Real Estate and Population Dynamics in the USA

Group 2
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Presentation Focus: Analyzing Population Trends and Residential Real Estate Dynamics

Our project agenda revolves around two key objectives:

1. Population Analysis:

Identify states and counties experiencing the highest and lowest population growth rates. This encompasses factors like the initial population, births, deaths, and migration.

2. Real Estate Assessment:

Compare population growth trends in major geographic regions with the dynamics of the residential real estate market. We will explore factors such as mortgage rates, the availability of homes for sale, and the turnover of residential real estate inventory.

By addressing these objectives, we aim to gain valuable insights into the interplay between population changes and the real estate market in different areas.

Data Sources:

We have obtained our data from two primary sources:

1. Census Data: We acquired a CSV file containing information spanning from 2010 to 2020.
2. FRED National Data: Database for a range of economic data, in our case, rental data across states
3. Zillow Public Data: Database on residential sales, average sale price, inventory level among others.

We are looking to answer the following questions:

1. How does population growth impact residential real estate sales?
2. How does population growth impact residential real estate sale prices?
3. What is the relationship between population change and rental vacancy
4. How can the relationship between population change and historical housing prices be used to estimate future prices in real estate markets?

Results

Census Population Data Analysis Result

- After examining Census population data, we found that Washington (18%), Utah (17%), and Texas (16%) saw the most substantial population growth between 2010 and 2020, while Illinois and Virginia experienced the smallest increases.
- We conducted a similar analysis for counties, revealing significant growth in McKenzie County, North Dakota (137% increase), and Loving County, Texas (115% growth) over the same 10-year period. Conversely, Alexander County in Illinois showed a decrease of 33%, and notably, Concho County in Texas experienced a decrease of 31%.

As a result, we focused our analysis on states with the highest population growth over a 10-year period, which included Washington, Utah, and Texas, as well as states with the lowest population growth, namely, Illinois and Virginia.

Census Population Data vs Residential Home Sales
- Plotting the total population numbers against total residential home sales numbers did not yield significant insights as to whether house sale prices impacted population growth.
- It is evident from the data that residential sales have increased across all states, and the same can be observed for the population, the only exception being West Virginia which increased in home sales price and decreased in population.
- Data for Washington, DC was not given so there was no way to see if there was a correlation or not between the residential sales and the population but given the data on the other states we can confidently say that there was no correlation.

Correlation of Total Population with Residential Home Sales Results
- Washington (WA) and Texas (TX) show a very strong and positive correlation between population and sales, suggesting that as population increases, sales increase significantly.
- Utah (UT) exhibits a very strong positive correlation, indicating that population growth is closely tied to higher sales in the state.
- Illinois (IL) and Virginia (VA) demonstrate strong negative correlations, implying that as population increases, sales tend to decrease notably in these states.
- In summary, population changes exert a significant influence on sales across these states, although the nature and strength of this correlation differ, ranging from positive to negative. These results offer insights into the population-sales dynamics specific to each state. However, it's important to note that these findings do not reveal a common pattern shared by all the states, indicating that regional market dynamics play a crucial role in shaping these relationships.

Correlation of Population Change with Rental Vacancy Rate
- One notable observation from this data is that the rental vacancy rates in DC and Virginia were the same in 2011 but, after that, diverted. Since they border each other, I assumed it would be similar. However, after 2011, DC, up until 2015, saw reductions in vacancy year after year. This was until 2016, when there was a positive increase, with 2017 being the largest at 1.3%. 2019 and 2020 optimal cancel each other out. When you look at Virginia, there were minor changes between 2014 and 2020. The most significant period for change was 2013, with a 2.2% decline.
- Out of all the states, Utah saw the most significant decline between years, with a decrease in 2015 of 3.5%.
- The city that increased the most in terms of rental vacancy was Virginia, which had an overall

- In summary, DC, UT, and IL saw decreased rental vacancy over the ten years. At the same time, UT and TX saw increased rental vacancy over the ten years.
- When comparing the rental data to population data, There was no correlation between the change in rental vacancy and population change. VA and TX saw increases in rental vacancy and population change, which follows my hypothesis of a negative correlation. This could be because of external factors like additional rentals being built.
- DC, UT, and Il show the relationship I was expecting, with DC and UT having very similar data points. IL stands out with a 2% decline in rental vacancy over the ten years.

Using historical data for population trends and fluctuations in house prices to predict future market value changes for select cities in the United States

- The increase in houses prices over the ten year span from 2010 to 2020 were actually negative for the first couple of years in our data set, and this could have been due to the downturn in the real estate market caused by the subprime mortgage crisis that triggered the Great Recession.

- Zillow market data was used to find the changes in house prices from 2010 to 2020, and then the average house price in each of the 1 year time periods was calculated.

- The year to year changes in prices found in the preceding step were then used to calculate the percent change (growth or decline) in house prices between the 1 year periods.

- After the growth rates were found, it was possible to find an equation that would allow us to find a variable to predict the amount that a house would increase (or decrease) in price for every one percent increase (or decrease) in the states population.

- By using the population percent increase of 17.6%, for the state of Texas, and the increase in house prices of $83,300, for the state of Texas, we were able to calculate that with every one percent increase in the population of select states the house price increased a little less than $5,000 over the ten year span studied in our analysis.

- As concluded in a previous section the population growth in the selected states had little impact on the increase in housing prices in those areas seeing the highest spikes in population growth. An increase 1% increase in the population for the state of Texas is equivalent to about 300,000 people, but with all those people the average price for a house would only increase by less than $5,000.

- The equation can be used to roughly predict future home values in the selected states if you have an accurate estimate on how the population will grow (or decline) in the state that you are looking at.