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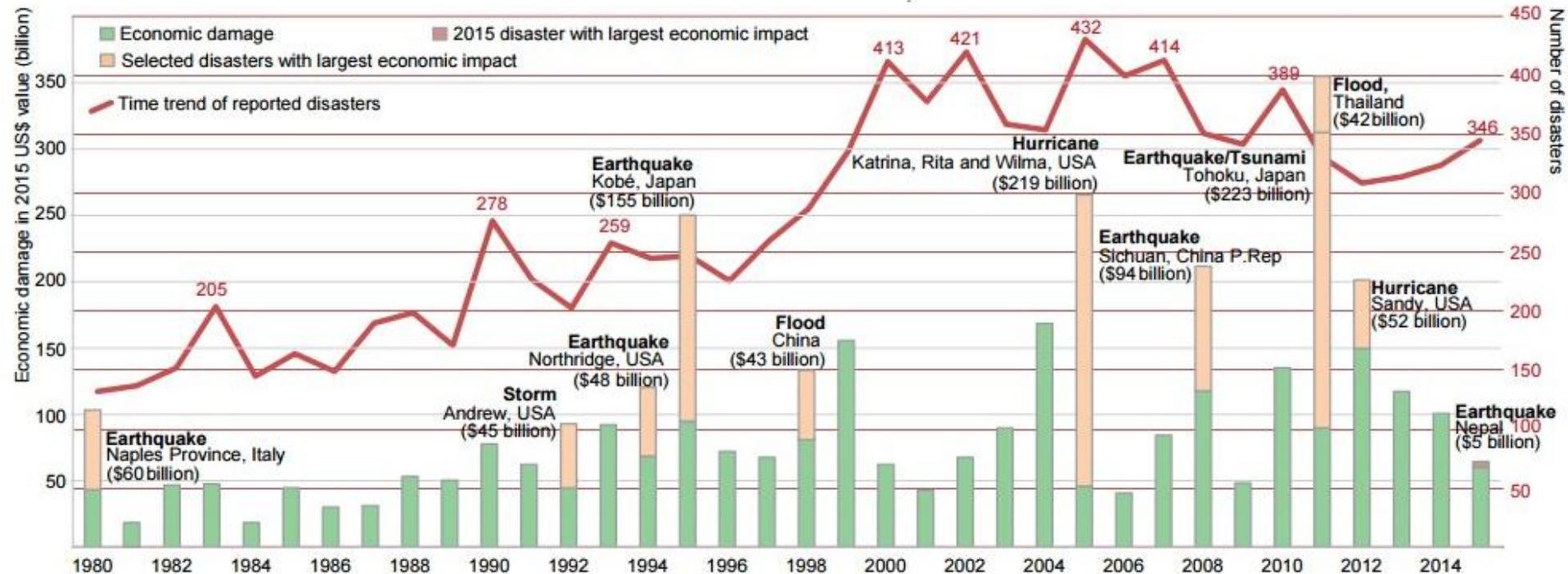
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International Research Collaboration to Identify Best Practices in Managing Catastrophic Risks

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Motivation: Worldwide, catastrophic events are increasing in frequency and severity

Annual reported economic damages and time trend from disasters: 1980-2015



Source: UN Office for Disaster Risk Reduction

Goals

- Catastrophic exposures require a distinct risk management approach
- It is necessary to consider interests of many stakeholders when addressing **preparedness** and **recovery**
- Today: consider the role of the insurance regulator

Loss Prevention, Mitigation, Risk Transfer

- Consumer awareness
 - Assessment of risk
 - Value of mitigating
 - Adequate insurance coverage
- Insurer's tools and techniques
 - Effective underwriting
 - Aggregation of exposures
 - Adequate capital
 - Reinsurance, Catastrophe bonds
- Regulation
 - Capitalization of insurers
 - Building Codes, enforcement



Preparedness

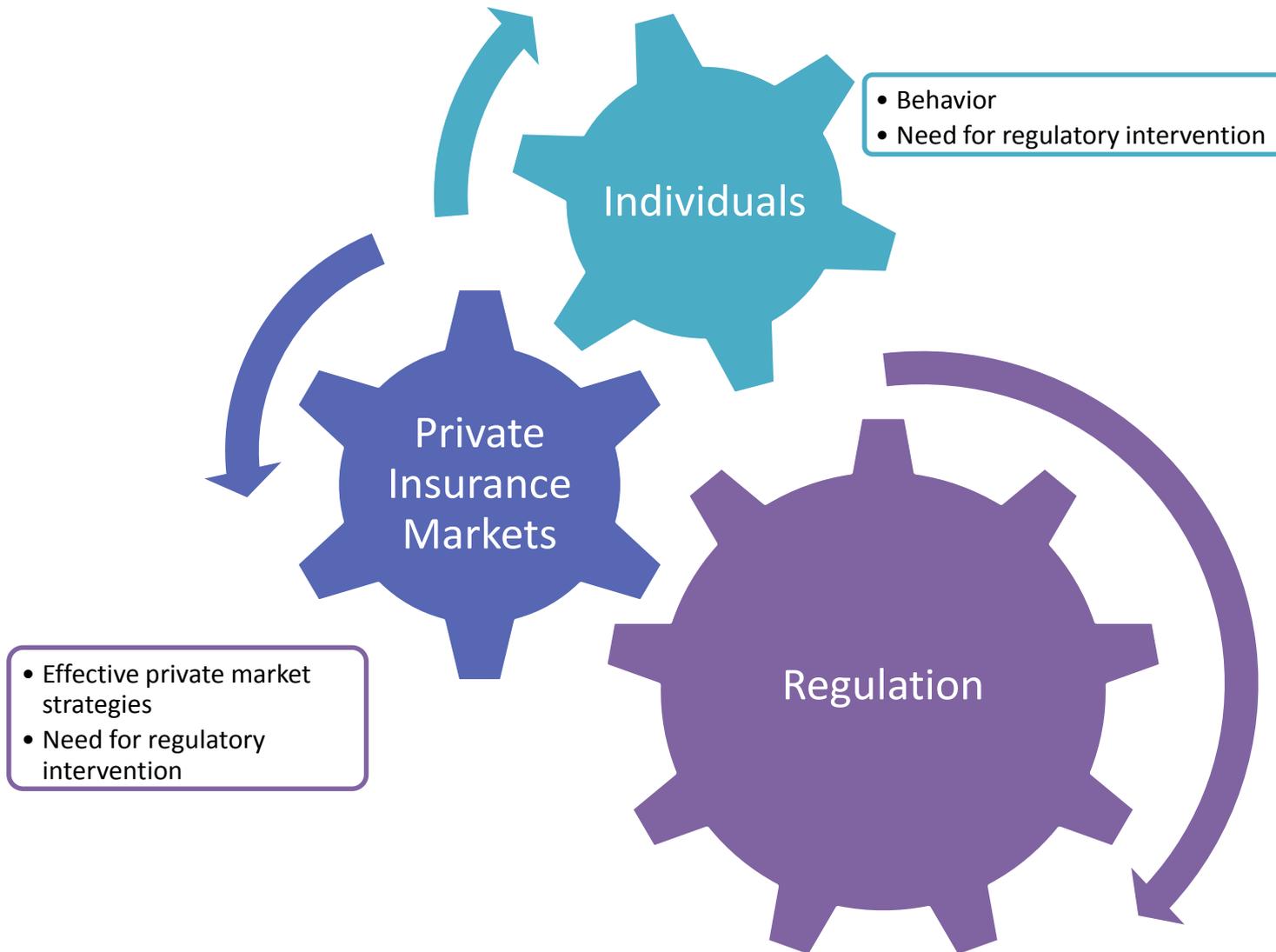
Post-Disaster Recovery

- Insurance claims processing, adjusters
- Demand surge
- Charitable donations
- Public health capabilities
- Government response
- Homeowners insurers affected more than commercial insurers
 - Regulatory constraints on rates and forms



Recovery

Research Questions

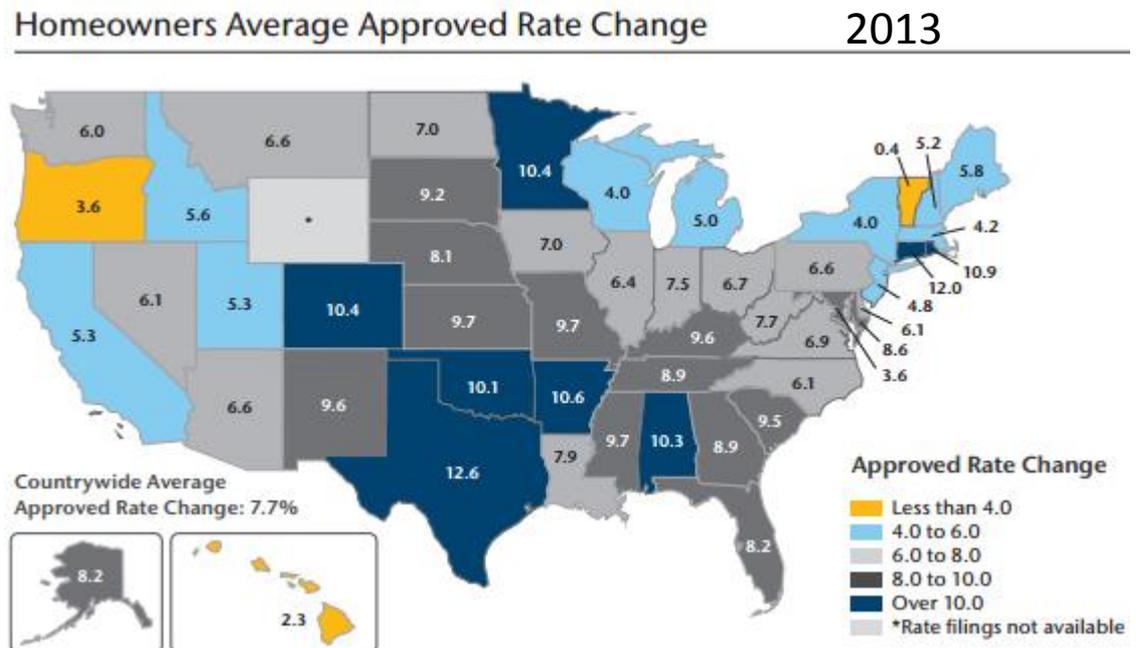


Research on the Role of Regulation

- Types of direct regulation: rates, forms, solvency
- Performance of Residual Markets
- Evaluation of programs
 - Building codes
 - Implementation
 - enforcement
 - Mitigation incentives
 - E.g., Residential Construction Mitigation Program (Florida), Hazard Mitigation Grant Program (FEMA).
 - Subsidized rates for insurance

Research on the Role of Regulation

- Best practices for regulators - ensure market stability
 - Coverage is available, rates are adequate, insurers are solvent, market disruptions are minimal
 - Safety net: residual markets used as necessary
 - Affordability?



Sample of Catastrophic Events and Their Impact on the State Homeowners Insurance Market

State	Year	Property Damage Per Capita	State Loss Ratio	Median Loss Ratio	90 th Percentile Loss Ratio
Alabama	2011	881.78	1.811	1.389	3.305
California	1994	934.48	0.746	0.625	1.671
Colorado	1990	255.58	1.921	1.383	2.503
Florida	1992	59.38	3.127	1.956	4.982
Florida	2004	1291.25	2.861	2.472	4.908
Iowa	2001	32.47	1.603	1.456	3.005
Kansas	1992	69.35	2.561	2.181	3.983
Louisiana	2005	12806.97	4.421	3.156	5.667
Minnesota	1998	226.50	2.888	2.370	3.849
Missouri	2001	236.48	1.801	1.394	2.711
Mississippi	2005	9500.72	4.292	3.213	4.908
North Dakota	2001	622.78	2.931	2.111	4.154
Oklahoma	1999	438.62	1.834	1.001	1.926
South Carolina	1989	1748.55	4.251	3.033	5.306
Tennessee	2011	312.84	2.134	1.750	3.341

Do all Catastrophes lead to a Crisis?

- From, Born & Klein, “Catastrophe Risk and the Regulation of Property Insurance Markets,” *Journal of Insurance Regulation*, 2016.
 - Analysis of insurer responses which defines an “economically” catastrophic year as one in which half of the homeowners insurers operating in the state report an underwriting loss ratio of 1.25 or greater.
 - Under this definition, there are 51 state-year observations involving an economically catastrophic event over the time period 1984-2013.
- First identify disrupted and/or unstable state markets.
 - Outcomes of this instability include reduced availability of coverage, search costs of consumers who need to find new coverage and the inability for insurers to obtain adequate reinsurance for subsequent years.

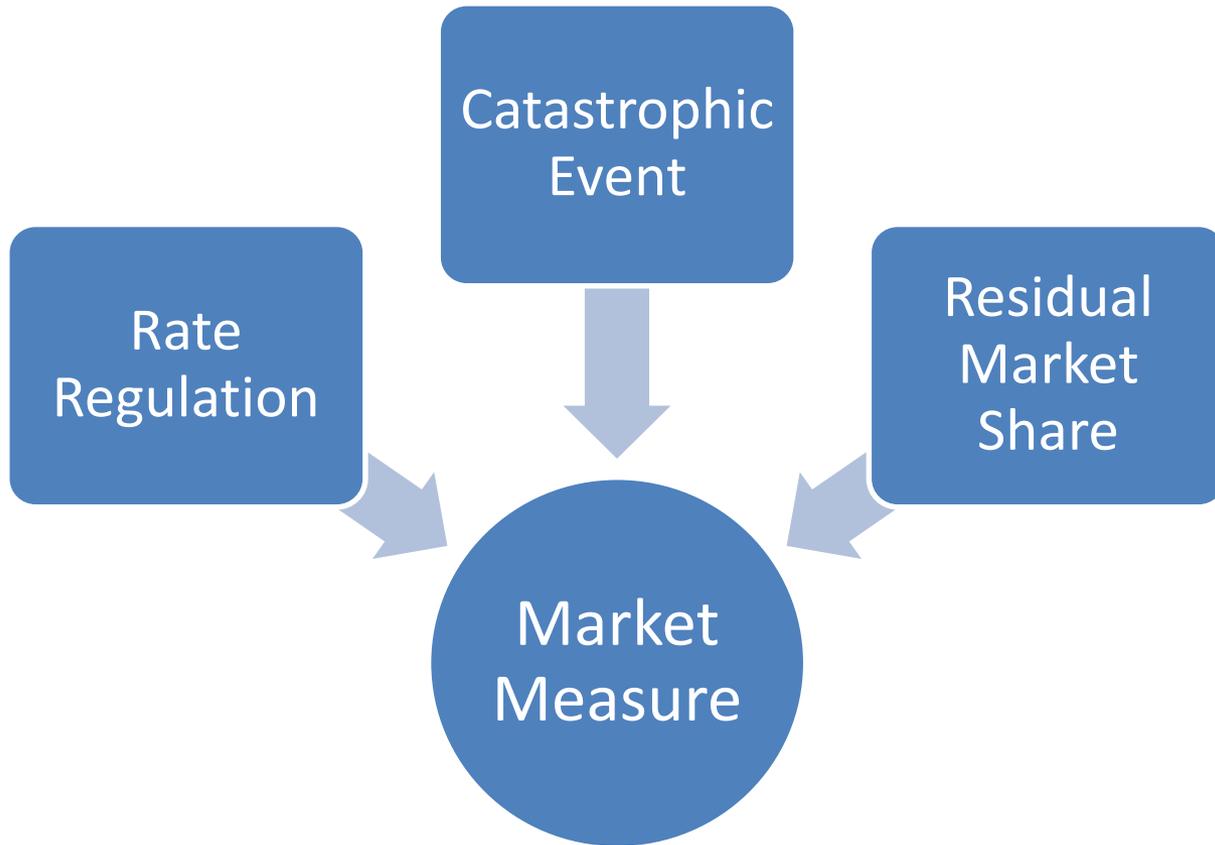
Identifying Best Practices: Regulation

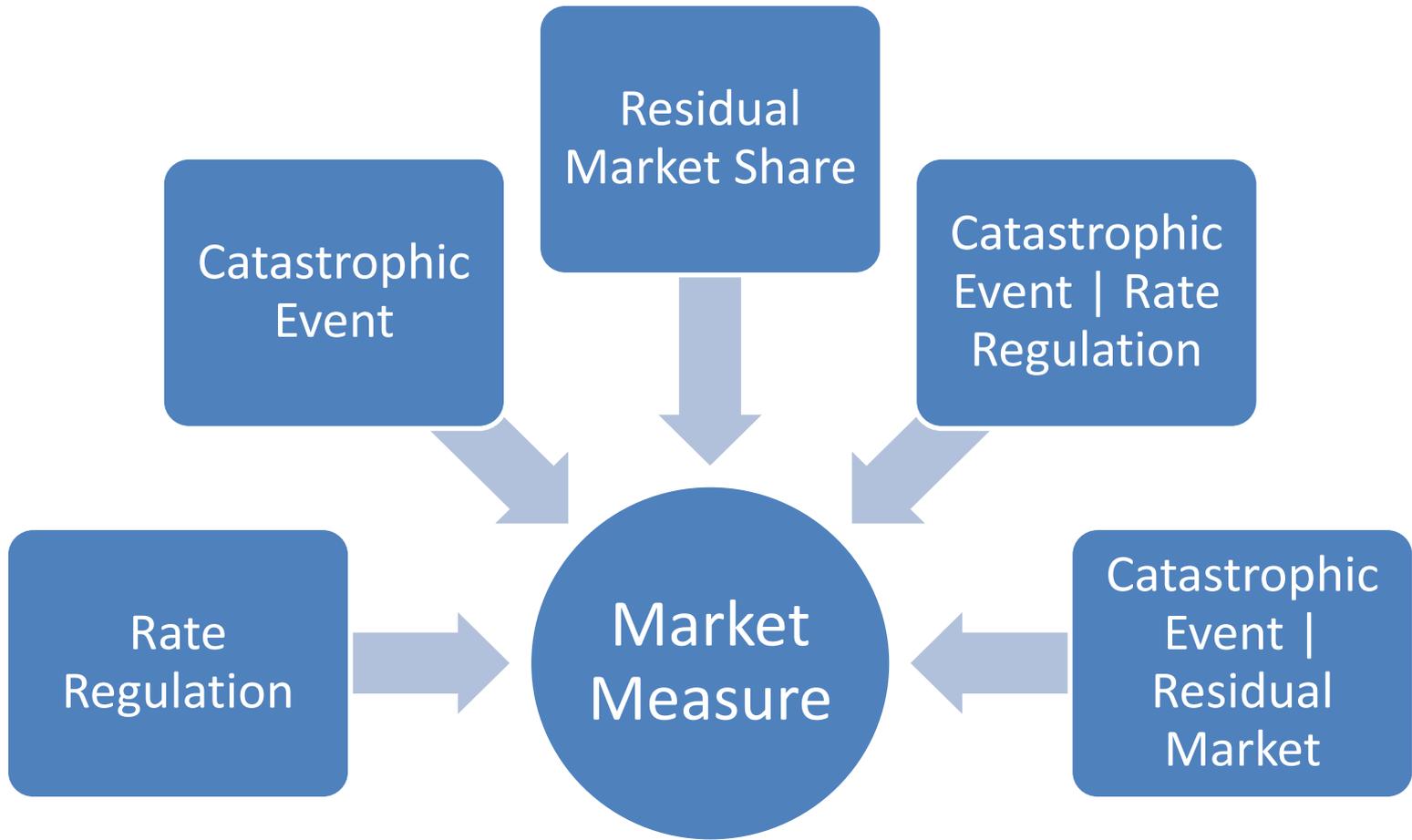
- An evaluation of regulatory practices should generally focus on how such practices affect the market as a whole, not specific insurers.
- Focus on two regulatory practices:
 - Rate regulation
 - Residual markets
- Assessed in relation to five *interrelated* market measures:
 - the number of private insurers operating in a market
 - the structural competitiveness of the market
 - the amount of capital supporting the insurance written in the market
 - the amount of reinsurance that insurers purchase to diversify their underwriting risk
 - the median loss ratio of insurers operating in the market (a measure of underwriting profitability)

Analytical Approach and Sample

- NAIC P/C Annual Statement data, All US Property Insurers, 1984-2013.
- Focus on results for Homeowners Insurers (not Commercial)
- Key measures evaluated include changes over a two year period* (described further on the following slides)
- The analysis considers three primary factors that affect these market measures:
 - Catastrophic event (dummy variable)
 - Strict (prior approval) rate regulation (dummy variable)
 - Share of premiums in the state residual market (FAIR and Beach plans)
- State population and housing starts per capita used to control for other macroeconomic effects.

* This two-year period is long enough to allow affected insurers time to evaluate their operations, but also short enough to avoid the need to control for subsequent catastrophic events or changes in regulations.





Market Size

- Assessed using: The number of firms operating in the state
- Expectations:
 - Number of insurers would decrease following a catastrophe.
- Findings:
 - Number of insurers is not significantly related to catastrophic events.
 - Strict rate regulation is associated with reduction in the number of homeowners insurers.
 - The size of the residual market is negatively related to the number of homeowners insurers.

Competition

- Assessed using: The Herfindahl-Hirschman index of competition
- Expectation:
 - Effect of a catastrophe is unclear, depends on which insurers respond.
- Findings:
 - Restrictive rate regime associated with increase in market concentration.
 - Size of the residual market is positively related to the concentration of the homeowners market, in general.
 - But, this relationship is negative following a catastrophe.

Capacity – Surplus (Capital)

- Assessed using: Total Surplus of insurers operating in the state (assumes insurers operate internal capital markets)
- Expectation:
 - Capital is reduced following a catastrophic event, but only in the short term.
- Findings:
 - Catastrophic events, in general, are not associated with changes in surplus.
 - States with restrictive rate regimes exhibit a reduction in capital over time.
 - States with a large residual market also exhibit a reduction in capital over time.

Capacity - Reinsurance

- Assessed using: the ratio of reinsurance ceded divided by the sum of reinsurance assumed and direct premiums written
- Expectation:
 - Effect of a catastrophe is unclear. Depends on how insurers respond.
- Findings:
 - Reinsurance ratio is higher in states with restrictive rate regulation.
 - A higher residual market share is associated with a lower reinsurance ratio.
 - The reinsurance ratio is unrelated to catastrophic events.

Underwriting Performance

- Assessed using: The median state loss ratio.
- Expectation:
 - If insurers raise rates following catastrophes, loss ratios should be negatively related to catastrophic events in the long term.
- Findings:
 - There is not significant relationship between insurer loss ratios and restrictive rate regulation.
 - The residual market share is positively related to homeowners insurers' loss ratios.
 - This effect is even larger after a catastrophic event.

Conclusions

- Results should be evaluated in concert.
- Caveats: other regulatory activities, such as cancellation bans, are not evaluated.
- Generally, we find that restrictive rate regulation is associated with poorer outcomes, i.e.
 - A decrease in the number of insurers
 - An increase in market concentration
 - A reduction in capacity (surplus and reinsurance)
- Residual markets are associate with poorer outcomes as well.
- Caveats:
 - Rate regulation regime may be poorly defined – (we may be omitting other important factors)
 - Residual markets differ in design and administration

International Collaboration

- International comparisons can highlight differences in:
 - Regulatory and legal environments
 - Country size, stage of development
 - Types of perils; frequency and severity
 - Structure of private insurance market



Regulation of Rates and Forms

- Chen et al., (2013) “The Development and Regulation of China’s Insurance Market: History and Perspectives”
 - Rate regulation objective is to set minimums on premium rates in order to prevent insolvencies due to price competition.
- Bouwer et al., (2007) “Adaptive flood management: the role of insurance and compensation in Europe”
 - Regulation regimes create administrative complexities and limit diversification opportunities.

High Risk Pools/Residual Market Mechanisms

- Pfeffer, I., (1974) “Residual Risks in Europe,” *Journal of Risk and Insurance*.
 - Suggests importance of investments in durable assets (homeownership, automobiles)
 - Insurance company density is higher in most of Europe
- Matthew, G. (2015) “After the Chennai Floods: Revisiting the Natural Catastrophe Pool,” *The Indian Express*.
 - Support for an insurance catastrophe pool (INCIP) comes and goes.
 - Difficult decisions: charging of premium, implementing the scheme across the country.

Thank you!

Questions?



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Selected References:

- Born and Viscusi, “The Catastrophic Effects of Natural Disasters on Insurance Markets,” *Journal of Risk and Uncertainty*, 2006.
- Born and Klimaszewski-Blettner, “Should I Stay or Should I Go? The Impact of Natural Disasters and Regulation on U.S. Property Insurers’ Supply Decisions,” *Journal of Risk and Insurance*, 2013.
- Aseervatham, Born, Lohmaier and Richter, “Putting Everything under the Same Umbrella – Hazard-specific Supply Reactions in the Aftermath of Natural Disasters,” *Geneva Papers on Risk and Insurance - Issues and Practice*, forthcoming, 2016.
- Born and Klein, “Catastrophe Risk and the Regulation of Property Insurance Markets,” *Journal of Insurance Regulation*, forthcoming.
- Born and Karl, “Insurer Responses to Catastrophic Events: A Thirty Year Retrospective Study,” Working paper.
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