The Equilibrium Effects of Wildfires: Evidence from the California Housing Market

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Economic impacts of wildfires

- 15 of CA's 20 most destructive fires have happened since 2015 (CAL Fire 2025)
  $\Longrightarrow$ Massive economic losses

- Change in housing markets and composition of neighborhoods (Hennighausen and James 2024)

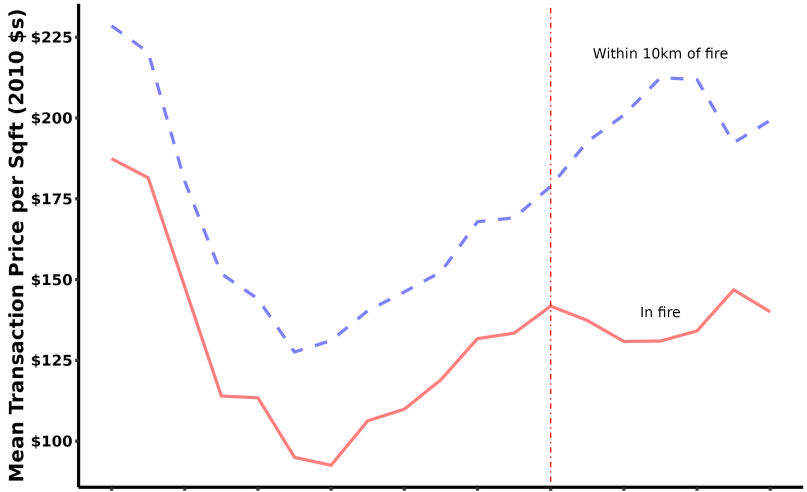
Estimated cost of fire damage balloons to more than $250 billion



Residents search for belongings in the remains of their burned-out homes in Altadena on Tuesday. (Allen J. Schaben / Los Angeles Times)

Source: Vincent 2025

Camp Fire (2018) lowered price/sqft



Research Question

What are the equilibrium effects of wildfires?

- Estimate the net effect of wildfire exposure on housing transaction prices
  - Wildfires negatively affect both supply and demand $\implies$ net effect is ambiguous
  - Shed light on supply vs demand effects
  - Housing quality, local amenity, and supply effects
- 20 years of California housing transaction and wildfire data
- Event study in a hedonic framework

Literature and contributions

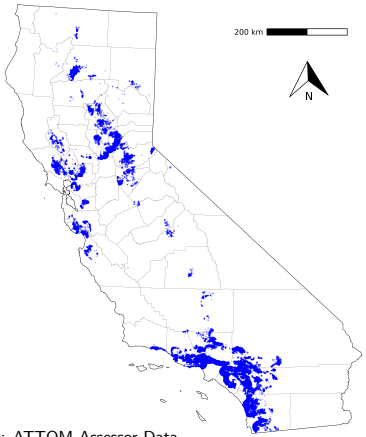
Previous work:

- Hedonic work evaluates environmental goods that don't directly affect the housing stock (Banzhaf 2021, Haninger et al. 2017, Muehlenbachs et al. 2015)
- Work on property values and wildfire exposure focuses on recovery and/or direct exposure costs (He et al. 2026, Issler et al. 2026, Malliaris et al. 2026)

This paper:

- **Considers supply and demand effects in a hedonic framework**
- **Estimates costs associated with declining housing quality and worsening amenities**
- **Shows that prices move in a way consistent with demand changes**

Housing Data

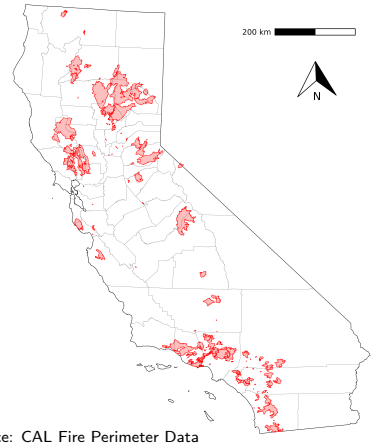


Source: ATTOM Assessor Data

ATTOM

- Recorder data: APN, sale price, sale date
- Assessor data: property characteristics, location, assessed value
- Keep residential owner occupied properties that sold at least twice between 2004 and 2024 and are within 10km of a wildfire
- Drop multi-treated properties ($< 1\%$) and housing characteristic outliers
- 400,000 properties with 2 million transactions

Wildfire Data: Perimeters



Source: CAL Fire Perimeter Data

CAL Fire

- Fire perimeters data: record fires of a certain size or if there is any structure damage or loss of life
- Wildfire name, start date, end date, perimeter
- Keep fires $\geq$ 300 acres from 2004 to 2024 that have at least one property in the perimeter
- 159 fires

Supplemental data:

- Property-level damage status
- Residential building permits
- Satellite vegetation data (NDVI)

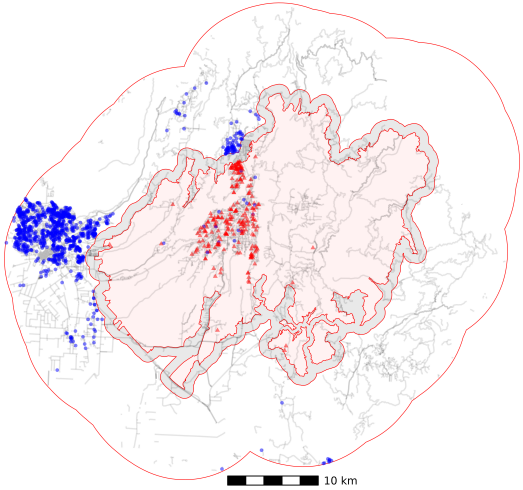
Identifying the supply and demand effects

1. Damaged:
   - housing quality (HQ): structure damage because of the fire $\rightarrow P \downarrow$
   - amenity (A): fire damages local amenities $\rightarrow P \downarrow$
   - supply (S): fire decreases local housing stock $\rightarrow P \uparrow$
   - $\Delta P_D = HQ + A + S$

2. Undamaged:
   - housing quality (HQ): not damaged $\rightarrow$ no effect on P
   - amenity (A): fire damages local amenities $\rightarrow P \downarrow$
   - supply (S): fire decreases local housing stock $\rightarrow P \uparrow$
   - $\Delta P_U = A + S \equiv A^{UB}$

$$\implies HQ = \Delta P_D - \Delta P_U$$

Defining treatment and control: Camp Fire Sales 2017-2019

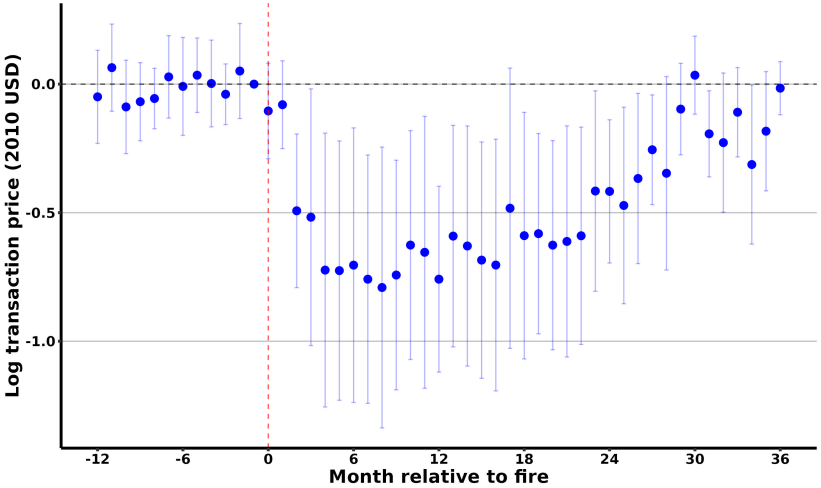


Stacked Event Study (Wing, Freedman, Hollingsworth (2024))

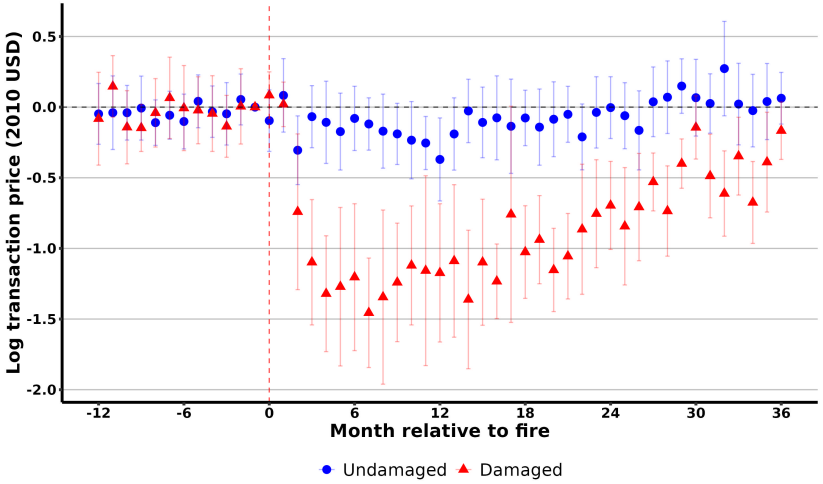
$$ln(p_{itycf}) = \sum_{\substack{\tau=k \\ \tau \neq -1}}^{K} \beta_\tau Fire_{if} * ET_{ft}^{\tau} + \gamma X_{ity} + \alpha_{if} + \delta_{tf} + \eta_{cyf} + \varepsilon_{itycf}$$

- p: transaction price of property i in month t in census tract c and year y
- $Fire$: indicator if property i is in the fire
- ET: indicator for being τ months from the fire month
- X: property characteristics (bathrooms, bedrooms, age, age^2, property type)
- property (α), sale month (δ), census tract-sale year (η) fixed effects are all interacted with a fire
- Standard errors are clustered at the fire level

Wildfires lead to a large, temporary decline in housing prices



Undamaged property prices fall by as much as 30%, damaged by 69%



Housing quality and amenity costs are substantial

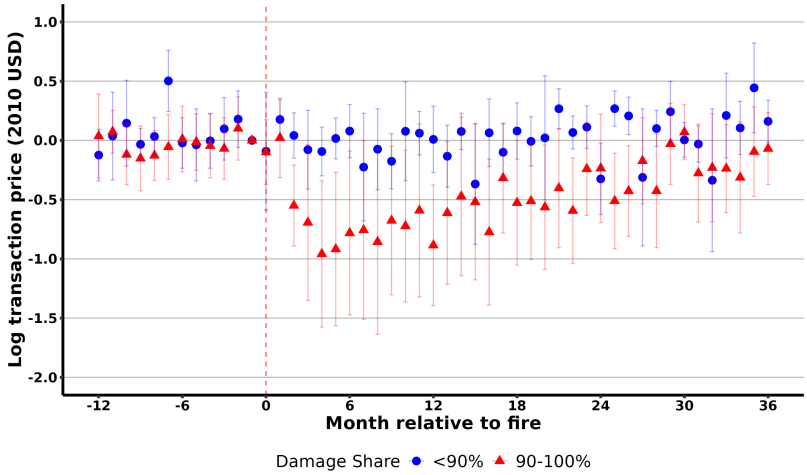
One year after the fire:

- $HQ = -55\%$
- $A^{UB} = -30\%$

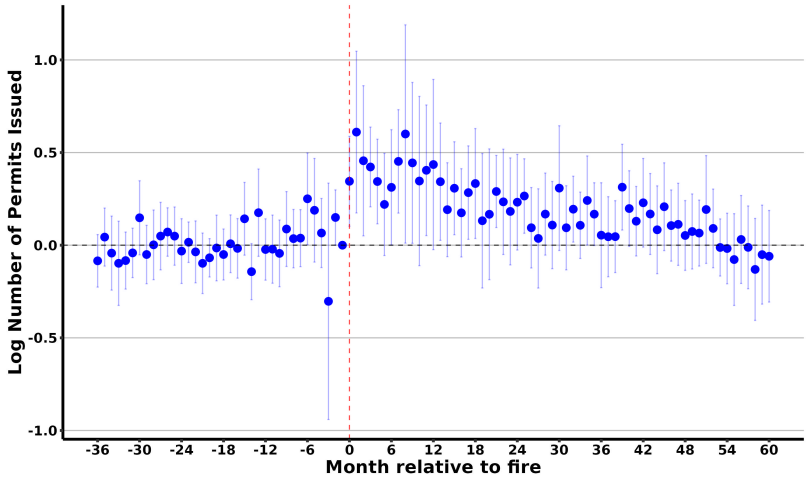
Calculate costs using pre-fire prices, number of properties, and HQ and A^{UB} estimates:

- Mean housing quality costs per fire: \$657 million
- Mean amenity costs per fire: \$812 million
- Camp Fire housing quality costs: \$2.6 billion
- Camp Fire amenity costs: \$1.7 billion

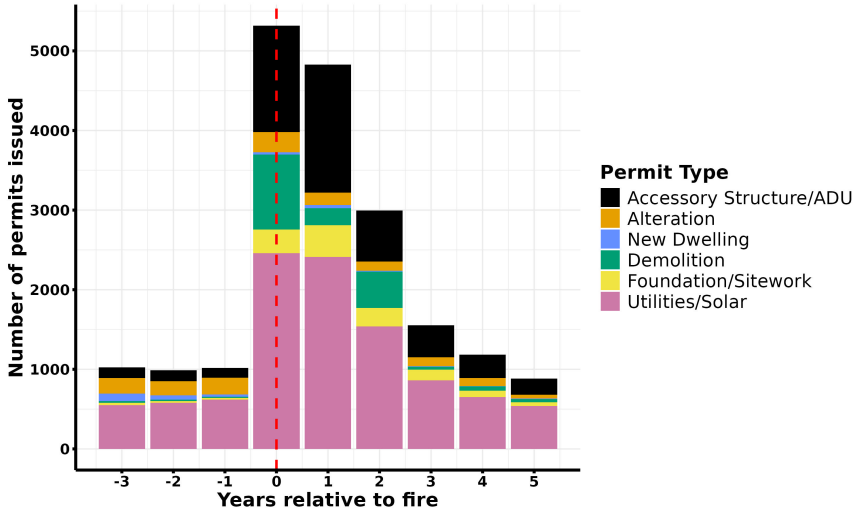
Substantial nearby damage leads to declining prices



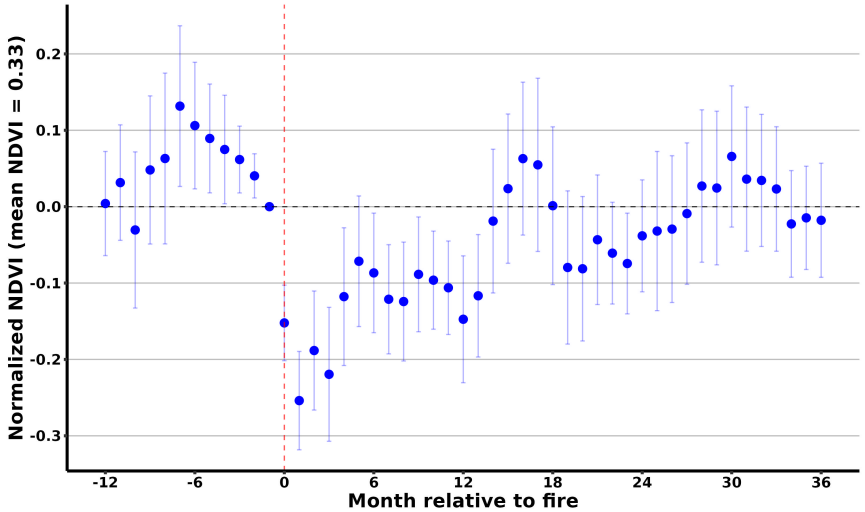
Residential building permits spike 1 month after the fire at 84%



Demolition, utility, and accessory structure permits drive the increase



Local greenery recovers with prices



Conclusion

- Wildfires affect housing market prices primarily through demand changes
- Declining housing and amenity quality leads to substantial costs
- Prices recover as neighborhood quality improves

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