncertainty in sea level projections and (2) limitations in producing very high resolution projections necessary for risk assessment

• Coastal property values
Key takeaways

• Private re/insurers see residential and small commercial flood as an opportunity to close the US insurance protection gap
  – Affords to ability to rebuild following extreme events

• In many cases, flood insurance can be provided for significantly less and at better terms than an NFIP policy

• Climate change will only exacerbate coastal flood risk, and flood risk assessment tools will only improve.
  – Collaboration and communication are key.
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