Analysis of the effect of Frequent Flash Floods on Local Housing Prices in the United States of America

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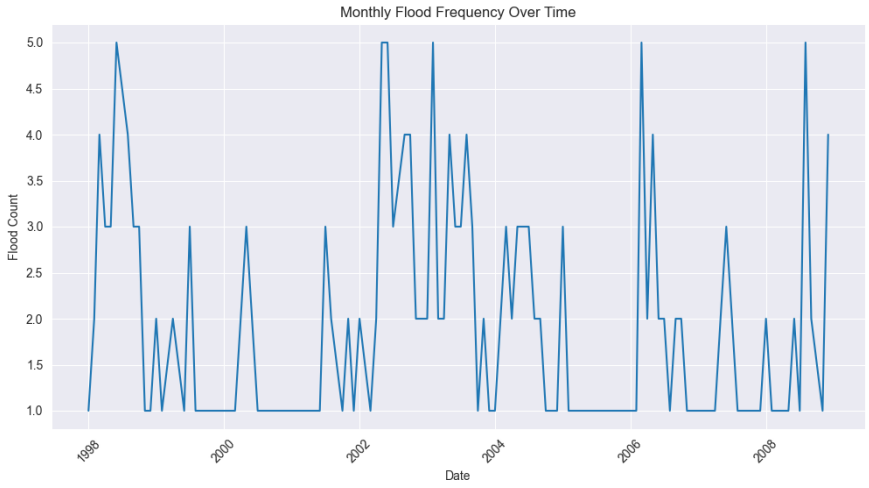
Introduction:

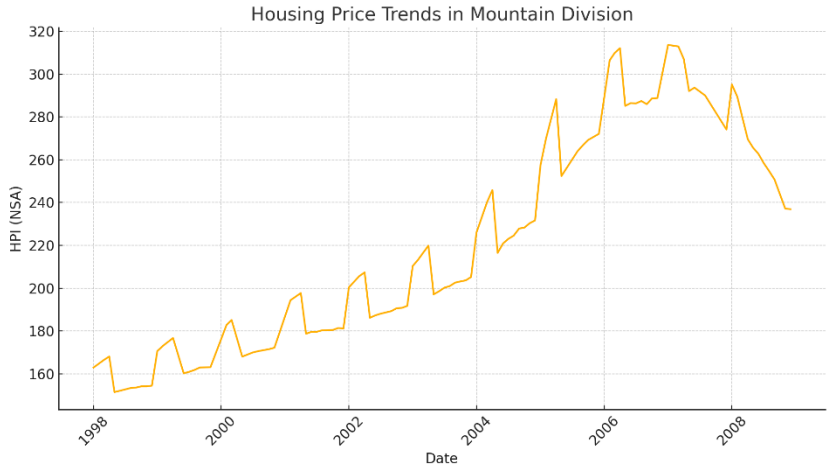
Natural disasters, particularly floods, pose significant challenges to societies worldwide, disrupting economies, displacing populations, and damaging infrastructure. Among their many consequences, the impact of floods on housing markets is a critical area of research, given the centrality of housing to economic stability and personal well-being. Housing markets are highly sensitive to environmental and economic changes and understanding how disasters like floods influence housing prices is essential for policymakers, insurers, real estate professionals, and affected communities. Floods can reduce housing demand in high-risk areas, temporarily decrease property values, or, conversely, lead to price increases in safer or newly developed areas due to migration and recovery efforts.

This report investigates the specific relationship between flood events and the Housing Price Index (HPI) in the United States, using data spanning several years. The HPI, a widely used measure of housing market performance, tracks changes in single-family home prices over time, providing a robust indicator of market trends. By integrating detailed flood event data—capturing frequency, severity, and associated fatalities—with HPI data at both national and regional levels, this analysis aims to assess whether floods significantly influence housing prices. The study explores immediate and delayed impacts of floods, considers regional variations across Census Divisions, and employs statistical models to derive meaningful insights. Through this comprehensive examination, the report seeks to contribute to a better understanding of how flash floods shape housing markets, offering valuable implications for future urban planning, disaster preparedness, and market forecasting.

Used Data:

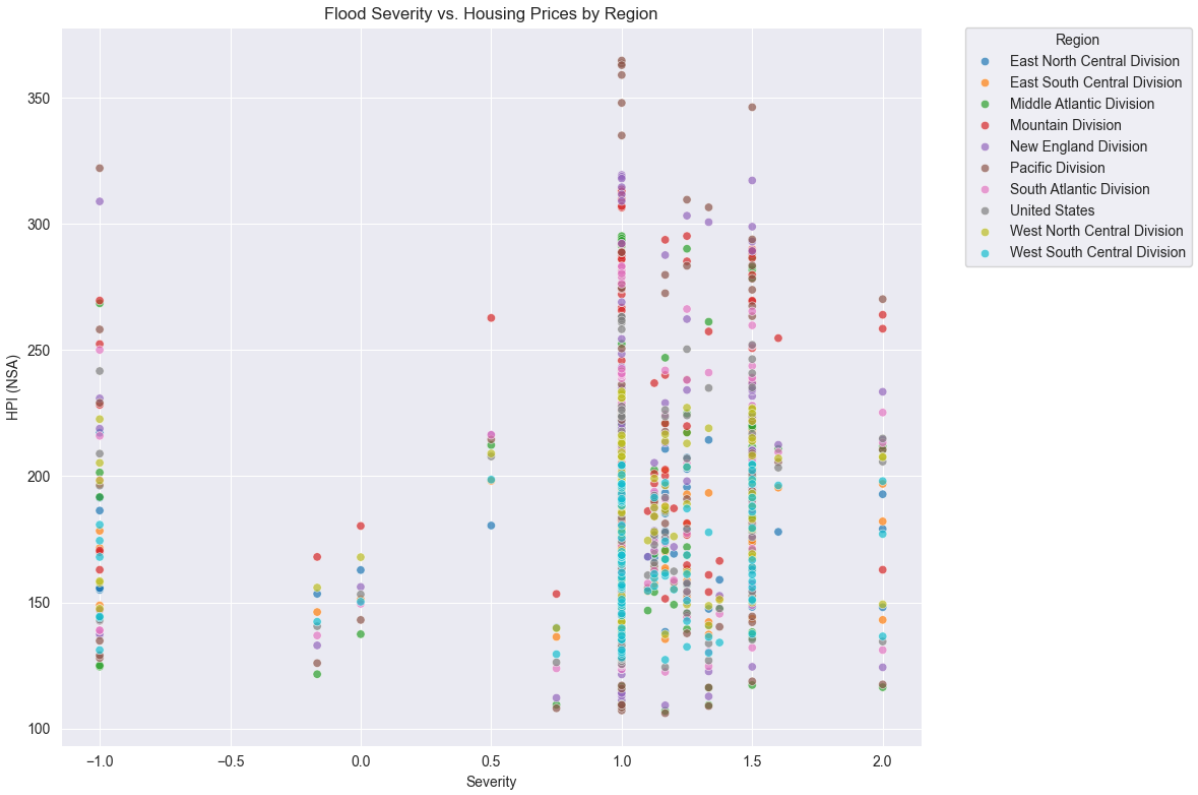
The final dataset used in this analysis resulted from the integration of two primary data sources (as explained in the data report). The Flood Event Data was filtered to include only events within the United States, capturing details such as the frequency of floods, fatalities, and severity on a monthly basis. The data was grouped by Census Divisions to provide a regional view. The Housing Price Index (HPI) Data, obtained from the Federal Housing Finance Agency (FHFA), provided monthly HPI values for the United States and its Census Divisions. This index tracks changes in single-family house prices, offering insights into the housing market's performance. The datasets were merged based on the date, creating a unified dataset that enabled temporal alignment of flood metrics and housing price trends. This final dataset included the date, region, flood frequency, average severity, total fatalities, and the corresponding HPI values, allowing for a comprehensive analysis of potential relationships between these variables.



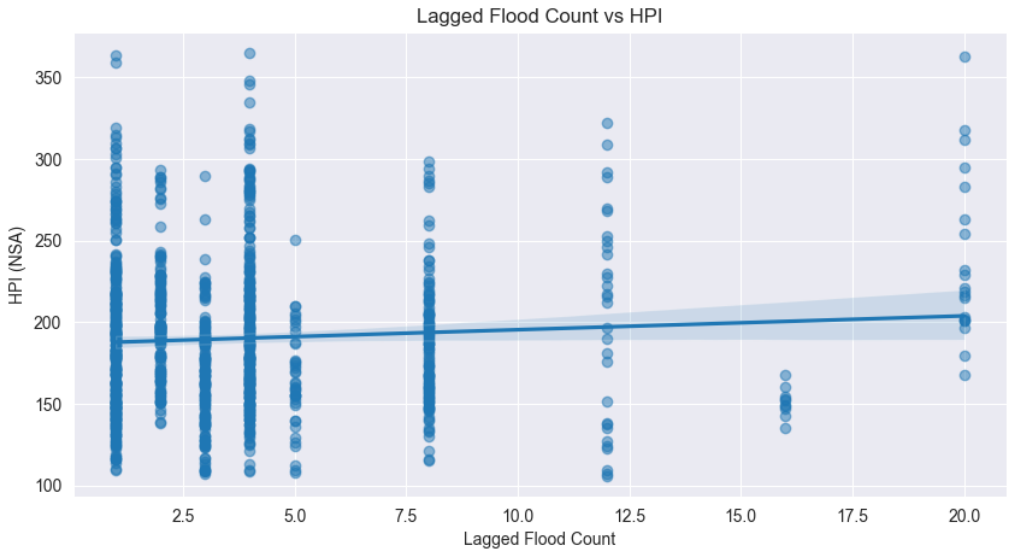


Analysis:

Following the Exploratory Data Analysis to generate the sink data described above, regression analyses were employed to evaluate the statistical relationships between flood metrics and HPI. At the national level, the results indicated no statistically significant relationship between floods and housing prices, suggesting that aggregated housing markets are not significantly affected by flood events. However, regional regression models revealed variations among Census Divisions. Certain regions, such as the East North Central and Middle Atlantic Divisions, exhibited significant positive correlations between flood frequency and HPI. These findings may reflect localized recovery efforts or shifts in housing demand post-disaster. Fatalities and severity metrics, however, showed no significant impact on HPI across all regions.

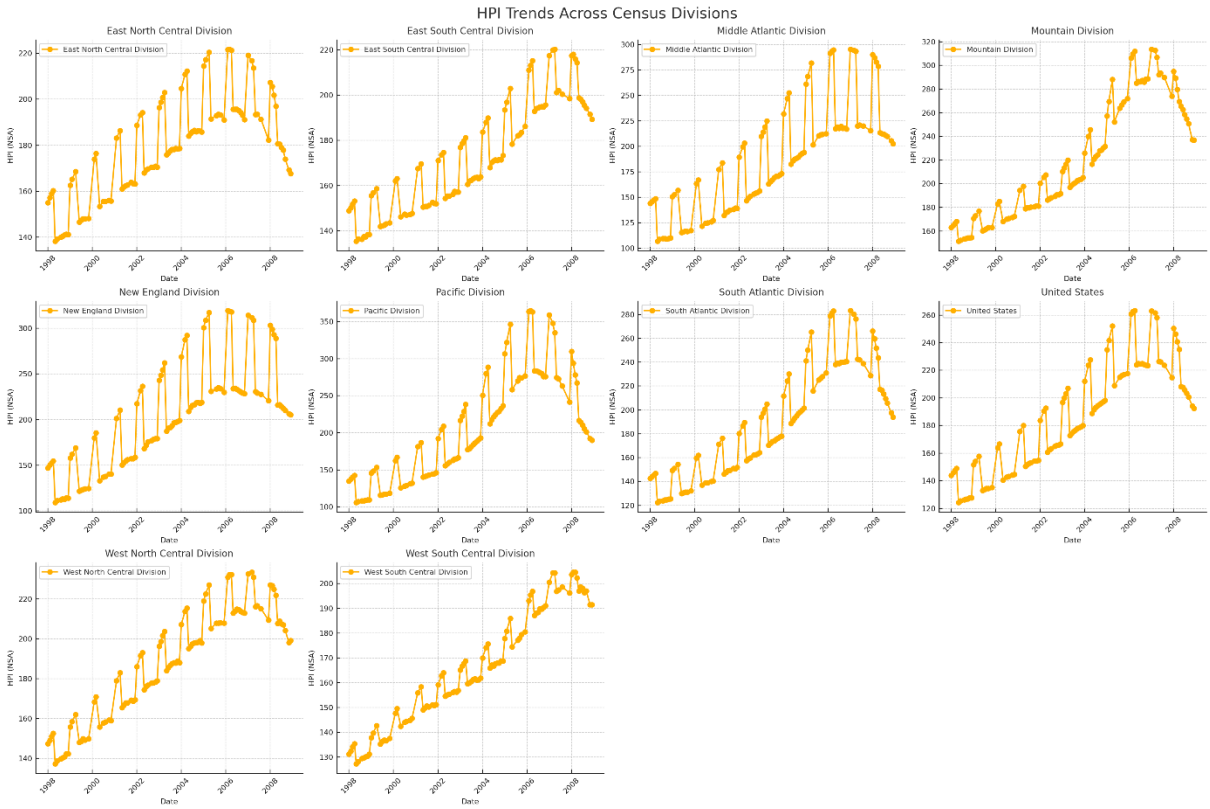


To account for potential delayed effects, lagged variables were introduced into the analysis. These included flood metrics from previous months to determine whether housing prices respond to flood events over time. While this approach added temporal depth to the model, the lagged variables demonstrated limited explanatory power, and no significant delayed impacts on HPI were observed.



Finally, a granular regional analysis provided additional context. By grouping data at the Census Division level, the study highlighted regional disparities in flood impacts. Certain regions displayed stronger relationships between flood metrics and housing prices, while others

showed negligible effects. This disparity underscores the importance of considering regional contexts when assessing the economic impact of natural disasters.



Conclusion:

Frequent flash floods appear to have a limited direct impact on local housing prices at the national level. However, regional analyses reveal that specific Census Divisions, such as the East North Central and Middle Atlantic regions, demonstrate positive relationships between flood frequency and housing prices. These findings may reflect localized post-disaster recovery efforts, shifts in housing demand, or government interventions that mitigate the negative consequences of floods. Despite these regional variations, metrics like flood severity and fatalities show no statistically significant influence on housing prices, suggesting that the broader market dynamics remain largely unaffected by these factors.

The proposed question is partially answered by this study. While the data provides insights into regional disparities and immediate impacts, the analysis does not comprehensively account for broader economic variables such as interest rates, employment levels, or population growth, which can significantly influence housing prices. Additionally, the granularity of the data—grouped at the Census Division level—may obscure finer-scale impacts that occur at the county or city level.

Remaining uncertainties include the potential lagged effects of floods on housing prices, which this study found to be minimal, but which could vary depending on the extent of recovery efforts and market conditions. Future research incorporating more localized data and broader economic indicators is necessary to fully understand the nuanced relationships between frequent flash floods and local housing markets.