Measuring the Climate Risk Exposure of Insurers

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OFR/Cleveland Fed Financial Stability Conference

17 November 2023

I really enjoy the paper

- It addresses a very important issue
- New application of technology to measure both physical and transition risks of the insurance sector
- Several contributions
  1. Physical risk factor
  2. Links climate risk betas to insurers' balance sheets
     - Physical risk beta and transition risk beta
     - Climate-RISK (CRISK)
- Paper is relevant and timely

Direct Premiums Earned – DPE

The premiums P&C insurers earn is a fundamental variable in computing the *physical climate factor*

Main idea: premiums are representative of P&C exposure to physical risks

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Theory: Insurers choose premiums to manage risk – see Verani and Yu (forthcoming)

- Premiums and markups are linked to capital structure and net worth
- Insurers with different tolerance for risk have different markups

$$RISK_{i,t} = \sum_{s \in S} \left[\left(\frac{DPE_{i,s,t-1}}{\sum_{s \in S} DPE_{i,s,t-1}} \times PropertyDamage_{s,t-1} \right) \times \frac{1}{ME_{i,t-1}} \right]$$

DPE – Cont'ed

Underwriting cycle:

⇒ Many competitors and low premiums

⇒ A (climate) shock generates a surge in claims

⇒ Less-capitalized insurers driven out of business

⇒ Less competition and higher premiums

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Potential solutions:

- Compare with actual payments when climate event occurs
- Discuss the above issues in the paper

Missing Information

"State Farm is stopping new home insurance sales in California, citing wildfire risks and [...]" Source: CNN, May 28^{th}, 2023

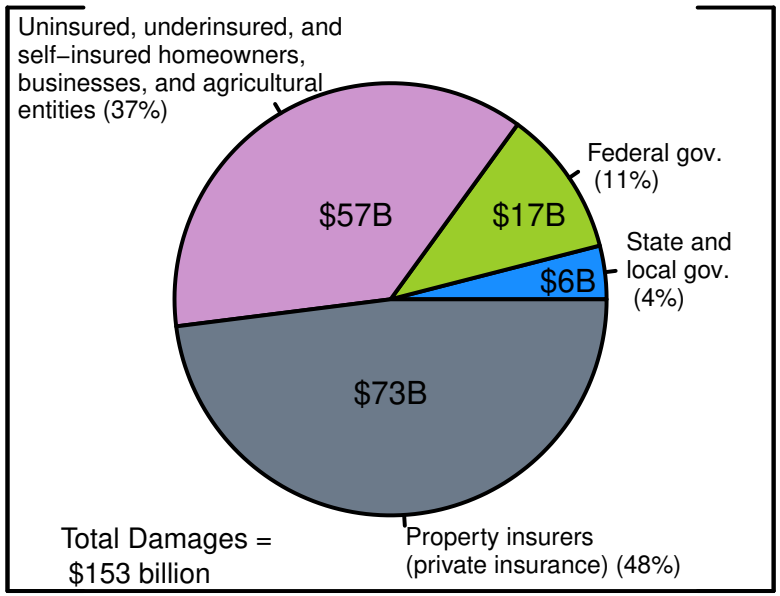


Figure: Coverage of Billion Dollars Climate Damages in 2021 (Brunetti et al, 2023)

Missing Information – cont'ed

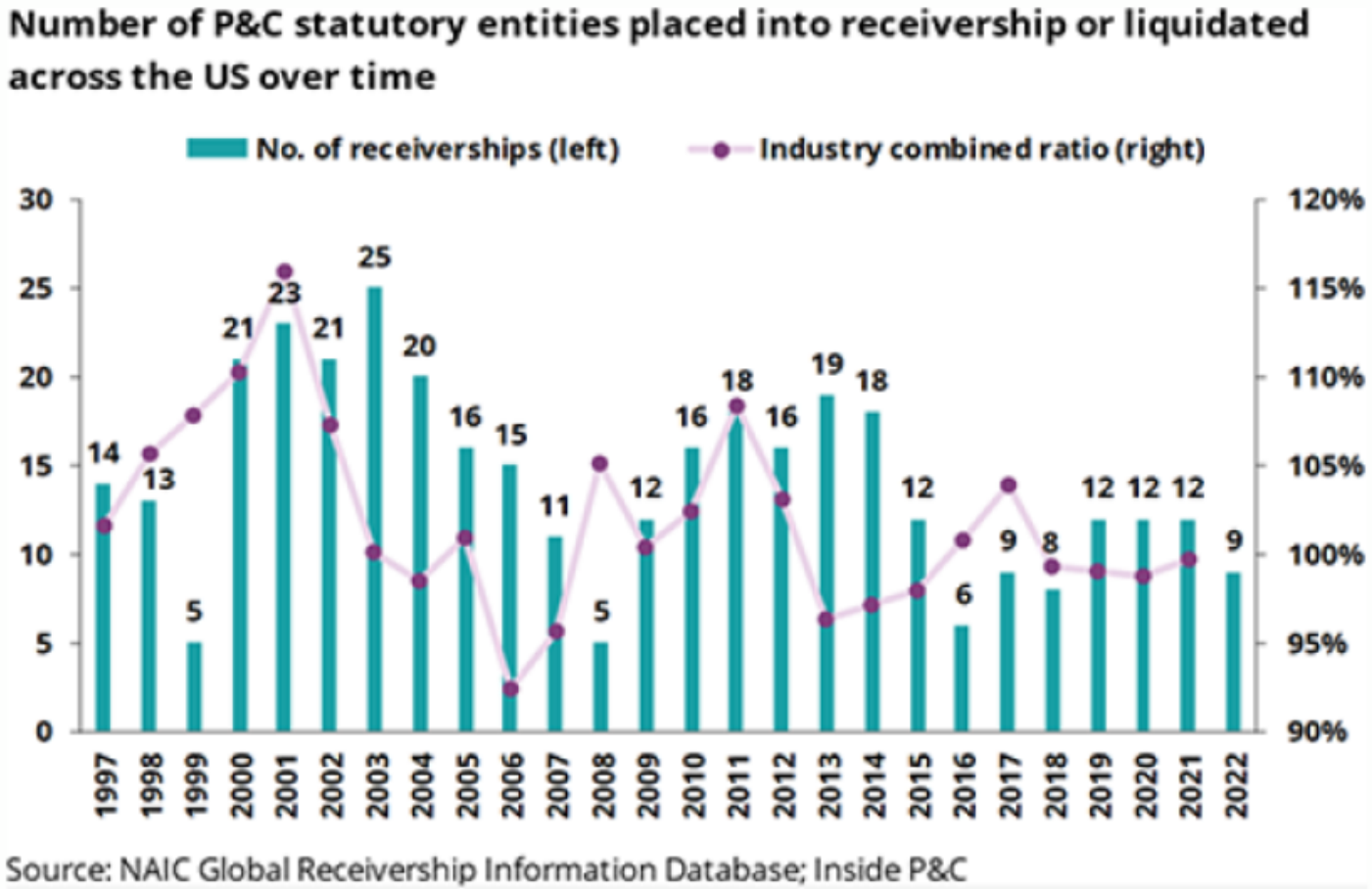


Figure: P&C Failures

Brown Exposure

$$BrownExposure^{P}_{i,t} = \sum_{j \in J} w_{i,j,t} Markdown^{P}_{j}$$

- Most life insurers' corporate bond holdings are HTM
- Ratings more important than $Markdown^{P}_{j}$
  $\Rightarrow$ downgrades may affect capital (fallen angels)
- Adaptation not considered

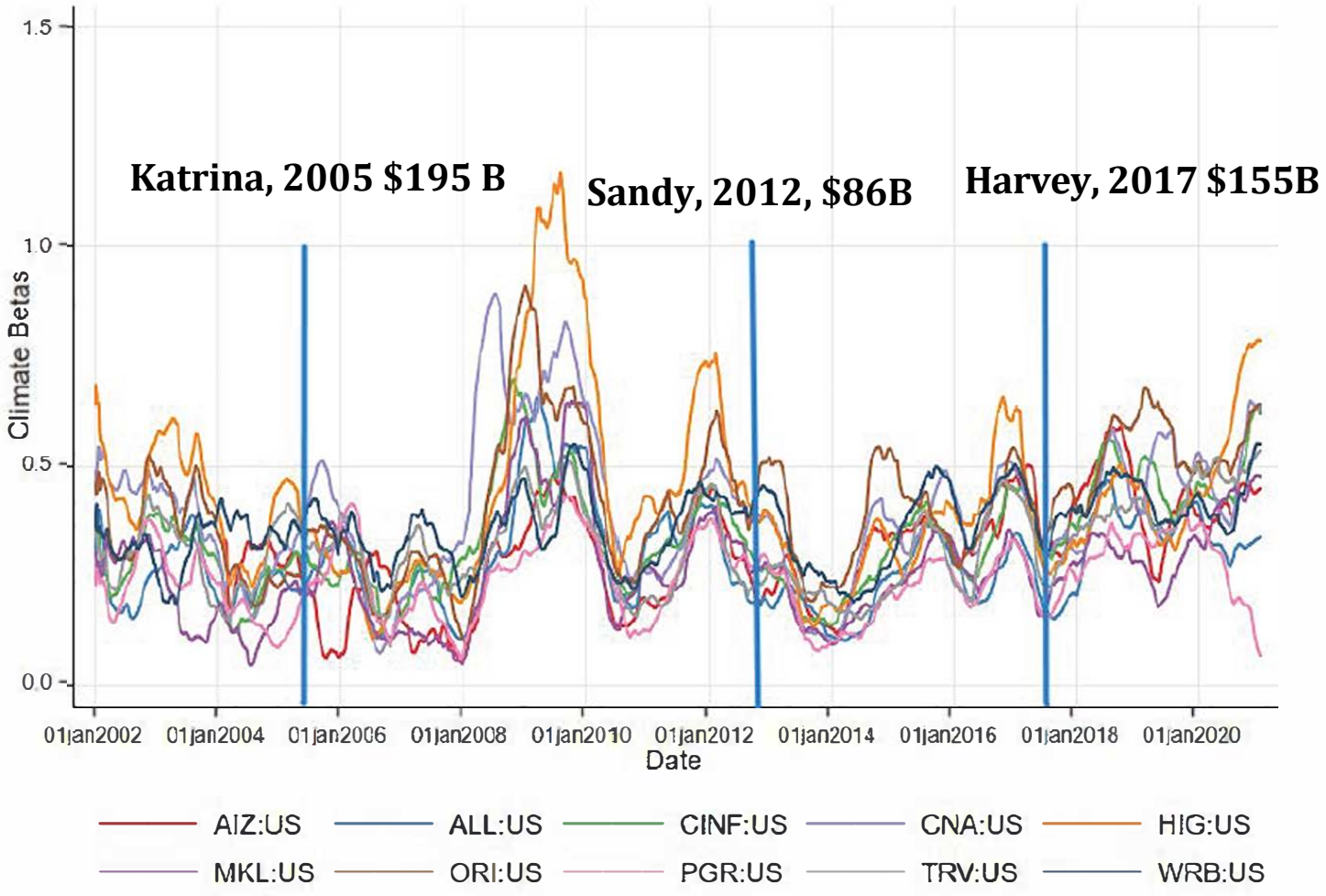
Market-based Approach

$$r_{i,t} = \beta_{i,t}^{Mkt} MKT_t + \beta_{i,t}^{Physical} PCF_t + \epsilon_{i,t}$$
$$r_{i,t} = \beta_{i,t}^{Mkt} MKT_t + \beta_{i,t}^{Transition} TCF_t + \epsilon_{i,t}$$

Insurance companies are very careful in managing interest rate risk - Brunetti, Foley-Fisher and Verani (2023)

Physical risk betas don't react to huge climate events

(a) Physical Climate Beta of P&C Insurers in the U.S.



Physical risk betas correlate with credit spreads

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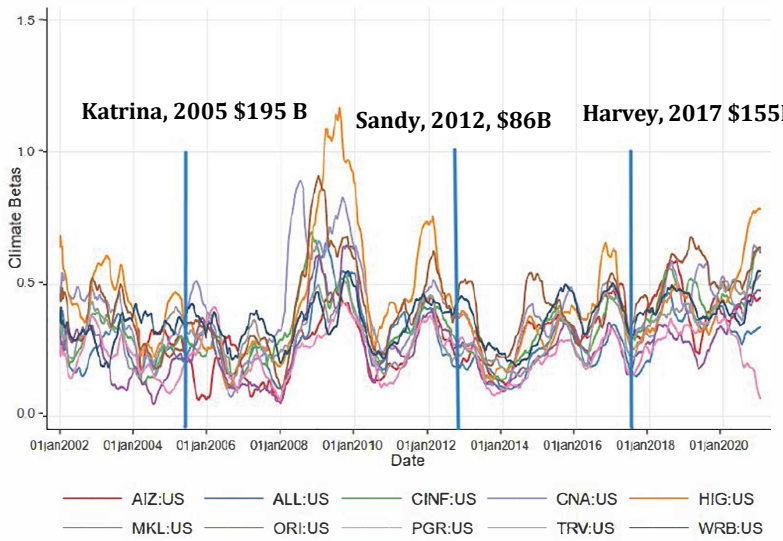
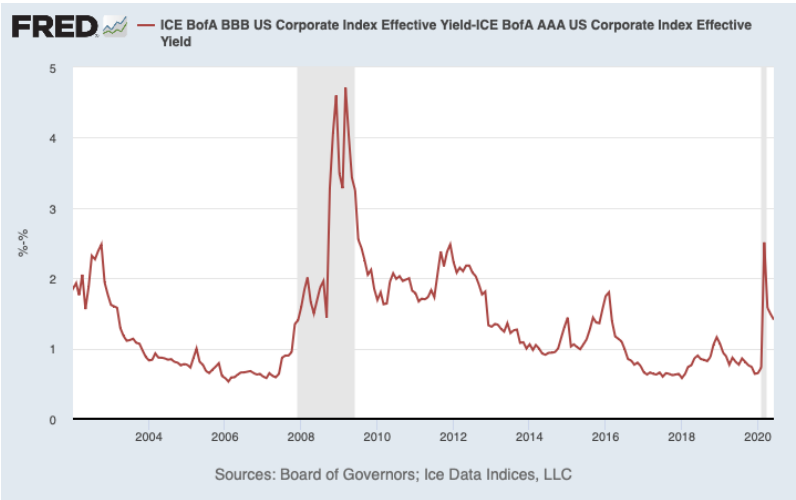
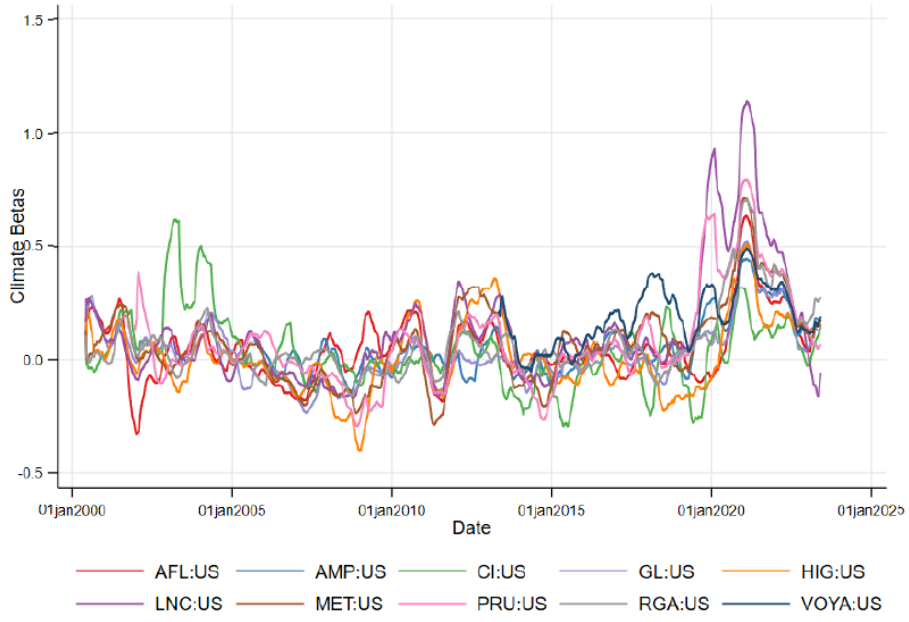


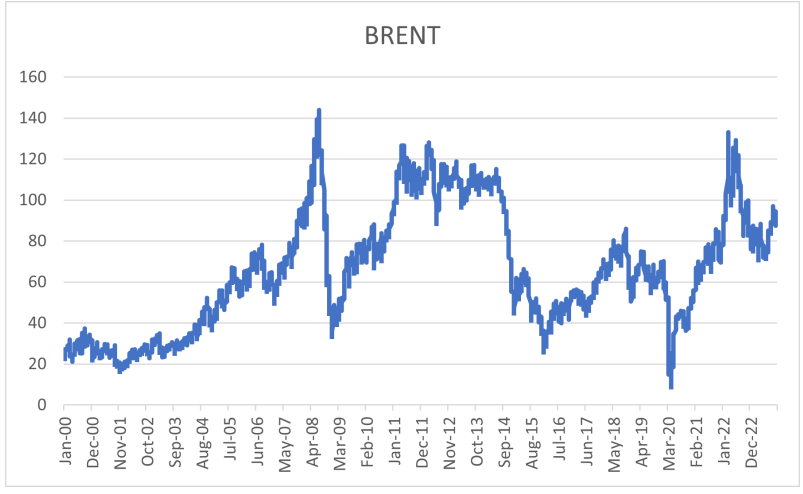


- Two puzzles
  1. No reaction to huge hurricanes
  2. Correlation with BBB-AAA spreads

Transition Risk

(b) Transition Climate Beta of Life Insurers in the U.S.





Potential solutions

- Physical risk: Combine market-based information with
  - News items – e.g., insurers exiting markets, CA statutory disclosure requirements
  - Number of failures
- Transition risk
  - Fallen angels
  - Political environment is important
- Inference: What can we learn from physical betas and transition betas?
  - Standard errors (Brunetti, Foley-Fisher, and Verani, 2023)
  - Comparison across industries

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We need more papers on this topic!