Rental and Home Price Index Analysis

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Introduction

This quantitative analysis investigates the relationship between rental and housing price indices in Chicago. The central question is: Do rental and housing prices consistently share a positive correlation over time and across different city neighborhoods? While theory predicts aligned movements, real-world data may reveal divergence. This analysis comprehensively examines the rental-price connection using statistical techniques, with a focus on teasing out the effects of temporal and geospatial factors. The investigation provides nuanced insight into the complex interplay between housing rents and sale prices. Understanding these market dynamics holds practical relevance for Chicago homeowners, landlords, tenants, buyers, sellers, and investors looking to make informed real estate decisions. The analysis aims to move beyond simplified assumptions about rent-price alignments and offer data-driven clarity around the true nature of this relationship in Chicago.

Analysis

The data utilized for this study is gathered from Zillow housing data, focusing on two critical datasets that contain the Zillow Home Value Index and the Zillow Observed Rent Index. These comprehensive datasets cover all U.S. ZIP codes, providing a monthly timeline from 2015 to the present. It is important to acknowledge certain limitations inherent in the data. One notable constraint is the nature of the indices. They represent all housing types, and if trend influences were rooted in an aspect outside location, like housing quality, this could be saturated or masked by viewing trends of locational averages. Additionally, the dataset contains NA (Not Available) values. To address this, these values will be filled by the average of previous and after values.

The initial visualization serves as a foundational exploration of the relationship between the rental and housing price indices. Three specific ZIP codes in Chicago were examined: 60608, 60618, and 60647. This intentional focus avoids crowded graphing and provides a clearer understanding of localized trends before scaling up the analysis to citywide. Figure 1 shows that these three Chicago ZIP codes do not move in exact coordination. However, there is a weak positive relationship form with what seems to be a lag after the pandemic; for instance, in the second graph in the year 2022, there is an uptick in home prices but there isn’t the same uptick in rental until a bit later. Overall, mainly observed is a disconnect throughout the years between the home and rental price, but one might wonder why.

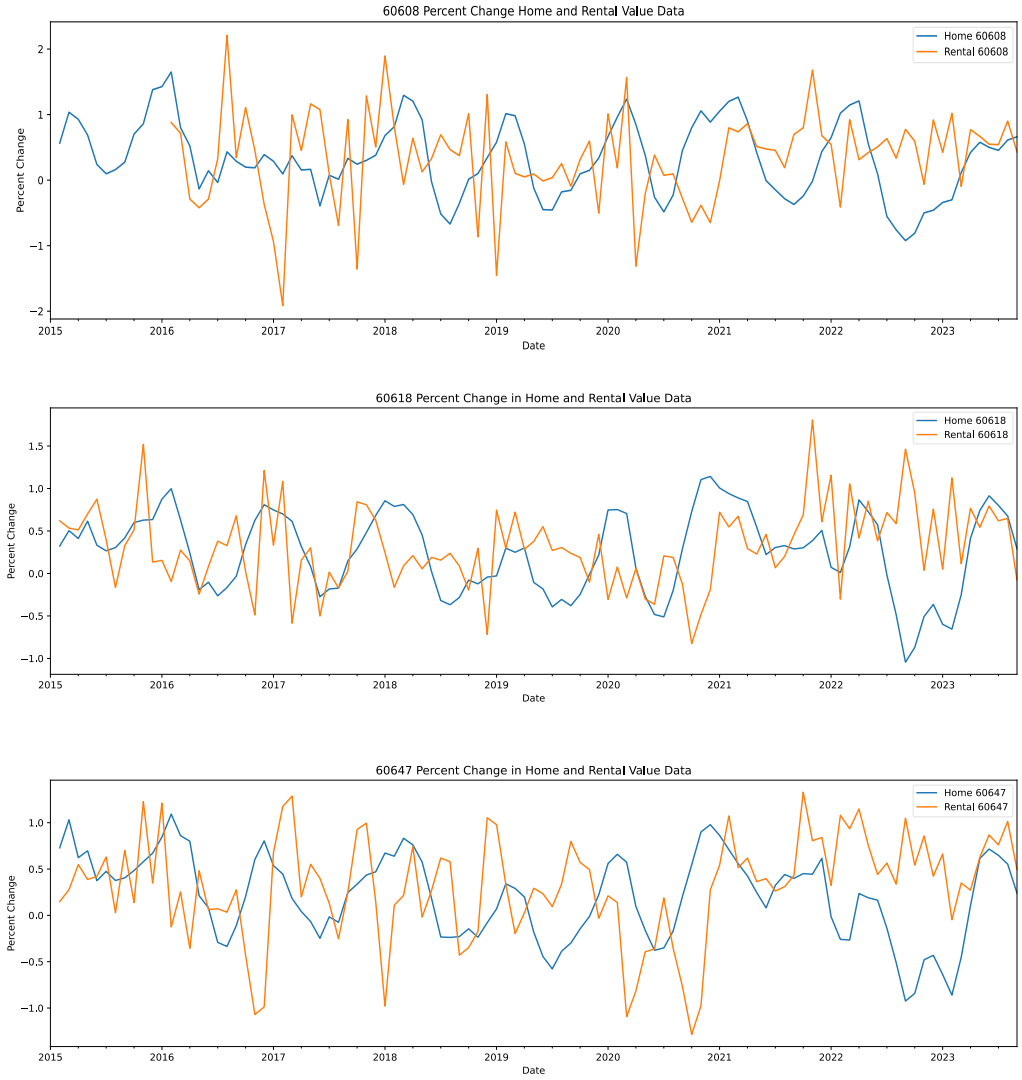

Figure 1

To better understand the relationship between home and rental values across these three specific Chicago ZIP codes, the next visualization titled Percent Change Difference by ZIP compares the percent change differences between the home and rental indexes. The observations from this graph highlight a general trend across the ZIP codes, especially following the onset of COVID-19 in 2020. This trend could be attributed to remote work enabling urban residents to relocate. The figure indicates a degree of synchronicity in home and rental value shifts in these ZIP codes. Although following comparable trajectories, the data also points to greater volatility in certain ZIP codes, suggesting certain zip codes experience the discrepancies at greater scale.

This analysis provides nuanced insight into fluctuations of these variables over time, which is significant for interpreting the interplay between rental and home values.

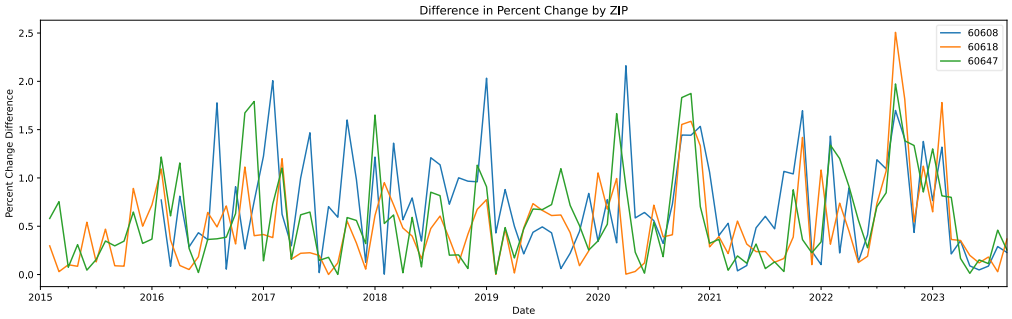

Figure 2

To further the understanding of the relationship between home and rental values, Figure 3 was created to reveal broader trends beyond the three ZIP codes initially examined. This figure depicts the average percent change difference across the entire city of Chicago, providing a comprehensive overview of citywide dynamics. Previously, analysis of the three ZIP codes uncovered a trend around the time of COVID-19, a spike also visible in the citywide data. This reaffirms external factors like the pandemic influenced the indices. Examining the data at a citywide level enables identification of patterns and trends not immediately apparent from analysis of the three ZIP codes alone. In this way, the figure and accompanying analysis enhance understanding of the complex interrelation between housing sales prices and rental rates.

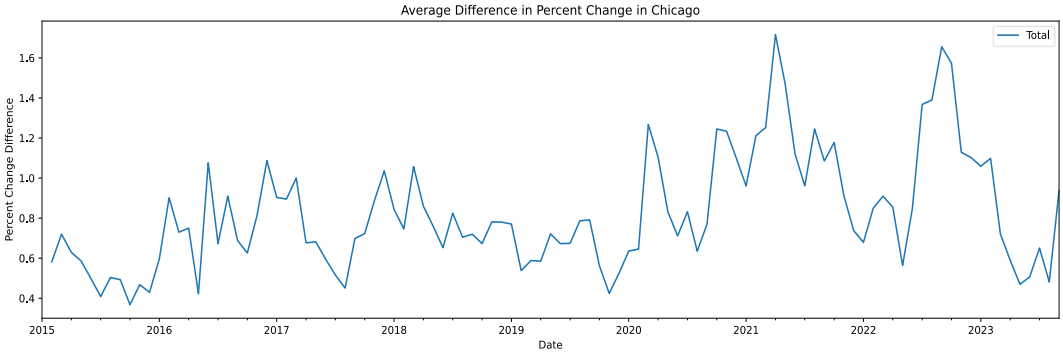

Figure 3

Figure 4 employs a kernel density plot (KDE) to elucidate the frequency and concentration of percent change differences. This graphical technique furnishes novel perspectives on the aggregate landscape of said differences. The KDE facilitates identification of modal values or agglomerations of percent change differences and ascertains the dispersion or aggregation of these differences. Furthermore, the KDE grants enhanced comprehension

regarding the quintessential percent change difference. Found by this model is that the average percentage difference across zip codes follows a relatively normal distribution and averages around .8 percent.

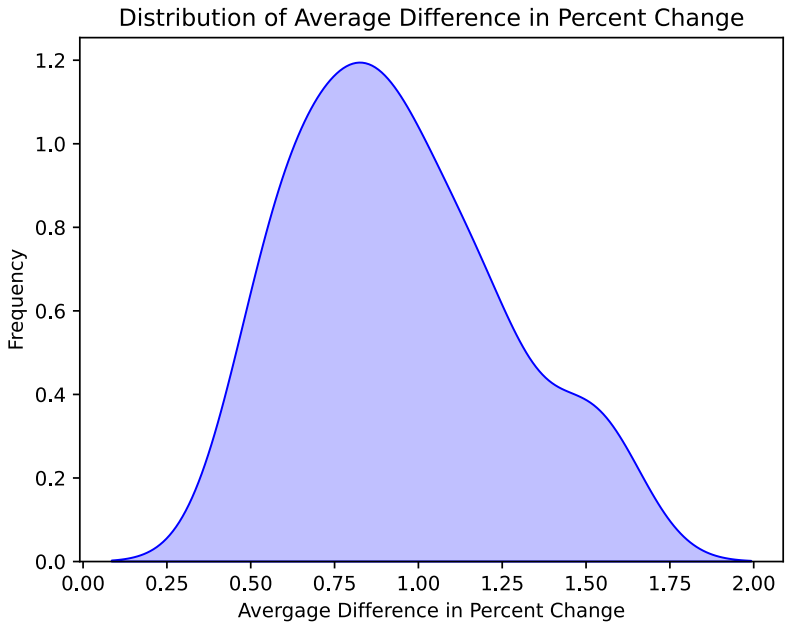

Figure 4

A further exploration was undertaken to unravel the intricacies of Chicago's rental and housing dynamics. The investigation was extended by examining geospatial location and how it might influence the correlation between rental prices and housing prices. Utilizing shapefile data, Figure 5 displays a geographical map of Chicago and each ZIP code for which data was available. The darker regions signify areas that experience less volatility, while the lighter areas represent higher volatility. This visualization offers a spatial representation of the disparities observed in the study. As part of the investigation, factors that could influence the geographic distribution of disparities in percent change difference were explored.

Interestingly, patterns related to a critical issue plaguing the city, gun violence, were uncovered. Figure 6 displays a graph quite similar to Figure 5, but instead uses a color spectrum to represent homicide per police department. While gun violence is not believed to be a direct

influencer, it is viewed as an indicator of underlying issues, reflecting challenges such as limited economic opportunities, decreased migration, and overall deterioration in the area's desirability.

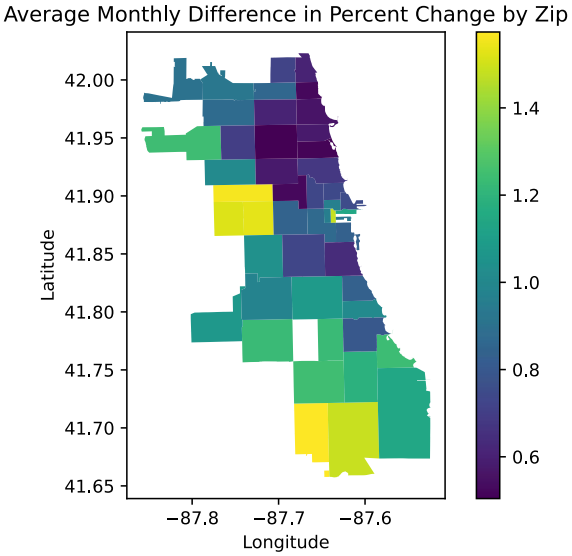

Figure 5

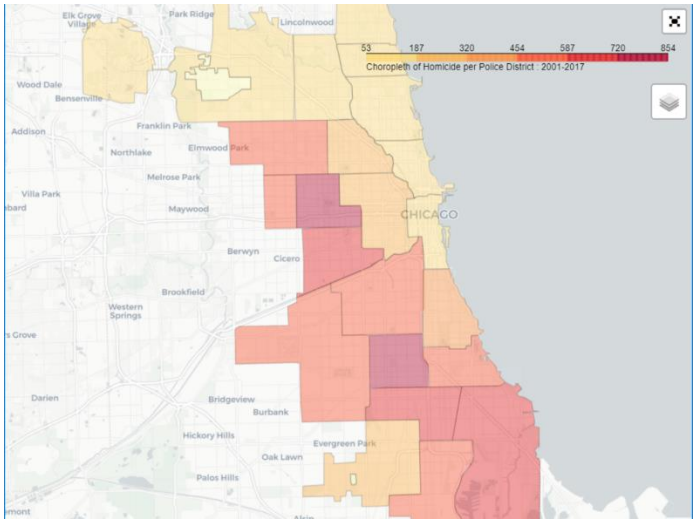

Figure 6

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Conclusion

For the purpose of enhancing the precision of predicting real estate investment profitability, the analysis delved into the interplay between rental and housing price indices across diverse Chicago ZIP codes. The primary inquiry questioned the consistency of their coordination, and intriguingly, the findings revealed an absence of a consistent positive relationship between these variables. To determine influences on the observed disconnect, the study navigated through specific ZIP codes, observed citywide trends, and examined distribution patterns. This approach not only deepened understanding of the intricate dynamics of the Chicago real estate market, but it also highlighted the significance of considering localized factors influencing the observed disparities. This study can be utilized for those navigating investment decisions, especially in active and multifaceted landscapes.

Citations

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