

Home Prices and Economic Data



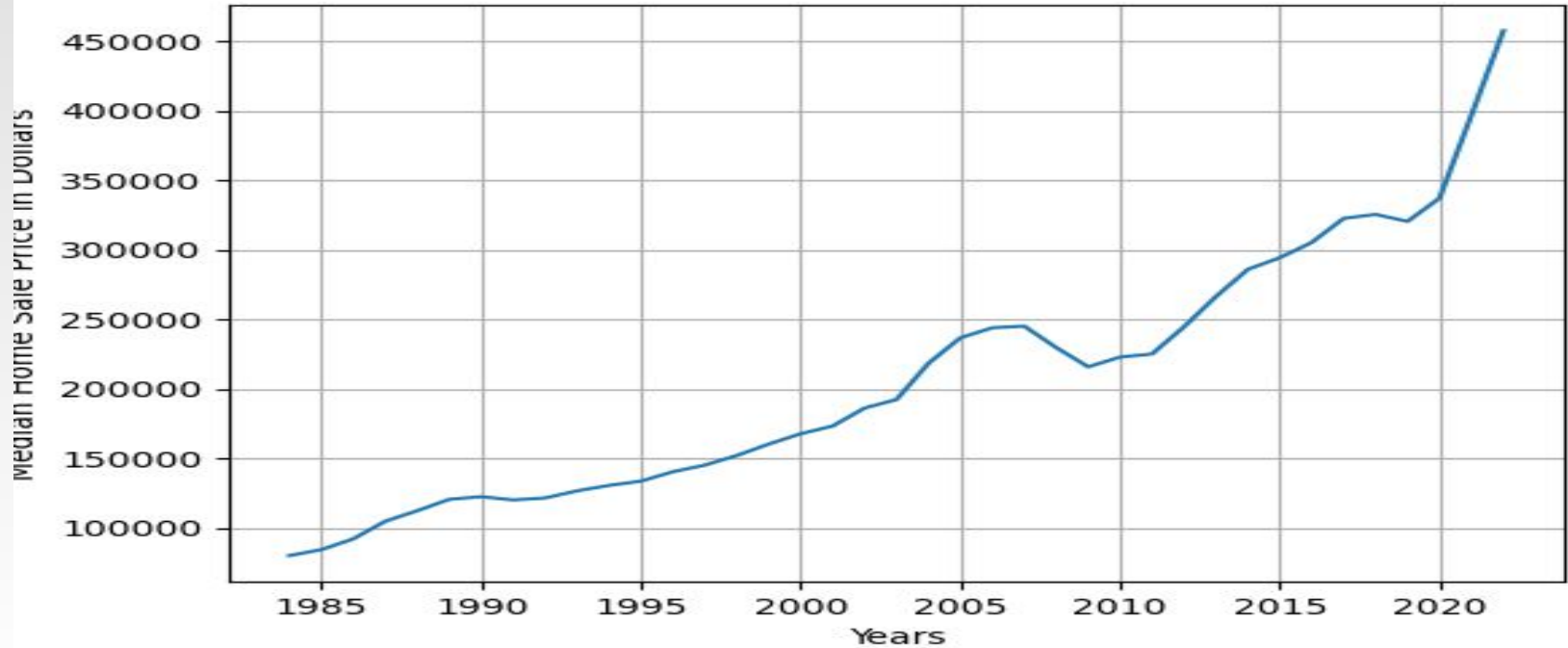
Team 6

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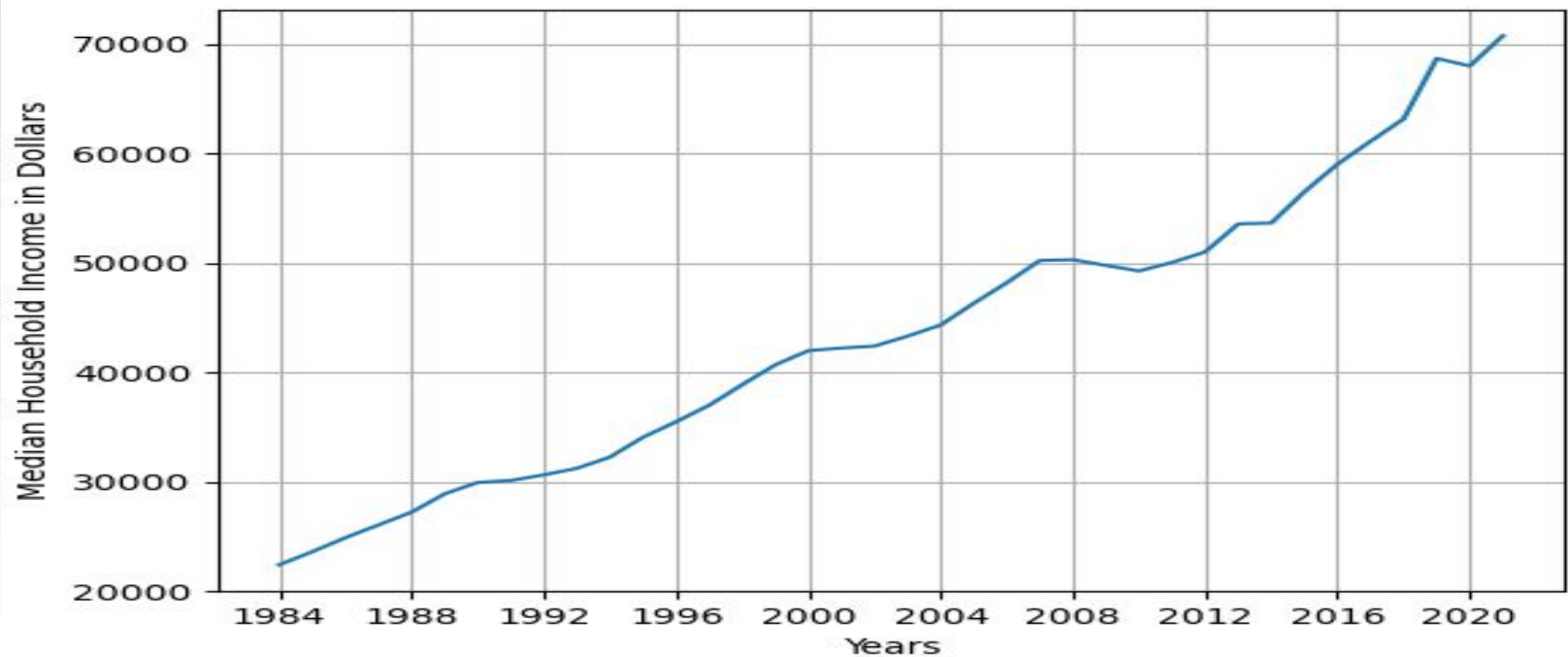
Objective

- To test common macro economic variables suitability in predicting Median Home Sale Prices. Various forms of testing were performed: time series and regression analysis.
- Variables tested against Median Home Sale Prices:
 - Rental Occupancy
 - Rental Cost Index
 - Total Residential Construction Spending
 - Dow Jones Industrial Index
 - Log Difference analysis and regression
 - Median Income
 - Indexed and Inflation Adjusted
 - Mortgage Rates over time
 - Consumer Price Inflation

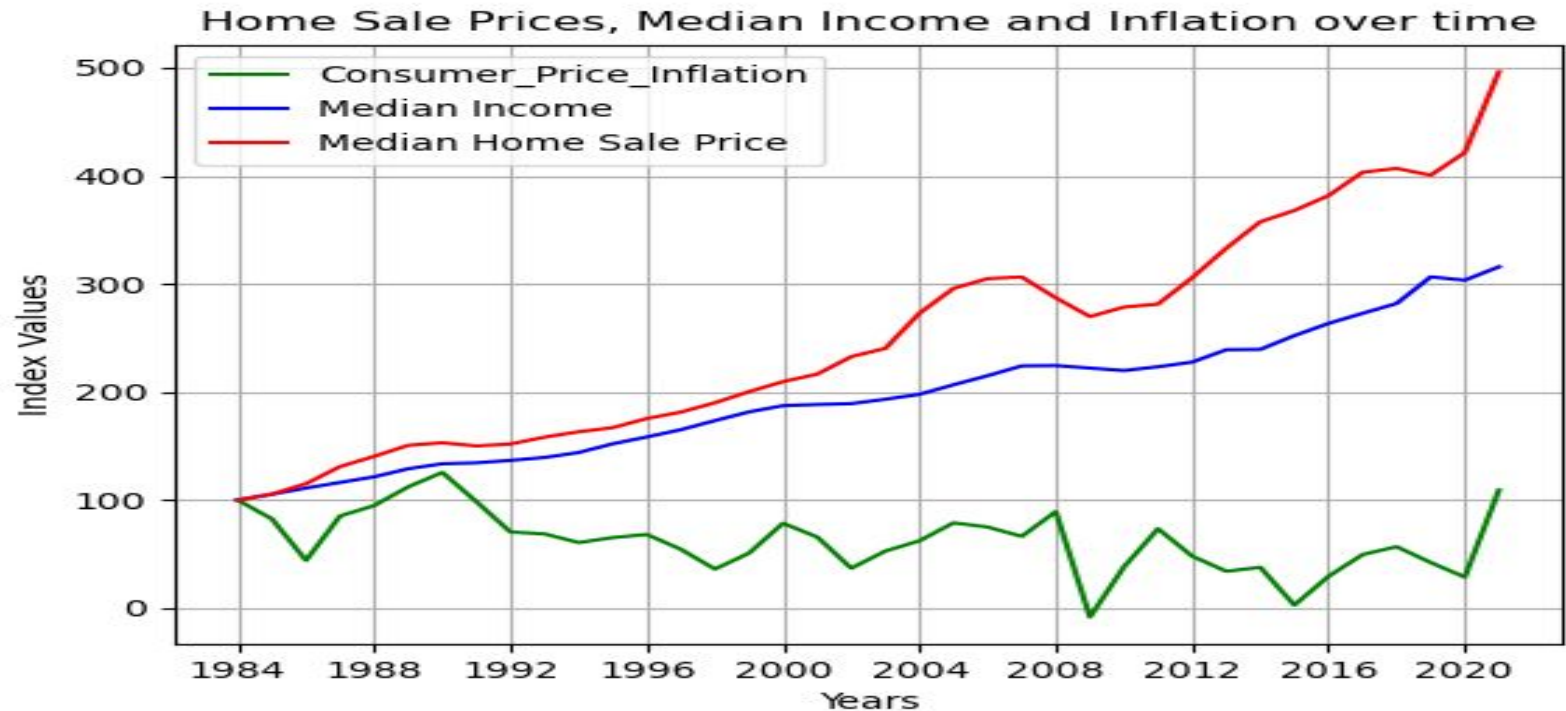
Median Home Sales Price



Median Household Income

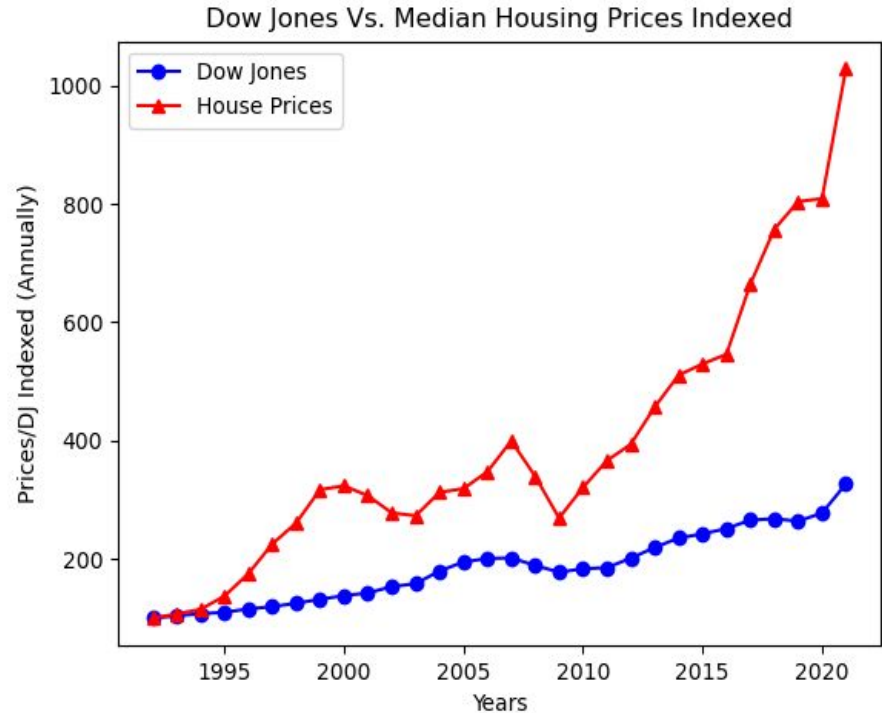


Home Sale Price vs Median Income (Index)



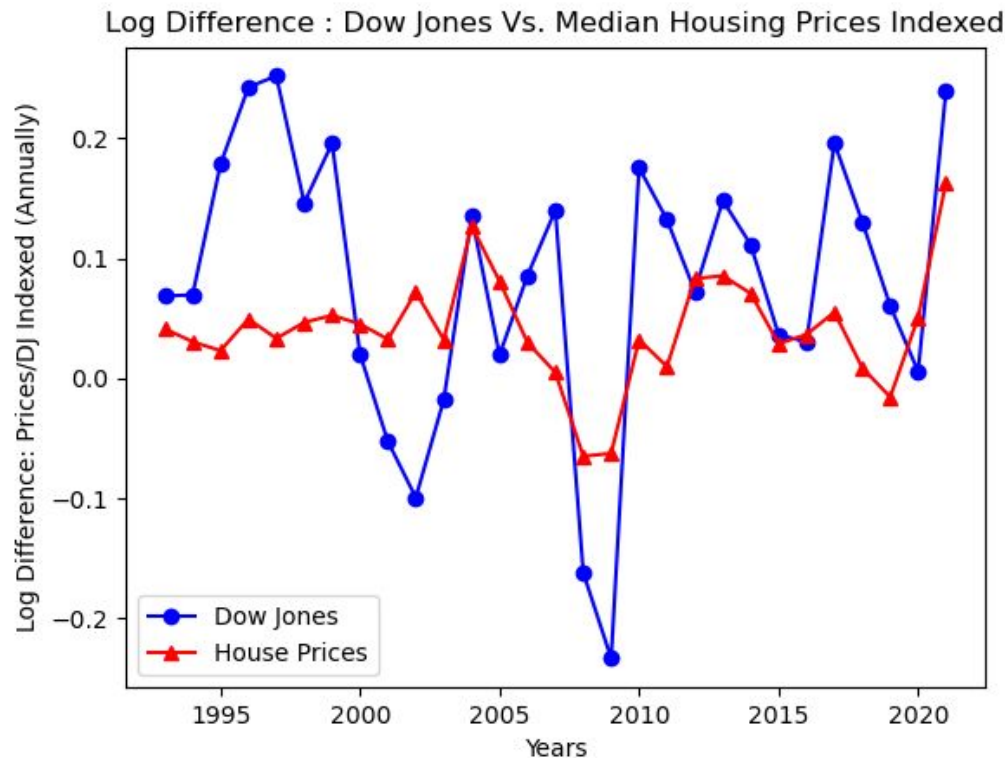
Dow Jones Industrial Avg.

- Dow Jones Index (DJI) is a stock market index of 30 prominent companies listed on stock exchanges in the United States.
 - The index is a price weighted index
- The Dow Jones was chosen as a predictor as it is often used as a proxy for future economic growth (leading indicator)
- It was predicted that, all else being equal, an increase in the index would lead to an increase in housing prices
- The different rates of returns based off the assets profiles can be seen in this slide.
- The DJI has a significant multiplicative trend



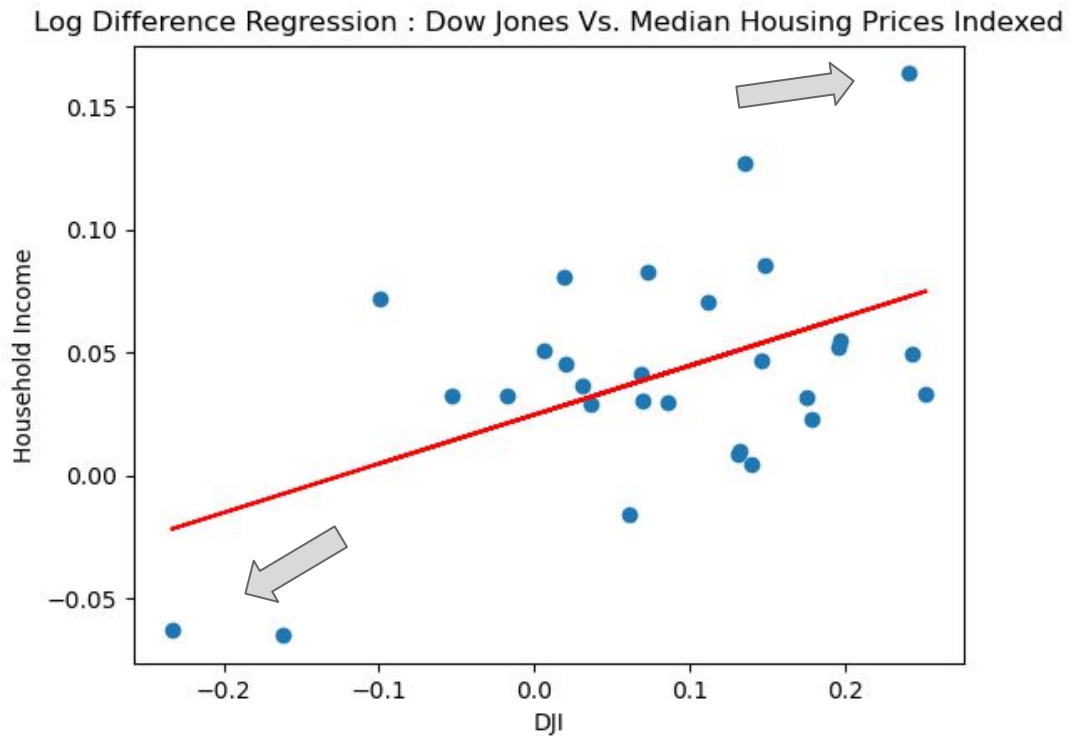
Dow Jones Log Difference

- Since the DJI has a multiplicative trend, the log difference was taken for both variables
- It allows for the analysis of the relative percentage change in the variables, while removing the effects of economic growth that impact regression analysis
- The scalability also allows for direct comparison over time with the HPI Index

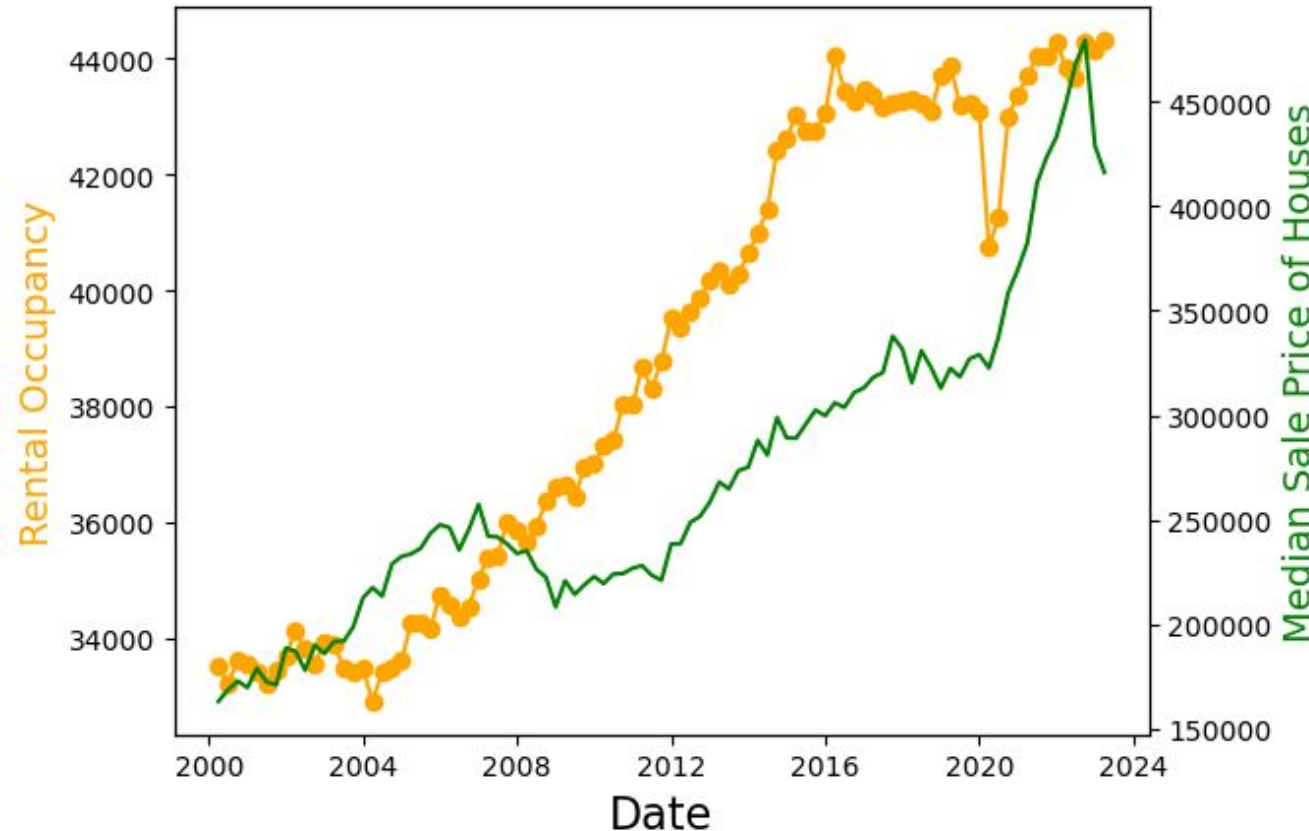


Log Difference Regression

- The correlation of the log difference regression was $\sim .5$ with a p-value of .01
- This was lower than the original correlation of .75 of the indexed data without taking the log difference.
 - The original correlation was driven by the compounding growth affecting the overall linearity of the model
- This correlation of the log differences was likely impacted with outliers. These outliers are caused by the extreme movements in the DJI and likely caused a significant relationship to form.

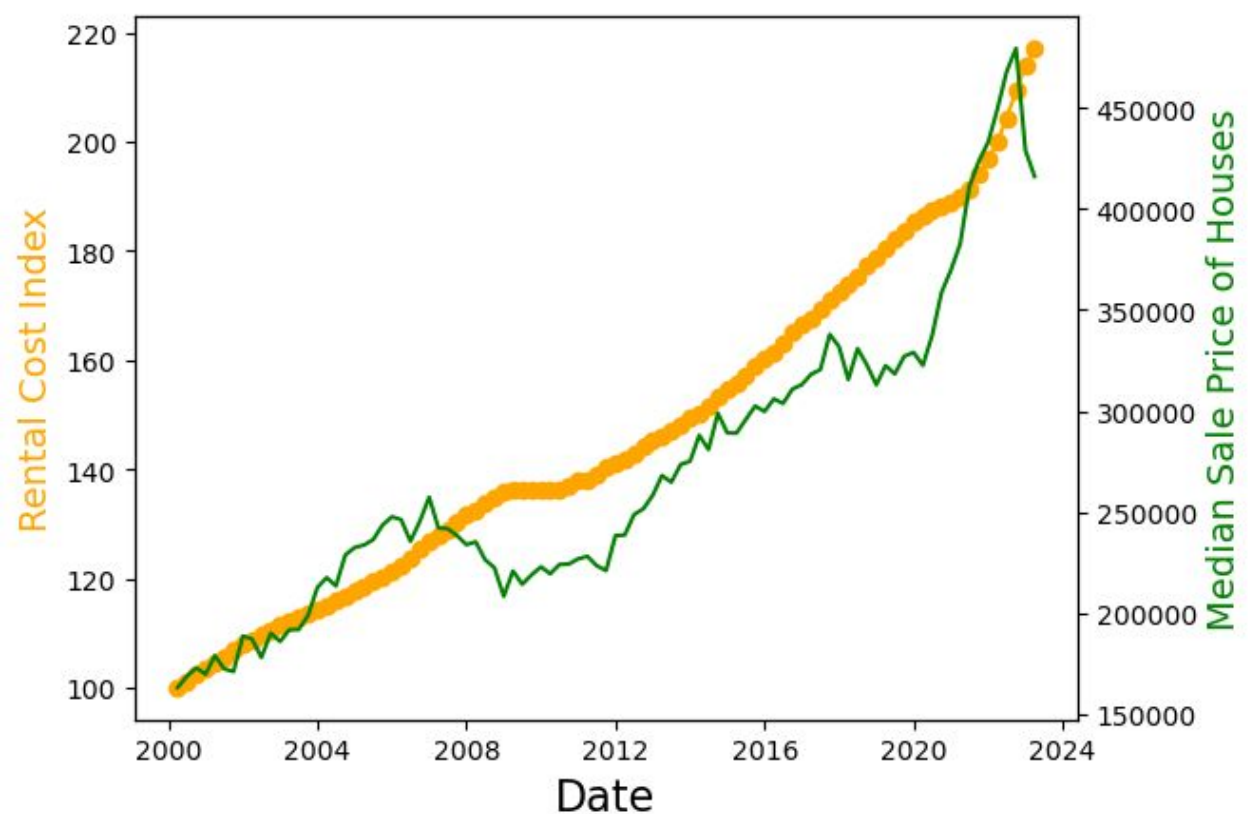


Rental Occupancy Vs. Med. Sale Price of Houses



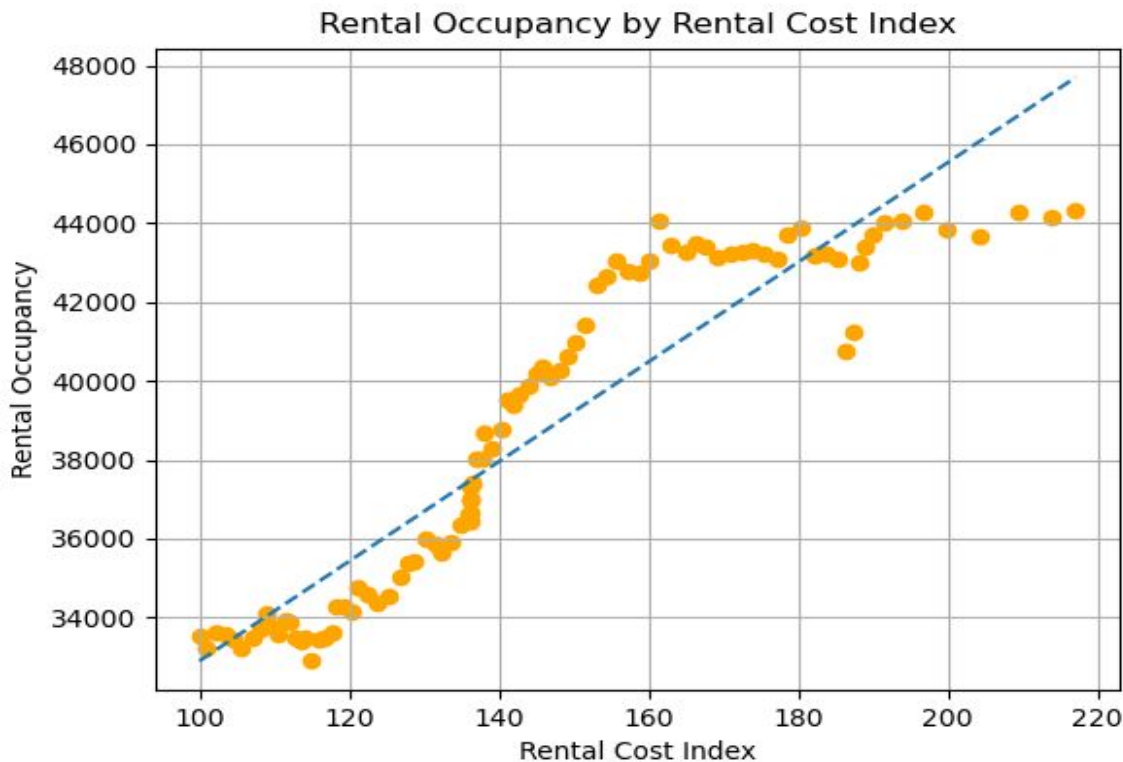
While the housing market was steadily climbing, it appears that the Pandemic turbo charged its climb, going from \$322,600 in 2020 to its peak of \$479,500 at the end of 2022

Rental Cost Index Vs. Med. Sale Price of Houses



While the pandemic negatively impacted occupancy rates, nothing stops the rent from climbing. Even in the recession of 2008, rent stayed flat, but continued its climb 2 years later

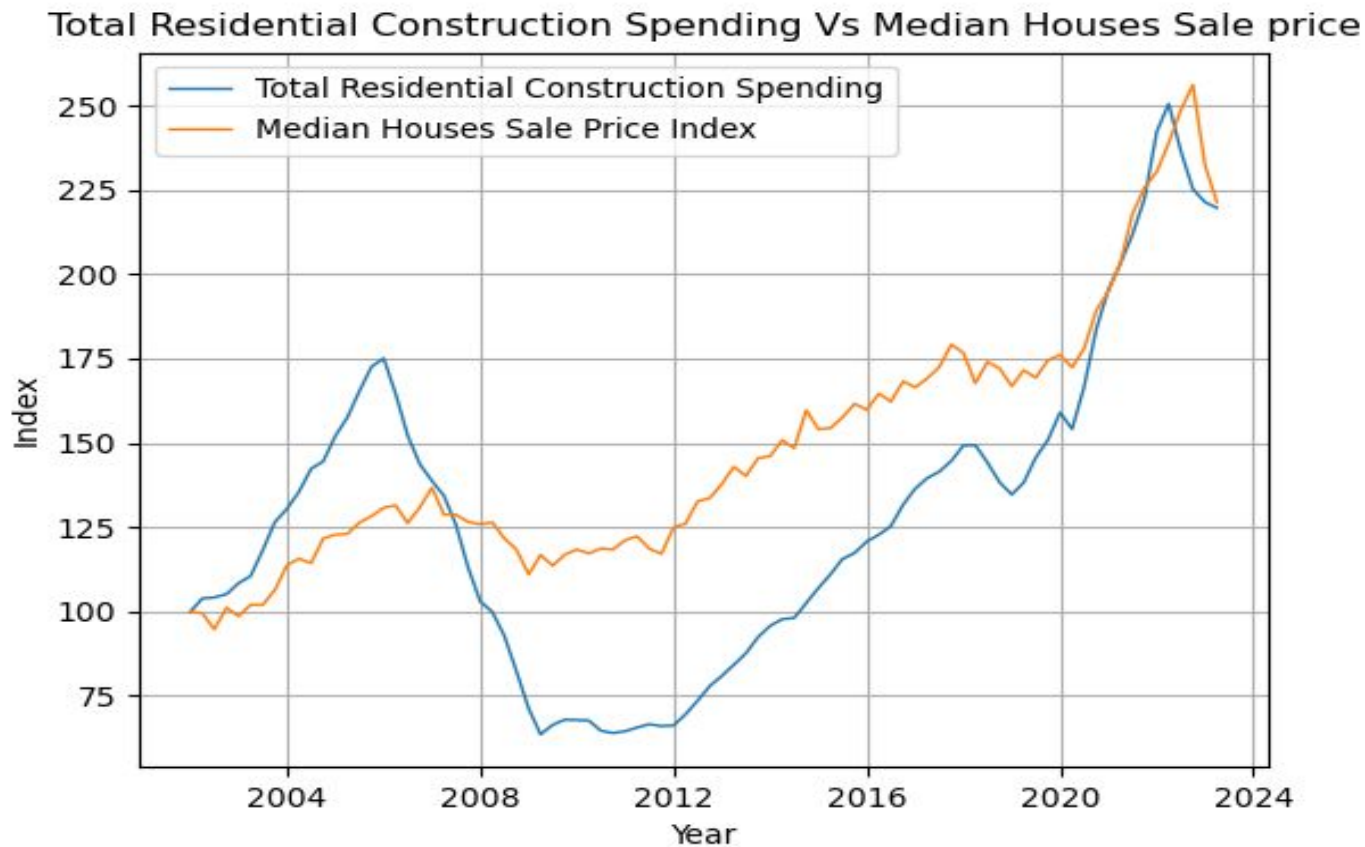
Rising Rentals, Rising Rents



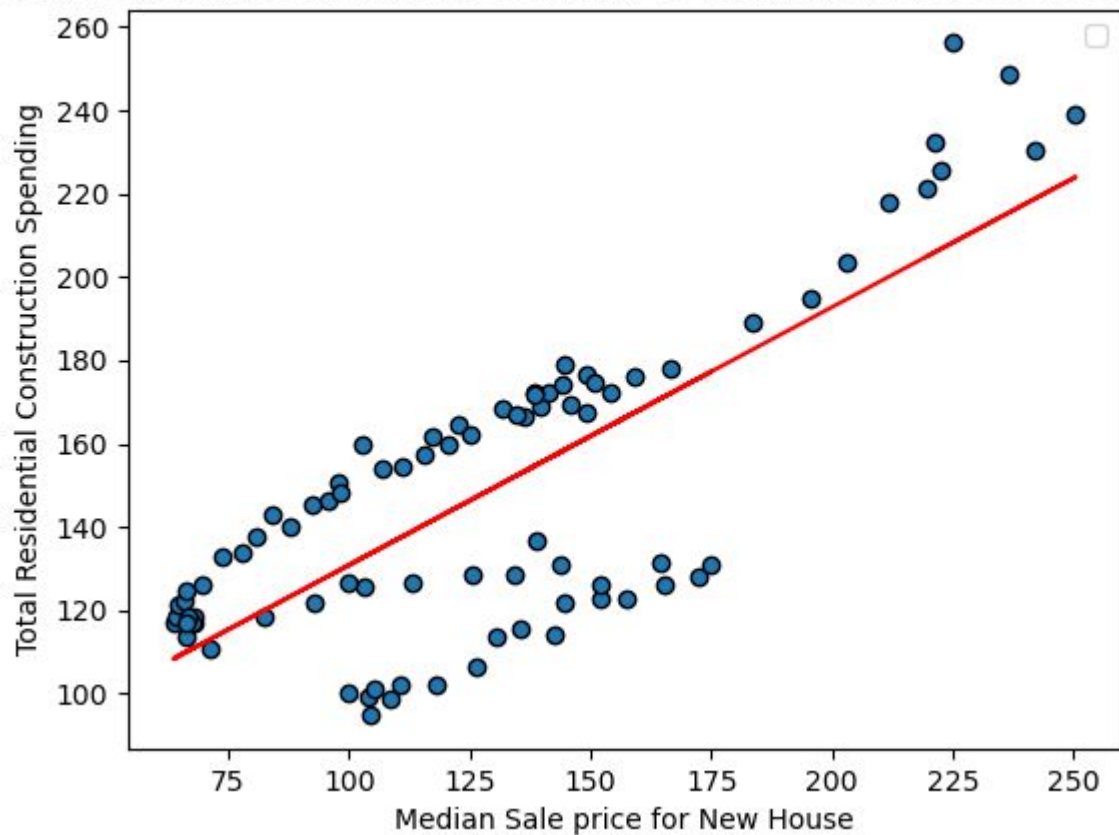
As Occupancy goes up, so does the rent index in a typical supply/demand fashion



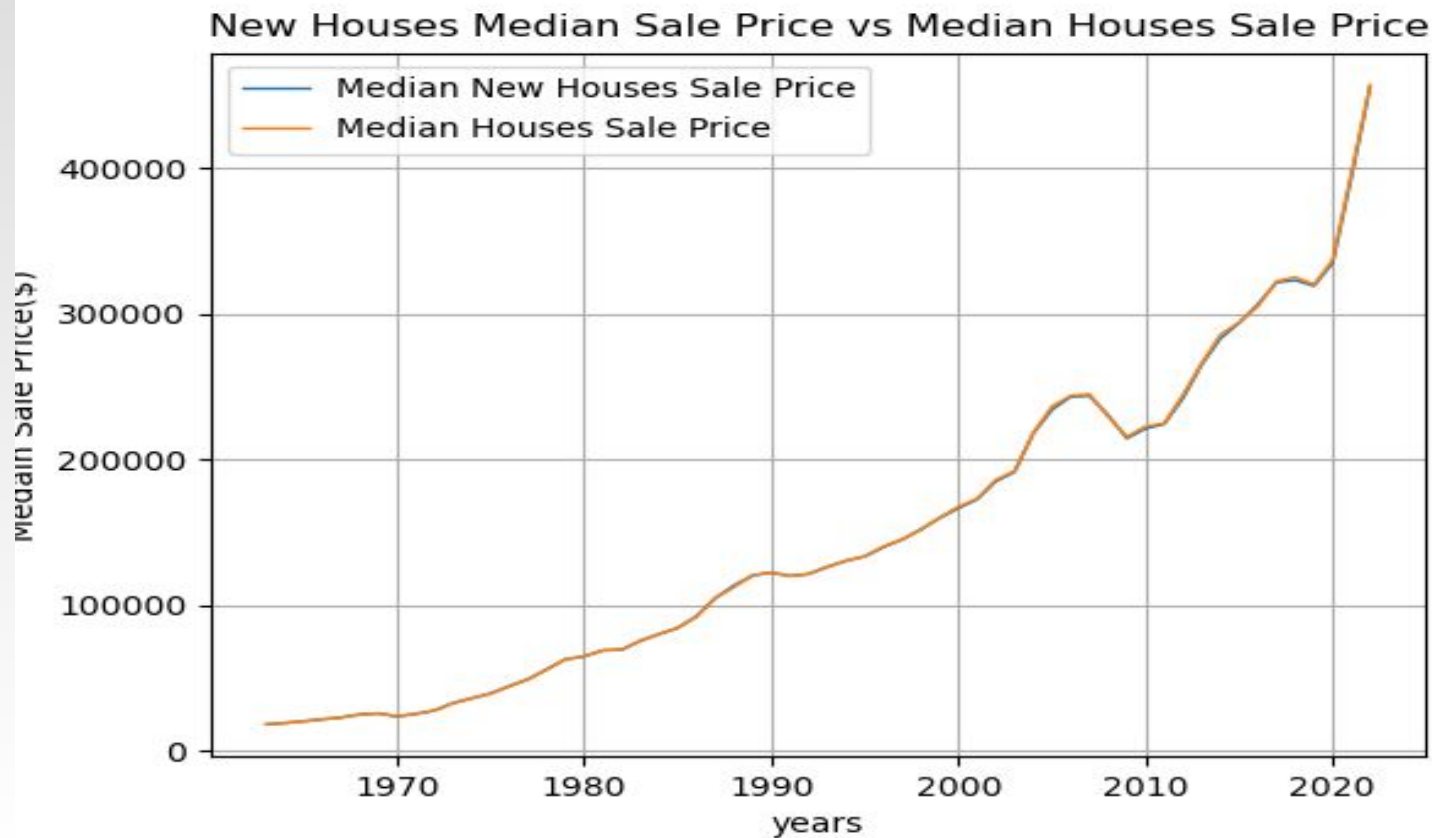
Growth Residential Construction



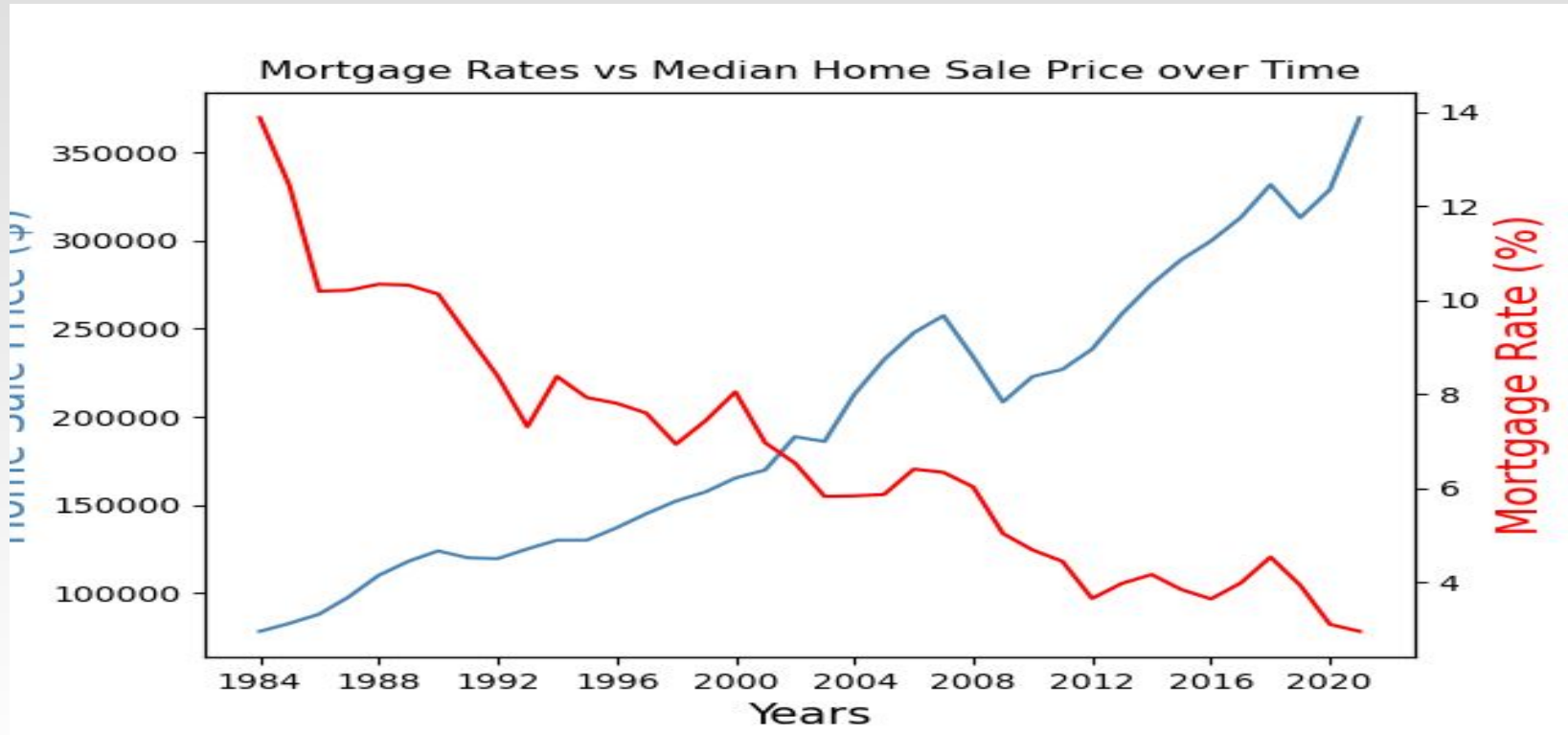
Total Residential Construction Spending Vs Median Sale price for New House



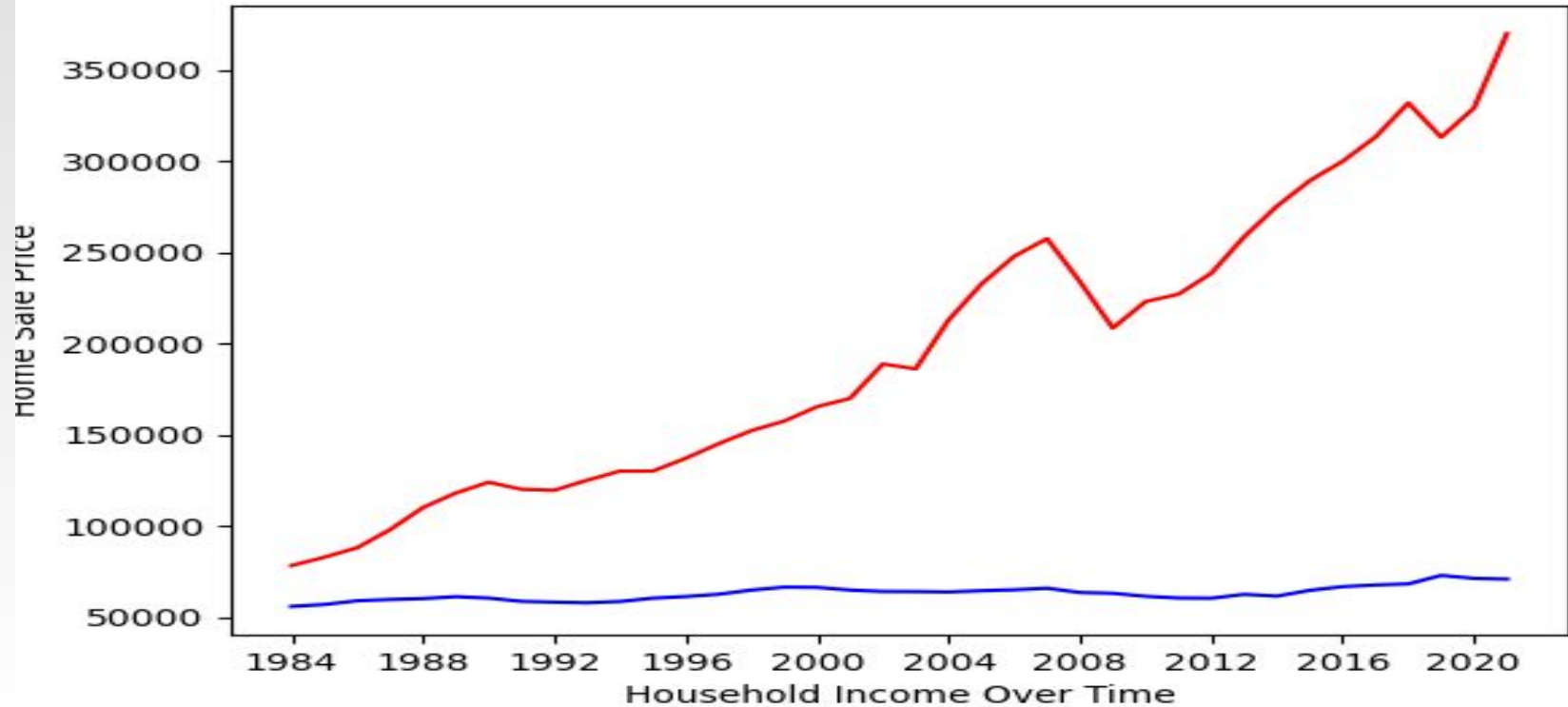
New Houses Sale Price vs. Houses Sale Price



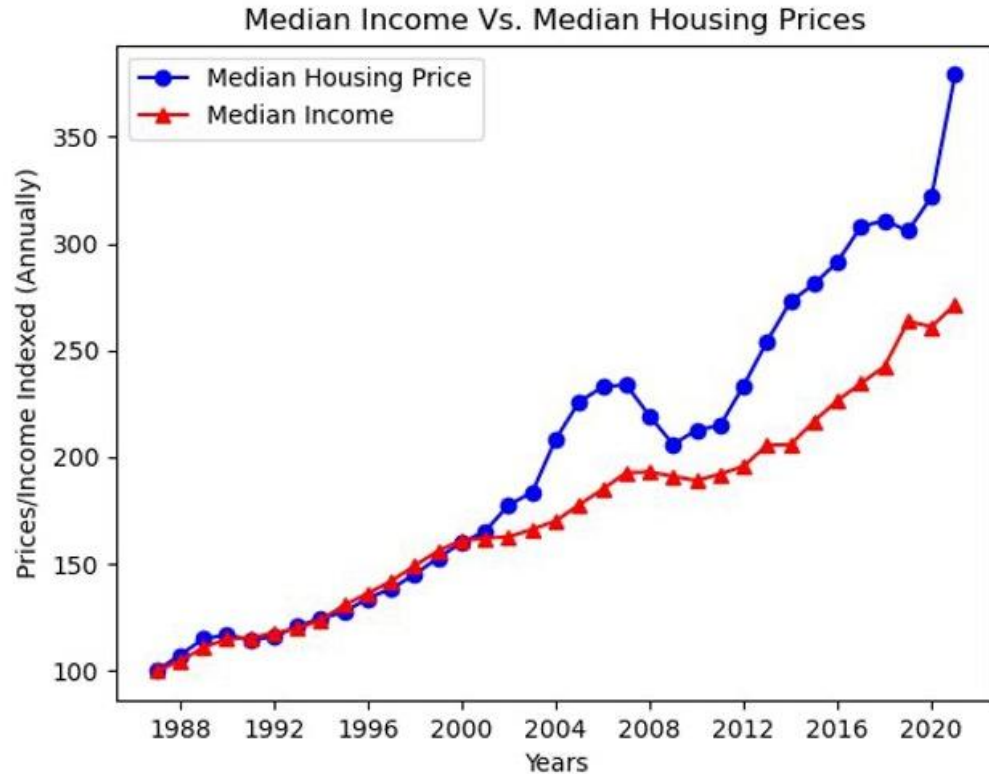
Mortgage Rate % vs Home Sale Price



Household Income



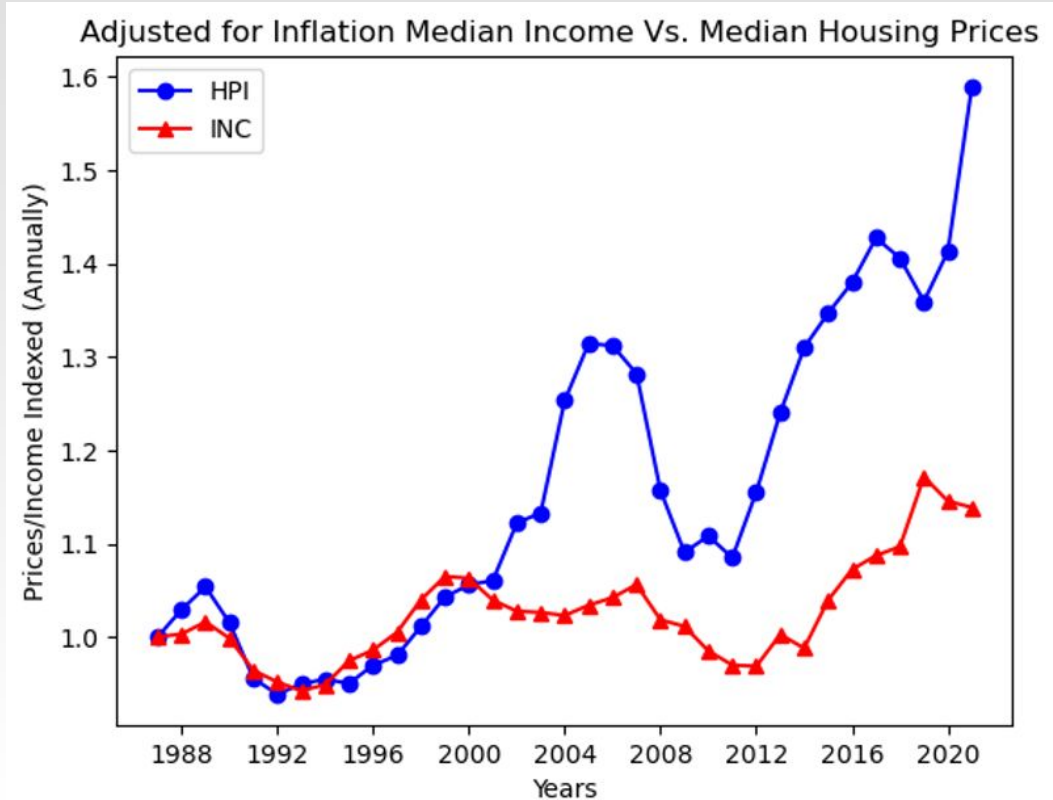
Household Income vs Median Housing Prices



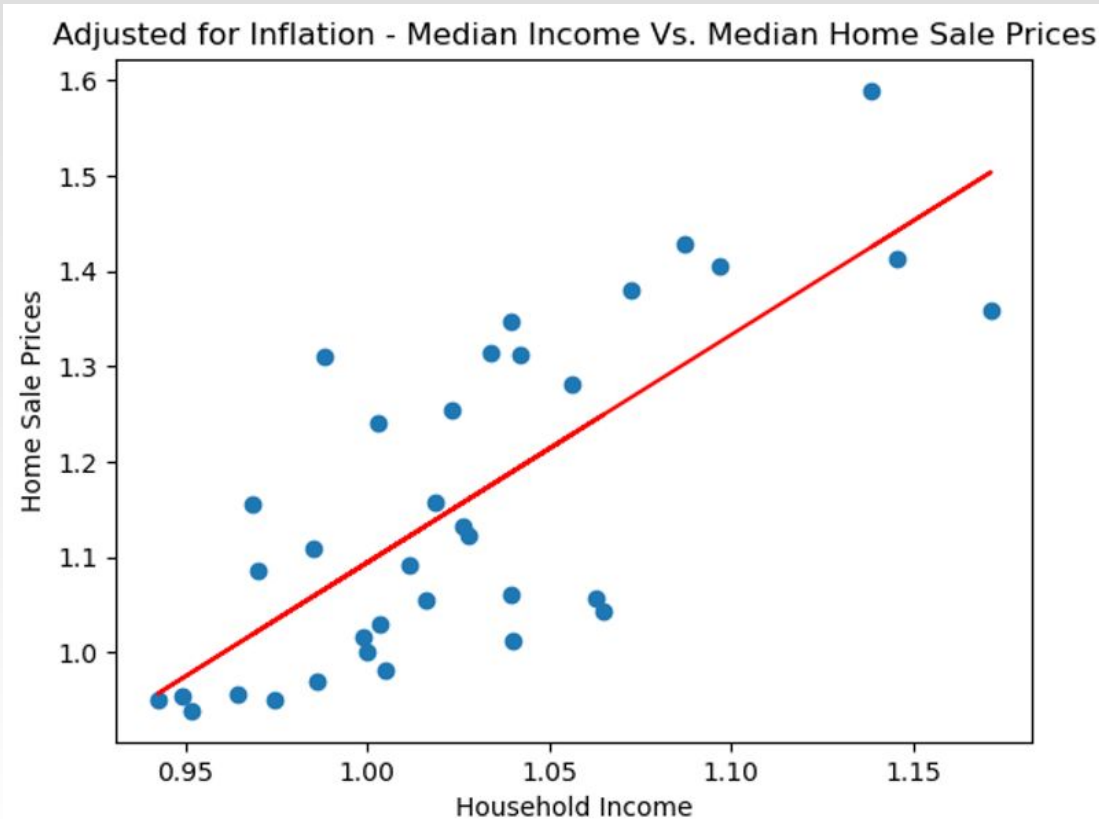


PearsonRResult(statistic=0.9811834941440882, pvalue=3.7697690153741353e-25)

Inflation Adjusted Household Income vs Home Sale Price



Regression Analysis



PearsonRResult (statistic=0.7522583744568648, pvalue=1.880644151374282e-07)

Appendix : Analysis and Conclusion

While it is clear that as the median house price increases so does the number of people renting, this rise also spurs a rise in the rental cost index. Or it's just plain old human greed. In conclusion it's pretty clear capitalism won't be satisfied until we are all homeless.

Median houses sale price and Residential construction spending have similar trends, but house prices tend to lag behind Construction spending.

A huge gap in home prices and household income, presents an affordability crisis amongst the population.

When adjusting for inflation, we see that household income has not kept up with the relative cost of purchasing a home, it is relatively slow growth compared to home prices.

Traditionally mortgage rates had an impact on home sales prices. The lower the rate, the higher the demand to buy homes thus driving up the cost of purchase.

Home Prices, unfortunately for most of us, will continue to rise as the true value of the dollar continues to drop.

While Housing Prices are reactive to Inflation, CPI is not a great indicator for predicting trends in home pricing.

The DJI, when transformed, is a weak predictor of home prices and should be avoided if possible.

Limitations

The relative increase in the house prices could be driven by consumer demand for a better product with more features that were not available at the beginning of our period of analysis (i.e. higher square foot homes, better construction materials, etc.)

The impact on the relative availability of other housing options (i.e. rental homes, multi-family homes)

The all data used was at the national level, and prices can vary significantly market to market

Adding in population analysis and the relative home supply might be another driver of the changes