Capital Costs, Reinsurance, and the Price of Climate Risk

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The Case for a Federal Reinsurance Cat Fund

- HO insurance costs have been rapidly growing, putting strain on HH budgets (Ge et al, 2026)
- Private insurers increasingly restrict supply to high risk areas
- **Policy response:** create a federal reinsurance backstop
- Precedents for intervention in the private P&C insurance market:
  - Federal level: terrorism backstop (TRIA), flood insurance
  - State level: Florida Hurricane Catastrophe Fund, Earthquake (CEA)

\+ Pros: undiversifiable tails, post-event capacity, cheaper public capital

– Cons: crowd-out, mispricing, cross-state transfers, fiscal risk

- **This paper:** first estimate of the cost-of-capital channel
  - Cut the capital tax on reinsurance and prices fall, premiums fall, entry rises.
- Pass-through implies a public reinsurer's cheaper capital would mostly reach HHs

This paper

Setting: NAIC Model Law 785

- Collateral on foreign reinsurers cut from 100% to a rating-graded schedule
- Staggered 2009–2021; Treatment determined by cedent's domicile state.

Market:

- Reinsurance ceded to foreign↑25%
- Reinsurer concentration↓
- More offerings in high risk places

Counterparty risk:

- Expected impairment loss ↑ \$58K per insurer-yr
- Mix moves toward rated reinsurers
- Risk/\$1 ceded same

Reinsurance prices (3,576 FL rate-filing layers).

- Premium per \$ of expected loss ↓ 2.1 from 6.85 (−31%); 1-in-500 cover +11 pp

Model (Work in progress)

- **Market:** county-quarter, **product**: wind policies; outside good: uninsured (39%)
- **Choice of Households** w/ heterog price sensitivity
  - Choice: pick a wind policy or go w/out wind coverage.
  - Insurers differ in quality that the econometrician cannot see.
  - **Elasticity**: N of rivals, insurers' losses in other states, how substitutable a product as instrument (shift P without shifting quality).
- Demand pins down **markups**
- Once we know markups we get **costs as the residual**
- Recovered log costs projected on adoption of the reform $\rightarrow$ coefficient is the **cost cut** ($\approx 9.6\%$)

Counterfactuals

- **Two experiments on the estimated market**, insurers and Citizens prices held fixed
- **Cost channel**: raise treated insurers' costs by 9.6%, and let everyone reprice.
  - Gain = cheaper policies, treated and rivals
- **Entry channel**: delete products first sold after adoption – incumbents only reprice.
  - Gain = the deleted products plus the competition they brought
- **Welfare** = price changes × post-reform shares, per HH
- All post-adoption products are credited to the reform

	Entry set		
Marginal costs:	No reform	Reform	Entry channel
No reform	**S4**: baseline	**S3**: not reported	
Reform	**S2**	**S1**	**$**37 (S1-S2)
Cost channel	**$58** (S4−S2)		

Contributions

- **Novel data on notorious black box – reinsurance**
  - Layer-level reinsurance prices and modeled losses from Florida rate filings, 3,500 layers over 2004-2025, hand-collected with text parsing.
- Natural experiment: how changes in reinsurance costs affect insurance markets and get passed on consumers
- Tradeoff: higher counterparty-risk vs lower reinsurance costs

Road Map

1. Fragility and Reinsurance
2. Magnitudes
3. DDD: wind vs non-wind
4. Slow-moving treatment

The connection between fragility and reinsurance

- In Florida makrets, there is a proliferation of fragile insurers (Sastri, Sen and Tenekedjieva, 2026)
- The only favorable risk comparison is that fragile insurers buy more reinsurance
- ... though from worse quality reinsurers and from more concentrated partners.

	Fragile (1)	Non-fragile (2)	Difference (1) - (2)
Insolvency rate	19%	0%	
Size and solvency ratio			
Assets ($ million)	312	3915	-3602***
RBC ratio	2173	3790	-1617*
Operational diversification			
No. states selling HO	3.45	27.68	-24.23***
% insurers selling in only 1 state	0.56	0.10	0.46***
% premium from HO	0.70	0.25	0.45***
No. insurers in the group	5.90	18.49	-12.60***
% belonging to a 2 or less insurer group	0.46	0.04	0.42***
Stock company	0.94	0.84	0.10*
Reinsurance			
% premiums reinsured	0.47	0.15	0.32***
% reinsurance partners rated above A	0.33	0.40	-0.07**
Fraction of premiums ceded to largest partner	0.13	0.04	0.09***
Share of FHCF	0.17	0.14	0.04

Suggested Model Expansion: Effect of Reform on Quality

- 3x Reinsurance is not enough to ensure that fragile insurers stay solvent
- P reinsurance $\downarrow \Rightarrow$ insurers to buy more reinsurance, **reducing fragility**
- ... but it may also enable more **fragile insurers to enter** the market place (who enters?)
- Expanding the model to consider this trade-off will be very illuminating
- **Side Note:** Include counterparty risk in the model (I treat the current model as federal reinsurance)

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Magnitudes: the collateral cost is too small

Collateral cost of foreign reinsurance:

\$0.87 per \$1 ceded $\times$ 2–3% yield give-up $\approx$ **3 cents per \$1**

Estimated price effect of removing it: **31%**

- A tax of 3 cents move the price by 31%
- Same gap downstream: -9.6% cost and -10 to -16% premiums vs. $\approx 2\%$ at most
- Did something other than the collateral tax move prices?
  - Florida reinsurance rates fell $\sim$40% over 2012–18 for everyone

Perhaps the model can explain the amplification through competition?

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DDD: cost pass-through

$$\underbrace{r_{ict}^{\text{wind}} - r_{ict}^{\text{ex-wind}}}_{\Delta r_{ict}} = \alpha_i + \lambda_{ct} + \sum_{\tau \neq -1} \gamma_\tau \, \mathbf{1}\{e_{it} = \tau\} + \varepsilon_{ict}$$

i insurer, c county, t quarter; r = premium per \$1,000 of exposure; e_{it} = years since i's domicile state adopted. α_i, λ_{ct} fit on not-yet-treated cells (imputation)

1. **Wind vs. ex-wind**: same insurer, county, quarter $\Rightarrow$ removes shocks common to both products
2. **Adopted vs. not-yet-adopted insurers**: same c-qtr, $\lambda_{ct} \Rightarrow$ removes local shocks to the gap
3. **Before vs. after adoption**: γ_τ vs. $\tau = -1$, net of each insurer's gap α_i

Assumption: parallel trends in the gap

$\rightarrow$ The Wind$-$No wind gap: if no reform, evolves the same way for affected&not yet affected insurers

Scrutinizing the assumption

Gap = Wind cost + Wind markup − Ex-wind markup

- **Threat**: anything that moves wind relative to ex-wind, differently for adopters, at adoption time
- **Markups: two different buyers**
  - GSEs rules: can't only have ex-wind policy ⇒ ex-wind elasticity ↑↑
  - HHs are 17x more elastic over coverage above lender requirements (Sastry et al., 2026)
  - A common shock passes through more to more inelastic buyers ⇒ gap moves with no wind-specific change

  → Show that late/early adopters have similar wind/ex-wind composition
- **Wind cost: the reinsurance cycle**
  - FL rates on line fell ∼40% over 2012–18
  - The wind rate carries more reinsurance; the cost cut is larger for insurers that cede more
  - Treated insurers cede more by construction

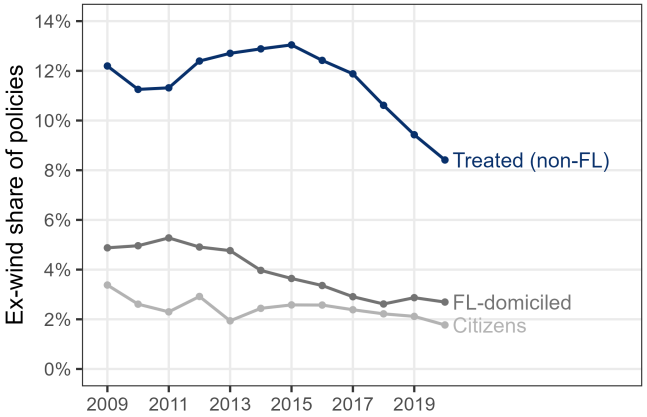
  → Show similar pre-period response to a known common shock (2011 sinkhole reform?)

Scrutinizing the assumption

Gap = Wind Cost + Wind Markup − Ex-wind markup

- **Issues**: factors that move wind relative to ex-wind, differently for adopters, at adoption time
- One concern: FL reinsurance *levels*↓ about 40% from 2012 to 2018, w/ different effect of wind and ex-wind
- Wind and Ex-wind policies may have very different elasticities
  - HHs are 17x more elastic over coverage above lender requirements (Sastry et al., 2026)
  - GSEs do not allow HHs to have *only* ex-wind policy, ex-wind elasticity may be much larger
  - The cycle effects + different price pass-through may threaten the assumption

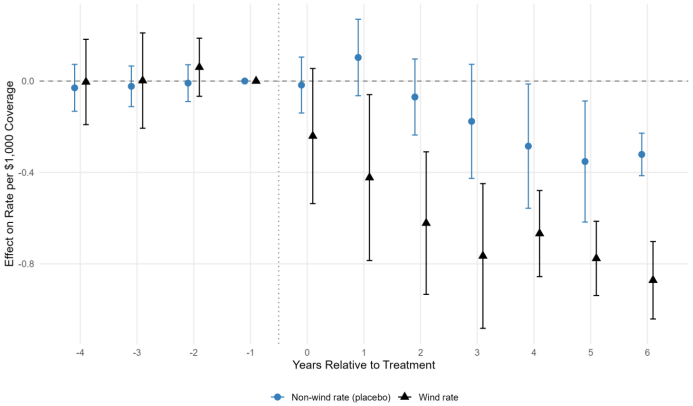
The comparison group is shrinking



QUASR; treated = non-FL-domiciled insurers, as in the paper.

- Treated insurers shed wind most: 11–13% ex-wind vs. 3–5%
- Share falls in the treatment window; Table 3: wind share of DPW $0.92 \rightarrow 0.97$
- Gap exists in only 35% of insurer-county cells
- FE remove levels, not shifting composition

The paper's placebo, and a cleaner test



Paper, Figure 23.

- Non-wind rate falls too, about $\frac{1}{3}$ as much
- **Cleaner**: OIR notional premiums, hurricane vs. non-hurricane, same home (Boomhower et al.)
- Balanced cells with both products
- Wind rate alone, county $\times$ quarter FE

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Slow moving treatment: The post-2019 amendments

- The effects on reinsurance quantity takes 5 years to become significant. Why?
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  - Placebo: domestic reinsurance quantity response

Slow moving treatment: The post-2019 amendments

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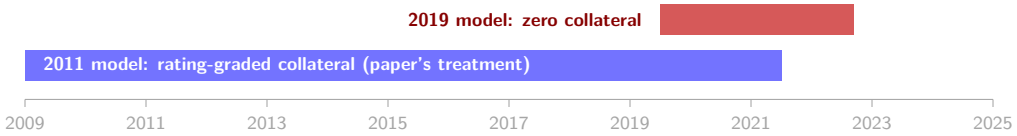
- Alt 1: Thin support of untreated insurers at the end of the sample, clustering by too few states will shrink the st. dev.
  - Placebo: domestic reinsurance quantity response
- Alt 2: a second reform in 2019. **Reciprocal juridictions**
  - Starting in 2019, **reinsurers domiciled in partner countries also subject to 0% collateral**
  - RU, UK, Bermuda, Japan, Switzerland



Why it matters here, and what to do

Why it matters

- Late cohorts may adopt both at once
- Early cohorts treated again at $\tau \geq 6$
- Schedule F (to 2024), prices (to 2025) straddle 2019–22
- No untreated states after 2021

Suggestions

- Check which text each late state passed
- Code 2019 adoption as a second treatment
- End samples in 2018; report $\tau \leq 5$
- Split by reinsurer domicile: reciprocal vs. other foreign

Conclusion

- The paper sheds light on a a notoriously opaque input into insurance prices – reinsurance
- The data innovation by itself is important contribution
- Careful analysis around a natural experiment
- The model has the potential to significantly contribute to an important policy debate
- Looking forward to the next iteration!

For authors only

- Careful with QUASR data after 2018. Market aggregates will be off because a number of insurers stop reporting.
- In the model, you treat the choice of no wind as no insurance. However, in practice, due to GSE rules, a lot of the no-wind insurers are probably supplemented by a wind-only policy from Citizens/private markets – the numbers are pretty close, and in fact, this helps your argument about the gap identification.
- The reinsurance data relies on rate findings – does that introduce selection?
- Oh, Sen and Tenek have nothing on elasticities :) In Sastry, Scharleman, Sen and Tenek we have market level elasticities that range from 10% from non-discretionary to 200% on discretionary coverage.