The Distribution and Consequences of Disaster Property Losses: Evidence from Tax Returns of Wildfire Victims

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Abstract

We merge property-level damage data for over 100 U.S. wildfires with individual tax and Census data to understand the demographics of wildfire victims and the effects of wildfires on earnings and migration. The granular data illuminate disparities in hazard (likelihood of a wildfire) and structure vulnerability (likelihood of destruction conditional on a fire). On average, occupants of exposed homes are wealthier and more likely to be white. Individuals with lower pre-fire incomes are more likely to have their homes destroyed, consistent with other evidence of a "structure vulnerability gap". Wildfires reduce earnings for occupants of destroyed homes by 10% on average in years immediately following the fire, and 40% of occupants of destroyed structures are still filing taxes from a different address two years after the event.

1 Introduction

Global economic losses from natural catastrophes totaled $320 billion in 2024, continuing a trend of increasing costs.[1] Adapting to these growing perils requires an understanding of the broader economic consequences of disasters as well as how these impacts are distributed. We provide new information for catastrophic wildfire events in the United States. We merge address-level damage data for more than 100 U.S. wildfires with individual tax returns and Census microdata to reveal detailed demographics of wildfire-affected

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1. Munich RE, "Natural Disasters in 2024", January 2025.

households and the effects of wildfire events on earnings, employment, and migration in subsequent years. The highly granular damage data allow us to separately examine occupants of destroyed homes, homes that were exposed to the fire but were not destroyed, and unexposed homes located near the area of the fire.

Our first main contribution is a set of descriptive analyses on the distribution of hazard and vulnerability. We document disparities in wildfire *hazard* by comparing the income, race, ethnicity, and age of the occupants of wildfire-affected (destroyed and surviving) homes to the US population and to nearby unaffected populations. The second descriptive exercise examines disparities in structure *vulnerability* conditional on exposure to a wildfire. These analyses compare demographics for the occupants of destroyed vs. surviving homes. Understanding these demographic patterns of hazard and vulnerability is crucial for designing and evaluating risk mitigation initiatives and post-disaster assistance programs.

Our second main contribution is to estimate the causal effects of wildfire on income, employment, and migration for affected individuals in the several years following the wildfire. Our empirical strategy compares three groups of individuals. The first group are people whose homes were destroyed in the wildfire, "wildfire victims". The second group are people whose homes were inside the wildfire perimeter but that survived the wildfire, or "wildfire survivors". We compare both groups to a comparison set of households located close to – but outside of – the wildfire-affected area.

On average, households affected by wildfires have higher income and are more likely to be white than the US population, reflecting the geography of wildfire risk. Perhaps more strikingly, there is a clear income gap between occupants of destroyed and surviving homes. This structure vulnerability gap is consistent with other evidence that suggests disparities in ex ante wildfire risk mitigation (Anderson, Plantinga, and Wibbenmeyer 2023; Sølvsten, Whitlock, and Liao 2024; Reining et al. 2025) and differences in structure survival according to age of home and other variables (Baylis and Boomhower 2025; Plantinga, Walsh, and Wibbenmeyer 2022).

Among occupants of destroyed homes, there is an immediate and persistent effect on migration. Up to three years after the incident, more than 30% of households are still filing their taxes from a different address and more than 10% from a different county. Relative to households outside of the burned area, average income for wildfire victims falls by 10% in

the two years following the wildfire. Contrasting with the income gap in structure vulnerability, the observed changes in post-wildfire earnings are similar in percentage terms for households with above- and below-median pre-fire income. There is also a smaller effect on average income for occupants of surviving homes inside the wildfire perimeter.

These results for wildfire leverage similar tax data to those used to measure the effects of Hurricane Katrina by Deryugina, Kawano, and Levitt (2018). Relative to those estimates, an advantage of our data is the ability to identify damage outcomes for each individual tax filer (as opposed to relying on zip code damage severity proxies). This allows us to understand the differential impacts by the extent of property loss. It is also interesting to compare our wildfire effects to the estimates for Hurricane Katrina and other hurricane and flood events. One interesting difference that we explore in the results is the fact that income losses for wildfire victims are concentrated among residents who relocate out of the incident area. For hurricanes and floods, the opposite prevails in the data: out-migrants in the wake of the disaster have higher post-incident earnings.

Our work also adds to a small body of literature measuring the economic effects of wildfires. Existing evidence suggests that experiencing a large wildfire leads to migration in the short-run. Winkler and Rouleau (2021) find that counties that experienced large wildfires had reduced in-migration and increased out-migration in the following year. McConnell et al. (2024) show that large wildfire events are associated with internal migration within the United States. Smaller events, particularly those that destroy few homes, lead to little migration. Hennighausen and James (2024) find that most residents who file change of address forms after the Camp Fire relocated within one hundred miles of their original homes. To the best of our knowledge, no work examines the long-run migration implications of wildfire events.

For homeowners specifically affected by wildfires, there is some evidence of declines in financial stability, particularly as a result of property loss. Biswas, Hossain, and Zink (2023) examine mortgage outcomes for homes that faced wildfire. They find that homes destroyed by fire are (on average) slightly more likely to fall behind on insurance payments and significantly more likely likely to fully pay off extant mortgage balances. They attribute the second effect they attribute to insurance payouts that were insufficient to cover reconstruction costs (but enough to allow for repayment of the original loan). An, Gabriel, and Tzur-Ilan (2024) study how wildfire burn zones affect household consumer

and financial outcomes in Texas. They find that low-income renters within a burned area (averaging together destroyed and surviving homes) demonstrated higher levels of financial distress (higher spending, indebtedness, and loan delinquencies), as did individuals facing increased smoke levels.

A small body of evidence looks for racial and wealth disparities in exposure to wildfire risk. Davies et al. (2018) and Wibbenmeyer and Robertson (2022) examine the geographic coincidence of wildfire hazard with race, income, and other variables measured at the aggregate level (e.g., Census tract). Anderson, Plantinga, and Wibbenmeyer (2023) and Sølvsten, Whitlock, and Liao (2024) show that fuel-reduction projects and FIREWISE participation are more common in affluent communities (holding local fire hazard constant). Reining et al. (2025) shows greater frequency of updating roofs in less disadvantaged Census tracts.

We contribute to this literature by: a) estimating longer-run outcomes than prior work, which typically focuses on outcomes within the first year after the incident, b) considering effects across a range of wildfire incidents with varying degrees of destruction, c) using individual tax return and linked Census data to observe chances in income, employment, and other key economic variables over both the short and long-run, and d) introducing an empirical strategy that allows us to separately estimate the impacts of home loss from community losses. We expect that our findings will provide actionable information for the design of policies designed to mitigate the losses from wildfire by helping affected households and communities recover as quickly as possible.

2 Data

We construct a new individual-level panel dataset on wildfire property damages, occupant demographics, and post-incident economic outcomes. Sections 2.1 and 2.2 describe the input datasets and Section 2.3 describes construction of the merged dataset.

2.1 Wildfire Property Damage

Our data on address-level wildfire damages were assembled by Baylis and Boomhower (2025) and are described in detail in that paper. The dataset includes house-level damage outcomes for more than 50,000 homes located inside more than 100 wildfire burned areas

in five western U.S. states. The data represent more than 70% of all U.S. wildfire-destroyed homes during 2003–2022 and more than 85% of wildfire-destroyed homes in CA, AZ, CO, OR, and WA. The data were assembled by requesting and harmonizing individual post-incident damage censuses conducted by county and state emergency response officials.

2.2 Tax and Census Data

Individual-level demographic characteristics and economic outcomes come from the Environmental Impacts Frame (EIF), a dataset assembled for environmental social science research by researchers affiliated with the United States Census Bureau. The EIF draws on restricted-access microdata from the American Community Survey and from the universe of tax returns filed with the Internal Revenue Service. It includes individuals observed annually between 1999 and 2022. The EIF also identifies a household's home location in a given year. Location in the EIF is usually determined by the location in the tax filing, unless a more recent address is available from another source, such as the ACS. The construction and contents of the EIF are described in more detail in Voorheis et al. (2023). When considering effects on earnings, we restrict this sample to individuals between 25 and 65 years of age.

2.3 Construction of the Merged Dataset

We merge damaged homes in the wildfire data to addresses in the EIF data using assessor parcel numbers where possible and, where not, using address data. This combination allows us to link the data to the Master Address File Auxiliary Reference File, an internal dataset within Census that identifies individual-address pairs for a given year. We then link the individual identifiers, which are known as a Protected Identification Key or PIK, to obtain the income and demographic data. As mentioned above, this process is described in more detail in Voorheis et al. (2023).

The main analysis dataset includes three categories of homes.

1. *Destroyed*: Individuals whose primary residence was inside the wildfire perimeter and was destroyed. These individuals are affected by both the direct loss of their home and the indirect losses they endure as a member of the community that faced the wildfire.

2. *Survived*: Individuals whose primary residence was inside the wildfire perimeter

and was not destroyed. These individuals do not suffer the direct loss of their home, but do still suffer the indirect loss faced by the community.

3. *Adjacent Unaffected*: Individuals whose primary residence the year of the fire was between 0 km and 25 km of the wildfire perimeter. To construct this group, we draw from individuals whose primary residence was outside of the fire perimeter but no more than 25 km and who are included in a 10% random sample of the American Community Survey (ACS).[2]

Fig. 1 shows destroyed and surviving homes and the burned area perimeter that determines adjacent unaffected areas for two major 2018 wildfires.

The final analysis dataset includes approximately 704,500 homes exposed to more than 100 wildfire events. Of these, approximately 16,000 were destroyed, 8,500 were exposed but survived, and 680,000 are nearby unaffected homes (these are rounded; the exact number of observations in each group is suppressed for disclosure reasons).

3 The Distribution of Wildfire Hazard and Vulnerability

This section describes the socio-economic characteristics of wildfire-exposed Americans. Section 3.1 compares destroyed and surviving homes to the US population and to nearby unaffected homes. Section 3.2 compares the occupants of destroyed vs. surviving homes, conditional on exposure to a wildfire event.

3.1 Wildfire Hazard

Table 1 describes pre-fire characteristics of the various samples. Occupants of homes located in burned areas have a pre-fire adjusted gross income of $146,000, markedly higher than the US average of $92,000. Burned areas also tend to be more affluent than the adjacent neighborhoods, which have an average adjusted gross income of $120,800. The same patterns exist when considering only wage earnings.

The racial and ethnic composition of wildfire-affected households also differs from the U.S. population and from adjacent unaffected areas. Eighty-one percent of wildfire-affected in-

2. The ACS is itself a random 2.5% sample from the full population, making the sample we use here a 0.25% random sample from the full population of households in these areas.

dividuals are white, compared to 75% in the US population and 46% in adjacent unaffected areas.

3.2 Structure Vulnerability

The columns in Table 1 labeled "Destroyed" and "Survived" report separate average pre-fire characteristics for occupants of exposed homes that were destroyed vs. not destroyed by the fire. The most striking difference is the difference in pre-fire income: $129,400 vs. $176,500. This difference is suggestive of a "vulnerability gap". In ongoing analysis, we plan to further decompose the determinants of this vulnerability gap in order to understand whether this difference is driven by systematically less intense fires in high-income areas, or greater resilience of homes occupied by high-income individuals to identical fires.

The racial and ethnic differences between occupants of destroyed and surviving homes are smaller and mostly not statistically significant. This is also true for occupant age and gender.

4 The Effects of Home Loss on Households

This section describes the effects of home loss on individuals' economic outcomes. Section 4.1 documents the local projections approach we use for estimation and Section 4.2 reports on the findings for migration and wage outcomes.

4.1 Estimation

We estimate the impulse response of migration and income to wildfire occurrence using a panel local projections model following Jordà (2005) and Jordà and Taylor (2024). As described by Dube et al. (2023), an advantage of the local projections model is that it naturally accommodates recent insights about two-way fixed effects estimators with varied treatment timing (e.g., Callaway and Sant'Anna 2021; De Chaisemartin and d'Haultfoeuille 2020). The model considers how a fire in year t affects outcomes in year $t + h$, where h is between -3 and 3. Years with $h < 0$ are included as checks for differences in pre-trends. The typical model includes controls X_i as well as fire f and year t fixed effects and takes the form:

$$y_{i,t+h} = \beta_h^D 1[\text{Destroyed}]_i + \beta_h^S 1[\text{Survived}]_i + X_i + \phi_f + \phi_t + \varepsilon_{i,t+h} \quad (1)$$

We run these as separate regressions for each value of h (excluding $h = 0$ for migration outcomes and $h = -1$ for income outcomes). The estimates we report are the β^D and β^S for each value of h. All the β_h capture changes in the outcomes relative to the Adjacent Unaffected control group individuals for each fire.

In later versions of this manuscript, we plan to report several other specifications that vary the type and number of fixed effects included in the estimation.

Identification in this setting is produced by the spatial and temporal unpredictability of wildfire occurrence. By focusing on individuals living relatively near a wildfire perimeter we ensure good comparability across non-wildfire determinants of the economic outcomes we estimate. β_h estimates for $h < 0$ provide tests of pre-trends in these outcomes and support the identification assumption that the relative outcomes did not change at the exact time of the fire for reasons unrelated to the fire itself. The addition of direct controls X_i in some specifications helps ensure against any remaining confounding variation, though we don't view it as essential to the identification strategy.

Direct comparisons between effects for Destroyed and Surviving groups require slightly more consideration, since prior work shows that structure survival is determined in part by structure characteristics, spatial arrangement in relation to other structures, and defensible space (see, e.g., Syphard et al. 2012; Plantinga, Walsh, and Wibbenmeyer 2022; Baylis and Boomhower 2025). Still, there remains little reason to think that the migration and economic outcomes we observe for these groups diverged at exactly the time of the fire for reasons related to the survival determinants we report above. Empirically, we again report the β_h for $h < 0$ to provide supporting evidence that the two groups were not on different trends prior to the fire.

4.2 Results

4.2.1 Migration

Experiencing a wildfire has large and immediate effects on location choice for those who lose their homes. Fig. 2 reports on migration outcomes in the years following the fire for Destroyed and Surviving individuals. We measure migration as either relocating to a different address (Panel A) or to an address in an entirely different county (Panel B). We note that these estimates very likely under-report migration since not all moving families change their addresses for tax reporting purposes.

Nevertheless, we find that individuals who lose their homes are more than 40% more likely than the control group to file taxes from a different address in the following year as well as the year after. By the third year a small proportion of these individuals have returned to their original address. We note some evidence of a small pre-trend here: in the year prior to the wildfire, these individuals were slightly more likely to report an address different from the address we observe for the the year of the incident. In on-going work we plan to consider additional tests for the source of this pre-fire "effect".

Individuals whose homes survive experience a comparatively small but still notable increase in the probability that they will relocate relative to the control group. This probability increases slightly over the three years following the fire and suggests some destabilizing effect of the disaster even for the homes that end up surviving the wildfire.

We find similar but lower magnitude estimates for the share of homeowners who relocate to a different county. Again, people who lose their homes are most likely to relocate outside of their original counties following the fires, but even those whose homes survive are more likely to migrate relative to Adjacent Unaffected individuals.

4.2.2 Income

Next we turn to the economic effects of wildfires on reported incomes. Fig. 3 reports on changes in adjusted gross income (AGI) in Panel A and on an indicator for any reported wages (a measurement of employment) in Panel B. For these estimations, we normalize the reported β_hs relative to $h = -1$ rather than $h = 0$ above since incomes reported in the year of the fire may be affected, particularly if the fire occurs early in the season.

We find large income effects for both Destroyed and Surviving individuals. In the year of

the fire, AGI reduced for both group, though actually more for individuals whose homes survive. (We speculate this may be the case because home survival may lead to more non-compensated work support community rebuilding efforts and plan to examine this further in future versions of this work.) In the three years following the fire, people who lose their homes experience the largest income losses, reporting AGI more than 10% less than comparable individuals who were living outside of the wildfire perimeter. Even those who survive the wildfire see reductions in income of more than 5% relative to a control. We observe some income recovery in both groups in the third year after the fire, but caution that this effect may be partly driven by changes in sample composition. In future versions we plan to control more directly for these compositional changes.

We also find still statistically significant effects on the reporting of any wages, the proxy for employment. Again, people who lose their homes experience roughly a 2% decrease in probability of employment relative to the control group.

4.2.3 Migration as a Correlate of Earnings Effects

To better understand how decisions following disasters affect economic outcomes, we separate individuals who choose to move to a different location after their homes are affected from those who remain where they were. Fig. 4 differentiates income effects for these two groups. We note here that these estimates are not meant to identify the causal effect of relocating after a fire on income, but instead to identify whether moving is an important predictor of post-fire outcomes.

Panel A reports how AGI changes for occupants of destroyed homes depending on whether they move after the wildfire or not. Moving appears to be an important correlate of post-fire economic health: those who relocate experience income losses of more than 15% by year 2, while those who remain limit their average losses to around 5%. Panel B conducts a similar comparison for individuals who relocate vs. not from the Survived groups. Here we do not find statistically meaningful differences, though those who relocate do report slightly lower AGI in magnitude.

5 Discussion and Conclusion

High-quality evidence on the economic burden of natural disasters is essential for designing policies to address growing extreme weather risks. We contribute new evidence on the distribution of wildfire hazard and vulnerability, and the post-incident effects of damaging wildfires on those who experience them. Our ability to analyze individual-level data on damages and economic outcomes for over 100 wildfire event extends both the granularity and the breadth of our understanding of the economics of wildfire property risk.

We find that homes affected by wildfires largely reflect the overall geography of wildfire risk, which is concentrated in particular areas of the western United States. More strikingly, we find evidence consistent with an important "structure vulnerability gap" in income. The existence of such a gap in loss probability conditional on experiencing a wildfire reinforces the need to successfully target risk mitigation initiatives towards socially-vulnerable populations.

We find large effects of fire-induced home loss on migration and income. We also see notable effects even for individuals whose homes survive. Our comparison of movers and stayers suggests that those who move suffer larger economic losses and indicate that these individuals may benefit more from targeted economic support to either remain in place or to rebuild their lives elsewhere.

Future versions of this work will expand on these initial estimates in several ways. We plan to report a wide range of sensitivity checks, consider outcomes separately by incident, and report on other important economic and social indicators.

Figure 1: Sample Wildfire Perimeters Illustrating Destroyed, Survived, and Adjacent Unaffected

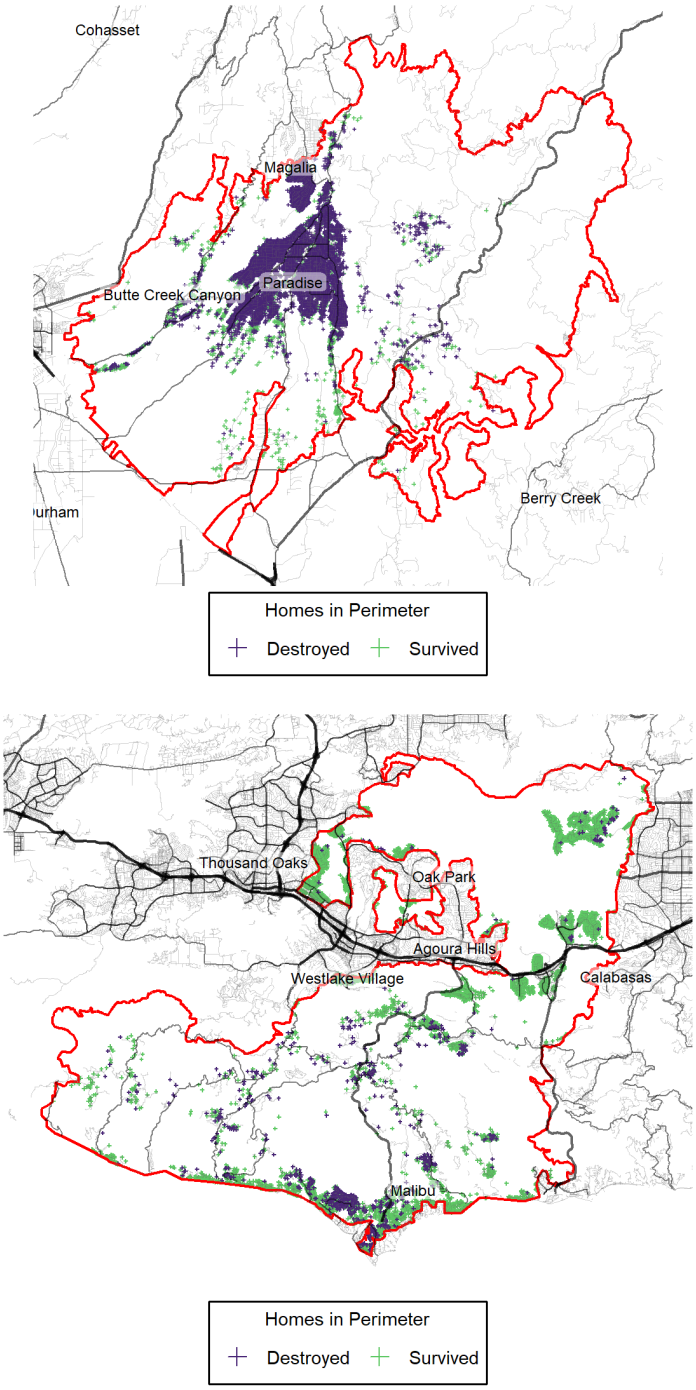
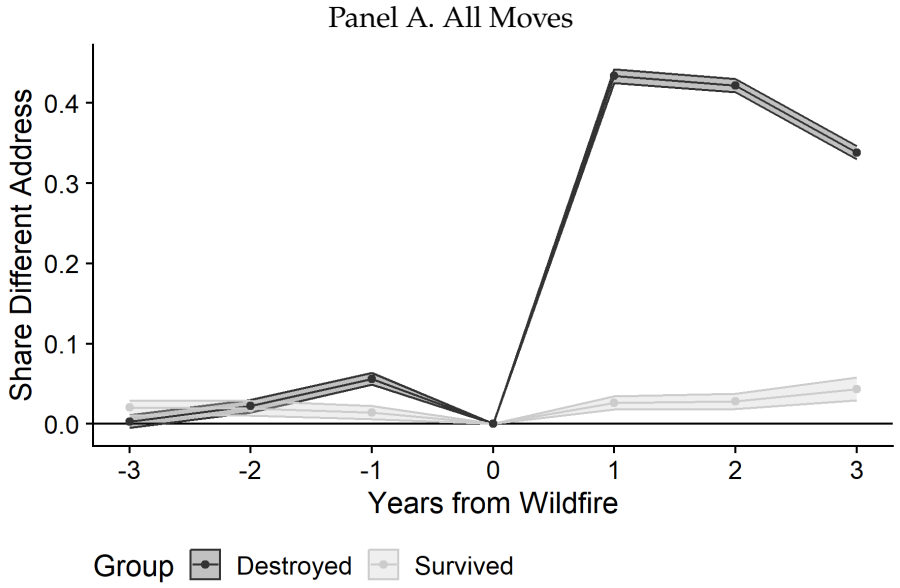


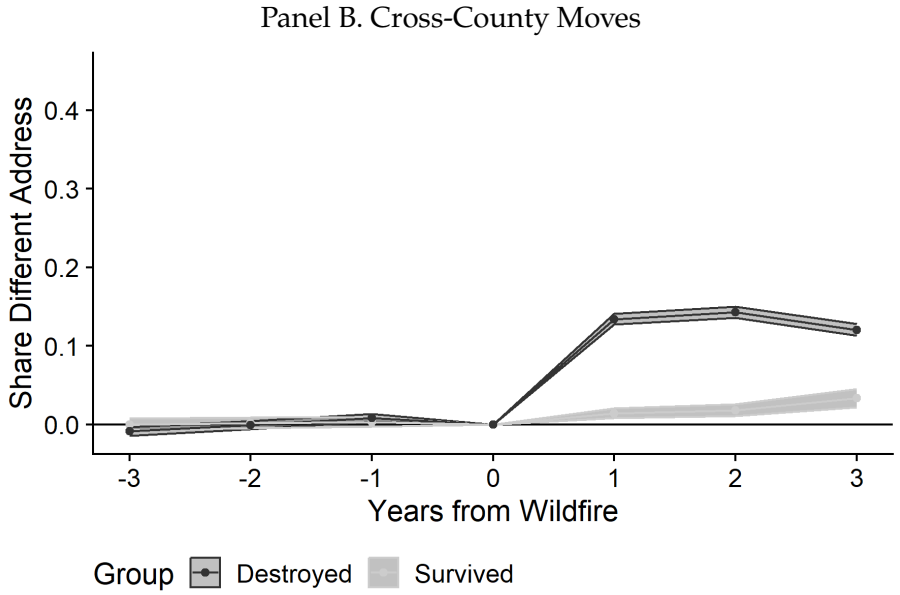
Table 1: Wildfire Victims vs. the U.S. Population

	U.S. Population	Adjacent Unaffected	Affected	Destroyed	Survived
Income					
Pre-fire AGI ($2022)	91,944	120,800	145,741	129,400	176,500
		(491)	(-)	(2,154)	(4,333)
Pre-fire Wages* ($2022)		83,530	90,436	78,830	112,900
		(269)	(-)	(1,451)	(5,966)
Race and Ethnicity					
Share White	75	46	81	82	78
		(0.06)	(-)	(0.3)	(0.45)
Share Hispanic	20	28	9.4	9.5	9.3
		(0.055)	(-)	(0.23)	(0.31)
Share Asian	6.4	15	4.2	3.4	5.8
		(0.043)	(-)	(0.14)	(0.25)
Share Other	3.4	7.7	3.5	3	4.5
		(0.032)	(-)	(0.13)	(0.22)
Share AIAN	1.3	0.57	1.4	1.6	1.1
		(0.0091)	(-)	(0.098)	(0.11)
Share Black	14	3.1	0.75	0.71	0.84
		(0.021)	(-)	(0.066)	(0.099)
Other Characteristics					
Share Male	50	49	49	49	48
		(0.061)	(-)	(0.39)	(0.54)
Age of Filer		45	48	47	48
		(0.014)	(-)	(0.094)	(0.13)
N		680,000	24,500	16,000	8,500

Notes: "Affected" includes occupants of destroyed or surviving homes. "Adjacent Unaffected" includes occupants of homes located near to (but outside of) the burned area. "U.S. population" values are temporary placeholder numbers drawn from IRS Statistics of Income and US Census Bureau QuickFacts. *Reported N applies to all variables with these exceptions: N for pre-fire wages across the final four columns is 530,000; 18,200; 12,000; and 6,200. N for pre-fire AGI for the Adjacent Unaffected group is 678,800. All observation counts are rounded for disclosure reasons.

Figure 2: Migration by Wildfire Victims





Notes: Figure reports local projection estimates of differential move probability for Destroyed and Survived groups relative to the Adjacent Unaffected group in years before and after the wildfire. The household's location each year is defined as the address from which they file their tax return.

Figure 3: The Effect of Wildfires on Victim's Post-fire Income

Panel A. Adjusted Gross Income



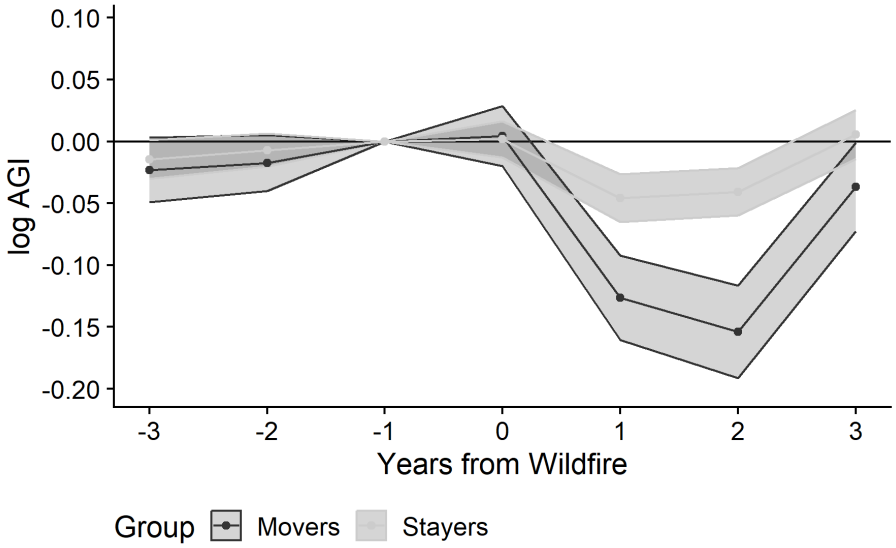
Panel B. Any Wages



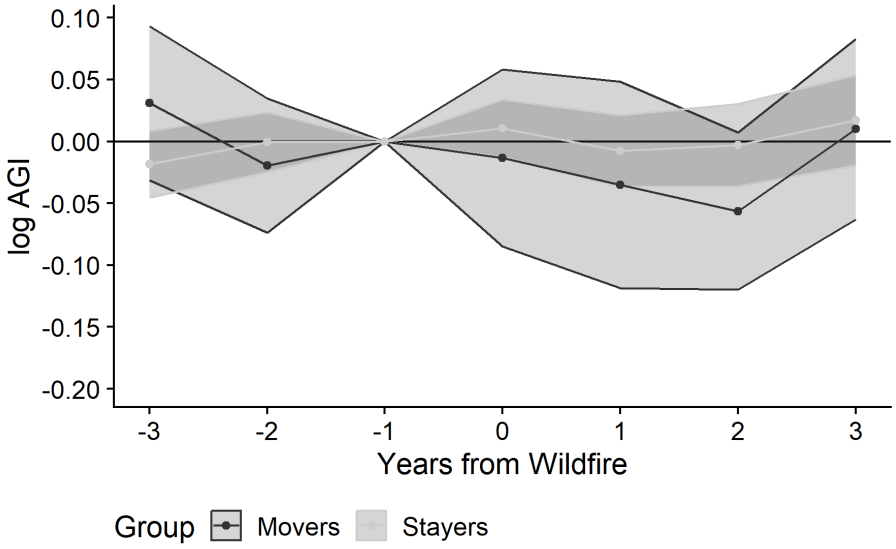
Notes: Figure reports local projection estimates of differential log adjusted gross income for Destroyed and Survived groups relative to the Adjacent Unaffected group in years before and after the wildfire.

Figure 4: Income Effects for Movers vs. Stayers

Panel A. Occupants of Destroyed Homes



Panel B. Occupants of Survived Homes



Notes: Figure reports local projection estimates of differential log adjusted gross income for Destroyed and Survived groups relative to the Adjacent Unaffected group in years before and after the wildfire.

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