



Group Project 1

Population and Vacancy Rates



Hypothesis

Our group hypothesized that an increase in population would be correlated with increased vacancies in rental and owned housing.

Our null hypothesis is that increasing population has no impact on the rate of vacancy.



Our Data

We used data from the U.S. Census API to track population increases county-to-county as well as state-to-state, aggregating the top counties and states for population increase. We then measured the rate of increase/decrease for housing vacancies by both rental and owned properties by charting the rates in Pandas dataframes. We also used data from the FRED database to chart vacancies against income levels.

We used data for both housing as an aggregate and for rentals specifically, wondering if renting populations were more vulnerable to population changes.



Initial Findings

First, we examined populations of states and the vacancy rates of metro areas in comparison to their rate of growth, population and incomes.

We found that the counties experiencing the most growth were mostly rural, such as McKenzie County in ND, Wasatch in UT, and Hays in TX.

However, most of the metro areas with the highest proportionate rise in vacancies were in medium-to-large urban areas that did not experience major population growth or decrease, such as Lee County, FL, and Dorchester County, SC

Vacancies v. Population Increase

	County	State
2016	McKenzie County	North Dakota
2673	Loving County	Texas
2042	Williams County	North Dakota
2627	Hays County	Texas
2802	Wasatch County	Utah

The 5 counties with the highest population increases.

Cape Coral-Fort Myers, FL.....	4.0	5.8	4.3	5.8	8.5	-72.00%
Charleston-North Charleston-Summerville, SC.....	8.7	12.2	17.9	17.0	16.7	-62.99%
Albany-Schenectady-Troy, NY	6.5	3.8	8.5	10.8	12.3	-61.70%
Louisville/Jefferson County, KY-IN15.....	5.7	5.0	7.8	7.7	10.6	-60.12%
Nashville-Davidson-Murfreesboro-Franklin, TN17...	4.9	4.8	7.6	7.5	8.6	-54.81%

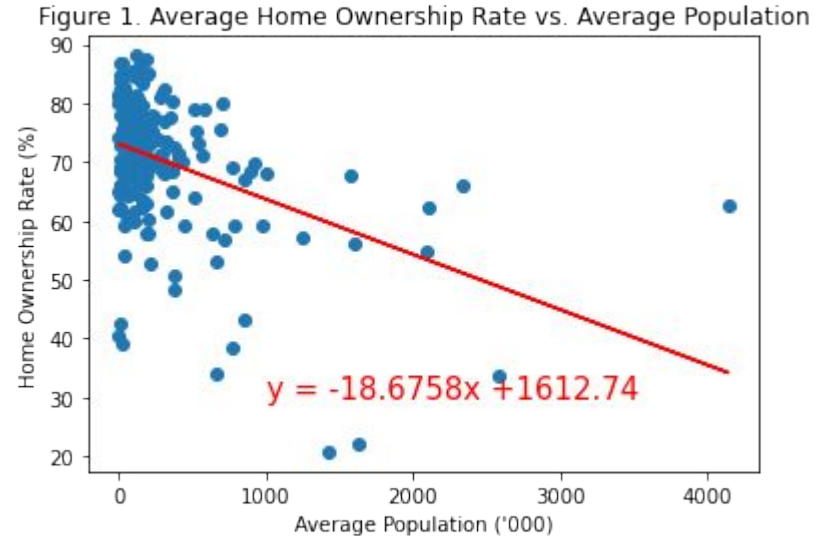
The top 5 metro areas for increasing rental vacancies

47	Omaha-Council Bluffs, NE-IA.....	
14	Buffalo-Cheektowaga-Tonawanda, NY\6.....	1
3	Albany-Schenectady-Troy, NY	
69	NY.....	Syracuse,
49	Oxnard-Thousand Oaks-Ventura, CA.....	

The top 5 metro areas experiencing gross vacancy increases

Plotted Findings

This scatter plot shows the relationship between total population and homeownership. If high populations create vacancies, it would be expected that the rate of homeownership decline with population increase.



Data Plotting Cont'd

This plot maps the same comparison, but only in counties with a population under 1 million. We can see that the same general line of best fit applies here, but homeownership is higher in general in smaller counties, probably due to less available rentals.

Figure 2. Average Home Ownership Rate for Counties with Population Below 1,000,000

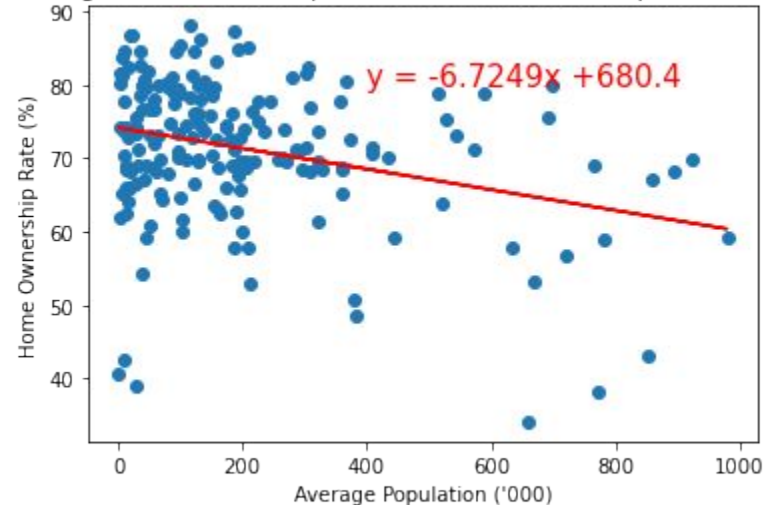
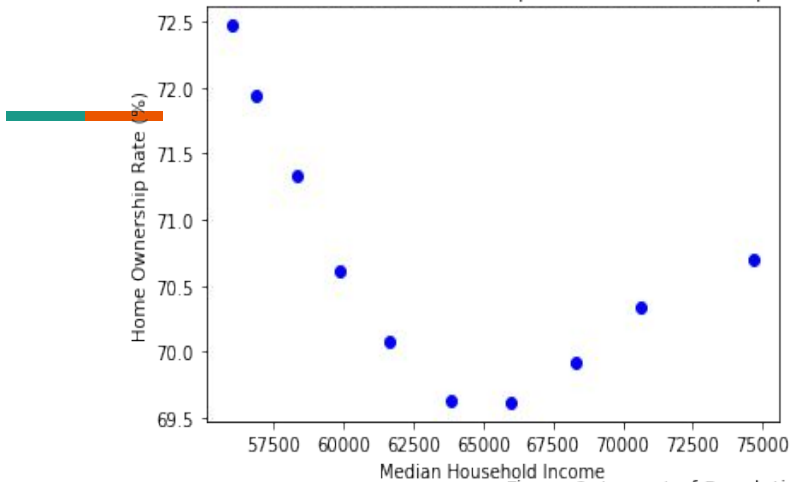
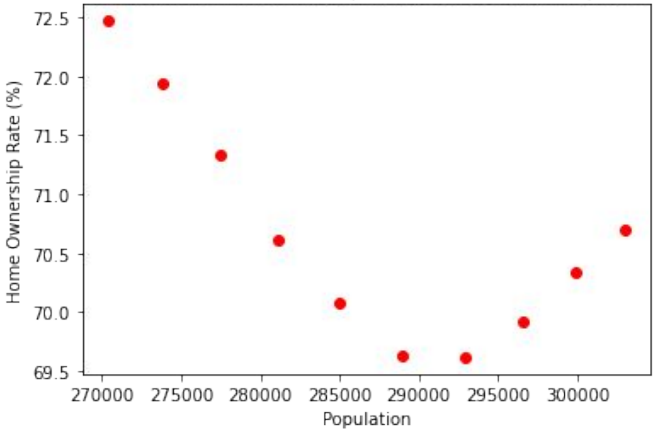


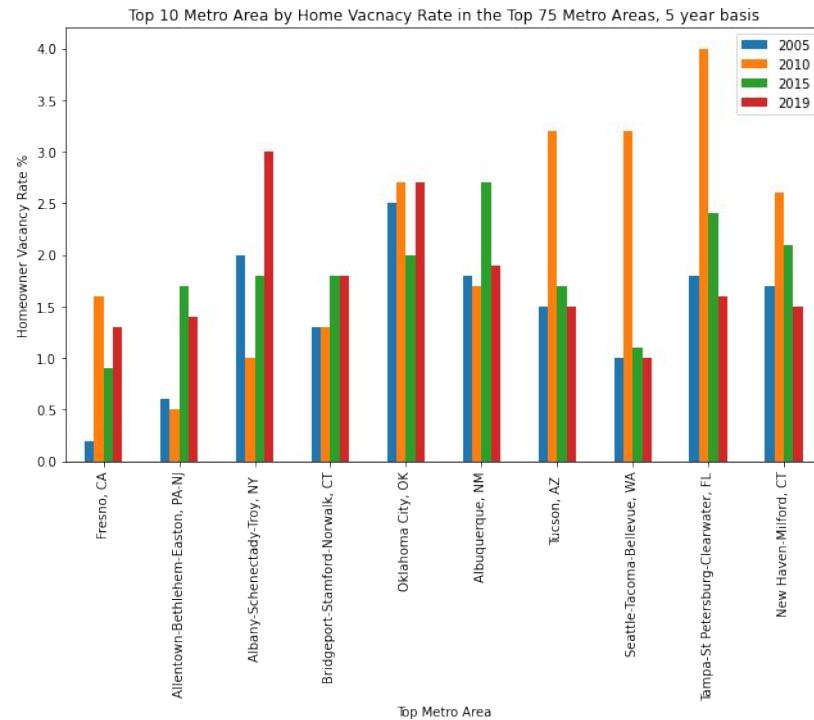
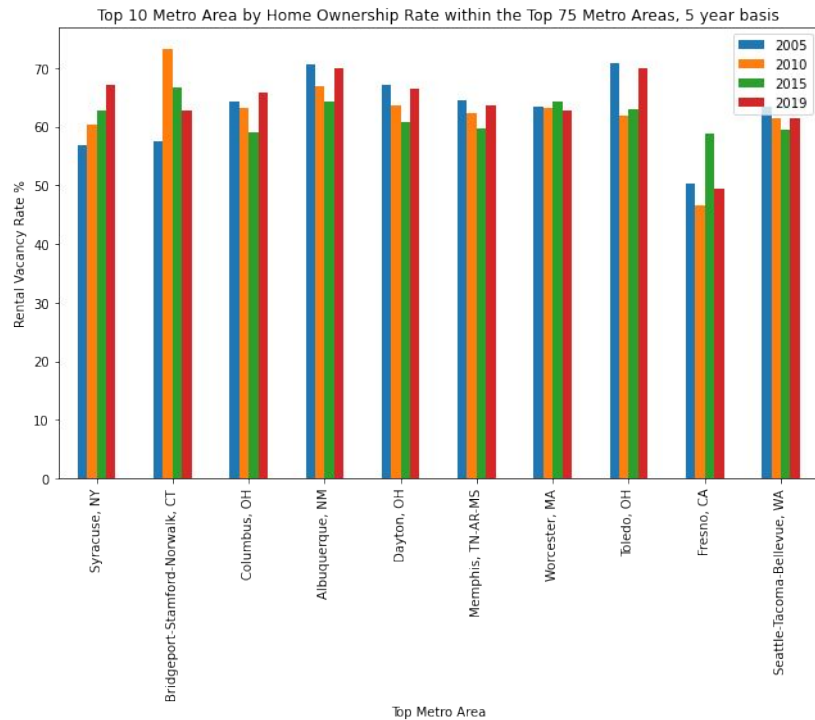
Figure 8. Impact of Median Household Income on Home Ownership Across the Fastest Population Growth Areas of the Country



We found extremely similar shapes of home ownership rates measuring across income and population. In both, the median tends to be near the point of lowest ownership.

Figure 9. Impact of Population Growth on Home Ownership Across the Fastest Population Growth Areas of the Country





By comparing home ownership rates to vacancy rates in top metro areas, we noticed that the rate of vacancies fluctuates much more wildly than ownership. This indicates different pressures on these rates.



Results

We found that the counties with the highest population did not have the greatest increases in vacancies, and that the metro areas experiencing the top expansions in vacancy were not consistently even experiencing population growth.

In addition, homeownership and rental vacancy rates appear to be under different pressures, not entirely related to population.



Interpreting Results

Our results indicate that population increase is not a solid predictor for an increase in vacancies.

However, the greatest vacancy increases were not correlated with smaller population increase, implying that the inverse of our hypothesis is also not true.

These results may indicate a null hypothesis.



Existing Literature

A 2019 study by the NIH indicated that rising costs from population increase displace residents into outlying suburbs and communities, leaving the proportionate rate of vacancy changed very little in an effect called “sprawling”.

However, a wide variety of socioeconomic effects can correlate with vacancies. Weakened wages, divorce rates and even the construction of retirement communities can all be more directly correlated with rising vacancy rates than population.

Source:

[https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6920573/#:~:text=When%20a%20city%20experiences%20population,2001\).](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6920573/#:~:text=When%20a%20city%20experiences%20population,2001).)



Data Limitations

Our data was only available at state, county and metro-area levels, while many vacancy increases happen in specific parts of their cities. Tracking the greatest vacancy increases by community could show some patterns that are invisible at larger scale.

With more time, we would have tried to chart changes in average income, as well as other factors that could impact vacancies more.

Our data takes a 10-year look at data that includes information skewed by the Great Recession as well as the 2015 inflation in the housing market. These created patterns in the housing markets that should not be extrapolated



Conclusions

Although an increase in population can impact housing prices, it generally relocates people to different parts of the same city, leaving total vacancies relatively unchanged.

Although a direct correlation cannot be tied to rising population and increases of vacancy, this does not mean it couldn't be one of several factors increasing vacancies in a city.