Property Insurance and Disaster Risk: New Evidence from Mortgage Escrow Data

Ben Keys
University of Pennsylvania - Wharton

Philip Mulder
University of Wisconsin - Madison

September 2024

Property Insurance and the Cost of Climate Change

- What will be the magnitude and distribution of the economic costs from increasing disaster risk on households?
- Critical questions arising around the cost of homeowners insurance:
  - What caused the recent spike in insurance costs?
  - What is the relationship between disaster risk and premiums? How and why has it changed over time?
  - How might premiums change under current climate forecasts?
- **The problem:** Existing data is inadequate to answer these questions

Homeowners Premiums Data Gaps: Frustrating for Homeowners

Just what does home insurance cost in Florida? Estimates vary widely, and new state data might surprise you

-South Florida Sun Sentinel, July 31 2023

"Which number is closest to what Florida homeowners are actually paying? It's impossible to say because the estimates are calculated based on proprietary methods"

Homeowners Premiums Data Gaps: Frustrating for Policymakers

Treasury's Federal Insurance Office Advances First Insurer Data Call to Assess Climate-Related Financial Risk to Consumers

National Plan to Look Into Homeowners Insurers Hits a Hurdle

Roughly two weeks after state regulators said they were collecting details on insurers' homeowners businesses, key states may opt out, undermining the effort.

What We Do in This Project

- Construct premiums from loan-level data to solve major data challenge on homeowners insurance premiums
- Use zipcode-level insurance expenditure indices to study where insurance premiums have changed over the last ten years
- Estimate time-varying relationship between risk and premiums
- Compare the influences of home prices and reinsurance costs in explaining premium dynamics

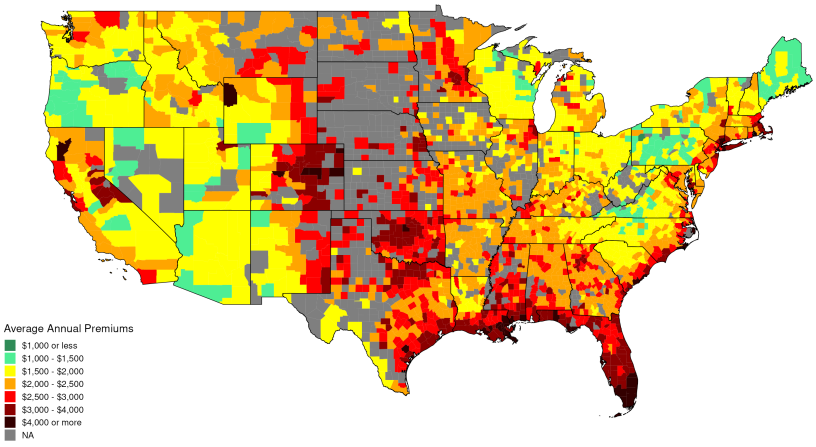
Data Sources

- CoreLogic: loan-level data on originations, payments, and property taxes. Includes sale price, loan amount, FICO score, and year-quarter of origination
- FEMA National Risk Index: Historical loss ratios from different weather risks by census tract
- First Street Foundation modeled expected loss ratios today and 2053 for hurricane winds and wildfires
  - Disaster risk is defined as standardized expected loss ratio for non-flood hazards
- Zillow average Zestimate home values, other census demographics data

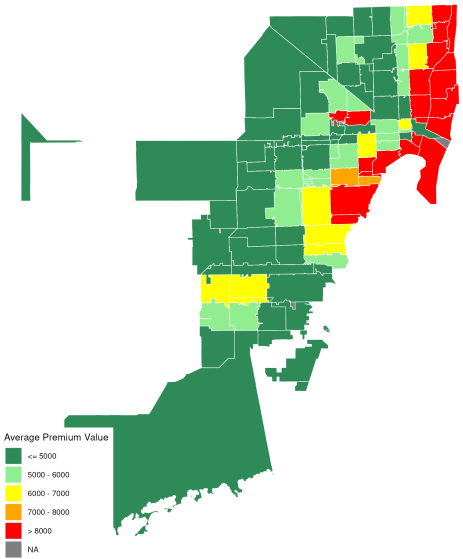
Inferring Premiums from Escrow Payments

- We create panel estimates of homeowner's insurance premiums paid by over 12.4 million mortgagors originated from 2014 to 2023
  - Over 47m premium observations inferred from escrow payments
  - Used to construct zipcode homeowner's insurance price indices
- Payments to Escrow:
  Total Payment $\equiv$ Principal + Interest (P&I) + Escrow (Taxes and Insurance)
- $\rightarrow$ Insurance = Total Payment - P&I - Taxes
- Follows method in Bhutta and Keys (2022) inferring PMI payments from mortgage escrow data

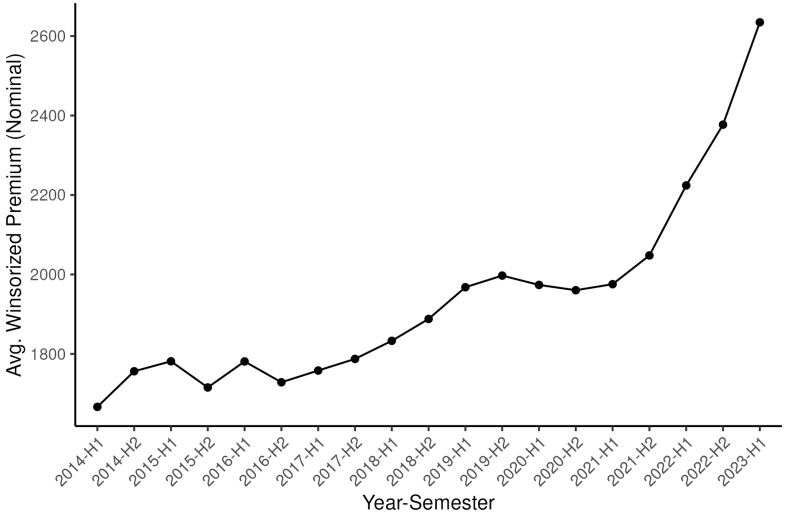
The Geography of 2023 Homeowners Premiums - U.S.



The Geography of 2023 Homeowners Premiums - Miami-Dade County



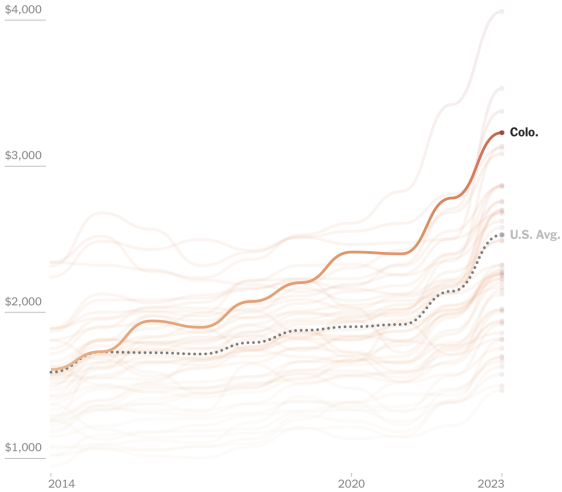
Premium Trends Over Time



Premiums have increased **33.8%** (14.8% real) from 2020 to 2023

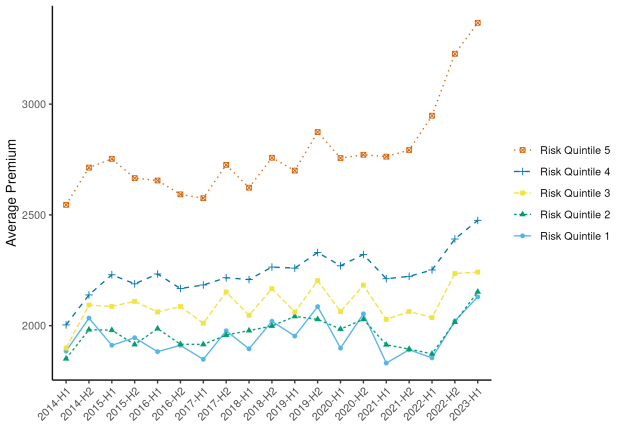
Premium Trends Over Time - Comparing States

In Colorado, average premiums have surged by **$818** since 2020.



Source: Keys and Mulder, National Bureau of Economic Research (2024)

Premium Dynamics by Disaster Risk Quintile



Annual premiums have increased over $500 for top quintile zips vs. $100 for bottom quintile zips

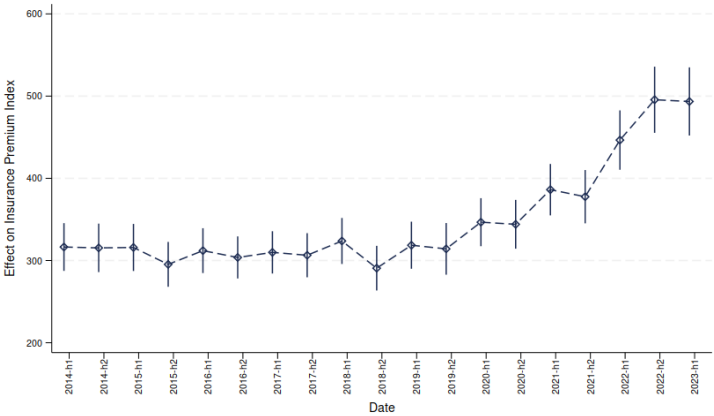
Correlates of Insurance Premiums

	(1)	(2)	(3)
	Insurance Premium Expenditures Index		
Disaster Risk	447.822***	495.943***	333.540***
	(15.737)	(15.288)	(16.357)
Pop. Share White		-380.382***	-287.976***
		(32.872)	(35.363)
Median Income ($1000s)		12.584***	12.764***
		(0.357)	(0.329)
N	177,631	177,479	177,479
R2	0.254	0.391	0.545
Demographic Controls	No	Yes	Yes
Year#Semester FE	Yes	Yes	Yes
Year#Semester#State FE	No	No	Yes

* p<0.10, ** p<0.05, *** p<0.01

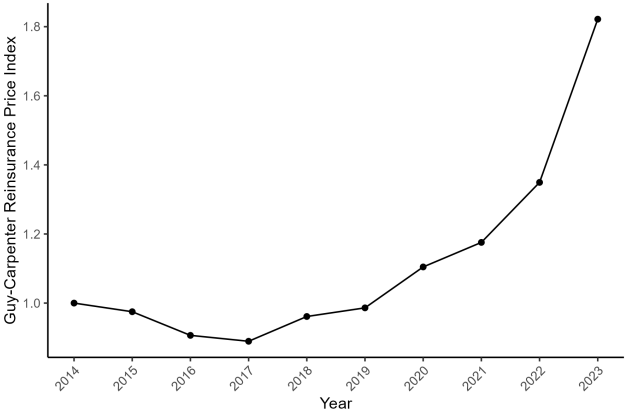
- One SD increase in disaster risk $\rightarrow$ \$330 higher premiums
- Higher premiums with higher income, but lower premiums with higher white population share
- Caveat: We only observe the premium (price times quantity of coverage)

The Changing Premium Disaster Risk "Beta"



- Between 2019 and 2023, the effect of a 1 SD increase in disaster risk on premiums increased from \$300 to \$500
- e.g. Orleans Parish is 4 SD above the mean, or \$2000 more vs. national average

Reinsurance and the Passthrough of Risk to Premiums



Guy Carpenter Reinsurance Rate Index

- Why has the risk-to-premium gradient increased?
- Many insurers rely on reinsurance contracts with global insurers to manage correlated catastrophic risks
- Since 2017, the cost of reinsurance has nearly doubled while reinsurers rationed coverage

Identifying Effect of Reinsurance Costs on Disaster Risk Pass-Through

- **Question:** How much of the increase in the passthrough of risk to premiums can be explained by the "reinsurance shock"?
- **Challenge 1:** Correlated with other factors affecting premium changes

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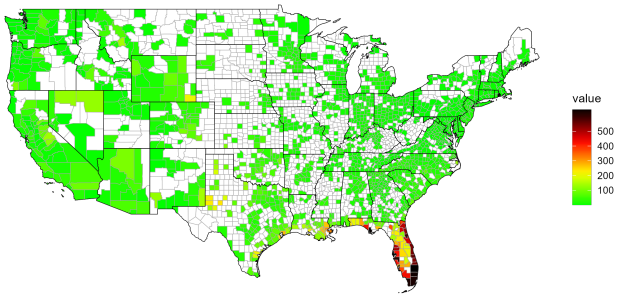
- **Challenge 2:** Exposure correlated with other factors affecting premium changes
  - *Solution:* Include state-by-year fixed effects and identify reinsurance shock by within-state change in disaster risk passthrough
  - Triple-diff strategy only possible with granular, within-state data

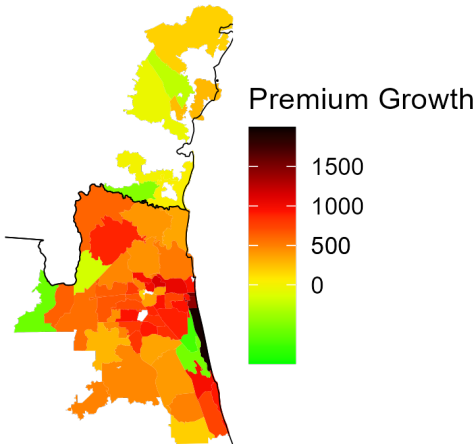
The Cost of the Reinsurance Shock to Households



County average premium increases due to reinsurance shock

- Re shock cost zipcodes in the top disaster risk decile $375 in higher average premiums
- Explains 25% of real premium increases and 50% among zipcodes in top risk decile
- Rising home prices explain 30% of premium increase
- If households reduced coverage in response to higher prices, then estimates understate passthrough

Case Study: Premium Changes Along the FL/GA Coast



Florida premiums grew faster between 2018 and 2023 than across the border in Georgia

Summarizing What We Show with Our New Premiums Data:

- Real premiums increased 13% between 2020 and 2023 - Much faster than inflation
- Increases were concentrated in zipcodes with the highest exposure to disasters
- The association between a 1 SD increase in disaster risk and premiums increased from $300 in 2018 to $500 in 2023
- These spatial dynamics can be primarily explained by rising reinsurance costs (as opposed to home price inflation or other state-specific factors)

Next Steps on Homeowners Insurance, Mortgages, and Housing Markets

- Connect insurance increases to **house prices**: Is the effect capitalized?
- Consequences for **mortgage default/prepayment** rates?
- Implications for policymakers and **tradeoffs between tighter/looser regulation**, state-run plan generosity
- Extensive margin - Are more homeowners **"going bare"**?
- Some important limitations here, but more data and evidence on the way (from us and other authors)!
- Thanks for your feedback! Contact: *benkeys@wharton.upenn.edu*