Wildfire Insurance Availability as a Risk Signal: Evidence from Home Loan Applications

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NOTE: For discussion only

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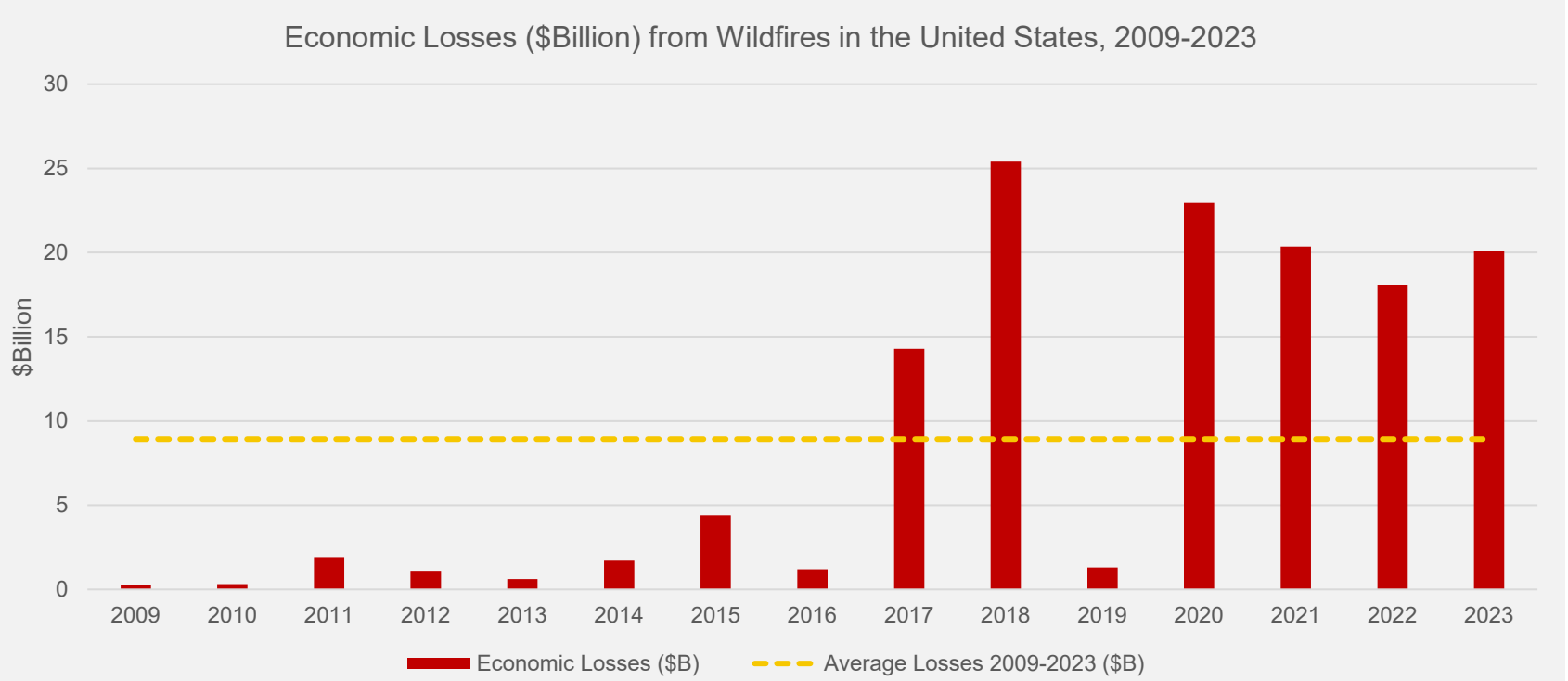
Motivation

- **Frequency and intensity of extreme wildfires have more than doubled in the last two decades**
  (Cunningham, Williamson, and Bowman, 2024)



Note: Economic losses includes estimates of any direct physical damage or direct net loss business interruption costs.
Source: Insurance Information Institute (III).

Extreme Wildfires Have Doubled in 2 Decades, Study Finds

In a changing climate, extreme wildfire events are becoming far more common and more intense, according to a new analysis.

Listen to this article · 4:43 min Learn more

Firefighters and residents trying to extinguish a fire in Canakkale, northwest Turkey, in August. Last year was the most extreme year for wildfire intensity on record. Ugur Yildirim/DIA Photo, via Associated Press

Motivation

- **Frequency and intensity of extreme wildfires have more than doubled in the last two decades** (Cunningham, Williamson, and Bowman, 2024)

- **Shrinking private insurance market as wildfire losses escalate**
  - Unlike floods, wildfire damage is covered primarily through standard homeowners insurance from private insurers
    - Homeowners insurance is one-year policy and must be renewed every year
  - Growing wildfire risk has led to reduced insurance options for many households
    - Sharp rise in insurers' decisions not to renew policies
    - Tightened underwriting standards for new policies
    - Increased insurer exits

- **California as our setting**
  - Greatest # of homes at risk for extreme wildfires (~1.3M; Insurance Information Institute)
  - Top 10 costliest wildland fires in US history → all in CA
  - Insurance market worsening in recent years

State Farm Halts Home-Insurance Sales in California

Insurers have faced higher costs and wildfire risks

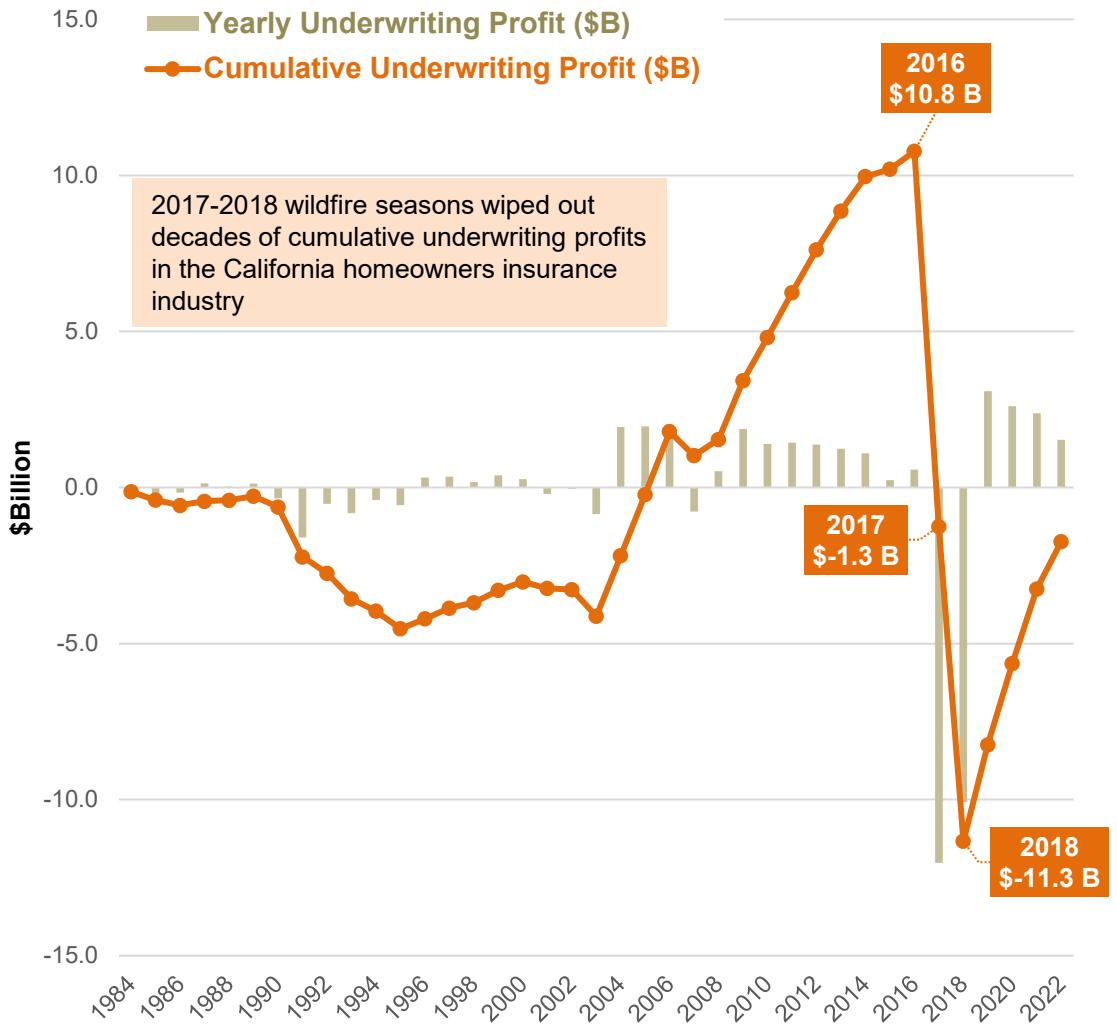
Allstate Is No Longer Offering New Policies in California

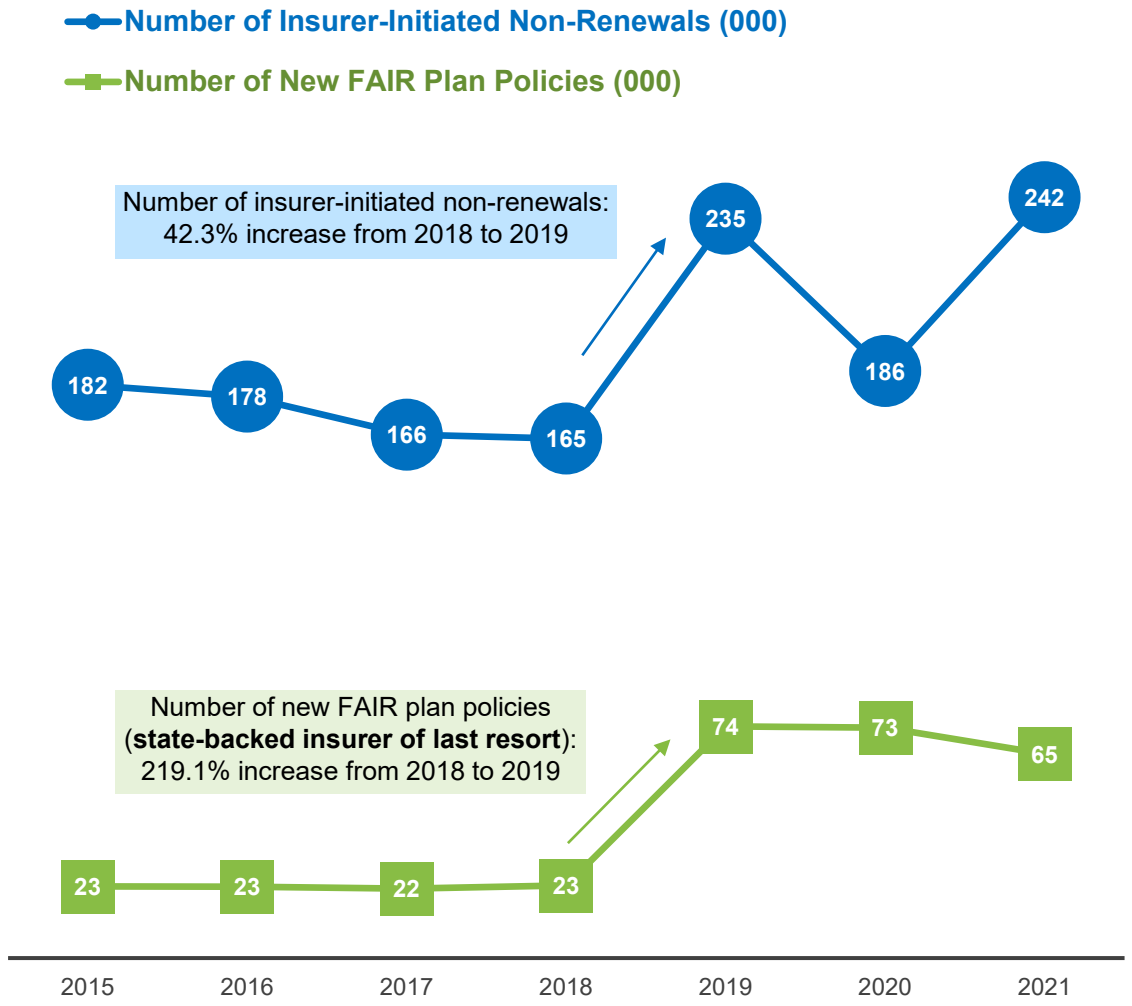
Like State Farm, which announced a similar move last week, Allstate cited worsening climate conditions that had made doing business there difficult.

Farmers, California's second-largest insurer, limits new home insurance policies

State Farm won't renew 72,000 insurance policies in California, worsening the state's insurance crisis

Shrinking Private Insurance Market in CA





Source: National Association of Insurance Commissioners (NAIC) and California Department of Insurance (CDI).

Motivation & Research Questions

- **How declining home insurance availability affects housing demand in wildfire-prone locations?**

  - Changes in housing demand
    - Detailed home loan application records → geographic preferences in search of a new home → "intent to move"

  - The extent of effect is not necessarily clear
    - Insurance details are usually communicated *after* a formal offer has been made (Kousky and Netusil, 2023)
    - Government-backed program guarantees the availability of basic insurance coverage → allow individuals to prioritize other demand factors
    - 6.9% of California realtors reported having at least one sales transaction falling through due to failure to secure insurance in 2023 (California Association of Realtors, 2024)

  - Two sets of analysis
    - **Intent to move out**: insurer-initiated insurance non-renewals → **existing homeowners** living in risky locations
    - **Intent to move in**: difficulty in obtaining insurance → **potential home buyers** that may consider moving into risky locations

  - **Identification Challenge**: Areas with decreasing insurance options are usually those
    - Experience more frequent fire events, and
    - Where the cost of insurance is increasing at a faster rate

Related Literature

- **Household mobility in response to amplifying climate risk**
  - Impacts of wildfire destruction (McConnell et al., 2021), wildfire smoke (Borgschulte, Molitor, and Zou, 2022), temperature changes (Mullins and Bharadwaj, 2021), hurricanes (Bleemer and Klaauw, 2019; Deryugina, Kawano, and Levitt, 2018), historical natural disasters (Boustan, Kahn, and Rhode, 2012; Bleemer and Klaauw, 2019)
  - Residential sorting by socioeconomic status (Bakkensen and Ma, 2020) and political beliefs (Bernstein et al., 2022)

- **Wildfire impacts on housing and credit markets**
  - Direct effects of wildfire experiences (An, Gabriel, and Tzur-Ilan, 2023; Biswas et al., 2023; Hennighausen and James, 2023; Baylis and Boomhower, 2022; Issler et al., 2022)

- **Link between insurance markets and real estate markets**
  - Property insurance as an important ex ante risk management tool for disaster recovery (Billings et al., 2022; Gallagher and Hartley, 2017; You and Kousky, 2024)
  - Insurance pricing challenges posed by climate-related factors (Boomhower et al., 2024; Keys and Mulder, 2024; Oh et al., 2022)
  - Implication of rising insurance costs on home value (Ge et al., 2022; Eastman et al., 2024)
  - Mortgage market responses to insurance non-performance risk (Biswas et al., 2023) and insurer counterparty risk (Sastry et al., 2023)

Data Sources

Household-address-time-level dataset: 2018-2021

- Current home address → New home address looking to buy
- Household characteristics (e.g., income, age, race, ethnicity, marital status, employment status, credit score, etc.)
- Property attributes at each home address (e.g., home age, square footage, # of bedrooms/bathrooms, etc.)
- Location-based attributes (e.g., wildfire hazard, distance to fire burn areas)
- Estimated address-level homeowners insurance cost at the time of home loan application

» Home loan application data

– Freddie Mac's automated underwriting system, *Loan Product Advisor (LPA)*
  - Current property address
  - Subject property address they intended to move to
  - Applicant characteristics

» Homeowners insurance data

– ZIP-year level premiums/exposures and claims/losses data from *California Department of Insurance (CDI)*

– Address-level homeowners insurance premium data from *Uniform Closing Dataset (UCD)*

» Wildfire hazard assessments, fire perimeters, and other geospatial data

– Wildfire Hazard Potential (WHP) from *USDA Forest Service*
  - Relative potential to experience a difficult-to-contain wildfire
  - Non-burnable, very low, low, moderate, high, very high

– Proximity to wildfire perimeters (*USDA Forest Service*)

– Proximity to nearest fire stations (*Department of Homeland Security*), coastlines and highways (*Census Bureau*)

» Parcel-level data

– County assessor data provided by CoreLogic

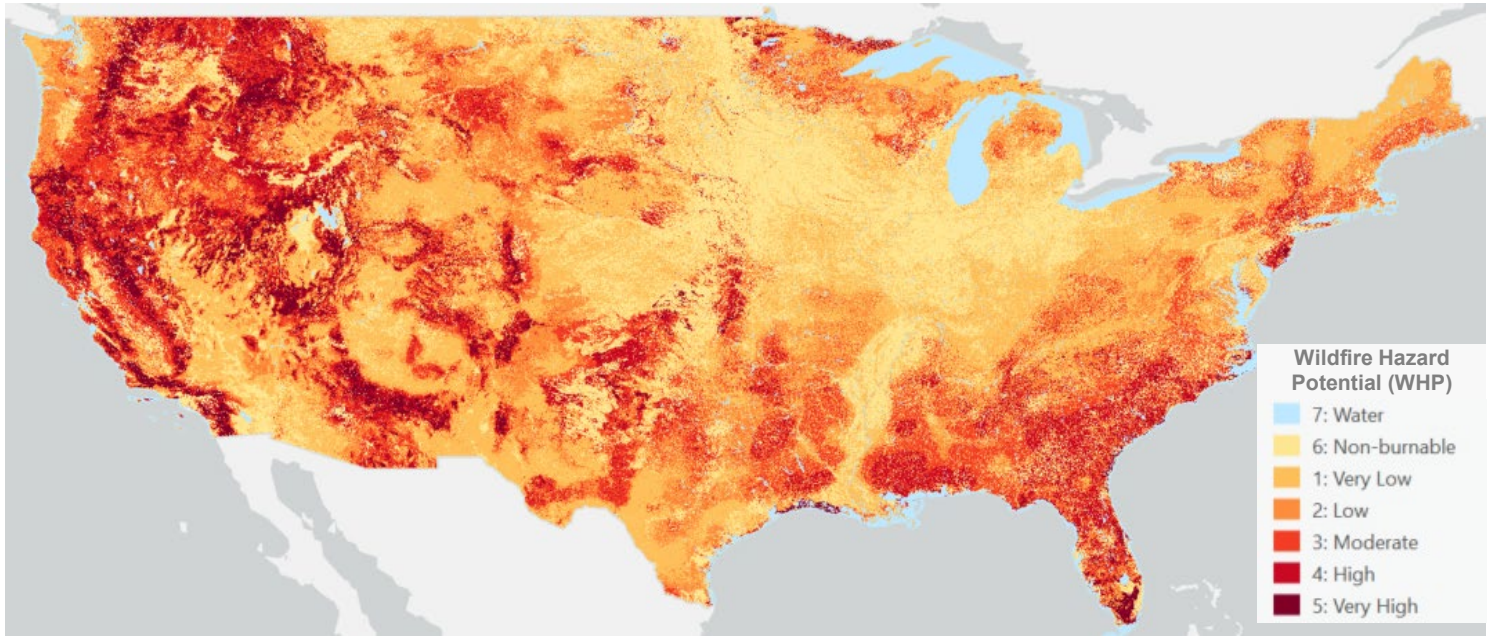
– Property attributes

Insurers' Non-Renewal and New Business Underwriting Decisions Evidence from Rate Filings

Insurer Name	2018 Market Share in CA (by DPW)	Non-Renewal Descriptions from Rate Filings	Wildfire-Related New Business Eligibility Descriptions from Rate Filings
State Farm	17.60%		"Non-Tenant Homeowners, Renters and Condominium Unit owners with the following are **ineligible** for new business: **High or Very High Wildfire risk exposure**… Non-Tenant Homeowners are ineligible in Managed Growth Areas... Managed Growth Areas are reviewed on a regular basis and are defined as **areas with the highest modeled wildfire** and fire following earthquake risk." "The current list of Managed Growth Areas (MGAs) has been changed to be focused on areas with a higher catastrophic risk as opposed to high loss frequency, market penetration and rate inadequacy."(*SFMA-132596302; 2020*)
Farmers	16.29%	"Farmers identified ZIP codes throughout California where Farmers has a higher concentration of high wildfire risk policies. Within those **high-risk ZIP codes**, we have selected the **highest risk policies** to non-renew based on our filed underwriting guidelines." (*FARM-132064418; 2019*)	"The acceptable FireLine threshold for new business, renewal business, rewrites, reissues and reinstatements over 60 days depends on the ZIP Code of the property. All ZIP Codes in the state have been assigned to one of two risk Tiers: Extreme and Other... The maximum allowed score for each tier is as follows: **Extreme Hazard (ZIP codes) - Only properties with a FireLine score of zero are permitted;** **Other Hazard (ZIP codes) - Homes with wood roofs may only have a FireLine score of zero. Homes with all other roof types are permitted up to a FireLine score of 3**." "The company used to accept certain zip codes up to FireLine score 6, and now the highest FireLine score is 3."(*FARM-132064418; 2019*)
Allstate	7.94%	"The (non-renewed) policies identified all have the following characteristics: 1. The location of homes will be selected based on **areas of the state with significant wildfire risk where Allstate also has a higher concentration** (household penetration above our statewide average). 2. **The homes have a very high wildfire risk** based on CoreLogic's Risk Meter score. The wildfire score threshold to be used for non-renewals will vary depending on location and concentration (the highest score being 100 and no homes below 60 will be impacted). 3. Homes in very small zip codes have been excluded (less than 10 Allstate insured homes)." (*ALSE-132044184; 2019*)	"Properties with dwelling coverage that have a **wildfire score over 20 (used to be 80) will be ineligible** for new business"(*ALSE-132200967; 2020*)
CSAA	6.53%	"On renewal business: in an effort to continue to offer coverage to as much of our existing book as possible, exceptions are not made by individual underwriters, but instead were **decided on a program level**, taking into account objective factors such as actual Non-CAT losses, expected CAT loss, underwriting expense, loss adjustment expense, and properties covered by Senate Bills 824 and 894."(*WSUN-132084878; 2019*)	"New business effective 11/09/2019 and later **must meet the maximum wildfire hazard score in its respective category** (Categories A-G) in order to be eligible." (The categories A-G are assessed based on: % area wildfire burned in last 30 years, % area classified as non-water and WUI/vegetation, % area classified as developed by National Land Cover Database, ZIP-level market share) (*WSUN-132084878; 2019*)
Liberty Mutual	6.25%	"Risks are identified for non-renewal based on **the location of the property** and if that **area** has been determined by our underwriting guidelines as a **high wildfire risk** which had been loaded into Map Analyst. Each non-renewal is reviewed by our underwriting team to ensure it is being evaluated based on the most recent available data."(*LBPM-131913180; 2019*)	"Designated areas of California present increased exposure to wildfire and as a result writing property exposures in these areas is restricted… These areas present an **unacceptable wildfire exposure** due to one or more of the following: proximity to native and non-native flammable brush, wind patterns relative to fuels during typical wildfire season, accessibility of roads to firefighting/emergency response equipment." (*LBPM-131913180; 2019*)

Proxy for Insurance Availability in a Location

- **Proxy for insurance availability: fire risk exposure at both property- and community-level**
  - » Availability challenges from low to high:
    1) Property in a low-risk community
    2) Low-risk property in a high-risk community
    3) High-risk property in a high-risk community
  - » Location-based fire risk exposure determined by Wildfire Hazard Potential (WHP) developed by USDA Forest Service
    - – Relative potential to experience a difficult-to-contain wildfire
    - – Factors used for fire risk assessment: fuel/vegetation, topography, historical wildfire ignition locations



High-Risk Property: WHP = High *or* Very High

Low-Risk Property: WHP = Non-Burnable, Very Low, Low, *or* Moderate

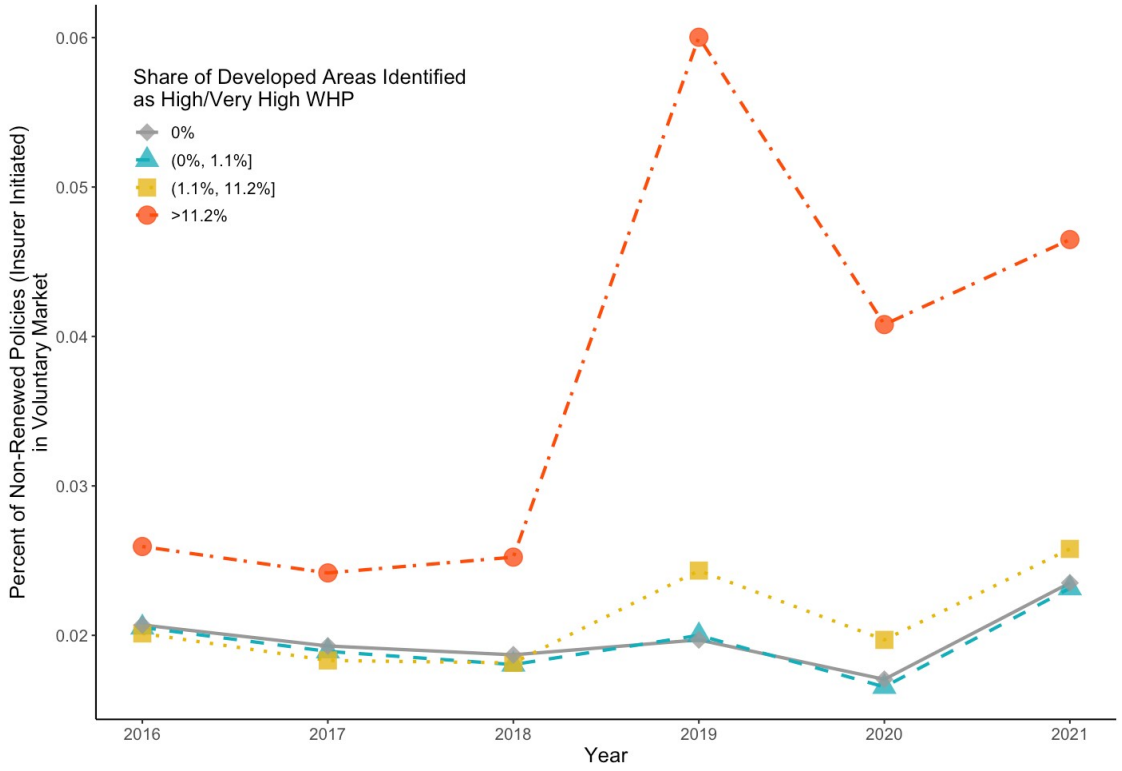
High-Risk Community: census tract where <u>at least some</u> properties are identified as high-risk

Low-Risk Community: census tract where <u>all</u> properties are identified as low-risk

Trends in Insurance Conditions: 2016-2021

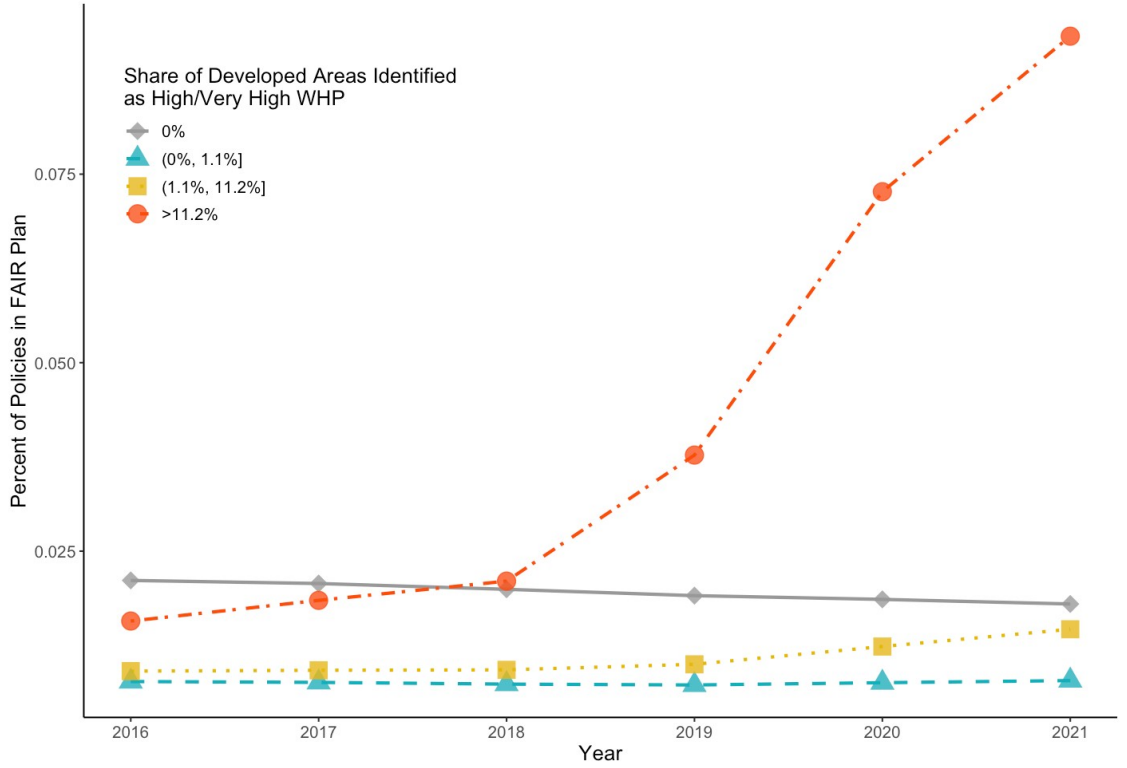
Insurer-Initiated Non-Renewal Rate

Percent of residential insurance policies in the private market not being renewed by insurers



California FAIR Plan Market Share

Percent of residential insurance policies in the state-backed insurer of last resort

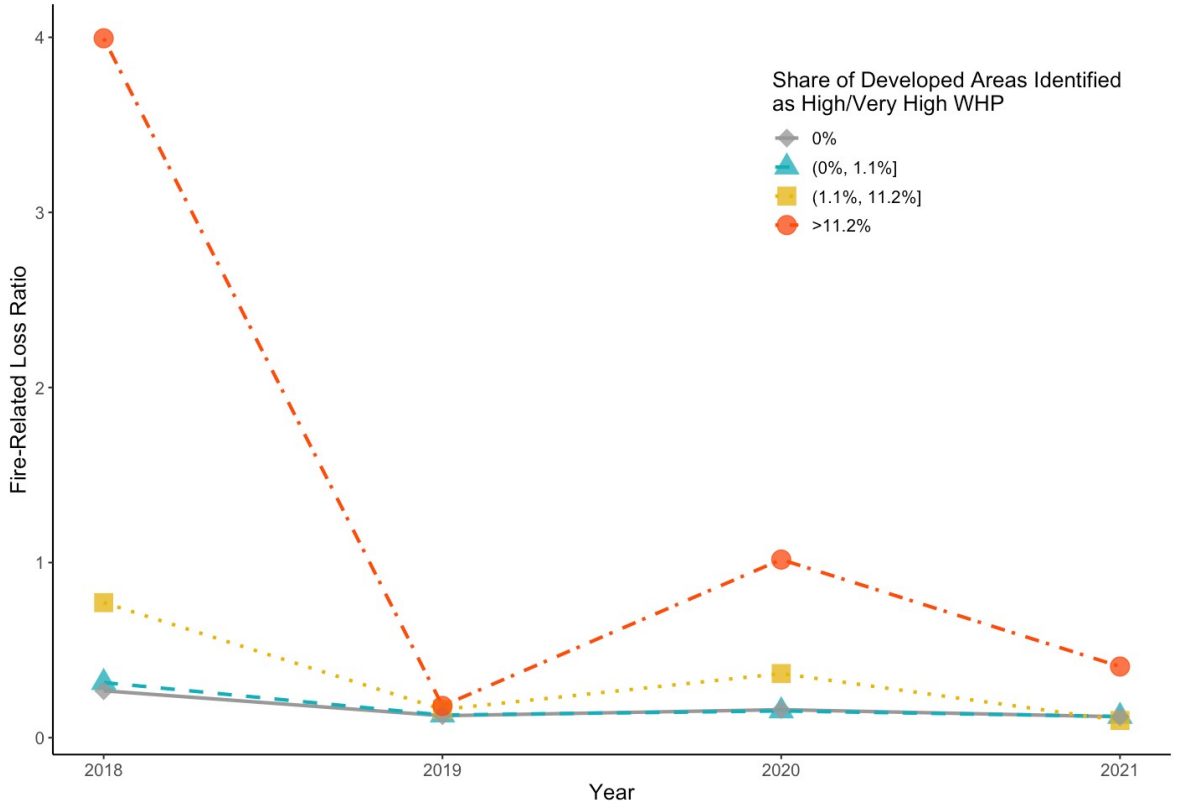


Note: ZIP-level insurance data from California Department of Insurance (CDI). ZIP-level fire hazard calculated based on the share of developed areas identified as having high or very high Wildfire Hazard Potential (WHP).

Trends in Insurance Conditions: 2016-2021

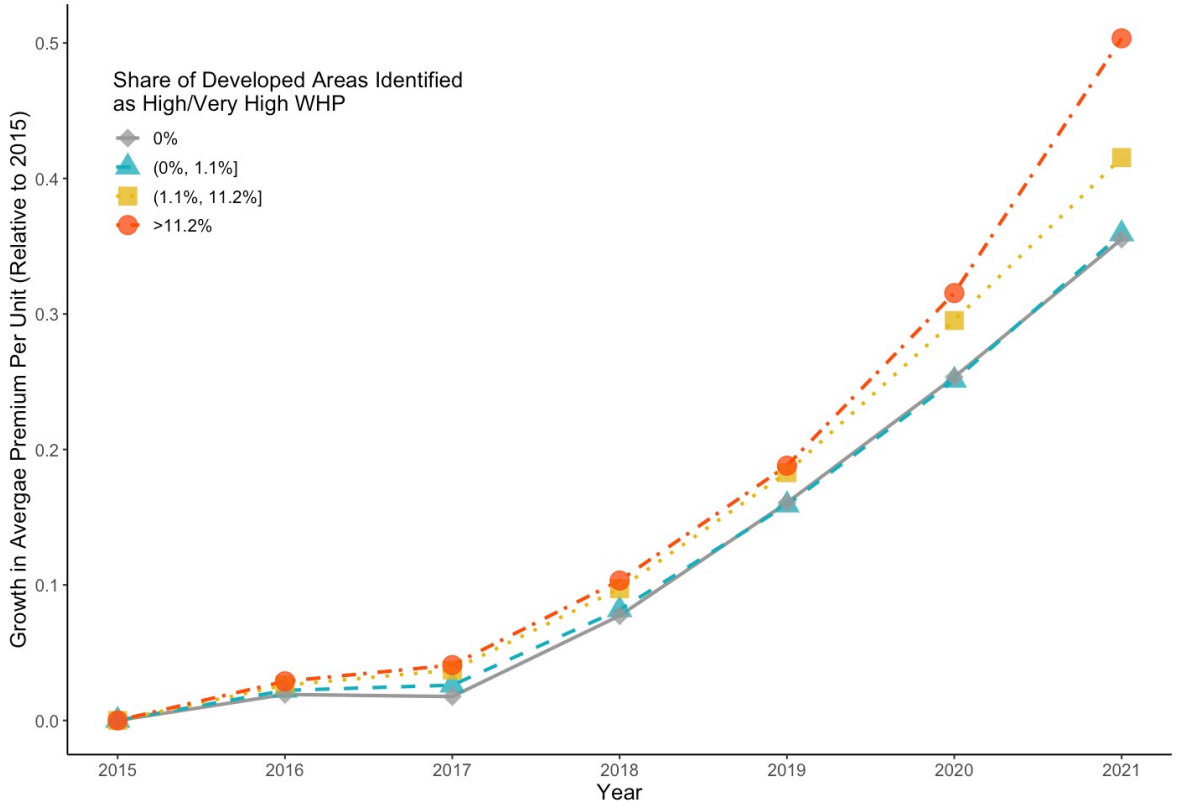
Fire-Related Loss Ratio

Losses incurred for fire-related claims divided by total premiums earned



Growth in Average Premium Per Policy

Total premiums earned divided by total number of exposure units earned, normalized by 2015 values



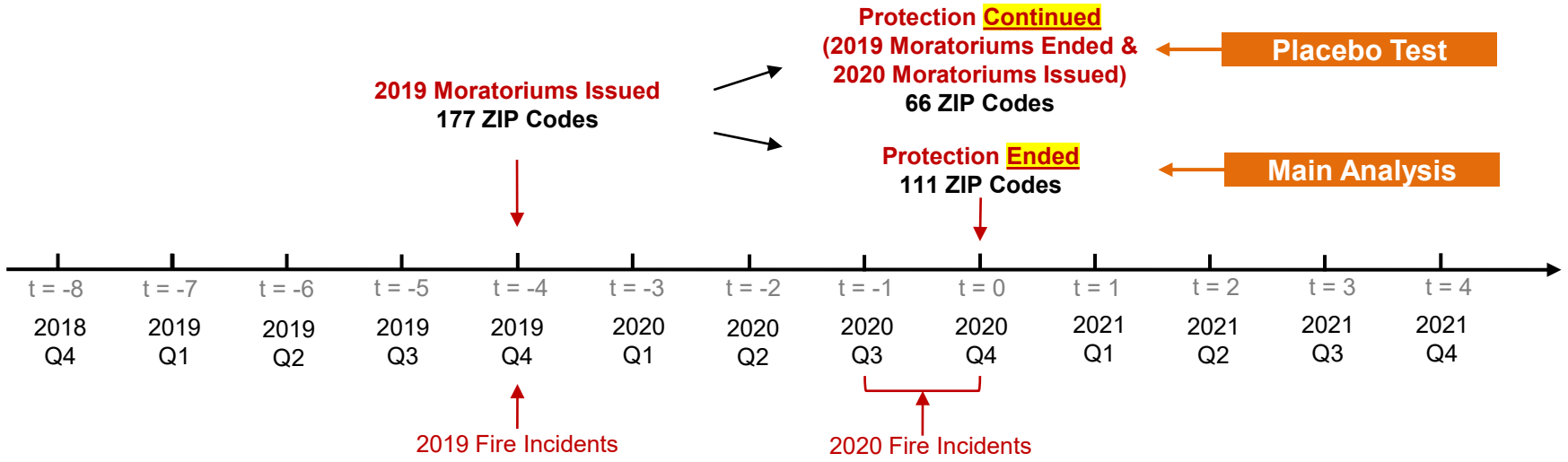
Note: ZIP-level insurance data from California Department of Insurance (CDI). ZIP-level fire hazard calculated based on the share of developed areas identified as having high or very high Wildfire Hazard Potential (WHP).

Existing Homeowners and Intent to Move Out:
Impact of Insurance Non-Renewals

- **Natural experiment: One-Year Mandatory Moratorium on Insurance Non-Renewals in CA**

Wildfire Incident → Governor declaration of state of emergency → Department of Insurance issue moratoriums to ZIP codes ***within or adjacent*** to a fire perimeter → **12 months** → Moratorium ends

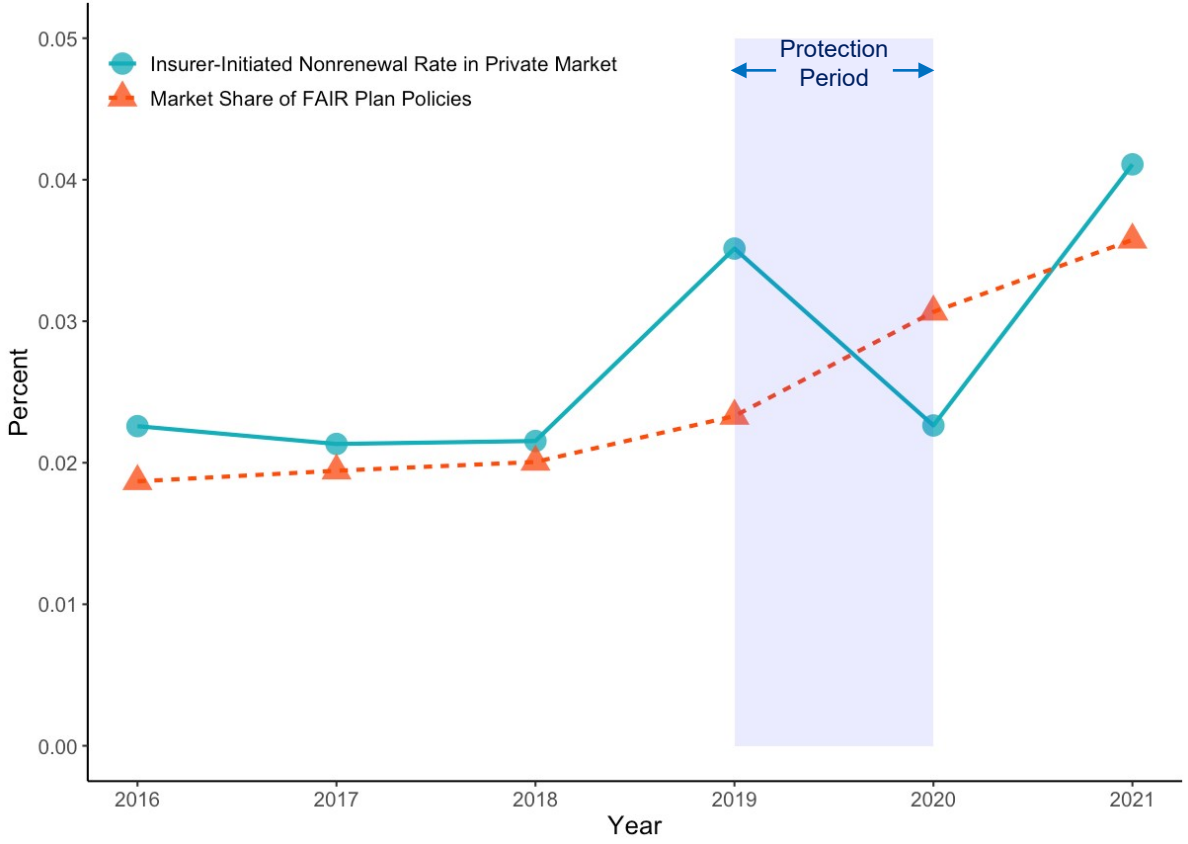
- Prohibits insurers from residential insurance coverage non-renewals due to wildfire-related reasons
- One-year protection
- First implemented in **October 2019** (177 ZIP Codes)



Insurance Availability in 2019-Moratorium-Protected ZIP Codes

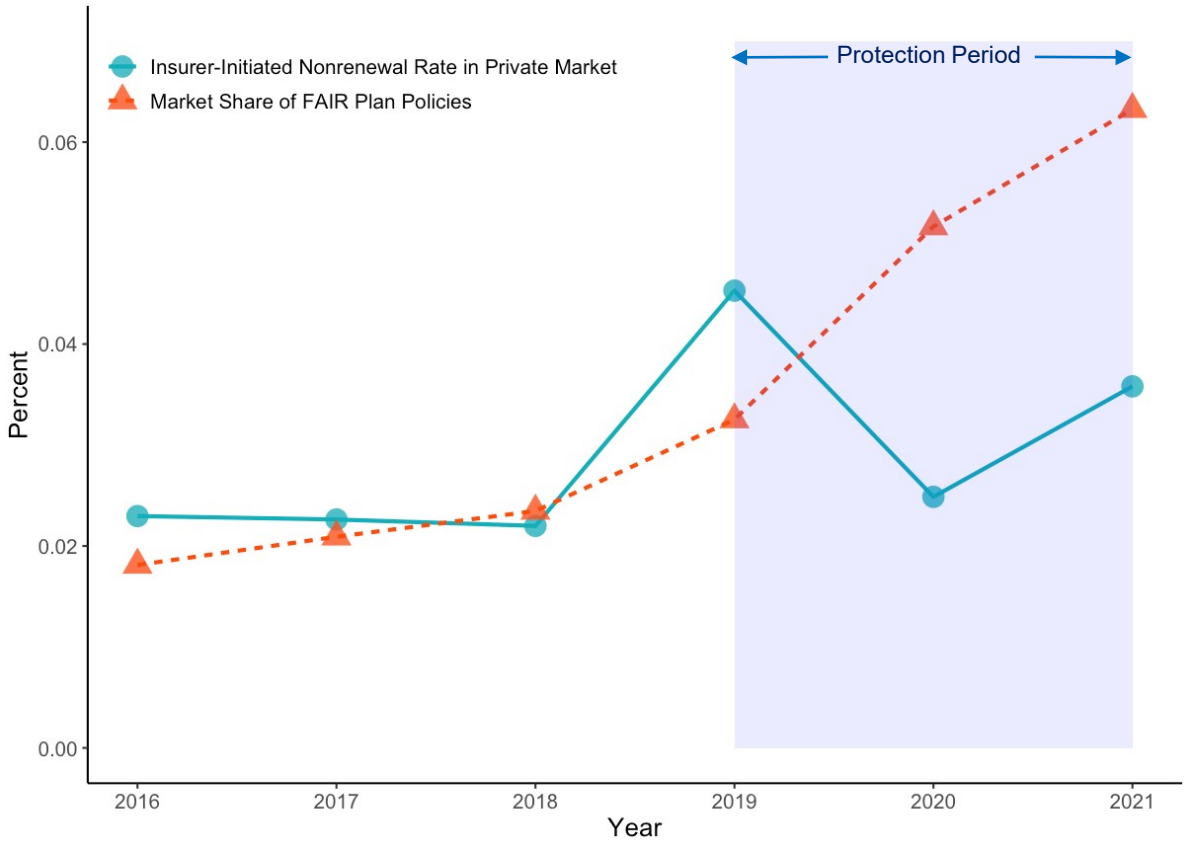
Protection Ended in October 2020

111 California ZIP Codes for Main Analysis



Protection Ended in August/September 2020

66 California ZIP Codes for Placebo Test



Note: ZIP-level insurance data from California Department of Insurance (CDI).

Methodology: Intent to Move Out

- **Methodology**: event study regression at quarterly frequency

$$y_{jpkt} = \beta_0 + \sum_t \boldsymbol{\beta_{1t}} * (EventQuarter_t \times FireHazard_{pk}) + \beta_2 * FireHazard_{pk} + \Omega \boldsymbol{X}_{jpkt} + \Gamma \boldsymbol{Z}_{pkt} + \eta_{kt} + \mu_{jpkt}$$

y_{jpkt} = geographic characteristics of homes that household *j* currently living in property *p* and ZIP *k* intend to move to in event-quarter *t*

$\boldsymbol{X}_{jpkt}$ = applicant socioeconomic characteristics (monthly income, monthly debt, race, ethnicity, age, FICO, marital status , FTHB, self-employed or not, residency duration, FTHB);

$\boldsymbol{Z}_{pkt}$ = location-based characteristics (proximity to fire perimeters, proximity to the nearest fire station, primary/secondary road, and coastline, fire hazard severity zone designation)

property characteristics (second order polynomials of home age and living square footage, number of bathrooms & bedrooms, presence of a garage or a pool)

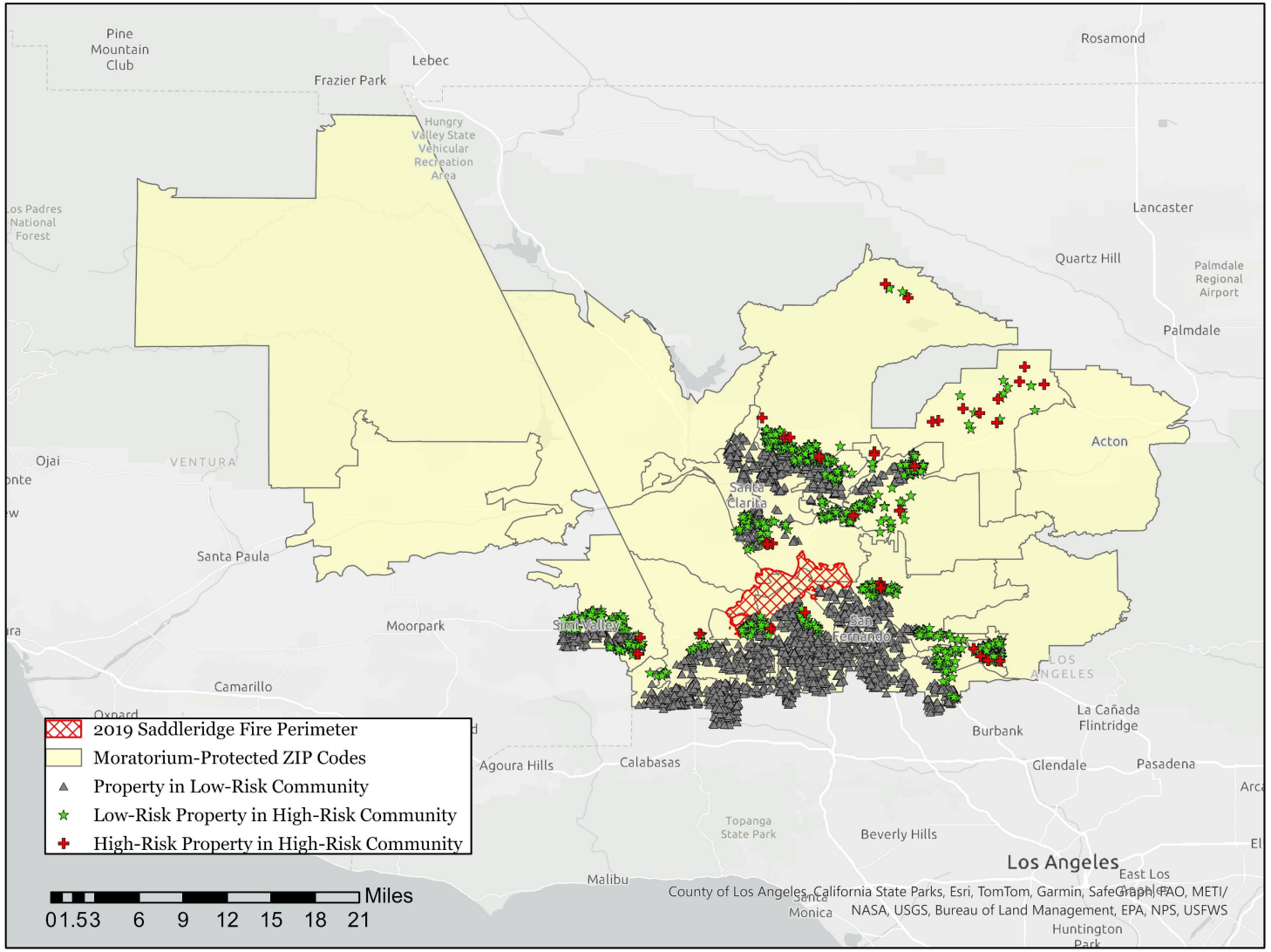
η_{kt} = ZIP-year-quarter fixed effects

- **Main Sample**: 11,107 household-quarter observations from 2018-Q4 to 2021-Q4
  - » Existing CA owners of a single-family home; inside 2019-moratorium-protected ZIP codes but outside fire perimeters
  - » Intend to occupy applied property

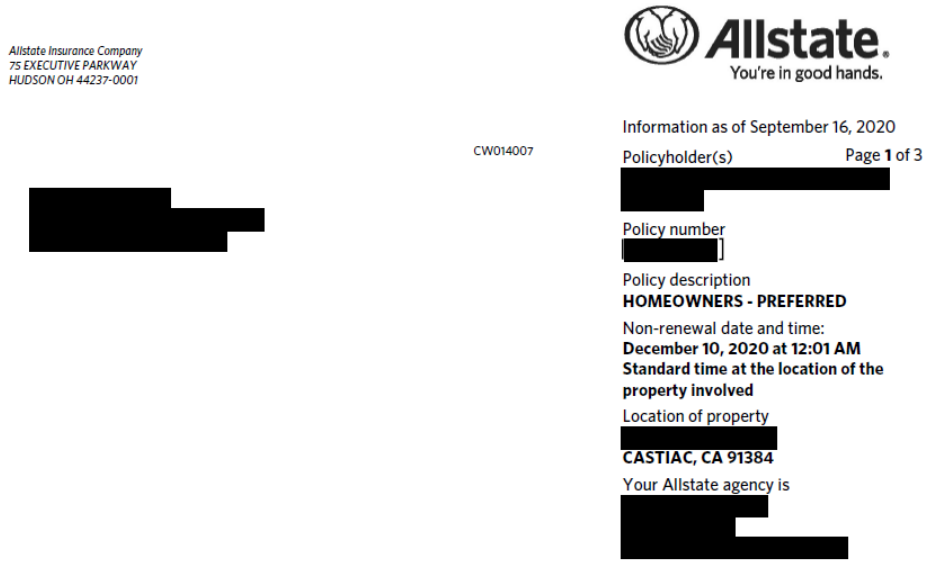
- **Hypothesis**:

Non-renewal protection ended → Current homeowners **with higher wildfire hazards (treatment group)** are more likely to experience insurance non-renewals → More likely to change home search preferences (e.g., search for lower-risk homes)

Example: 2019 Saddleridge Fire & Moratorium-Protected ZIP Codes



Notice of Non-Renewal and Risk Information



Allstate Insurance Company
75 EXECUTIVE PARKWAY
HUDSON OH 44237-0001

Allstate. You're in good hands.

CW014007

Information as of September 16, 2020

Policyholder(s) [redacted] Page 1 of 3

Policy number [redacted]

Policy description
HOMEOWNERS - PREFERRED

Non-renewal date and time:
December 10, 2020 at 12:01 AM Standard time at the location of the property involved

Location of property [redacted]
CASTIAC, CA 91384

Your Allstate agency is [redacted]

Notice of non-renewal

We are writing to inform you that we will be unable to renew the Allstate policy identified above. Your policy will terminate as of the non-renewal date and time shown above due to the following reason(s):

Your dwelling is ineligible for a homeowner policy because the property is located in a brushfire or wildfire area that no longer meets Allstate's minimum standard for wildfire in that area.

The protection provided by your policy will remain in effect until the non-renewal date and time shown above. However, in the event that any policy premiums are not paid when due, we may cancel the policy prior to that non-renewal date and time.

It's important to remember that you will be without this insurance coverage as of the non-renewal date and time displayed at the top of this notice. Feel free to contact your Allstate representative to see if there are other ways Allstate can continue to work with you to meet your insurance needs. Please keep in mind that you may also be eligible for this type of coverage through other insurance providers.

If you have any questions about your policy or the reason(s) for this non-renewal, please don't hesitate to contact your current Allstate representative or call 1-800-ALLSTATE® (1-800-255-7828). If your questions about this non-renewal are not addressed to your satisfaction, you may contact the Department of Insurance, Consumer Services Division, at 1-800-927-4357 to have this matter reviewed.

Sincerely,

Risk Management Department

Allstate Insurance Company

Notice of non-renewal

We are writing to inform you that we will be unable to renew the Allstate policy identified above. Your policy will terminate as of the non-renewal date and time shown above due to the following reason(s):

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↓

Risk Information

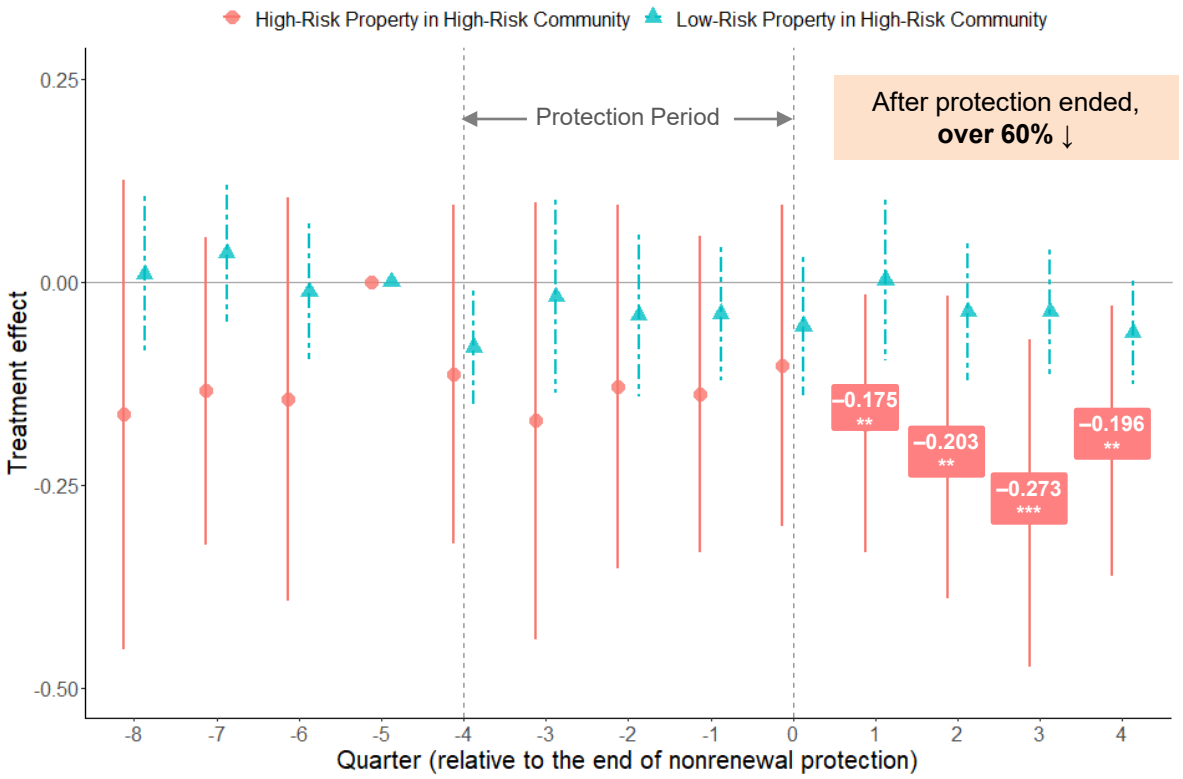
↓

Location choice when searching for a new home

Main Results: Intent to Move Out

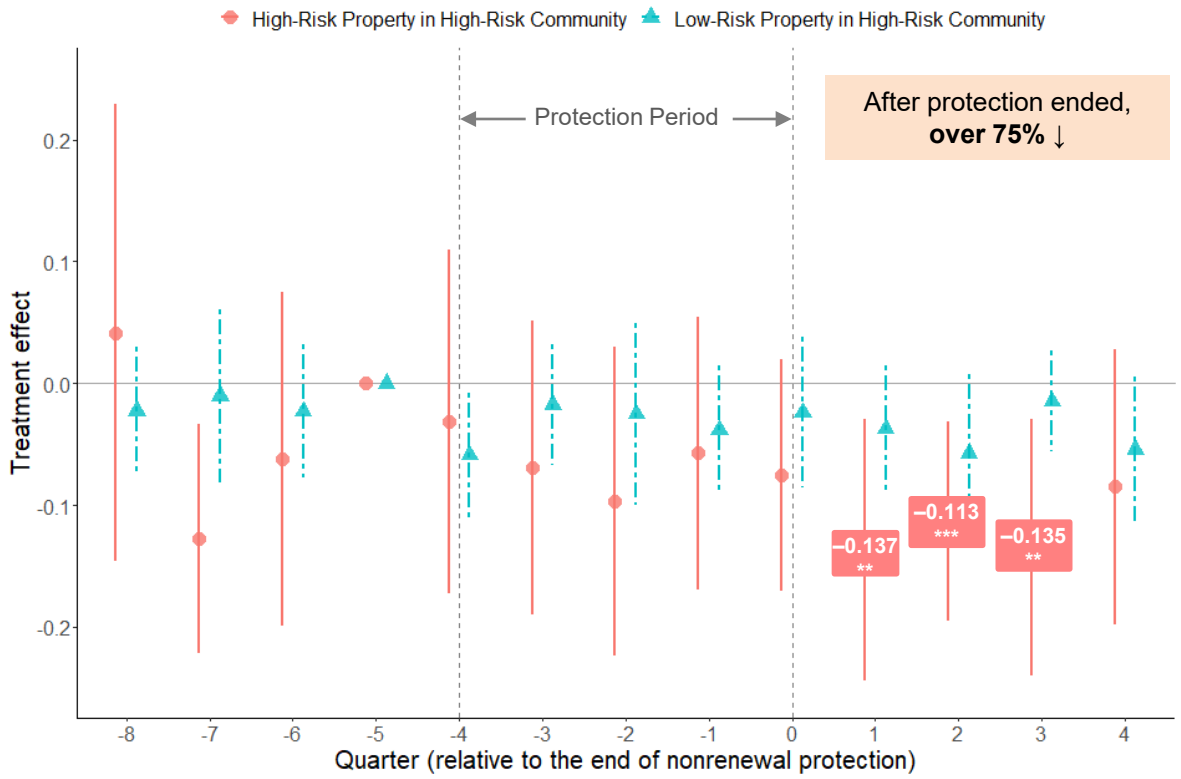
Search for High-Risk Homes in High-Risk Community

Pre-Moratorium Level $_{t=-5}$ = 0.277



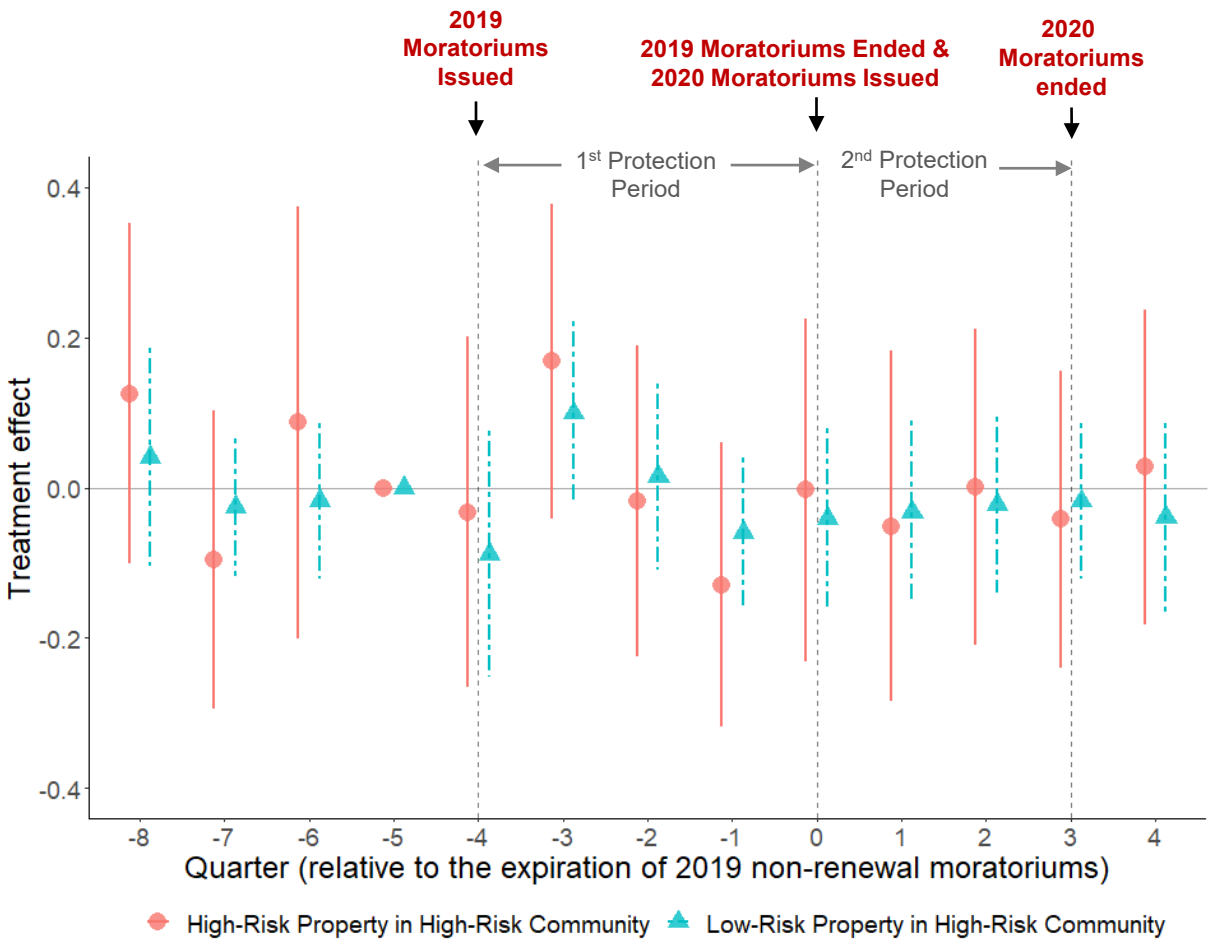
Vegetation Share of Areas within 0.1 Mile Radius of Applied Homes

Pre-Moratorium Level $_{t=-5}$ = 0.151

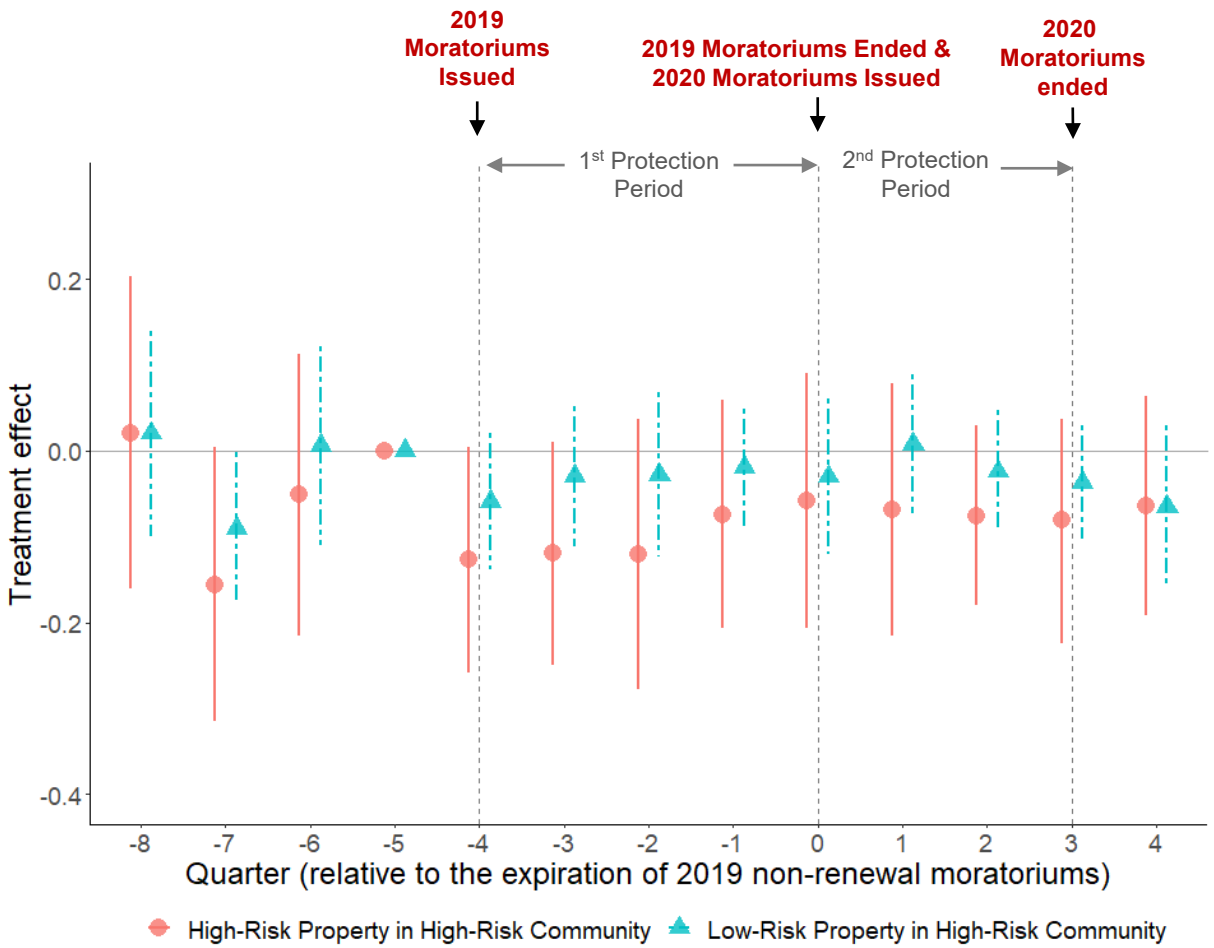


Placebo Test

Search for High-Risk Homes in High-Risk Community



Vegetation Share of Areas within 0.1 Mile Radius of Applied Homes



Alternative Explanation for Observed Non-Renewal Effect

- **Alternative Explanation: Cost concern of managing fire risk**
  - » Rejected by private market → Higher insurance costs + Wider coverage gap
  - » California FAIR plan policy
    - – Offer less comprehensive coverage
    - – More expensive

	Standard Homeowners Policy	FAIR Plan Policy
2021 Average Deductible	$1,997	$2,045
2021 Average Coverage Amount	$927,000	$505,000
2021 Average Annual Premium	$1,400	$1,900

Note: Authors' calculation using data from California Department of Insurance (CDI).

- **Two sets of tests:**
  - » Control for insurance cost
    - – Estimate address-level homeowners insurance cost at the time of home loan application
    - – Increased insurance costs only partially explain observed effects
  - » Heterogeneity analysis by applicant income
    - – Applicants' geographic choices of home search do not vary by income

Characterize Homeowners Insurance Premium

- **Data Source**: Uniform Closing Dataset (UCD)
  - Closing documents for all single-family loans purchased by GSEs

- **Data Field**:
  - Monthly homeowners insurance premium
    - At a street address
    - At the time of closing a mortgage

Other Costs

E.	**Taxes and Other Government Fees**			**$4,029.40**
01	Recording Fees	Deed: $95.00	Mortgage: $345.00	$440.00
02	STATE TAX/STAMPS	to		$3,589.40
F.	**Prepaids**			**$1,479.70**
01	Homeowner's Insurance Premium (12 mo.) to STATE FARM INSURANCE COMPAN			$1,093.00
02	Mortgage Insurance Premium (mo.)			
03	Prepaid Interest ($77.34 per day from 6/26/24 to 7/1/24)			$386.70
04	Property Taxes (mo.)			
05	PROPERTY TAXES DUE	(3 mo.) to		
G.	**Initial Escrow Payment at Closing**			**$732.86**
01	Homeowner's Insurance	$91.08 per month for 3 mo.		$273.24
02	Mortgage Insurance	per month for mo.		
03	Property Taxes	$641.78 per month for 2 mo.		$1,283.56

- **Methodology**: Characterize insurance cost in year τ

$$HOPremium_{pk}^{\tau} = \alpha_1 * FireHazard_{pk}^{\tau}$$
$$+\alpha_2 * \left(FireHazard_{pk}^{\tau} \times HomeAge_{pk}^{\tau}\right)$$
$$+\alpha_3 * HomeValue_{pk}^{\tau} + \Theta \boldsymbol{Z}_{pk}^{\tau} + \eta_k + \mu_{pk}^{\tau}$$

$\boldsymbol{Z}_{pk}$ = location-based characteristics (proximity to fire perimeters, proximity to the nearest fire station, primary/secondary road, coastline, fire hazard severity zone designation)

property characteristics (home age, number of bathrooms & bedrooms, garage type, dwelling style, construction type, living square footage, fuel type for heating, roof type, type of exterior wall, fireplace type, presence of pool)

η_k = ZIP fixed effects

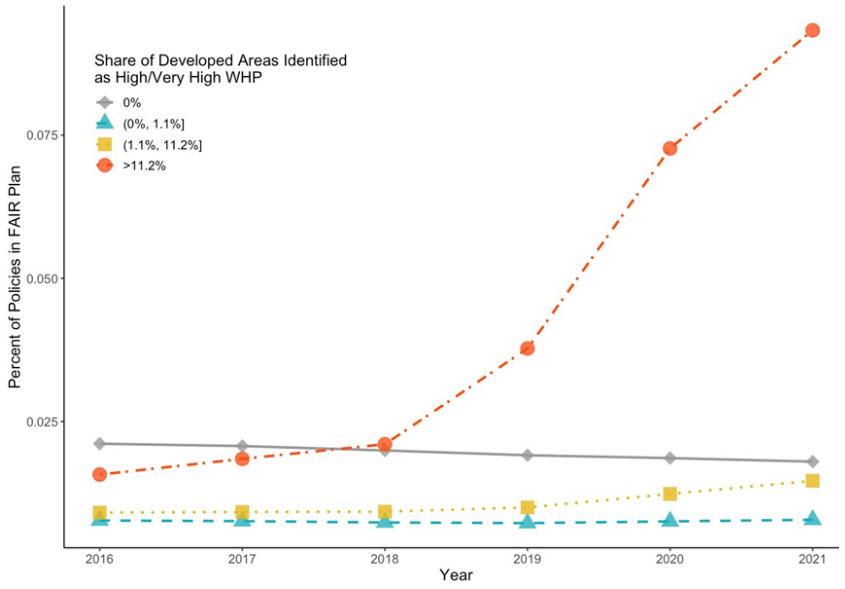
- **Assumption**:
  - Single-family homes with the same fire hazard, value, and structural/location characteristics in the same ZIP code → similar homeowners insurance premiums in the same year

New Home Buyers and Intent to Move In
Impact of Reduced Insurance Availability

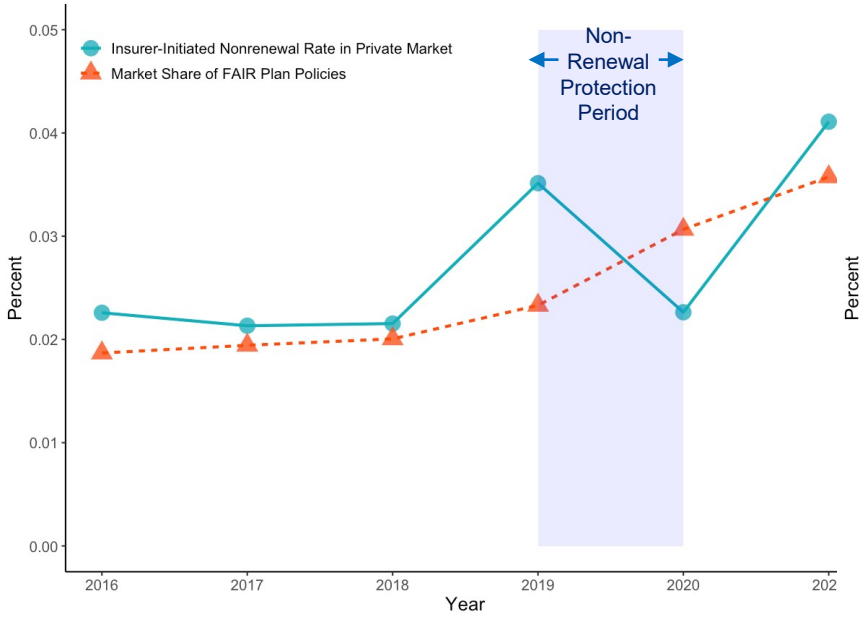
- **Natural Experiment**: Sudden deterioration in insurance options for new customers after the 2017-2018 wildfire seasons

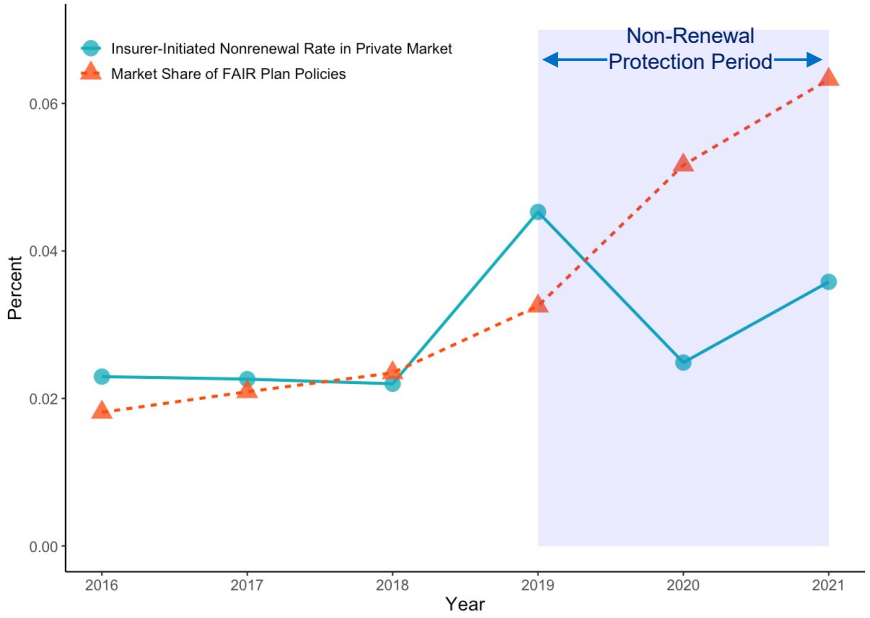
FAIR Plan Participation

- Sharp & continued increase in high-risk areas since 2019



- FAIR plan participation continued to elevate during the non-renewal protection periods
- Non-renewal moratoriums did not stop insurers from imposing restrictions on new business (Taylor et al., 2024)





Methodology: Intent to Move In

- **Methodology:** event study regression at yearly frequency

$$y_{jpkt} = \lambda_0 + \sum_{t \neq 2018} \boldsymbol{\lambda_{1t}} * (Year_t \times FireHazard_{pk}) + \lambda_2 * FireHazard_{pk}$$
$$+ \sum_{t \neq 2018} \lambda_{3t} * (Year_t \times HOPremium_{pkt}) + \lambda_4 * HOPremium_{pkt}$$
$$+ \Omega \boldsymbol{Z}_{pkt} + \eta_{kt} + \mu_{jpkt}$$

y_{jpkt} = characteristics of potential home buyers who are looking to buy property *p* in ZIP *k* in year *t*

$\boldsymbol{Z}_{pkt}$ = location-based characteristics (proximity to fire perimeters, proximity to the nearest fire station, primary/secondary road, and coastline, fire hazard severity zone designation)

property characteristics (second order polynomials of home age and living square footage, number of bathrooms & bedrooms, presence of a garage or a pool)

η_{kt} = ZIP-year fixed effects

- **Sample:** 373,118 application-year observations from 2018-2021
  - All home loan applications for single-family homes with a street address in California; outside fire perimeters
  - Intend to occupy applied property

Number of Home Loan Applications

	log(1+ApplicationVolume)					
	(1)	(2)	(3)	(4)	(5)	(6)
High-Risk Community × 2019	0.071***			0.033**		
	(0.015)			(0.014)		
High-Risk Community × 2020	0.142***			0.054***		
	(0.015)			(0.016)		
High-Risk Community × 2021	0.095***			0.087***		
	(0.016)			(0.017)		
High-Risk Property in High-Risk Community × 2019		−0.108***			−0.095***	
		(0.015)			(0.012)	
High-Risk Property in High-Risk Community × 2020		−0.261***			−0.261***	
		(0.017)			(0.015)	
High-Risk Property in High-Risk Community × 2021		−0.379***			−0.380***	
		(0.018)			(0.016)	
Low-Risk Property in High-Risk Community × 2019			0.053***			0.017
			(0.015)			(0.014)
Low-Risk Property in High-Risk Community × 2020			0.120***			0.029*
			(0.016)			(0.015)
Low-Risk Property in High-Risk Community × 2021			0.069***			0.054***
			(0.016)			(0.017)
Average HO Insurance Premium				0.006***	0.006***	0.006***
				(0.0002)	(0.0002)	(0.0002)
Average HO Insurance Premium × 2019				0.001***	0.001***	0.001***
				(0.0002)	(0.0002)	(0.0002)
Average HO Insurance Premium × 2020				0.002***	0.003***	0.002***
				(0.0003)	(0.0002)	(0.0003)
Average HO Insurance Premium × 2021				−0.001***	0.001***	−0.001***
				(0.0003)	(0.0002)	(0.0003)
Tract FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster by Tract	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.849	0.857	0.843	0.874	0.895	0.870
N	29,812	29,812	29,812	29,812	29,812	29,812

In aggregate, application volume ↑ in high-risk communities

- Application volume ↓ **for high-risk properties in high-risk communities** (locations that face the most challenge of obtaining insurance)
- Application volume ↑ **for low-risk properties in high-risk communities**

Applicant Composition

	Not Worried About Climate Risk		Logged Monthly Income		Logged Home Price	
	(1)	(2)	(3)	(4)	(5)	(6)
High-Risk Property in High-Risk Community	−0.070	−0.071	0.076***	0.050***	0.010	−0.016
	(0.078)	(0.079)	(0.012)	(0.012)	(0.020)	(0.019)
High-Risk Property in High-Risk Community × 2019	0.104	0.088	−0.018	−0.005	−0.021***	−0.011
	(0.099)	(0.101)	(0.014)	(0.014)	(0.007)	(0.007)
High-Risk Property in High-Risk Community × 2020	0.022	0.057	−0.015	−0.004	−0.038***	−0.021**
	(0.092)	(0.093)	(0.014)	(0.014)	(0.009)	(0.008)
High-Risk Property in High-Risk Community × 2021	0.179**	0.178**	−0.016	0.004	−0.046***	−0.023**
	(0.089)	(0.090)	(0.013)	(0.014)	(0.011)	(0.010)
Low-Risk Property in High-Risk Community	0.028	0.025	0.036***	0.028***	0.014	0.008
	(0.042)	(0.042)	(0.008)	(0.007)	(0.016)	(0.015)
Low-Risk Property in High-Risk Community × 2019	0.037	0.029	−0.004	−0.003	−0.004	−0.003
	(0.054)	(0.055)	(0.008)	(0.008)	(0.004)	(0.004)
Low-Risk Property in High-Risk Community × 2020	0.010	0.034	0.001	−0.001	−0.017***	−0.016***
	(0.050)	(0.051)	(0.008)	(0.008)	(0.005)	(0.005)
Low-Risk Property in High-Risk Community × 2021	0.074	0.078	0.0001	−0.00000	−0.019***	−0.016***
	(0.049)	(0.050)	(0.008)	(0.008)	(0.006)	(0.005)
HO Insurance Premium		−0.002		0.006***		0.002***
		(0.001)		(0.0005)		(0.0001)
HO Insurance Premium × 2019		0.001		−0.001***		−0.0004***
		(0.001)		(0.0002)		(0.0001)
HO Insurance Premium × 2020		−0.002*		−0.001***		−0.001***
		(0.001)		(0.0002)		(0.0001)
HO Insurance Premium × 2021		0.0005		−0.002***		−0.001***
		(0.001)		(0.0002)		(0.0001)
ZIP-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster by ZIP	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.650	0.650	0.386	0.388	0.601	0.617
N	373,118	373,118	373,118	373,118	617,208	617,208

1) Characteristics of home buyers interested in **high-risk** properties:
   - More likely to come from areas that show **lower concerns over climate change**
   - **No significant changes in applicant income**

2) Home prices of high-risk homes ↓ significantly by 2-3% post-2019

Summary

- **Reduced home insurance availability** affects where people choose to live and what homes they consider buying

  - » Existing homeowners
    - – Insurance non-renewal → search for homes in less fire-prone locations
    - – Not entirely explained by increased insurance cost
    - – Pattern does not vary by applicant income

  - » Potential home buyers
    - – Increased challenge of obtaining home insurance → Number of applications for high-risk homes declines
    - – Potential buyers shift to those with less concern over climate risk, with no significant changes in applicant income

  - » Home prices of high-risk homes decline
    - – Changes in housing demand plays a role
    - – Changes in credit supply may also play a role → deserve more investigation

  - » Decreased insurance availability affects housing demand through **risk signaling**

Thank You!

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NOTE: For discussion only

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