The response of the property insurance market in California to rising wildfire risk

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About me

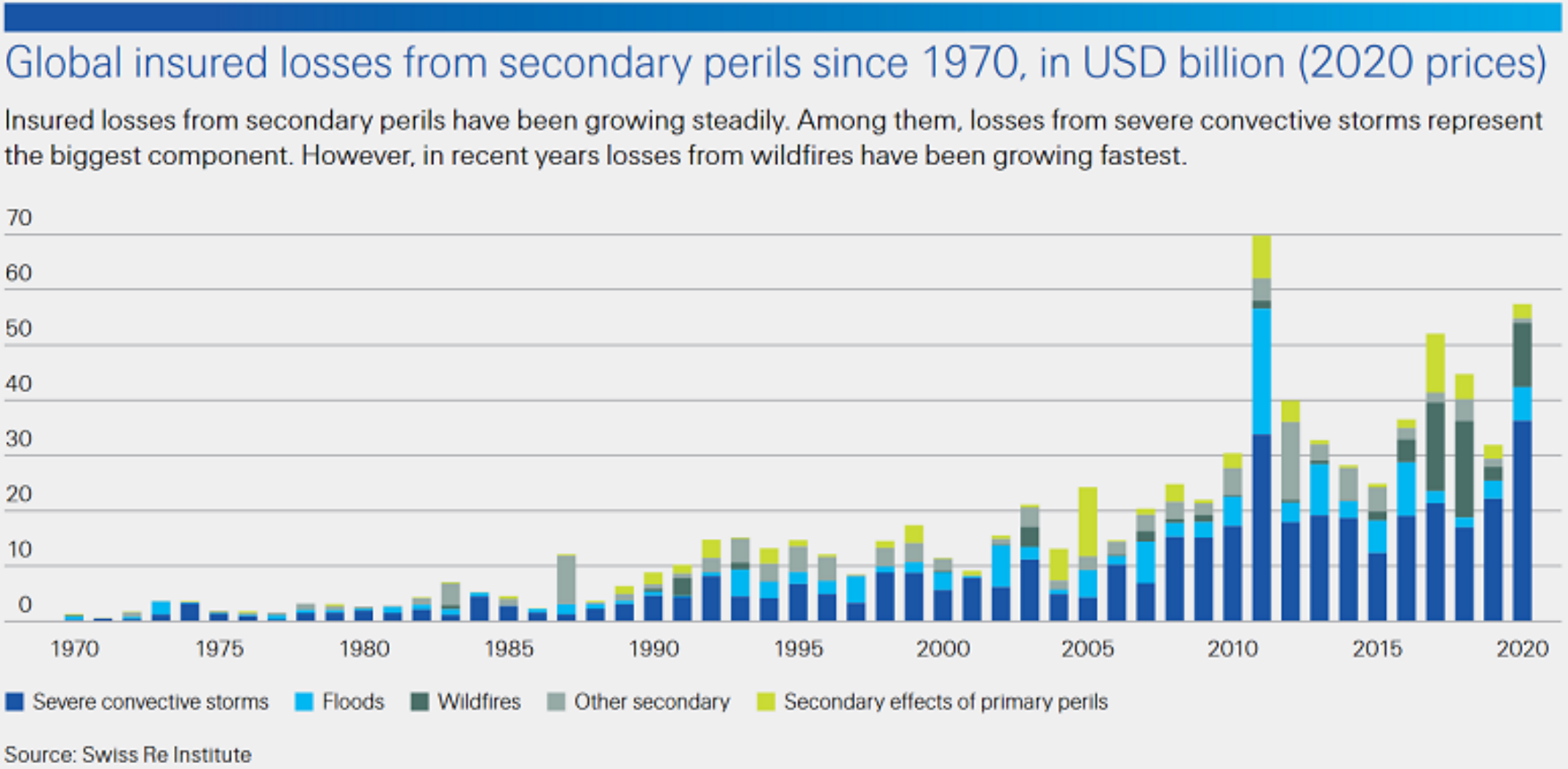
- I’m a professor in the Bren School of Environmental Science and Management at UCSB
- I do research on the economics of natural resources, with an emphasis on land use and land markets
- In recent years, a lot of my research has focused on wildfire in California

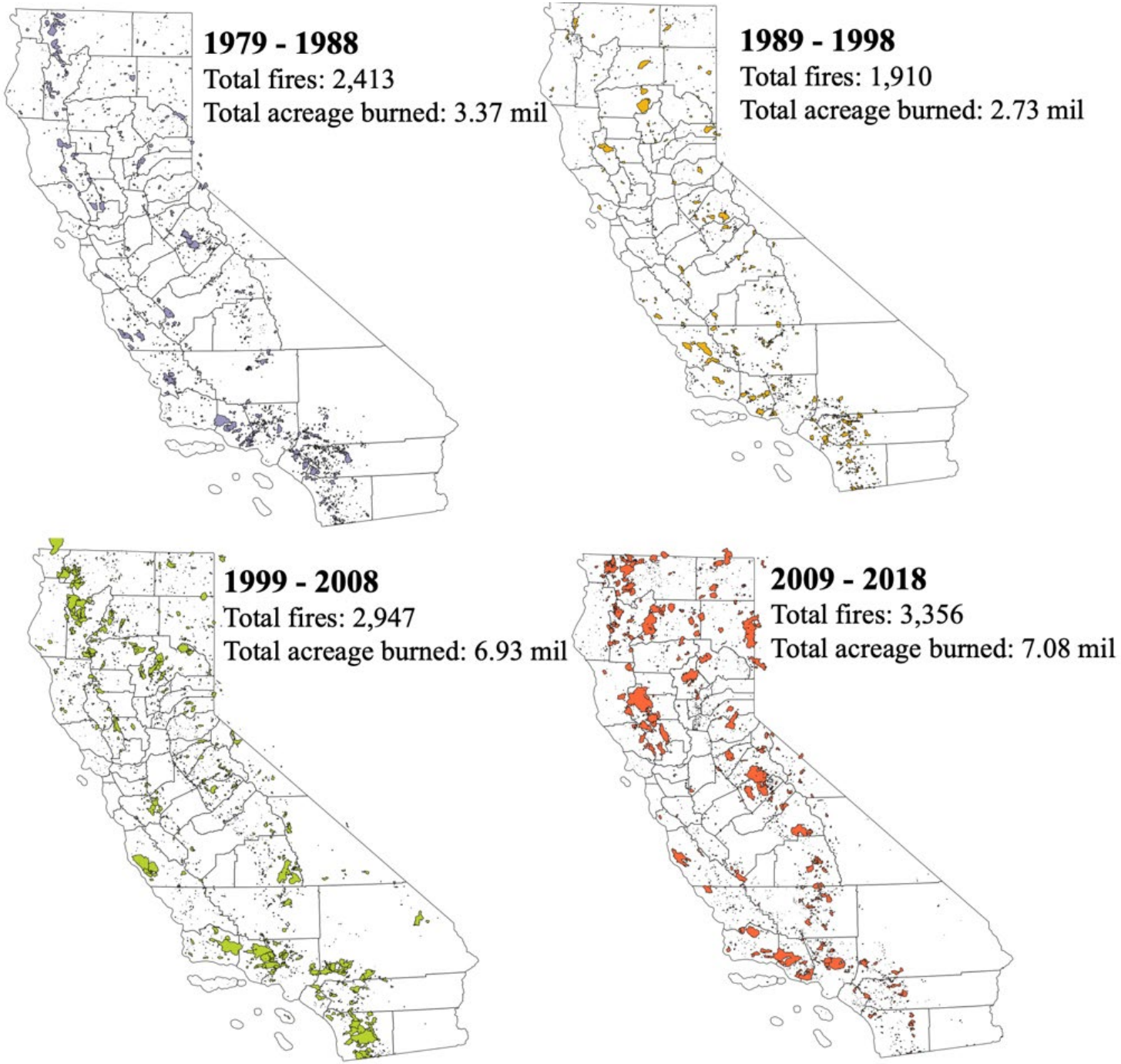
Bren Hall, UCSB

Outline of my talk

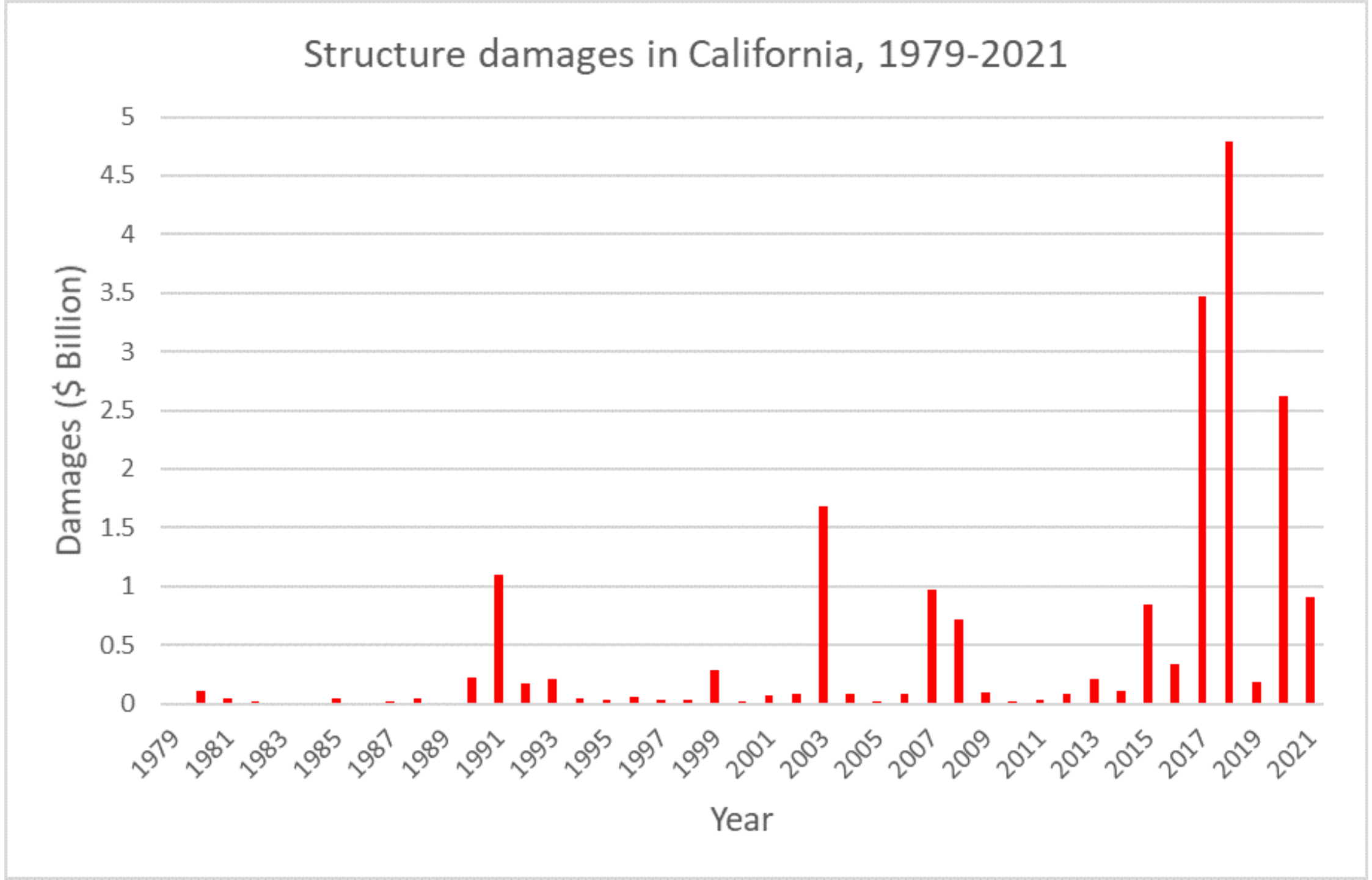
- Rising wildfire risk in California
- Markets for property insurance in California
  - Trends
  - Innovations in risk modeling
  - Regulation

Global insured losses are increasing





Buechi, H., Weber, P., Heard, S., Cameron, D., and A.J. Plantinga. 2021. Long-term Trends in Wildfire Damages in California. *International Journal of Wildland Fire* 30(10):757-762.


Structure damages in California, 1979-2021
Damages ($ Billion)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
2019
2021
Year

How insurance works

- The policy holder pays regular premiums to an insurance company
- The insurance company pays claims to cover losses according to the terms of the insurance contract
  - For example, a standard homeowners policy covers reconstruction costs in the event of loss due to wildfire
- The insurance company “diversifies” the risk by holding many policies
  - The key is negatively correlated risks – claims are covered by the premiums on policies that do not have losses
  - For risks like wildfire, hurricanes, and floods, insurance companies need to hold surplus funds, referred to as risk load, to avoid insolvency in the event of catastrophic loss

Property insurance and wildfire

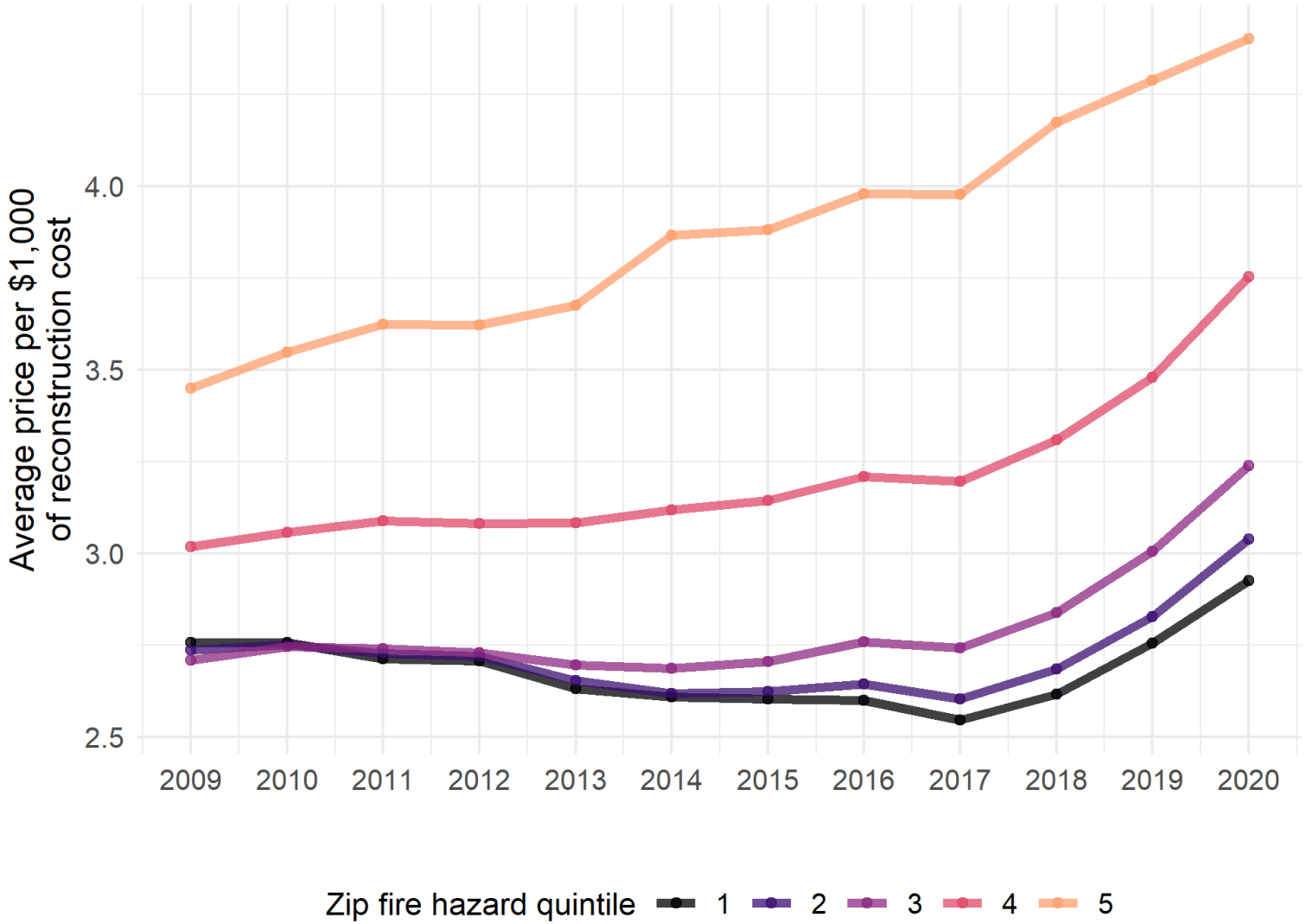
- Wildfire damages are typically bundled with other perils under a standard homeowners' multi-peril insurance policy
- Most mortgage lenders require homeowners' insurance, and 95% of U.S. homeowners have these policies
- Homeowners receive annual renewal notices providing information about changes to contract terms (or cancellation)

Homeowners insurance in California

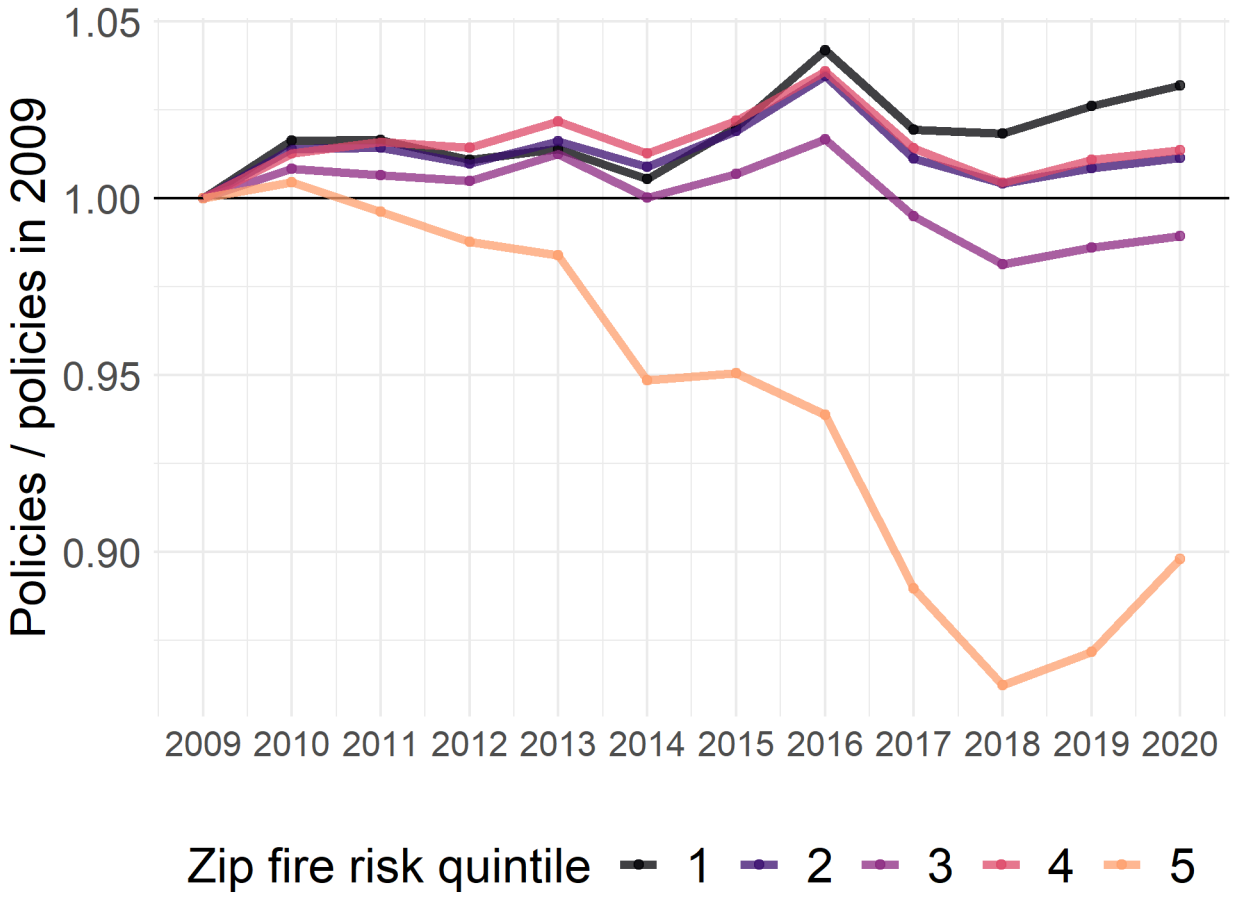
- Private-market homeowners' insurance premiums were $120B in 2021
- California represents 12% of this market
- Since 2017, wildfire property damages in California total $40B
- Since 2017, California homeowners have faced rising premiums and reduced availability in high-hazard areas

Image from 2018 Carr Fire

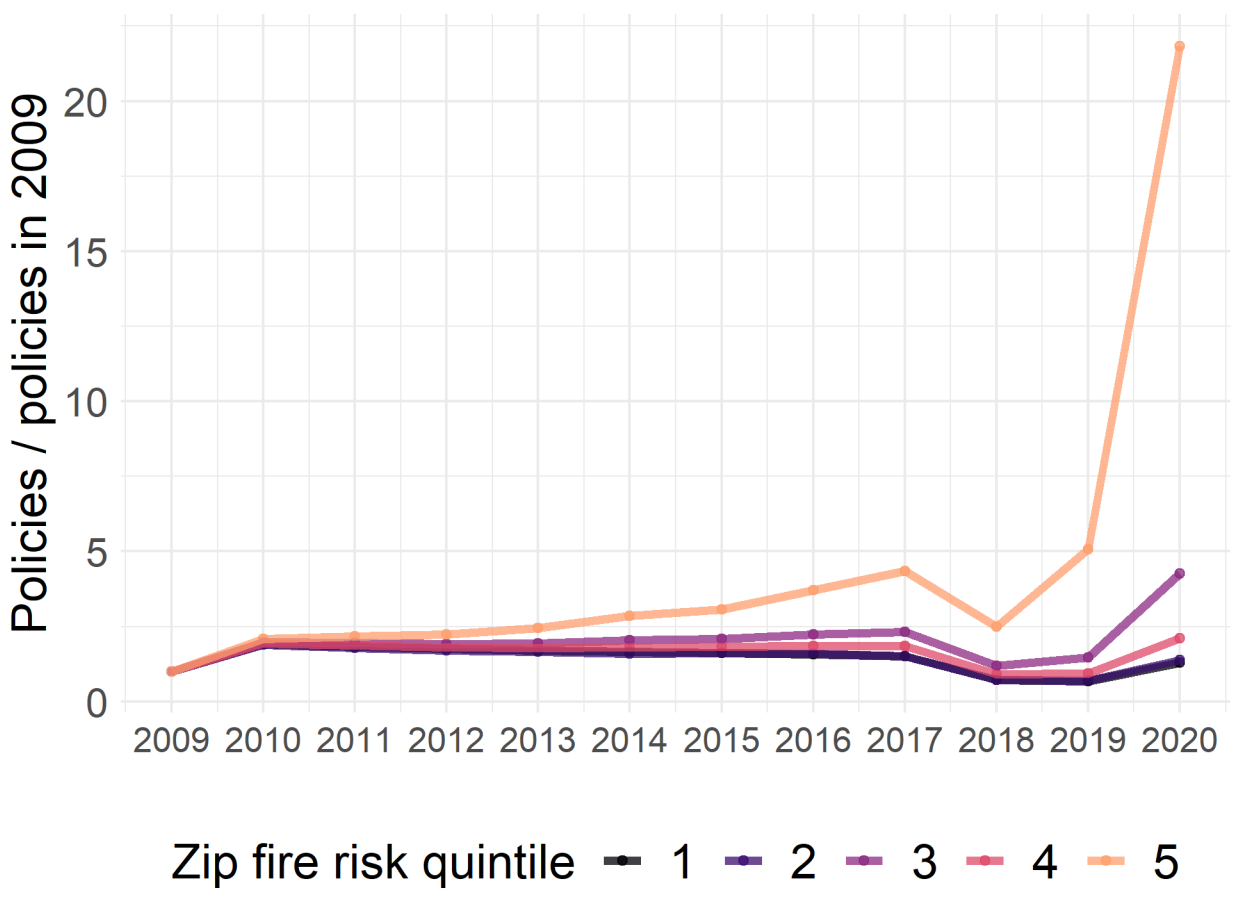
Rising average premiums over time



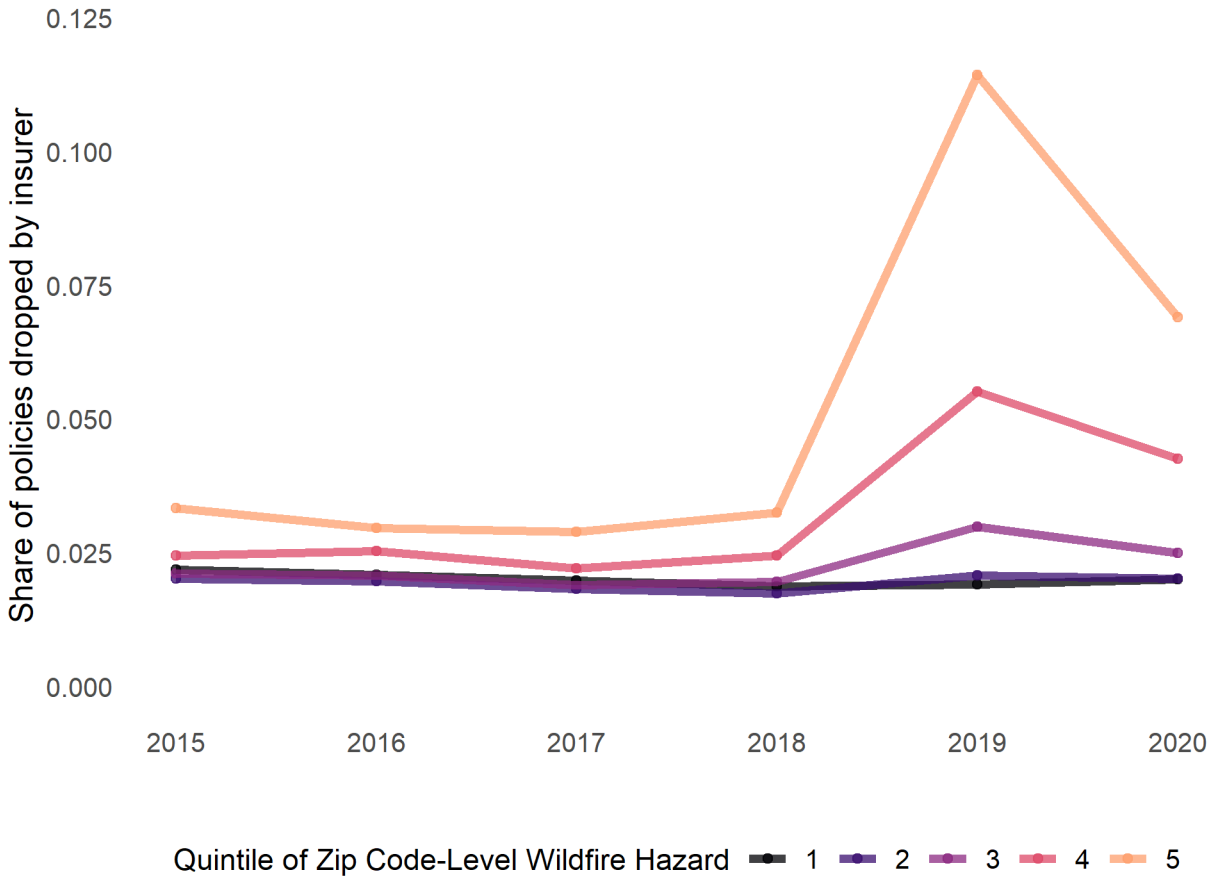
Declining availability of private-market policies in high-risk areas



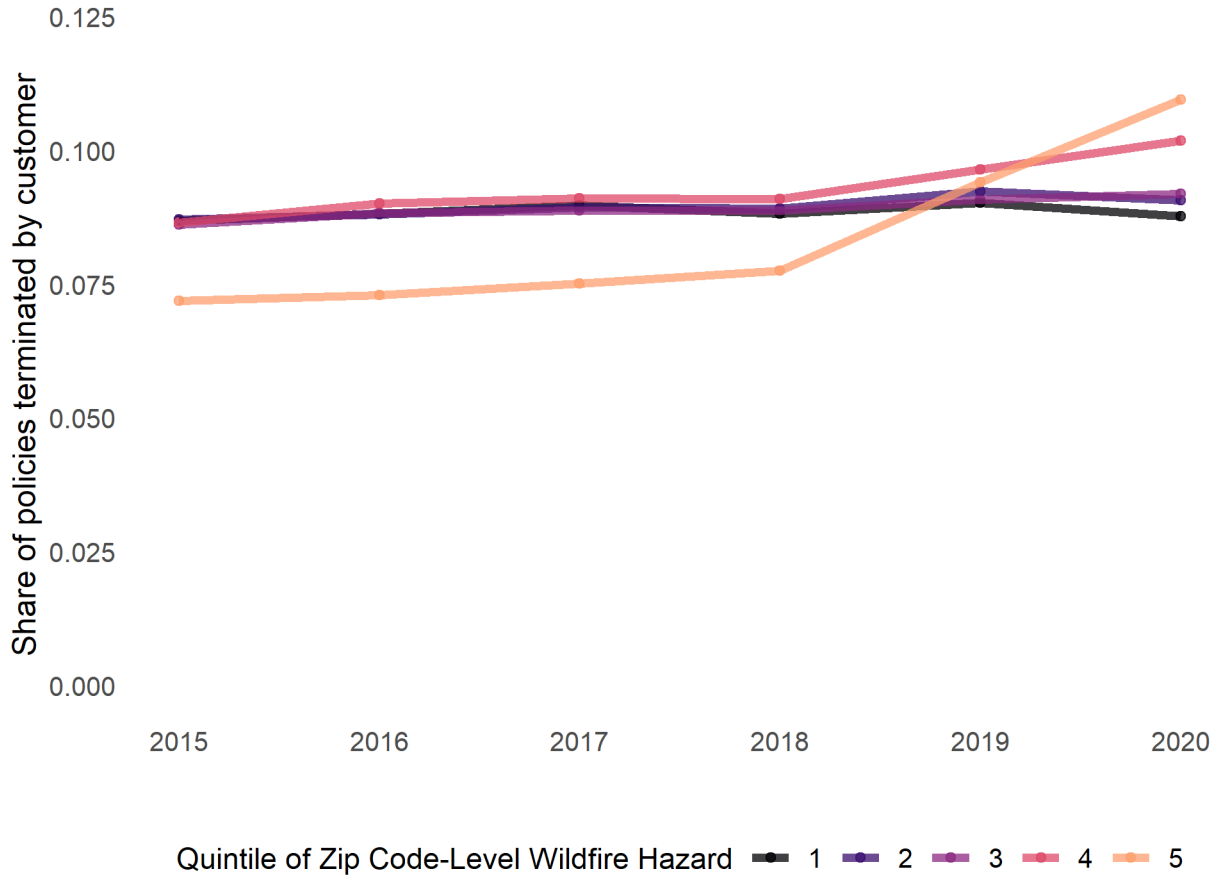
Growth in FAIR Plan policies



Insurer initiated non-renewals



Customer initiated non-renewals



Innovations in risk modeling and pricing

- **Risk rating 1.0:** Historically, all insurers priced wildfire risk at the zip code level
- **Risk rating 2.0:** After 2010, some insurers began using property-level categorical risk scores
  - E.g., Verisk's Fireline score (1-30), Corelogic's Wildfire risk score (5-100)
  - Index of wildfire hazard (fuels, slope, access, etc.)
- **Risk rating 3.0:** More recently, use of wildfire catastrophe models that generate dollar-denominated risk estimates at the property level
  - E.g., Corelogic provides estimates of average annual loss at the property level, accounting for building characteristics in addition to hazard

Within-zip code variation in wildfire risk

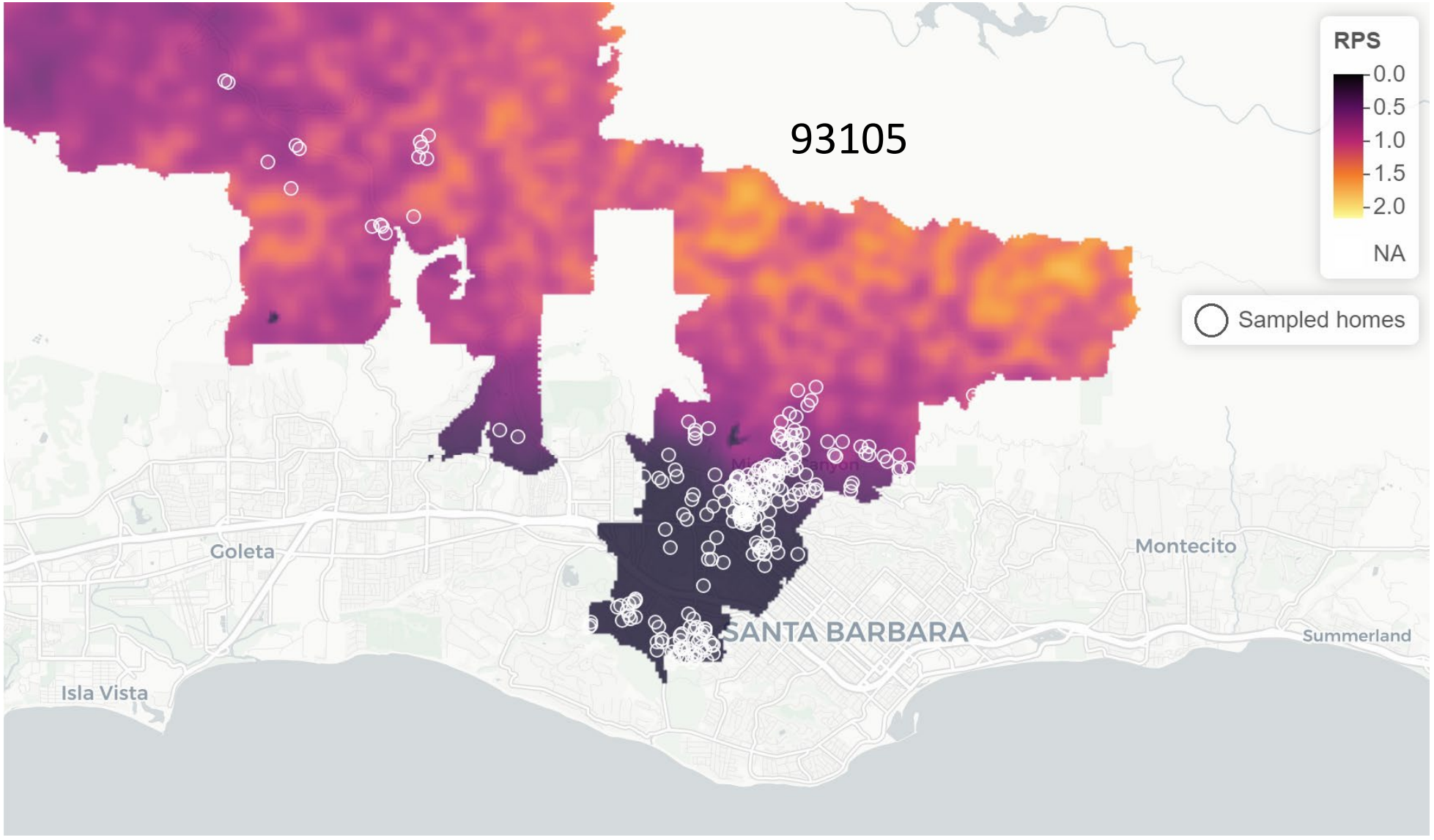


Table 1: Insurer market shares and granularity of wildfire rating

Insurer	Market Share (Percent)		Wildfire Hazard Variables	Hypothetical Best Fit
	Statewide	High-Risk Zip Codes		
State Farm	18.0	18.4	434,252	0.82
Farmers	15.5	14.7	2,304	nd
CSAA	7.6	8.6	26,055	0.67
Mercury	7.1	0.9	2,248	nd
Auto Club Enterprises	6.9	0.2	22	0.13
Liberty Mutual	6.5	3.4	1,698	0.47
Allstate	5.8	3.3	111	0.18
USAA	5.3	5.9	838	0.43
Travelers	3.2	4.8	1,572	nd
Nationwide	2.5	2.5	59	0.16
FAIR Plan	2.5	20.4	736	nd
All Others	19.2	16.9		

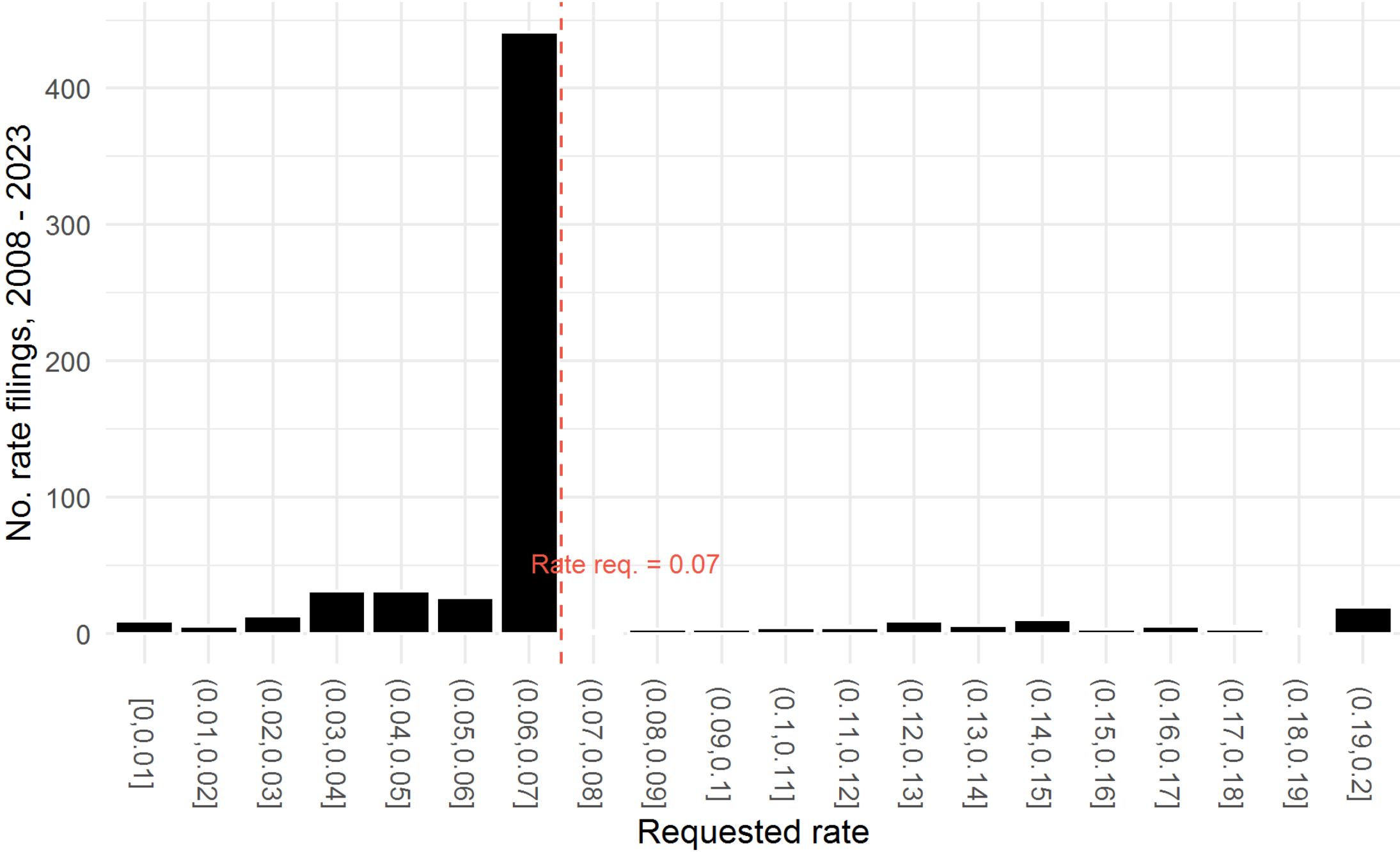
Notes: Market shares are based on CDI CSS exposures data for 2020 at the insurer group level for the HO insurance line plus FAIR Plan. High-hazard zip codes are those falling into the highest quintile of average wildfire risk as reported in the CDI Wildfire Risk Information Report for 2021. Wildfire hazard variables count the number of factors an insurer uses to capture the likelihood of wildfire occurrence; more information on wildfire hazard variables is available in Appendix A. Hypothetical best fit is the R^2 from a regression of catastrophe model wildfire risk (average annual loss or AAL) on rating variable indicator variables using the 100,000 homes in the dataset. Firms with no data ('nd') use proprietary information such as Verisk FireLine scores or Zesty AI ratings, which were unavailable for regression.

Adverse selection

- Our research shows that in high-risk segments, high premiums and availability is due in part to “adverse selection” among insurers
- A low-information insurer should worry about getting a lot of the bad (i.e., high) risks when competing with high-information insurers (the “winner’s curse”)
- For example, Allstate and Nationwide price wildfire risk using the Corelogic Wildfire Risk Score, a 5-100 index of wildfire hazard. State Farm prices wildfire risk using highly granular results from a catastrophe model.
- Our research shows that when Allstate and Nationwide charge a single price (for wildfire risk) to customers with a given Wildfire Risk Score, State Farm is charging different prices – in particular, it charges lower prices to get the low-risk customers, leaving Allstate and Nationwide with an “adversely selected” group of high-risk customers.
- What do low-information insurers do to avoid adverse selection? They raise prices to high-risk customers and limit eligibility.

Regulation

- Premiums charged by insurers in the admitted market must be pre-approved by the California Department of Insurance
- Regulation limits increases in the *average* premium across the insurer's book of business
  - Average increases must be justified by historical losses over the preceding 20-year period
  - Rate requests above 6.9% are subject to public hearings
  - Firms can use forward-looking models to allocate the overall rate increase across its customers ("relativities")
- Insurers are unrestricted in deciding who to insure ("eligibility")
- State-run FAIR Plan or surplus lines provide coverage to homeowners who cannot get insurance in the admitted market


No. rate filings, 2008 - 2023
400
300
200
100
0
Rate req. = 0.07
[0,0.01]
(0.01,0.02]
(0.02,0.03]
(0.03,0.04]
(0.04,0.05]
(0.05,0.06]
(0.06,0.07]
(0.07,0.08]
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(0.1,0.11]
(0.11,0.12]
(0.12,0.13]
(0.13,0.14]
(0.14,0.15]
(0.15,0.16]
(0.16,0.17]
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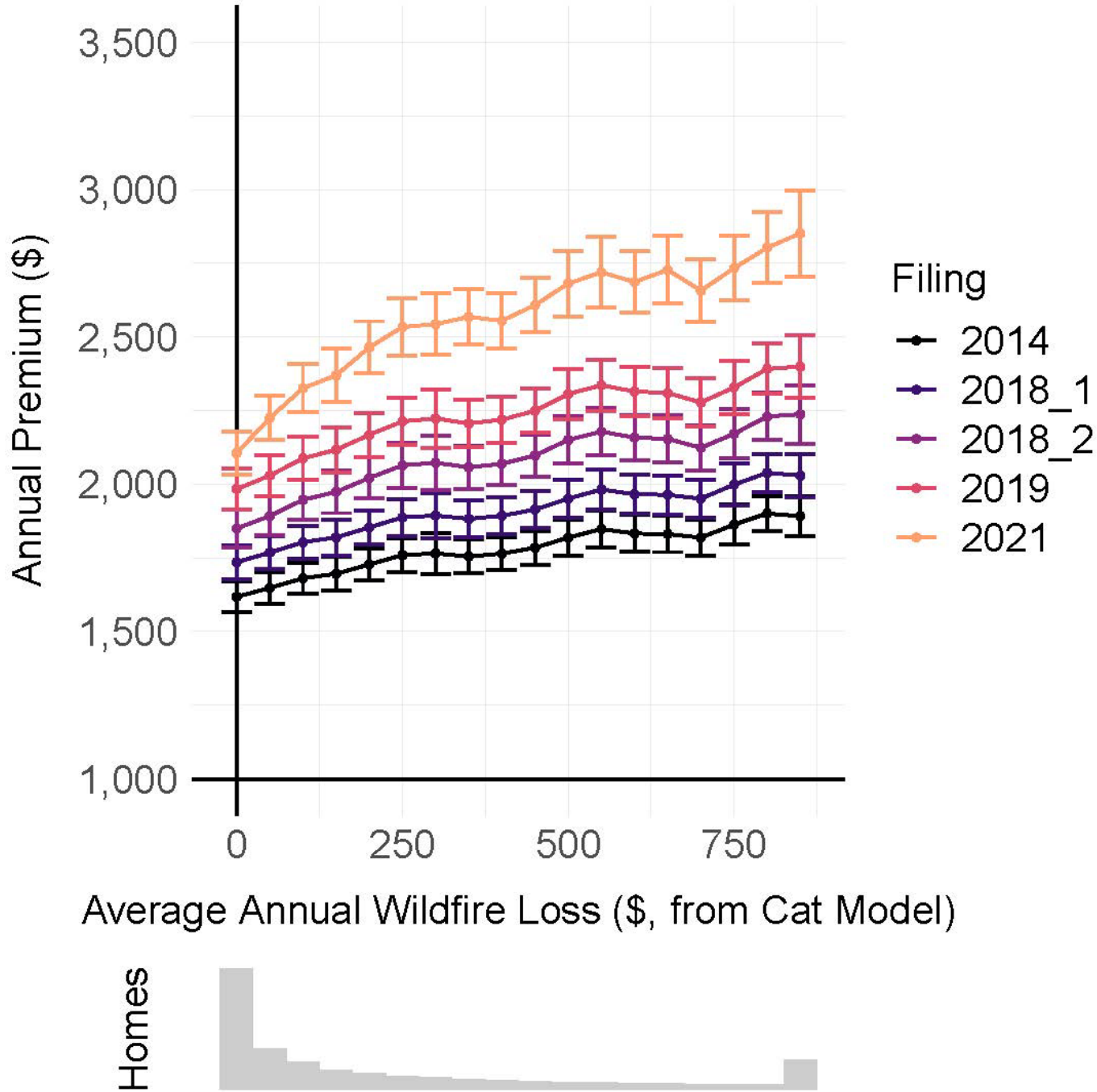
(0.19,0.2]
Requested rate


3,500
3,000
2,500
2,000
1,500
1,000
Annual Premium ($)
0
250
500
750
Average Annual Wildfire Loss ($, from Cat Model)
Filing
2014
2018_1
2018_2
2019
2021
Homes

Conclusions

- Natural disaster risk increasing, including wildfire risk in California
- Admitted market insurers have responded by
  1. Raising premiums
  2. Limiting coverage in high-risk areas
  3. Adopting more sophisticated wildfire risk pricing
- We have not found evidence that regulation is restricting upward price adjustments