Post Wildfire Effects on Flagstaff Property Values

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Undergraduate Research Symposium, Northern Arizona University, Flagstaff, AZ 86011

Introduction

The Schultz Fire of 2010 had dramatic effects on the Doney park area of Flagstaff, AZ. More recently, the pipeline and tunnel fires re-burned portions of the Shultz fire burn, impacting nearby homes.

This project examined the post-wildfire effects from the Schultz Fire on Flagstaff housing prices in Doney Park and the greater Flagstaff area. As climate change increases the frequency and volatility of wildfires, it is important for homeowners to understand what property values are critical to review for houses in high-risk areas.

Methods

Hedonic Property Model
Previous literature shows how the Hedonic Property Model has been the **basic model used for evaluating housing prices.** It takes the value of a house and determines it by its characteristics.
The issue is, the model does not consider non-linear relationships, heteroskedasticity, and outliers in the data.

Nnmatch Command
We're using the **nearest-neighbor matching (nnmatch)** command to estimate the **Average Treatment Effect (ATE)** on housing prices in homes located within **1KM, 2KM, and 3KM of the Schultz fire.**
Each output compares homes within the distance (treated group) to similar houses outside that distance (control group), matched based on similar attributes.

ATE – Treatment:

(Abadie, Drukker, et al., 2004)

$$\tau_M^{\mathrm{sm},t} = \frac{1}{N_1} \sum_{i:W_i=1} \left\{ Y_i - \widehat{Y}_i(0) \right\} = \frac{1}{N_1} \sum_{i=1}^{N} \left\{ W_i - (1 - W_i) K_M(i) \right\} Y_i$$

Results

Within 3KM:

```
. teffects nnmatch (Real_sale Multistory UNIVERSAL YEAR_BUILT DistancetoSchoolmeters Dis
> tancetoSchultzFiremeters DistancetoFlagstaffmeters) (PostFire), nneighbor(4) biasadj(D
> istancetoSchoolmeters DistancetoFlagstaffmeters DistancetoSchultzFiremeters), if(Zip==
> 86004 & Real_sale<=1500000 & AD==1)

Treatment-effects estimation                   Number of obs      =        118
Estimator      : nearest-neighbor matching     Matches: requested =          4
Outcome model  : matching                                  min =          4
Distance metric: Mahalanobis                               max =          4
```

Real_sale	Coefficient	AI robust std. err.	z	P>|z|	[95% conf.	interval]
ATE						
PostFire (1 vs 0)	-45275.41	19773.62	-2.29	0.022	-84030.99	-6519.82

Within 2KM:

```
. teffects nnmatch (Real_sale Multistory UNIVERSAL YEAR_BUILT DistancetoSchoolmeters Dis
> tancetoSchultzFiremeters DistancetoFlagstaffmeters) (PostFire), nneighbor(4) biasadj(D
> istancetoSchoolmeters DistancetoFlagstaffmeters DistancetoSchultzFiremeters), if(Zip==
> 86004 & Real_sale<=1500000 & AC==1)

Treatment-effects estimation                   Number of obs      =         69
Estimator      : nearest-neighbor matching     Matches: requested =          4
Outcome model  : matching                                  min =          4
Distance metric: Mahalanobis                               max =          4
```

Real_sale	Coefficient	AI robust std. err.	z	P>|z|	[95% conf.	interval]
ATE						
PostFire (1 vs 0)	-53737.04	31780.03	-1.69	0.091	-116024.7	8550.676

Analysis within 3KM:

Houses **within 3 KM** of the Schultz Wildfire perimeter sell for about **$45,275 less** than similar houses farther away.

- **Statistically significant** at the **95%** confidence level.
- **p-value:** 0.022 < 0.05

Analysis with 2KM:

Houses **within 2 KM** of the Schultz Wildfire perimeter sell for about **$53,737 less** than similar houses farther away.

- **Not statistically significant** at the **95%** confidence level.
- **p-value:** 0.091 > 0.05

Within 1KM:

```
. teffects nnmatch (Real_sale Multistory UNIVERSAL YEAR_BUILT DistancetoSchoolmeters Dis
> tancetoSchultzFiremeters DistancetoFlagstaffmeters) (PostFire), nneighbor(4) biasadj(D
> istancetoSchoolmeters DistancetoFlagstaffmeters DistancetoSchultzFiremeters), if(Zip==
> 86004 & Real_sale<=1500000 & KM==1)

Treatment-effects estimation                   Number of obs      =         24
Estimator      : nearest-neighbor matching     Matches: requested =          4
Outcome model  : matching                                  min =          4
Distance metric: Mahalanobis                               max =          4
```

Real_sale	Coefficient	AI robust std. err.	z	P>|z|	[95% conf.	interval]
ATE						
PostFire (1 vs 0)	-17756.98	77801.29	-0.23	0.819	-170244.7	134730.7

Analysis within 1KM:

Houses **within 1 KM** of the Schultz Wildfire perimeter sell for about **$17,756 less** than similar houses farther away.

- **Not statistically significant** at the **95%** confidence level.
- **p-value:** 0.819 > 0.05

References

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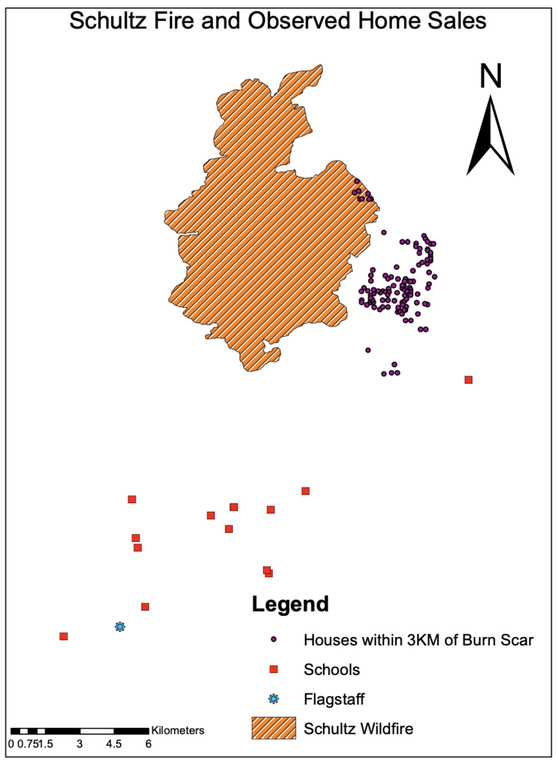
Home Sales 3KM



Home Sales 2KM