**A Brief Analysis of Housing Market Trends in Nebraska**

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**Background**

With current trends in the housing market in the United States and abroad, the price of homes has quickly reached all time highs. With prices growing so quickly in a relatively short period of time many potential buyers in the market have been priced out of homes that would have been well within reach just a few years ago. Nebraska in particular has been heavily affected by these changes and when coupled with the high property tax rate, in comparison to other states within the U.S., homes have become much more difficult to purchase with long term residence in mind. With these trends in mind the goal of this analysis is to determine if the current wages given within the state of Nebraska allow for a feasible purchase of a home in the market over the next 5-year period based on data from current market trends.

Business Problem/Research Questions

Within the previously mentioned 5-year period this analysis will look at the changes in price over time for residential buildings in Nebraska. This information is key to understanding what direction the market could potentially be moving in. With rumors of a potential housing market crash imminent, it is important to understand the current trajectory of the market if no changes were to occur. With this data in mind the project aims to look at the average prices of home mortgages against the prices of rental properties within the state. The culmination of these findings will help with determining if the current rate of wages is sustainable for future housing market growth.

**Analysis**

Data Preparation/Source

The data for this analysis has been sourced from the Realtor.com comprehensive residential data library. This data source provided a large amount of data dating back to 2016 and was considerably more accessible than other housing data repositories. In addition the data dictionary provided a considerable number of terms to use in this analysis. Not all of these datapoints were within the framework of this project, the variables chosen from the list include the active listing count of properties, the days on the market, the median listing price, and average listing prices. In addition this source provided data specific to the state in question, Nebraska, allowing for a more direct look this specific market.

Methodology

The model chosen to look at future predictions for this dataset is the seasonal auto-regressive integrated moving average with exogenous factors further referred to as SARIMAX. This model was chosen for this data because of its ability to deal with seasonality and its ability to account for external data which given the nature of this dataset seemed the most appropriate. Within the SARIMAX model there were a few variables that were the main focus of change/tweaking when building the model, within the seasonal order component of the model the variables that had the most influence on this data where the P-value indicates the number of previous seasons that are being considered for each point (3 years) and the M-value indicating the frequency of our seasons (12 months). The three year period was chosen as a middle ground for fitting the data. With the 1-2 year periods being very skewed due to the nature of the last year of data being a considerable change/outlier and the full 5 year period heavily discounting the massive changes in the previous period, the 3 year period seemed the most appropriate. The 12 month value was chosen due to the nature of data in the repository. Given the data was already broken up into monthly installments it felt the most appropriate to continue with this trend.

Analysis

Chart, line chart

Description automatically generatedChart, line chart

Description automatically generatedGraphical user interface, chart, line chart

Description automatically generated Based on the SARIMAX model used on the data there are few key trends to take a look at. Firstly one of the most important aspects when purchasing a home is the price of the property, this information would be included in the median and average listing prices for said homes. Looking at the predictions made on this data we can continue to see an upward trend in both median and average prices over the next 5 years. The graphs indicate that the model is predicting a relatively small increase year over year until about 2027, at which time it indicates that there may be a small drop off in price possibly signaling a shift in the market. Similarly the average number of listings seems to be heavily affected by the previous years of data with an inverse trend downward in the number of active listings. The model seems to show an ebb and flow of listings with gradual decreases towards the year 2027.

**Conclusions**

Conclusions

The data from these predictions seems to indicate that there will continue to be an upward trend in the cost of purchasing a new home in the Nebraska market for at least the next 5 years. In addition the number of home being listed on the market for purchase will likely trend down within the same time frame. This is likely due to the same issues being seen across the country and around the globe, the large number of properties being purchased by large corporations for rental use and the advent of quick rentals such as AirB&B. In Nebraska alone the number of homes being sold to investors has increased 50% (Henderson, 2022). This can really be seen in the total number of homes being listed decreasing, whereas in a traditional market the number of homes being bought and sold by individual consumers being much higher, companies with large amounts of capital are able to sit on empty properties for a much longer period of time. This in turn greatly lowers the amount of homes being listed and with that lack of supply and an unchanged demand the eventual result will be an uptick in the cost of the existing for sale housing pool. As that pool diminishes even further it is likely we will either reach some sort of breaking point (market collapse) or the capital held by these developers will be much too high to match forcing families to rent rather than buy. With the median household income in Nebraska being around $66,644 (*U.S. Census Bureau quickfacts: Nebraska*) the latter seems to be the more likely outcome. With prices of a home exceeding $350000 and the rate of mortgages on the rise, monthly payments may soon be out of reach for many Nebraskans. Coupled with the exceedingly high average property tax rate of 1.51%, the eighth highest in the nation, (*Nebraska Property Tax Calculator*) potential homeowners are looking at an additional $5,285 a year in property taxes alone for a home valued at $350000. This does not seem to be a sustainable trend for the housing market in Nebraska without major changes in wage or housing price/availability.

Assumptions

Going into this project I had mostly assumed that there was mostly just a major increase in the price of homes from cursory research on the subject. While this was true, there were major underlying issues with the market itself that caused that change rather than it being an organic response to something like inflation. While there is an argument that inflation has played a factor in the increased pricing, the lack of available homes seems to have played a larger factor in the speed at which the price has grown in the last 1-2 years.

Limitations

The number of factors playing into the price of a home in any given area are too high to count. When spread over large market areas these less quantifiable variables can greatly skew the data and are much more difficult to account for. In addition, the layout of the state is also quite different from many of the larger housing markets. In comparison to states like Texas or New York, Nebraska’s population is quite concentrated in just two cities. While these cities contain a majority of the houses located in the state, the number of houses located in the vast quantities of rural communities are not negligible. This could greatly skew the overall price of homes in a downward trend due to the lower cost of property in these communities.

Challenges

Originally the goal of the project was to compare two different models to see if the results were comparable and give a more solid basis for the analysis. The second model chosen was a linear regression model in order to compare results to current government studies using a similar model type. With the setup of the linear regression model, it required a generated dummy dataset in order to properly forecast future predictions. Given the time constraints and complexity of multiple data points this did not seem like a feasible addition to the analysis at the time. Some of the data chosen in the wrangling stage of preparation did not necessarily fit the purpose of the project. The original data source provided a lot of subjective datapoints like “hotness rank” which factored in some of the less logical factors previously mentioned, but these variables didn’t seem as reliable as much of the other data.

**Recommendations**

Recommendations

Based on the findings from the analysis the current trend of housing prices and availability seems to be unsustainable in the long term. Unless there are changes to the way housing purchasing is regulated, it seems unlikely that there will be any disincentive for large property management firms to continue purchasing large amounts of residential homes. Its possible that increased taxes on these types of empty properties could be that disincentive, but further study is warranted. An alternative approach could be the conversion of more office areas of major cities like Omaha to multipurpose high-density housing. This could give potential property owners more options in the form of condos located in more favorable areas opening up large amounts of suburban housing for purchase. More housing in general seems to be a necessary change to decrease the overall pricing of homes in the state.

Future Use/Additional Applications

The scale of the market being studied this project warrants the need for additional studies to be conducted to assure the information being speculated. So future use of this model and similar approaches will likely be necessary to determine the trajectory of the market in order to prevent crisis. As a market focused around a piece of property the model used could likely be used in similar studies for markets surrounding other pieces of property.

Ethical Considerations

Some things to note with the ethics of this project, while the source of data seems to be relatively solid it is not a government run resource. It is possible that this data has been cherry picked or changed in some way to support the goals of the company running the repository. This is unlikely, but still something to consider. In addition the outcomes predicted in the market will likely affect a huge portion of consumers in the state, so it is important to consider how these results could change or skew prices or availability based on consumer confidence.

**References**

*U.S. Census Bureau quickfacts: Nebraska*. United States Census Bureau. (n.d.). Retrieved March 31, 2023, from https://www.census.gov/quickfacts/fact/table/NE/AGE295221

*Nebraska Property Tax Calculator*. SmartAsset. (n.d.). Retrieved March 31, 2023, from https://smartasset.com/taxes/nebraska-property-tax-calculator#1hhBQpN5vJ

Henderson, T. (2022, July 22). *Investors bought a quarter of homes sold last year, driving up rents*. The Pew Charitable Trusts. Retrieved March 31, 2023, from https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2022/07/22/investors-bought-a-quarter-of-homes-sold-last-year-driving-up-rents

*Mortgage calculator*. Bankrate. (n.d.). Retrieved March 31, 2023, from <https://www.bankrate.com/mortgages/mortgage-calculator/>

*Residential Data*. Realtor.com Economic Research. (2023, March 30). Retrieved March 31, 2023, from https://www.realtor.com/research/data/

Appendix A

A chart showing the original data for the number of active listings against the SARIMAX model to ensure that the model was a correct fit.

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