Insurer Capitalization and the Performance of State Guaranty Associations

Lars Powell, Kenny Wunder, and Boyi Zhuang
University of Alabama
Work in progress
Climate Change?
A personal take on science and society

World view

Why 2023’s heat anomaly is worrying scientists

Climate models struggle to explain why planetary temperatures spiked suddenly. More and better data are urgently needed.

When I took over as the director of NASA’s Goddard Institute for Space Studies, I inherited a project that tracks temperature changes since 1880. Using this trove of data, I’ve made climate predictions at the start of every year since 2016. It’s humbling, and a bit worrying, to admit that no year has confounded climate scientists’ predictive capabilities more than 2023 has.

For the past nine months, mean land and sea surface temperatures have overshot previous records each month from stratospheric water vapour, and the ramping up of solar activity in the run-up to a predicted solar maximum. But these factors explain, at most, a few hundredths of a degree in warming (Schoeberl, M. R. et al. Geophys. Res. Lett. 50, e2023GL104634; 2023). Even after taking all plausible explanations into account, the divergence between expected and observed annual mean temperatures in 2023 remains about 0.2°C — roughly the gap between the previous and current annual record.

There is one more factor that could be playing a part. In 2020, new regulations required the shipping industry to use cleaner fuels that reduce sulfur emissions. Sulfur compounds in the atmosphere are reflective and influence several properties of clouds, thereby having an overall cooling effect. Preliminary estimates of the
Large losses that have already happened!
Cat 5
How much can insurance pay in 1st year?
The federal solution
U.S. Insurance Regulatory Divisions
What we do

• Refine and build on the model developed by Cummins et al. (2002) to estimate each insurance company’s exposure to industry-wide losses by state and line of business.

• Simulate loss events of increasing magnitude.

• Assess the capacity of the insurance industry and the efficiency of the state guaranty fund system in response to large scale loss events.

• Show how the guaranty assessments can threaten market competition and the quality of insurance products.

• Propose policy solutions.
Can insurers pay for the “big one”?
Measuring the capacity of the insurance market to respond to catastrophic losses

J. David Cummins *, Neil Doherty ¹, Anita Lo ²

Wharton School, University of Pennsylvania, 3641 Locust Walk, Philadelphia, PA 19104-6218, USA
Guaranty Funds

PROTECTING POLICYHOLDERS
HOW THE PROPERTY AND CASUALTY GUARANTY FUND SYSTEM WORKS

What happens when a policyholder whose insurance company becomes insolvent has an active claim for:
• Workers’ Compensation
• Other Property and Casualty Claims such as Homeowner’s and Auto

AN INSOLVENCY HAPPENS
A state court orders the company liquidated; this triggers the guaranty funds, which pay covered policyholder claims.

POLICYHOLDER CLAIMS
Active claims are transferred to the guaranty funds for review and payment.

STATE GUARANTY FUNDS
Guaranty funds step in to pay covered claims in accordance with state law.

CLAIMS COVERAGE
Claims are paid from a pool of money drawn from the company’s assets, cash on deposit with state regulators and assessments on licensed insurers.

AT THE STATE LEVEL
States determine caps on claims. However, 100% of Workers' Compensation claims are paid in all states.

CONTINUING ON
If a claim is not fully covered by the guaranty fund, policyholders can seek further payment from any remaining assets of the now-closed insurer.

National Conference of Insurance Guaranty Funds (NCIGF)
300 North Meridian St., Suite 1020
Indianapolis, IN 46204
T: 317.464.8199 F: 317.464.8180
WWW.NCIGF.ORG
Guaranty Fund Rules

- Limit ≈ $300k per claim ($100K - $5MM)
- Assessments capped at ≈ 2% of DPW @ t-1 (1% - 3%)
- 1 to 5 accounts
Assessment caps may apply to accounts

- One single account
- Workers compensation
- Auto
- All other
- Homeowners
- Title
- Fire & allied lines
- Domestic mutual companies
Recoupment
Insolvency Assumption

• Groups do not let affiliates fail?

• State Farm Florida
• Allstate Floridian
• Etc

The tribe has spoken.
Company vs group level payout

- Full Payout
- Amount Paid Company Level
- Amount Paid Group Level

Amount Paid First Year (Billions)

Unexpected Loss (Billions)
Estimating insurer exposure

Each dollar of loss is distributed to companies and states based on their exposure in two ways.
Estimating insurer exposure: $\rho_{is}$ & $\sigma^2_{is}$

$$\sum_{i=1}^{N} E(T_i|L) = \sum_{i=1}^{N} \int_{0}^{Z_i} [E(L_i) + Q_i - L_i]f(L_i|L)dL_i$$

$$\sum_{i=1}^{N} E(T_i|L) = E(L) + \sum_{i=1}^{N} Q_i - \sum_{i=1}^{N} E(T_i|L)$$

$$E(T_i|L) = E(L_i) + Q_i - \mu_{L_i|L} \exp \left[ \frac{1}{\sqrt{2\pi}} \cdot \exp \left[ -\frac{1}{2} \left( \frac{E(L_i) + Q_i - \mu_{L_i|L}}{\sigma_{L_i|L}} \right)^2 \right] \right]$$

$$R_i|L = E(L_i) + Q_i - E(T_i|L)$$

$$= [E(L_i) + Q_i]N(-C_i) + \mu_{L_i|L}N(C_i) - \sigma_{L_i|L}f(C_i),$$

$$\mu_{L_i|L} = \mu_i + \frac{\rho_i \sigma_i}{\sigma_L} (L - \mu_L),$$

$$\sigma^2_{L_i|L} = \sigma_i(1 - \rho_i^2),$$

$$\hat{\rho}_{is} = \frac{1}{T-1} \sum_{t=1}^{T} (L_{ist} - \bar{L}_{is})(L_t - \bar{L})$$

$$\hat{\sigma}^2 = \frac{1}{T-1} \sum_{t=1}^{T} (L_t - \bar{L})^2$$

$$L_{ist} = \beta_{0is} + \beta_{1is}t + \varepsilon_{ist}$$

$$L_t = \beta_0 + \beta_1 t + \varepsilon_t$$

$$\text{Pay}_{is|L} = \min \left\{ \frac{\hat{R}_{is|L} \cdot E(L_i) + Q_i}{\sum_s \hat{R}_{is|L}^s} \right\}$$
Premium method

• National and state exposure based on premium share
• Ignores potential underwriting heterogeneity
• Wind pools and FAIR Plans impose market-share exposure for the greatest risks.
How is PWZ(2024) ≠ CDL(2002)?

- Estimates at the firm/state level
- Cannot explicitly control for reinsurance
- Can study guaranty fund performance
Insolvency

Insurers are insolvent when they run out of surplus

Remaining losses are owed by guaranty funds

Guaranty fund assessments are limited by % of premium written and account rules
Guaranty fund payments and assessments

Pay $L_{is}$ $\Rightarrow$ $L_{is}^p$
How much is paid 1st year?
Average time to full payment
Surplus paid out
Potential consequences

- Unpaid losses
- G-fund death spiral
- Federal regulation
Public policy solutions

- Prearranged debt capacity
- Assessment parity with tax on new firms
- Require group support
Thank you

Comments to:

Lars.Powell@ua.edu