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Monthly condensed analyses of crucial real estate and economic issues offered by UCLA Anderson Forecast and UCLA Ziman Center for Real Estate. In this January 2024 Letter, Vice President at Federal Reserve Bank of Philadelphia Xudong An, UCLA Ziman Center for Real Estate Director Stuart A. Gabriel, and Federal Reserve Bank of Dallas Research Economist Nitzan Tzur-Ilan present comprehensive new research on wildfires' economic impact on households. This letter is based on the complete UCLA Working Paper -- "Extreme Wildfires, Distant Air Pollution, and Household Financial Health."

Finances in Flames

How extreme wildfires burn through household wealth and health

By Xudong An, Stuart A. Gabriel, and Nitzan Tzur-Ilan

As wildfires become more catastrophic, the stress on household finances becomes increasingly evident. And although some of the most obvious damage occurs to life and property within the immediate vicinity of the fire, economic research has only begun to assess the broader effects of these disasters on environmental and household financial outcomes beyond the fire zone. Our paper provides a more complete picture of households – both homeowners and renters – afflicted by wildfire. Specifically, we examine North American wildfires, wildfire-related smoke, and ground-level pollution from wildfires, and assess their impacts with data on personal credit, consumer spending, and even migration. In the wake of wildfire-related smoke and air pollution that can extend for hundreds of miles across continents, the financial damage of wildfire events is increasingly broad and impacts sizable populations far beyond the immediate fire zones.

> *"Wildfire-related smoke and pollution can extend for hundreds of miles across continents, resulting in adverse household health and financial effects among large populations far beyond the immediate fire zone."*

U.S. wildfires on average were four times in size, triple in frequency, and more widespread during the 2000s than in prior decades. The National Oceanic and Atmospheric Administration since 2000 has recorded 15 wildfire events incurring damage in excess of 1 billion dollars. In 2020, smoke from wildfires on average fully covered U.S. and California counties for 20 and 64 days, respectively. More recently, in the wake of 500 active wildfire events in eastern Canada in June 2023, heavy smoke and particulate emissions blanketed 122 million people across major parts of the Northeast and North Central United States, resulting in some of the most polluted days on record. According to the Stanford ECHO Lab, smoke exposure associated with Canadian wildfires through mid-2023 was substantially worse than total cumulative exposure in every year since 2006.

Our assessment of environmental, economic, and financial data from these catastrophes – including northern California's 2018 Camp Fire – yields many salient takeaways. (The Camp Fire in Butte County destroyed more than 18,000 buildings. To date, that fire is the most extreme U.S. wildfire, in the sense that it destroyed more than twice as many structures as any other sampled extreme wildfire.)

The findings provide novel evidence of elevated spending, indebtedness, and loan delinquencies among households distant from the burn perimeter but exposed to elevated levels of wildfire-attributed air pollution. Results also show higher levels of financial distress among renters in the burn zone, particularly those with lower credit scores. Financial distress among homeowners within the fire perimeter is less prevalent, likely owing to insurance payouts. Findings also show out-migration and declines in house values in wildfire burn areas. Adverse smoke and pollution affect substantial geographically dispersed populations and add appreciably to household financial distress.

Consider, for example, the economic damage of air pollution from fires. Approximately one-third of U.S. households include someone with an existing respiratory health condition at risk of serious medical complications in the wake of prolonged exposure to the fine particulate matter (PM2.5) found in smoke. Wildfire smoke and related spikes in particulate emissions result in increased demand for both goods and services that mitigate deleterious air pollution effects (especially for increased medical and medical equipment spending). Smoke events also have been shown to result in work interruption and reduced earnings, reduced business activity in tourism and outdoor recreation, and even increased traffic accidents. Together, these outcomes suggest significant income loss and deterioration in household financial status in the immediate aftermath of the smoke event.

Results of the fire analyses also show an increase in net migration from housing tracts that experienced the most destructive wildfires, as well as a marked decline in house prices in the quarters immediately following the fire event. We also find a near-term increase in mortgage, credit card, and personal loan delinquency among consumers in the fire zone, with a more pronounced effect for the much larger Camp Fire than for the three other extreme wildfires we examined. Adverse household fire-zone treatment effects typically persisted for multiple quarters after the fire.

To better understand the delinquency results, we used individual account-level data to study credit card spending, repayment, and monthly balance. Interestingly, we found that post-fire, treated households in the fire zone on average increased spending but paid down credit card debt even more, resulting in a decline in monthly balance. While the combination of reduced credit card indebtedness (repayment in excess of spending) and increased delinquency seem puzzling, further analysis showed that the reduction of credit card balance occurred largely among homeowners, whereas increased credit card delinquencies occurred among renters, especially those with lower credit scores.

Fire damage typically is covered by homeowner's insurance. In recent years, in areas of increased wildfire-related insurance payout and risk, related coverage in California often has been excluded from the standard homeowner's insurance policy. In response, the State of California has made limited fire coverage available via the California FAIR Plan. Among homeowners, our estimated attenuation in adverse household financial impacts (including paydown in credit card balances post-wildfire) likely reflects use of funds from insurance claim payout to reduce debt. (This is consistent with findings from the flood disaster literature.) In contrast, renters typically receive limited fire insurance payout and may experience financial distress owing to their limited resources – distress includes work disruption as well as event-related health expenses.

We also present new evidence of adverse impacts of distant wildfire-induced air pollution on credit outcomes. We find significant increases in credit card spending as well as marked declines in credit card payments in the wake of the smoke event. Those findings are largely evidenced among zip codes well beyond the fire zone that experienced large spikes in wildfire-induced pollution in the quarters immediately following the wildfire event. Results also show

sizable increases in child emergency visits and asthma emergency department visits well beyond the fire zone and in the wake of a wildfire-induced smoke event. In the five quarters following the Camp Fire, the combination of added credit card spending and reduced credit card repayment among consumers experiencing high levels of wildfire-induced particulate pollution resulted in an additional $500 per annum in credit card balance. Further analysis indicates that the reduction in credit card repayment is primarily among lower credit score borrowers, consistent with the idea that those borrowers, in the absence of adequate government assistance, typically have fewer resources to cope with natural disasters. In contrast, the increase in credit card spending is found largely among prime borrowers. Those borrowers likely have the capacity to spend more on preventive measures to combat air pollution induced by the wildfire.

As anticipated, the estimated far-flung wildfire-attributable pollution treatment effects are smaller in magnitude than those estimated for households in the immediate burn-zone. For example, the Camp Fire resulted in an average 45 percent increase in the likelihood of credit cards past due among burn-zone households, whereas distant wildfire-attributable emissions and particulate pollution are associated with a 20 percent increase in credit cards past due. However, the pollution results are also economically salient, because pollution harms substantially larger geographies and populations due to far-flung wildfire-related emissions.

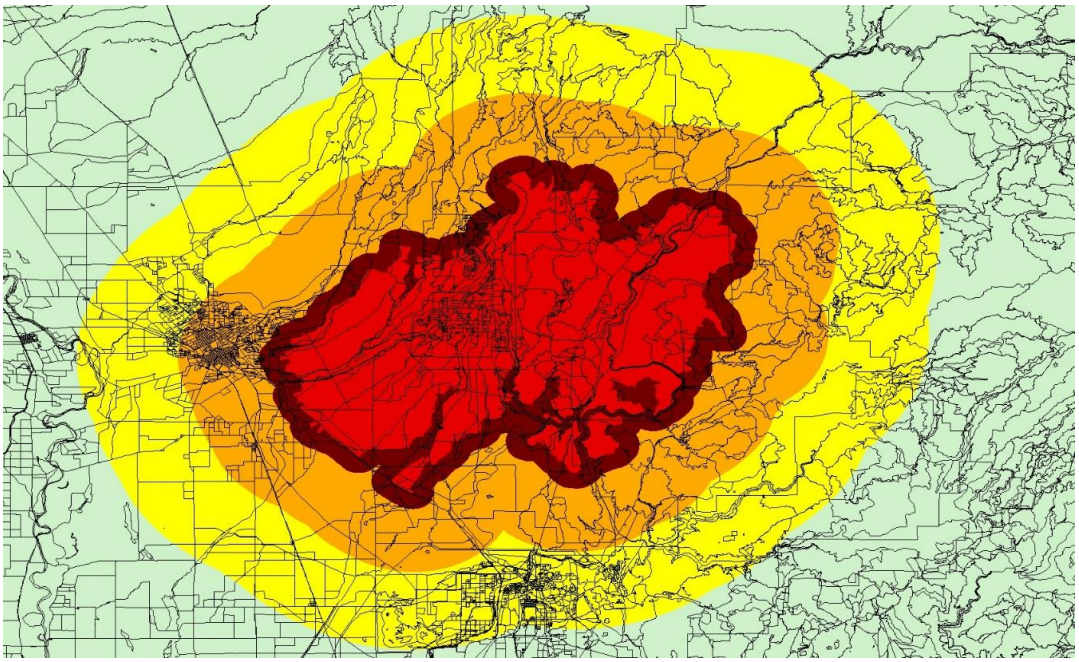

Figure 1. Treatment and Control Areas in the Camp Fire Analyses
This figure shows the treatment and control areas in the Camp Fire analyses. The red area is the fire footprint, which is the treatment area; the brown area is a 1-mile peripheral ring, which we carve out in our analysis; the orange area is a 1- to 5-mile peripheral ring, which is the control area; and the yellow area is a 5- to 10-mile peripheral ring, which is an alternative control area. The border lines are census blocks in California. Source: U.S. Forest Service Monitoring Trends in Burn Severity (MTBS) database.

If we conservatively attribute estimated pollution effects of California's 2018 Camp Fire to the 19 million people in the New York Metro Area exposed to heavy smoke and pollution in the wake of the 2023 Canadian wildfires, a back-of-the-envelope calculation suggests that affected households in the New York area incurred an incremental $3 billion in credit card spending and an added $4 billion in credit card debt.

CONCLUSION

Overall, our findings indicate that adverse effects of wildfires can go far beyond the fire perimeter. Failure to account for broadly diffused and consequential smoke and pollution events yields a partial and incomplete rendering of household financial effects of extreme wildfires. Future research should assess findings related to severe wildfire and their pollution increasingly evidenced in such places as eastern Canada and southern Europe. And, with insurance companies increasingly excluding wildfire damage from the standard homeowner's policies, it may be worthwhile to consider whether the public sector should expand fire coverage of last resort or offer other remedies to mitigate adverse impacts of insurance withdrawal on housing markets.

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