AN ANALYSIS OF THE CALIFORNIA EARTHQUAKE INSURANCE MARKET SINCE ITS EARLY STAGES

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An analysis of the California earthquake insurance market since its early stages

**Overview**

- A large share of uninsured loss caused by natural catastrophes

Focus on the USA:

- Share of insured people against earthquake risk
  - California (2018): 13% (California Department of Insurance)
  - Rest of the USA (2016): ≈ 6% (Statistica)

*Holzheu and Turner (2018)*
Analysis of the California earthquake insurance scheme at homeowner level

Data

- Earthquake insurance market data (1915 – 2017)
  - Average premium amount (1915 – 2017)
  - Total premium amount collected (1915 – 2017)
  - Share of homeowners insured (1915 – 2017)

- Socio-economic data (1915 – 2017)
  - Consumer Price Index
  - Average building price
  - Population density

- Past earthquakes (1966 - 2016)
  - ShakeMaps footprints in intensity (MMI)

Modeling framework

- Homeowners subscribe earthquake insurance according to their awareness of earthquake risk and the premium amount (Expected Utility theory)

- The earthquake risk awareness is calculated as the ratio between the believed and the historical probability for a homeowner to experience a MMI ≥ VIII
To get most of California homeowners buying an earthquake insurance cover, there is two possibilities:

- The threat of an imminent large earthquake (M6.7+). $AWR_N=425\%$ corresponds to a occurrence probability of 66% over the next year
- A premium decrease by 66% (i.e. from $980$ to $310$)

Need for a new earthquake insurance scheme to develop this market
An analysis of the California earthquake insurance market since its early stages

Analysis of the California earthquake insurance scheme at market level

- Data (1906 – 2018)
  - Earthquake insurance market data
  - Literature review
    - Earthquake prevention measures
    - Earthquake risk modeling
    - Political decision and official communication
    - Historical earthquakes and their socio-economic consequences
  - Benchmark with other earthquake insurance schemes
    - France (CAT-NAT plan)
    - India
    - Indonesia

Modeling framework

- Development of a maturity scale
  - Several indicators
  - Each indicator has several modalities

Pothon et al. (2019)
An analysis of the California earthquake insurance market since its early stages

Analysis of the California earthquake insurance scheme at market level

→ Findings

→ Details of each modality for each indicator of the maturity scale

<table>
<thead>
<tr>
<th>Variable</th>
<th>Emerging</th>
<th>Standard</th>
<th>Advanced</th>
<th>Sustainable</th>
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</thead>
<tbody>
<tr>
<td>Risk monitoring</td>
<td>Not material: A destructive earthquake is not expected to occur again</td>
<td>Experienced: Recent events showed the destructive power of an earthquake</td>
<td>Controlled: The risk is monitored and extreme events are modeled</td>
<td>Anticipated: The risk is monitored both at short term and long term view.</td>
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<td>Premium affordability</td>
<td>Very low: The risk being ignored, the premium is low and considered as a profit</td>
<td>Commercial-based: The premium amount reflects the market and does not take into account the risk level</td>
<td>Risk-based: The premium is calculated based on the risk in order to guarantee the solvency of the insurance company</td>
<td>Economic-based: The premium depends on both the risk and the consumers’ expectations</td>
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<td>Market demand</td>
<td>Low: People do not feel the need to be protected against the risk</td>
<td>High: Following the last earthquakes, insurance need is spreading over the population</td>
<td>Low: High premiums lead to a trade-off between the risk and the cost. Only few people prefer to be insured, especially if no earthquake has occurred recently</td>
<td>High: Most of people purchase an earthquake insurance encouraged by a significant premium amount decrease and a better risk awareness</td>
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<td>Prevention measures</td>
<td>Emerging: Only academic researches work on prevention measures. Applications are very few and on a very simple basis.</td>
<td>Institutional: Prevention measures are managed by the authorities and considered as a public mission</td>
<td>Risk holders: Prevention measures are supported both by the officials and the insurance companies</td>
<td>Economical: Prevention is funded by the market and is recognized as the only long-term efficient risk reduction process</td>
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<td>Solvency level of insurance companies</td>
<td>Low: The solvency of insurance companies is questionable because the earthquake risk is not monitored</td>
<td>Medium: Insurance companies are subject to solvency regulations.</td>
<td>High: Insurance companies’ reserves are designed to face a very extreme loss</td>
<td>Secured: Additional mechanisms are used to support insurance companies if their reserves are exceeded.</td>
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Current earthquake insurance scheme in California lies between the grades « Advanced » and « Sustainable ».

To improve the earthquake insurance scheme the effort must focus on:
- A « Secured » Solvency (e.g. a State guarantee)
- A « Long-term based » premium (e.g. calculated over a long time period)
- A « High » demand (e.g. consecutive to a lower premium amount)

A long-term based insurance policy has been designed as part of my PhD. The resulting premium amount is decreased up to 66%.
References

  

  
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  www.nat-hazards-earth-syst-sci.net/19/1909/2019/