

AI Boot Camp **Project 1**

Class_Project_Group_5

Team Members:

Matthew Watkins

Michael Sheridan

Terry Hood

Project 1 Overview

Project Purpose / Description

Introduction to the Analysis of Real Estate Price Trends

- The American housing market is experiencing a notable surge in prices, presenting a significant challenge.
- Conventional wisdom attributes this surge to internal migration and a stagnant housing supply.
- Surprisingly, regions with population declines haven't seen corresponding decreases in housing prices.
- This study explores alternative factors influencing housing prices in ten selected cities.
- These cities represent both booming and sluggish markets, including Atlanta, Miami, Detroit, Tampa, and Las Vegas, among others.
- Analysis from 2012 to 2022 incorporates variables like population growth, homelessness, crime rates, college tuition costs, college SAT entrance scores and printing of money.
- The goal is to identify correlations explaining the divergent housing price trends observed across these cities.

Project 1 Overview

Goals/Questions to be addressed

To research variable data elements or social impacts and their affect or correlation to housing prices

Questions:

- Does college tuition affect home prices
- Does Scholastic aptitude affect home prices
- Does printing of money have an impact on housing prices
- Does crime have an impact on housing prices
- Does population change have an impact on housing prices
- How does homelessness affect housing prices

Project 1 Overview

Approach taken to achieve goals

- Our project commenced with an intensive brainstorming session to establish objectives, goals, and key variables.
- Communication methods included Slack Direct Message channel, Slack Huddle, Google Meets, and Zoom.
- Task allocation was conducted, assigning team members specific GitHub project elements.
- Continuous dataset comparisons, collaborative coding resolution, and rigorous reviews were integral throughout the project.
- Analysis involved uncovering correlations and implications of our findings collaboratively

Project 1 Overview

Overview of data collection, cleanup and exploration process

- Our team conducted a comprehensive analysis of housing price dynamics from 2012 to 2022.
- We started by compiling a foundational dataset of median housing prices.
- Additionally, we integrated six datasets covering variables like college tuition, quantitative easing, crime rates, population demographics, college SAT entrance scores and printing of money.
- Data collection utilized HTML and .CSV read access methods.
- Rigorous cleanup ensured uniformity and coherence across all datasets.
- Standardization was achieved through z-scores.
- By comparing variable outputs with median housing prices, we identified potential correlations and insights.
- Statistical analysis was performed using Pearson Correlation.

Project 1 Baseline Dataset

The Baseline

- The question the group set out to answer: "What is driving home prices up?"
- We got the data from Zillow and used it as a baseline for the correlations we tried to make. I decided to look at education, scholastic aptitude, and the printing of money as factors I thought might be contributing to the rise in real estate prices.

Project 1 Baseline Dataset

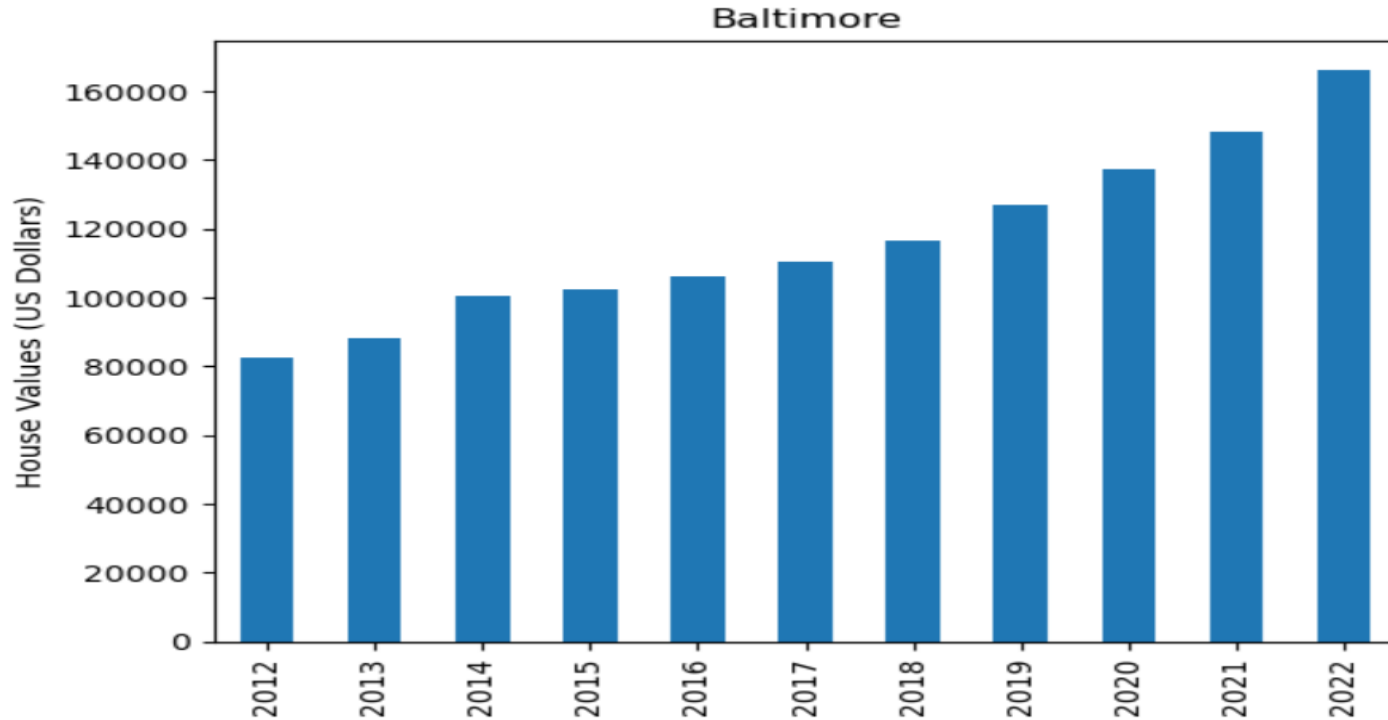
The Baseline

Right away we notice growth in every city and exponential growth in others

Baseline Discovery

Plot over 10 year time period showing median home price growth in Baltimore

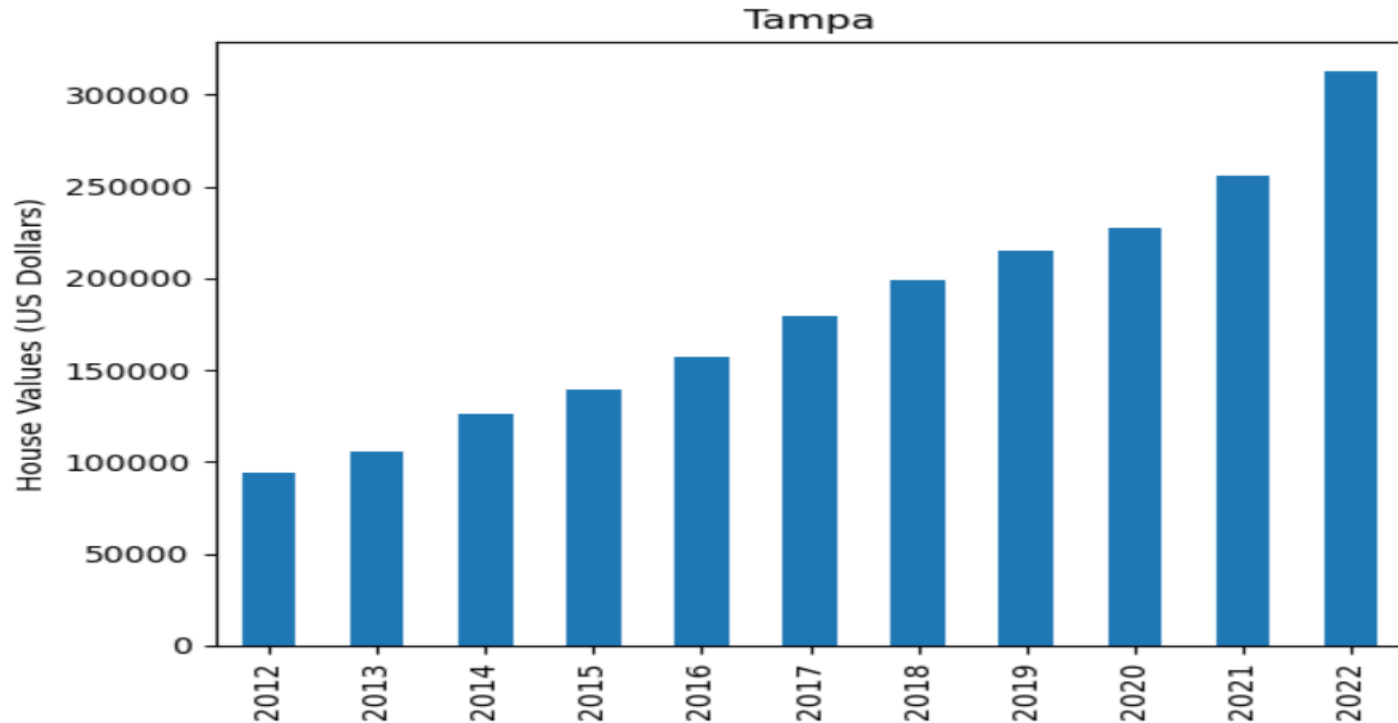
What is driving home prices up



Baseline Discovery

Plot over 10 year time period showing median home price growth in Tampa

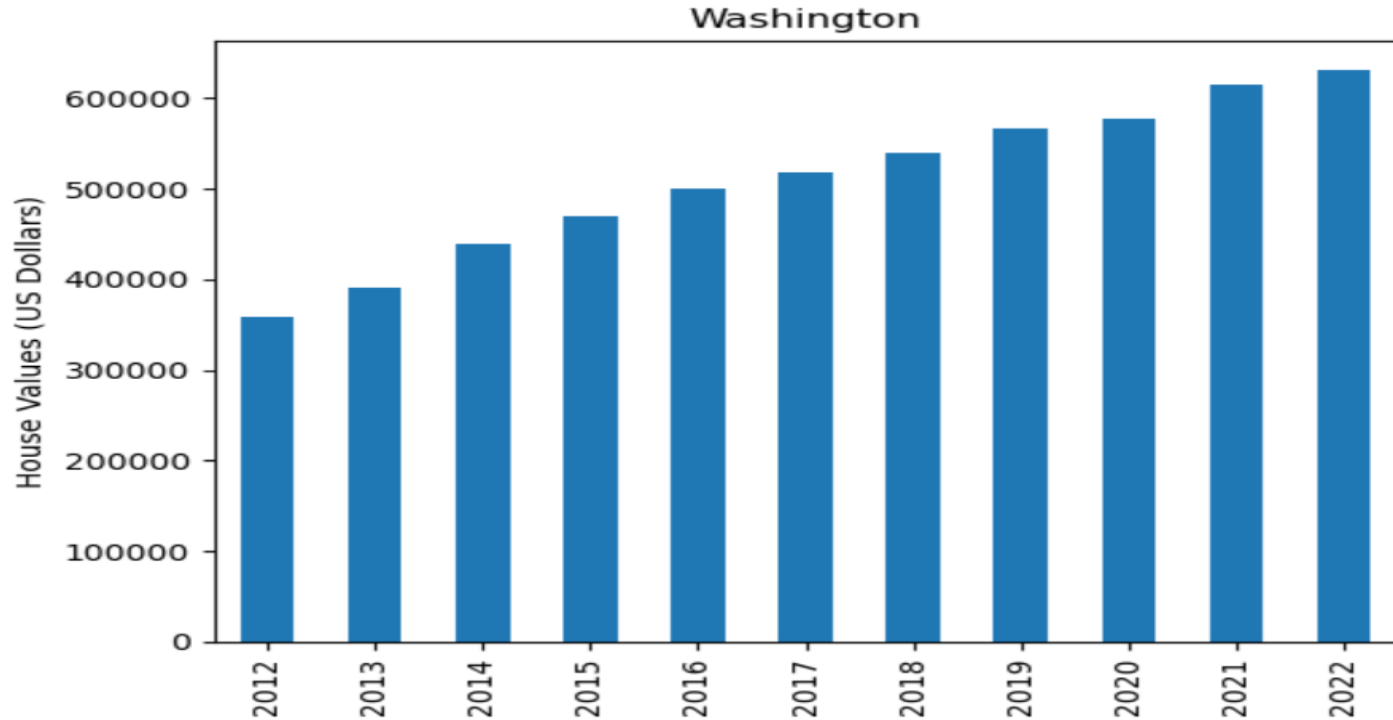
What is driving home prices up



Baseline Discovery

Plot over 10 year time period showing exponential growth in Washington

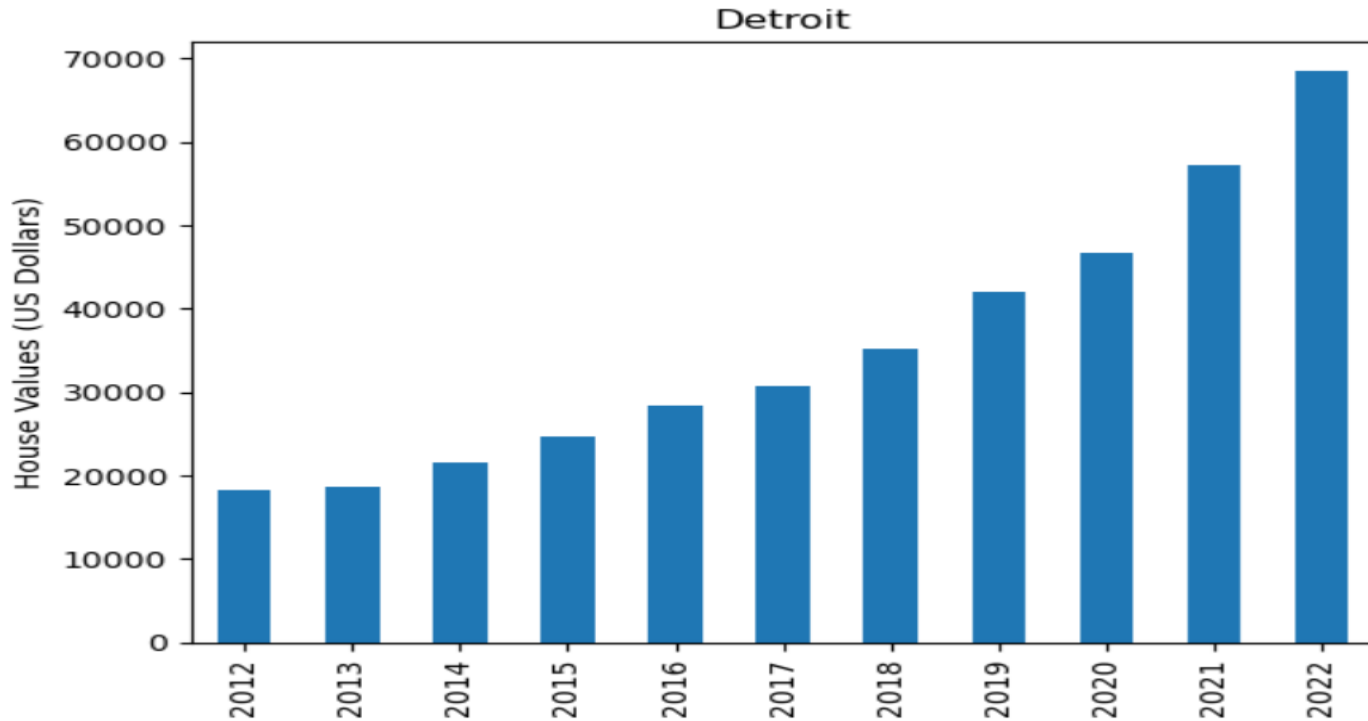
What is driving home prices up



Baseline Discovery

Plot over 10 year time period showing exponential growth in Detroit

What is driving home prices up



Project 1 Tuition Dataset

I hypothesized that with the cost of tuition going that those graduating would be seeking out better jobs, having more money, and spending that money on real estate.

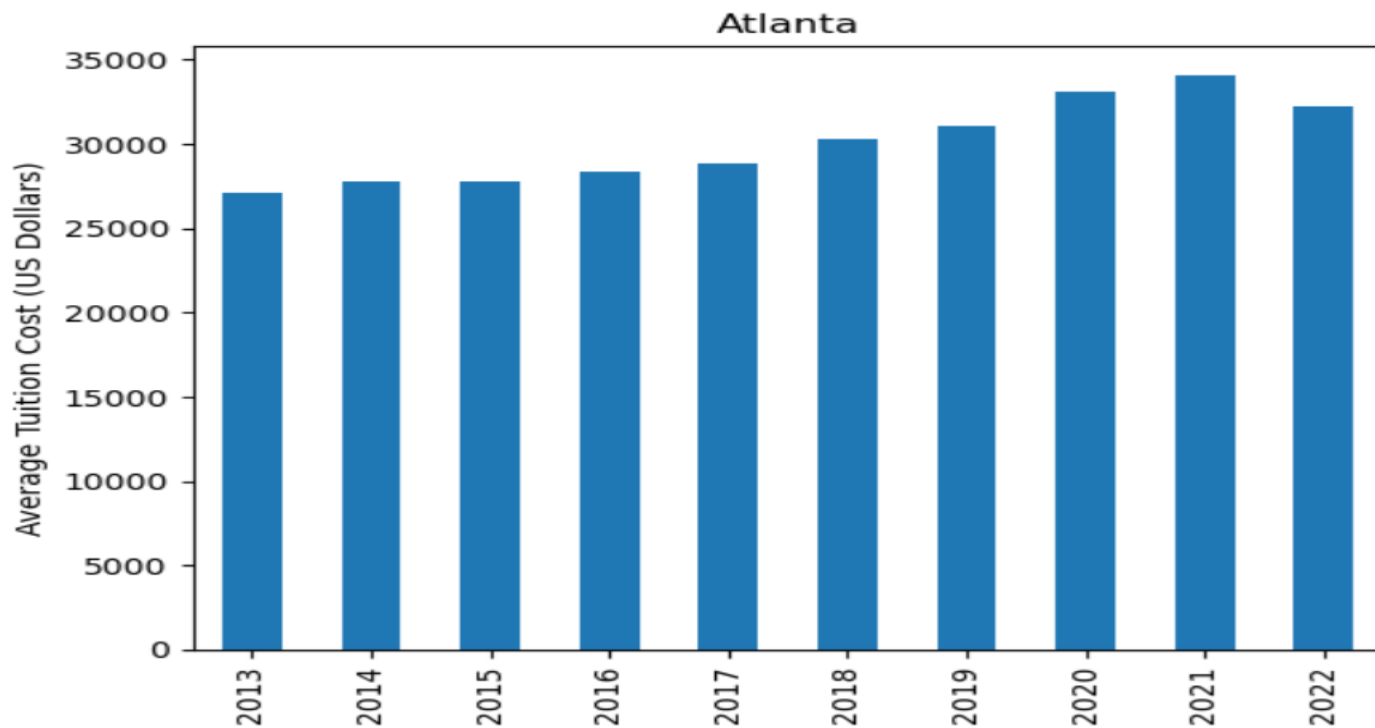
That'll Cost Ya:

Though it is more subtle in some than others. Each of the cities showed a rise in tuition cost

Tuition Discovery

Plot over 10 year time period showing
tuition price in Atlanta

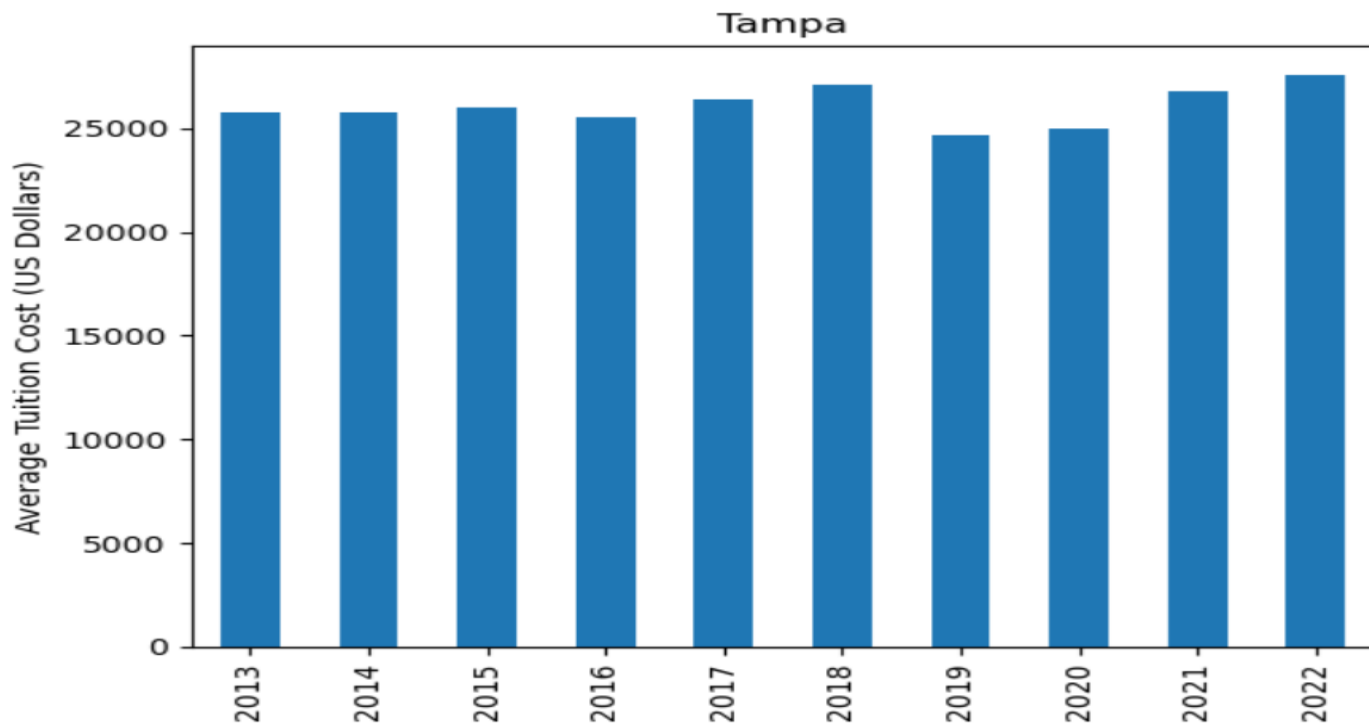
Does College tuition affect home prices



Tuition Discovery

Plot over 10 year time period showing
tuition price in Tampa

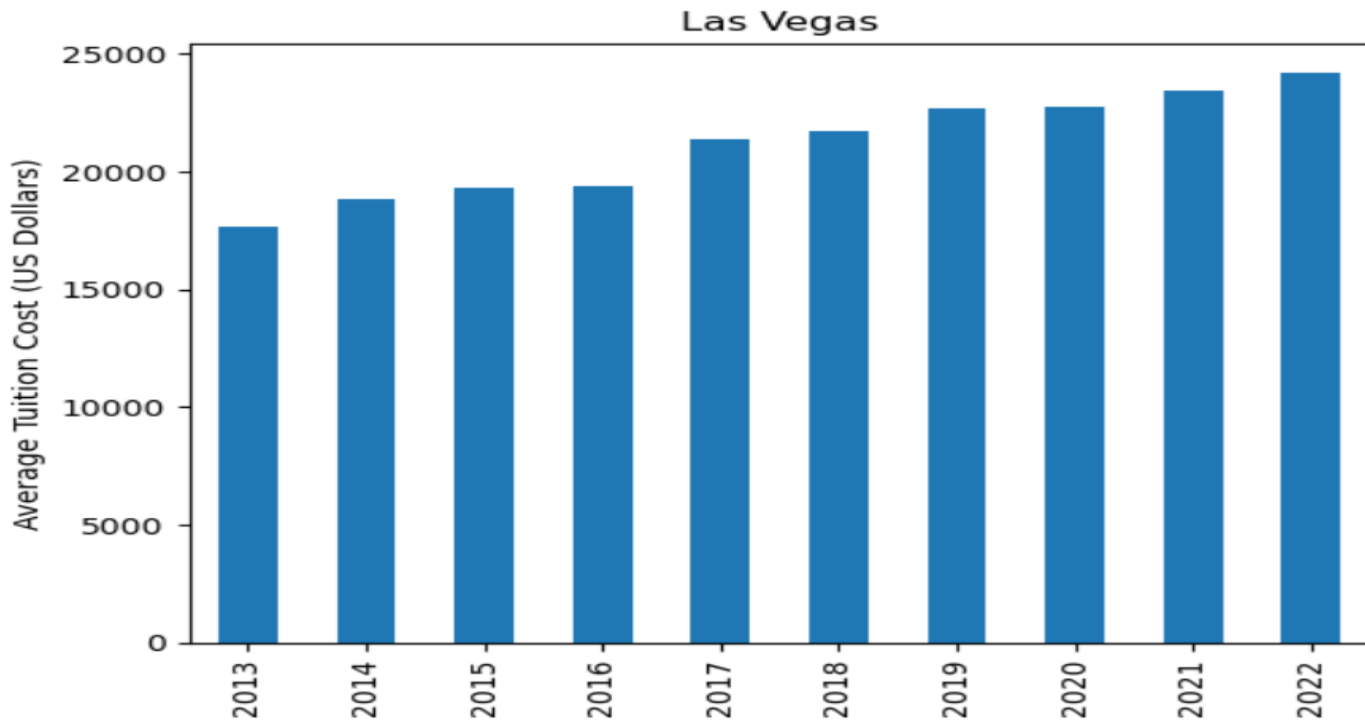
Does College tuition affect home prices



Tuition Discovery

Plot over 10 year time period showing
tuition price in Las Vegas

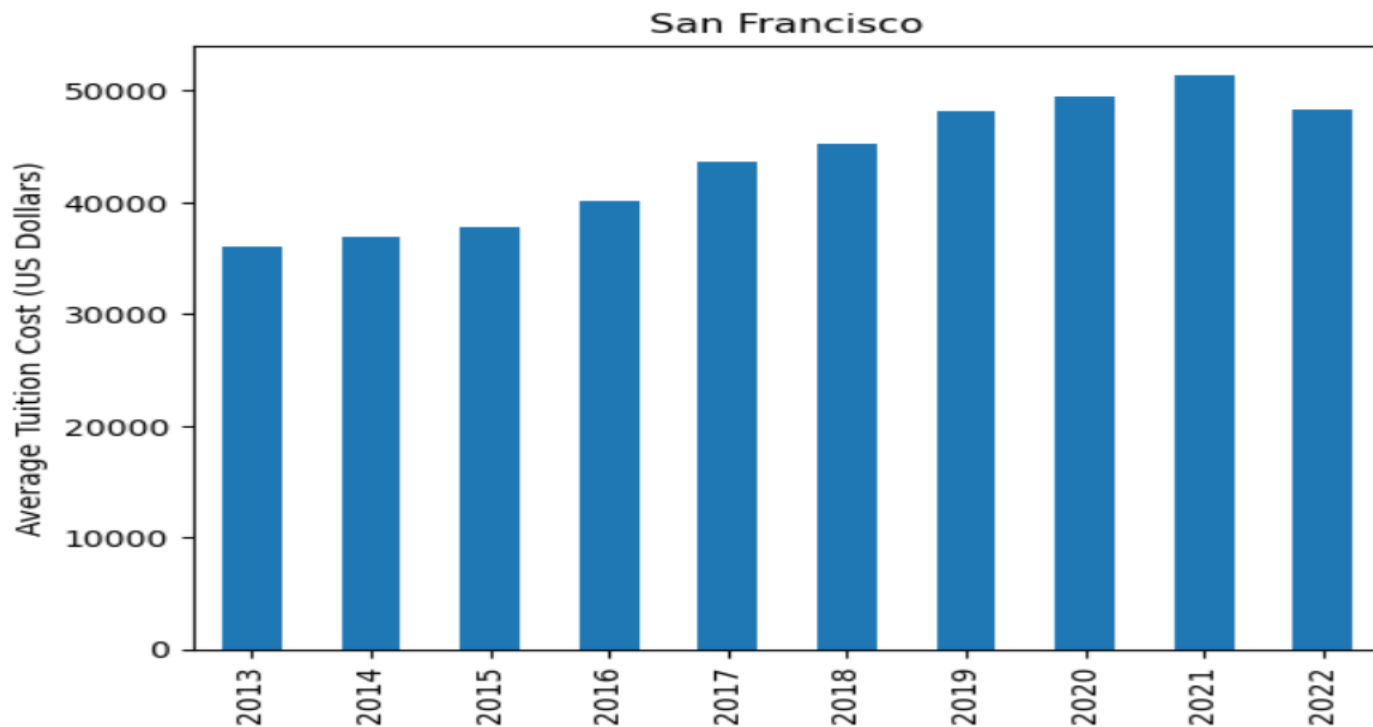
Does College tuition affect home prices



Tuition Discovery

Plot over 10 year time period showing
tuition price in San Francisco

Does College tuition affect home prices



Project 1 Tuition Dataset

I hypothesized that with the cost of tuition going that those graduating would be seeking out better jobs, having more money, and spending that money on real estate.

Conclusion

- As you can see the average cost of College Tuition has gone up in each of the cities we looked into. Though not as much of an increase as we saw in the real estate data set, which would have shown a strong correlation.
- My conclusion is that the cost of Higher education does seem to have an impact on the cost of homes in their respective cities, even if it's only a minor correlation.

Project 1 Scholastic Aptitude Dataset

Does Scholastic aptitude affect home prices?

- Now I wanted to see if scholastic aptitude has an impact on Home Values in the 10 cities we are looking at.
- To get some measure of what "scholastic aptitude" can be graphed by, I took the average SAT scores for the colleges in the cities we were looking at and how much they changed over the same 10 years.
- My assumption is that if scholastic aptitude is going up, that those people would be more inclined to invest in things like real estate, and that could be a factor in the inflation of home values.

Project 1 Scholastic Aptitude Dataset

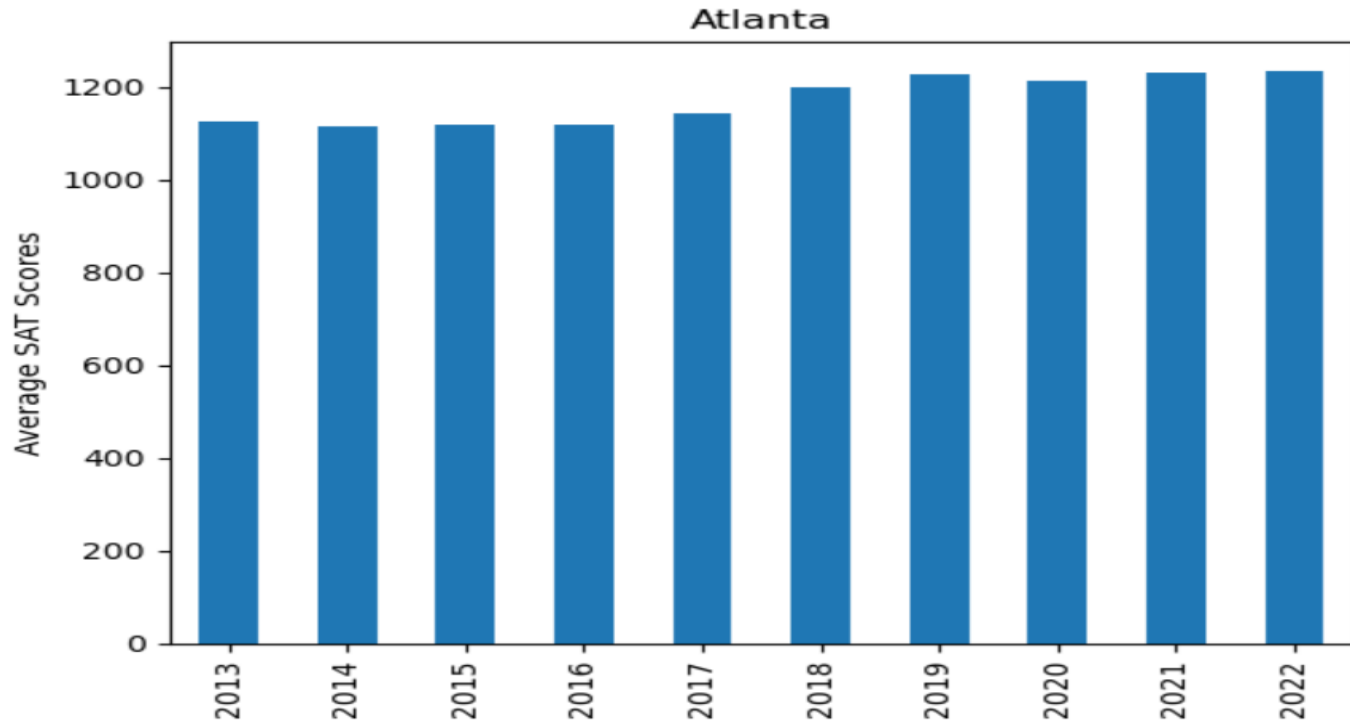
Test Results:

Even though its subtle, there does seem to be a rise in the average test scores of the students in the cities we looked into over that same 10-year period.

Scholastic Aptitude Discovery

Plot over 10 year time period showing scholastic aptitude in Atlanta

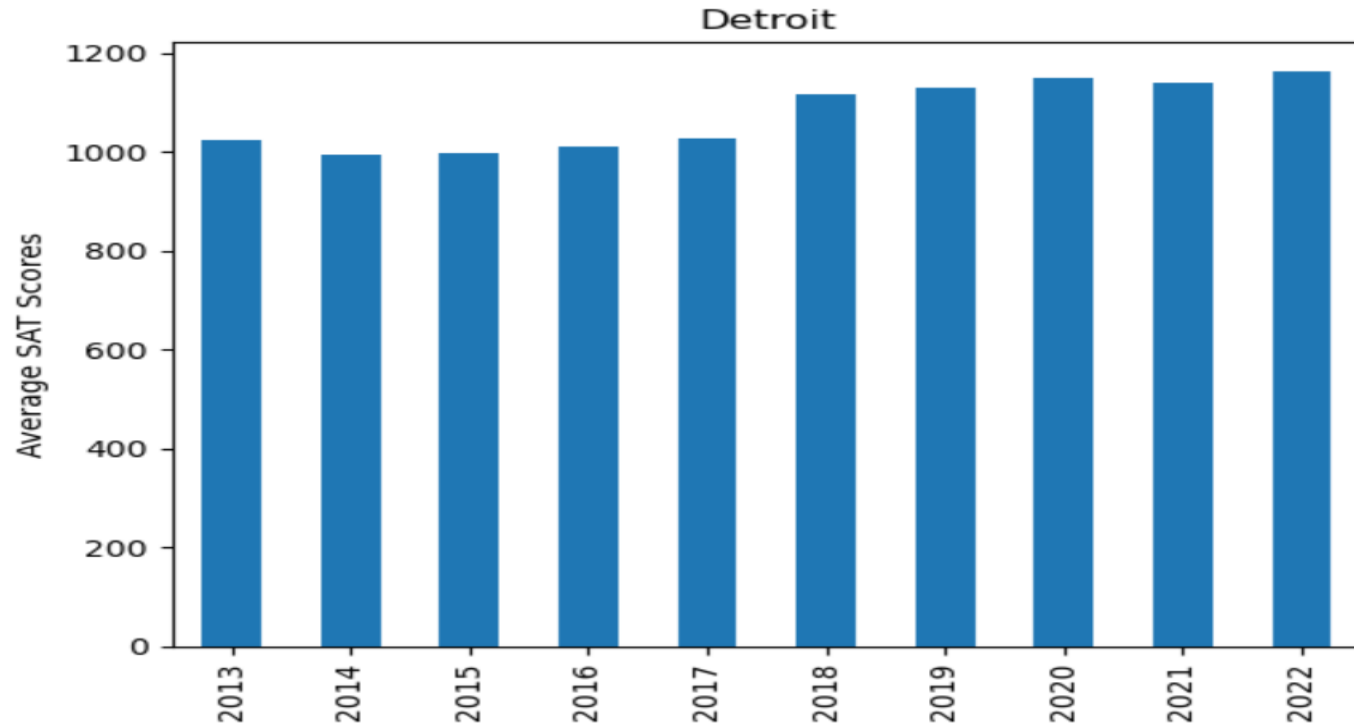
Does Scholastic aptitude affect home prices



Scholastic Aptitude Discovery

Plot over 10 year time period showing scholastic aptitude in Detroit

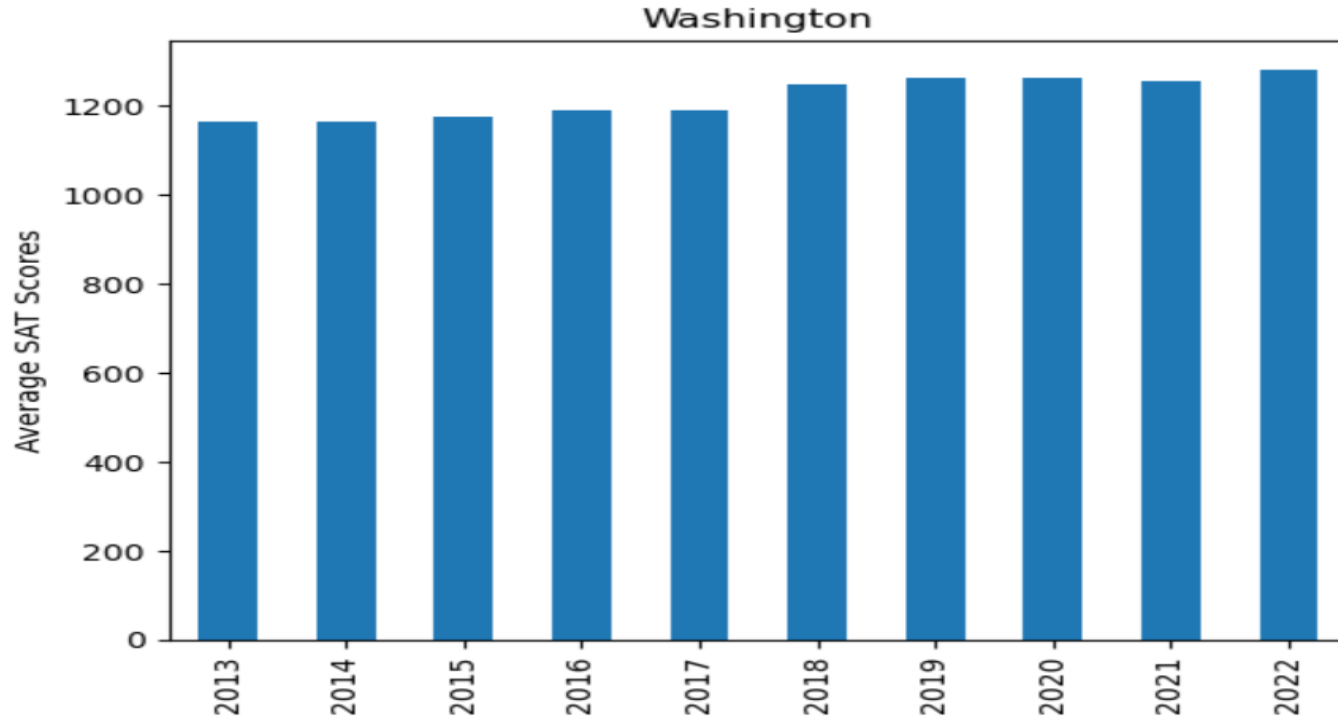
Does scholastic aptitude affect home prices



Scholastic Aptitude Discovery

Plot over 10 year time period showing scholastic aptitude in Washington

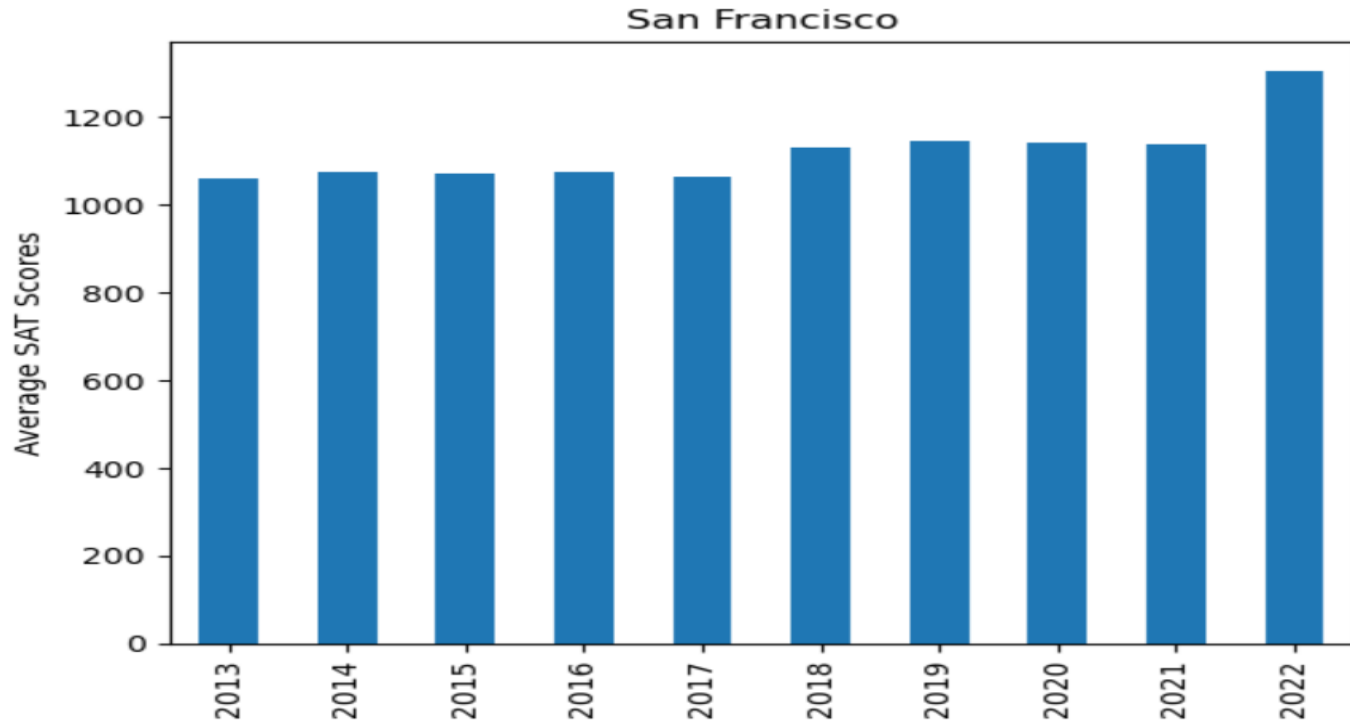
Does scholastic aptitude affect home prices



Scholastic Aptitude Discovery

Plot over 10 year time period showing scholastic aptitude in San Francisco

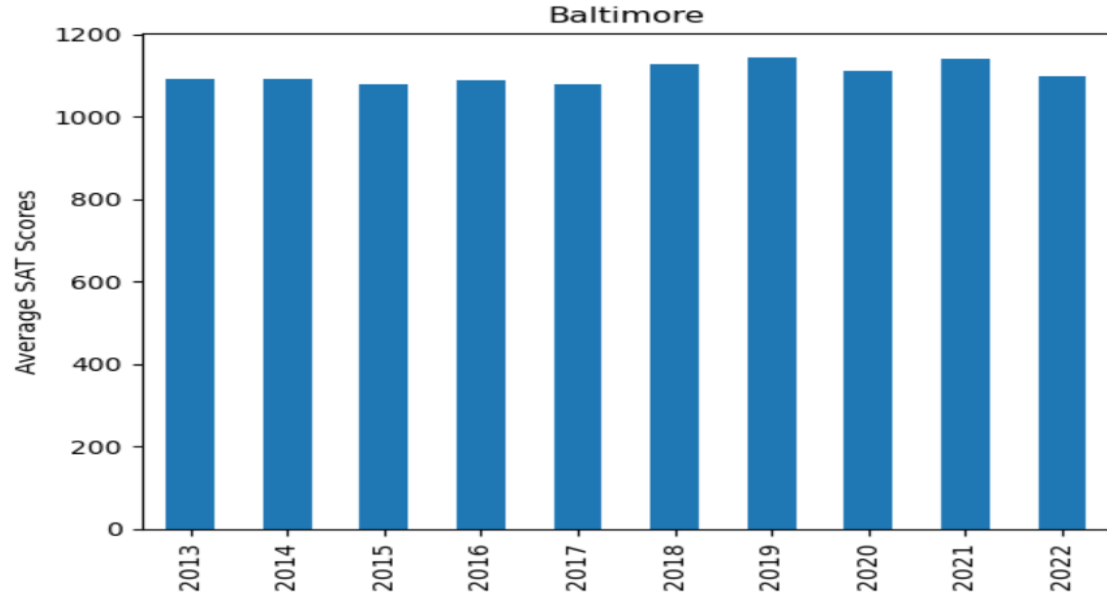
Does scholastic aptitude affect home prices



Project 1 Scholastic Aptitude Summary

Way to go Baltimore!

- Because every data set needs its outlier, what I found is that in every city beside Baltimore, there is a noticeable increase in the scholastic aptitude reflected in average SAT scores over the last 10 years.
- Higher performing home buyers might be a contributing factor in the increase in home values base on this analysis.



Money Printing Dataset

**Does the Printing of Money itself
have an impact on housing
prices**

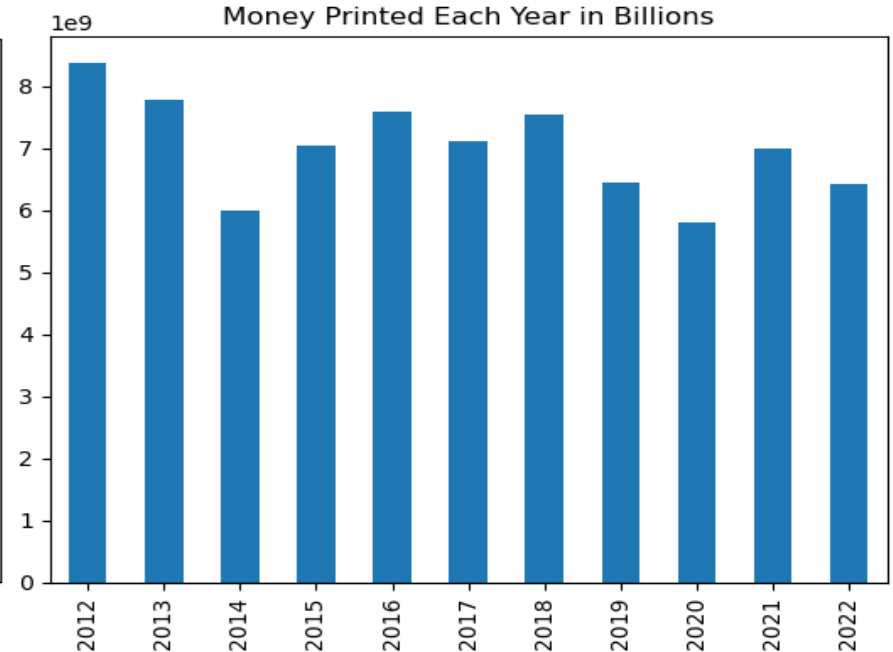
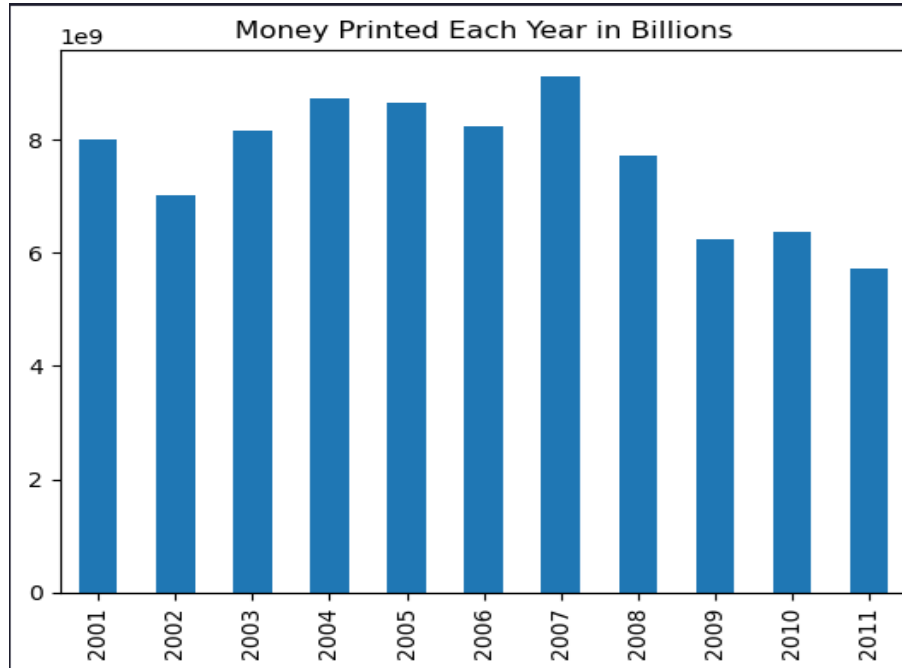
Is Money the Problem?

- Now I wanted to ask the question: Is the printing of money increasing real estate prices?
- My assumption is that if money is being printed at the same rate housing prices are going up that there is correlation between the printing of money itself and the increase in home values.
- For this I gathered the annual production reports, totaled them, and graphed them over the same 10-year span.

Money Printing Discovery

To my surprise there seems to be a downward trend in how much money we print over the years. Not to believe just one ten-year span I took the data from the previous 10 years as well.

Does the Printing of Money itself have an impact on housing prices?



Money Printing Summary

**Does Money Printing have an
impact on housing prices?**

Conclusion

- No, for as much as I thought The printing of Money contributed to the rise in real estate prices, there doesn't appear to be a correlation.
- If I had more time this would have been the item I looked into more. Like how much money is lost each year and comparing that data set to this one.

Project 1 Z-score

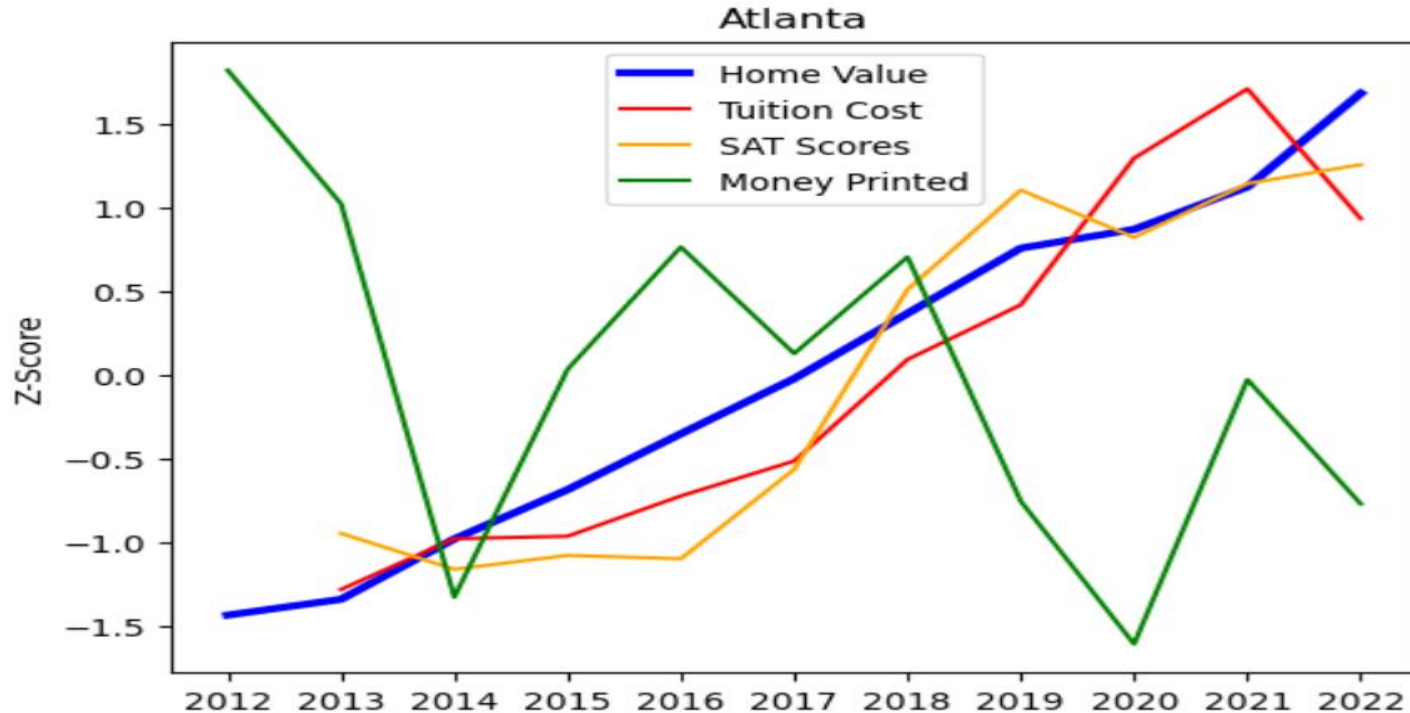
Putting it all together

- To make a better apples to apples comparison I then converted the graphs to their respective z-score values to get a better idea of what might be related.
- This, unfortunately, made the results even more inconclusive.

Result/Conclusion

Viewing all the data together like this in a graph started to show some similarity to the lines drawn by changes in the cost of tuition and show the lack of correlation in other lines like the printing of Money.

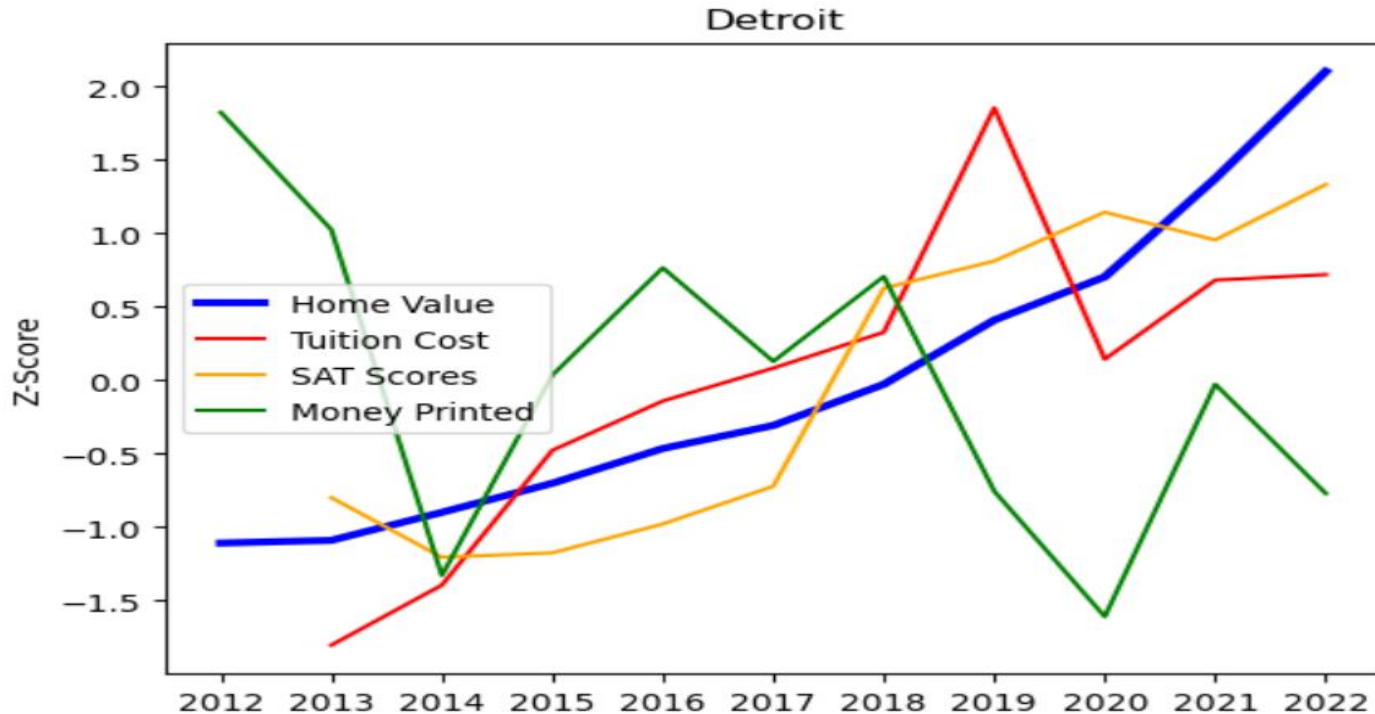
Z-score plots for comparison - Atlanta



Result/Conclusion

Other Cities like Detroit showed very little correlation in any line.

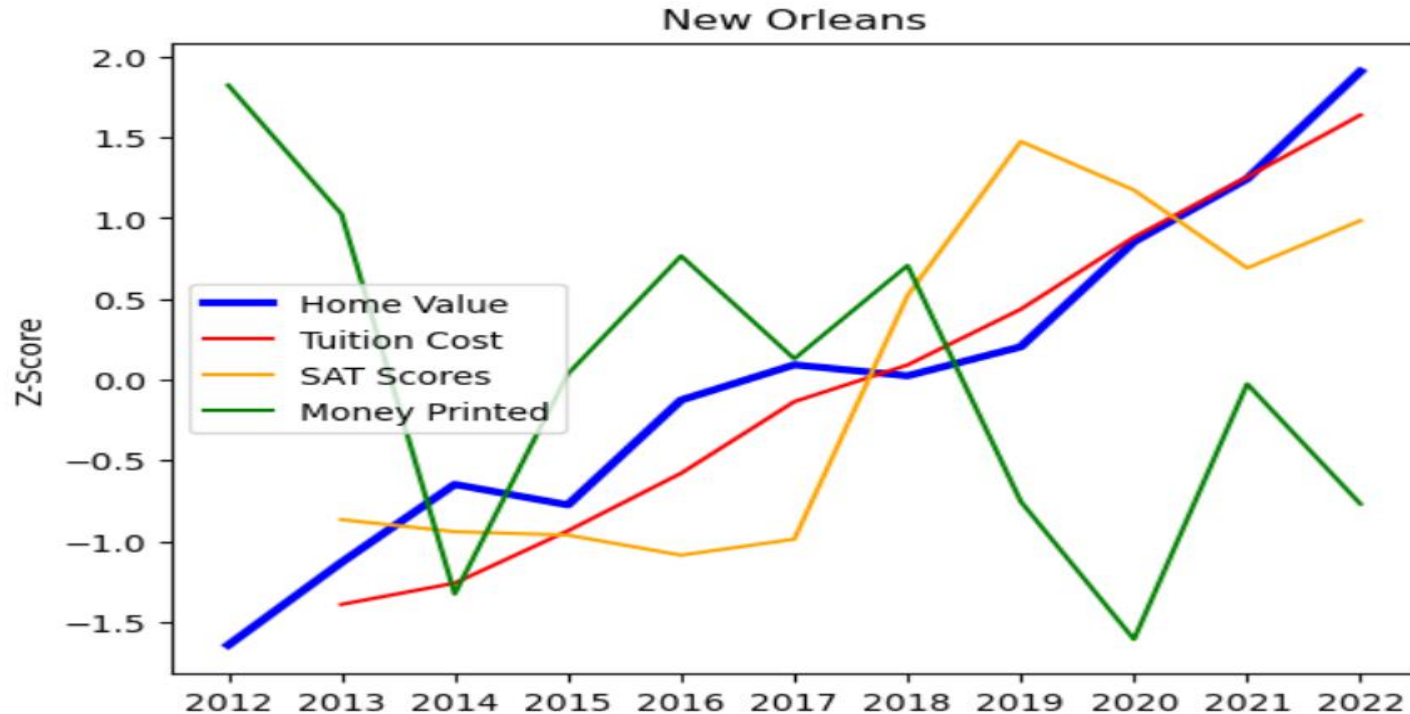
Z-score plots for comparison - Detroit



Result/Conclusion

But, most showed the same similarities between tuition cost and real estate prices like New Orleans...

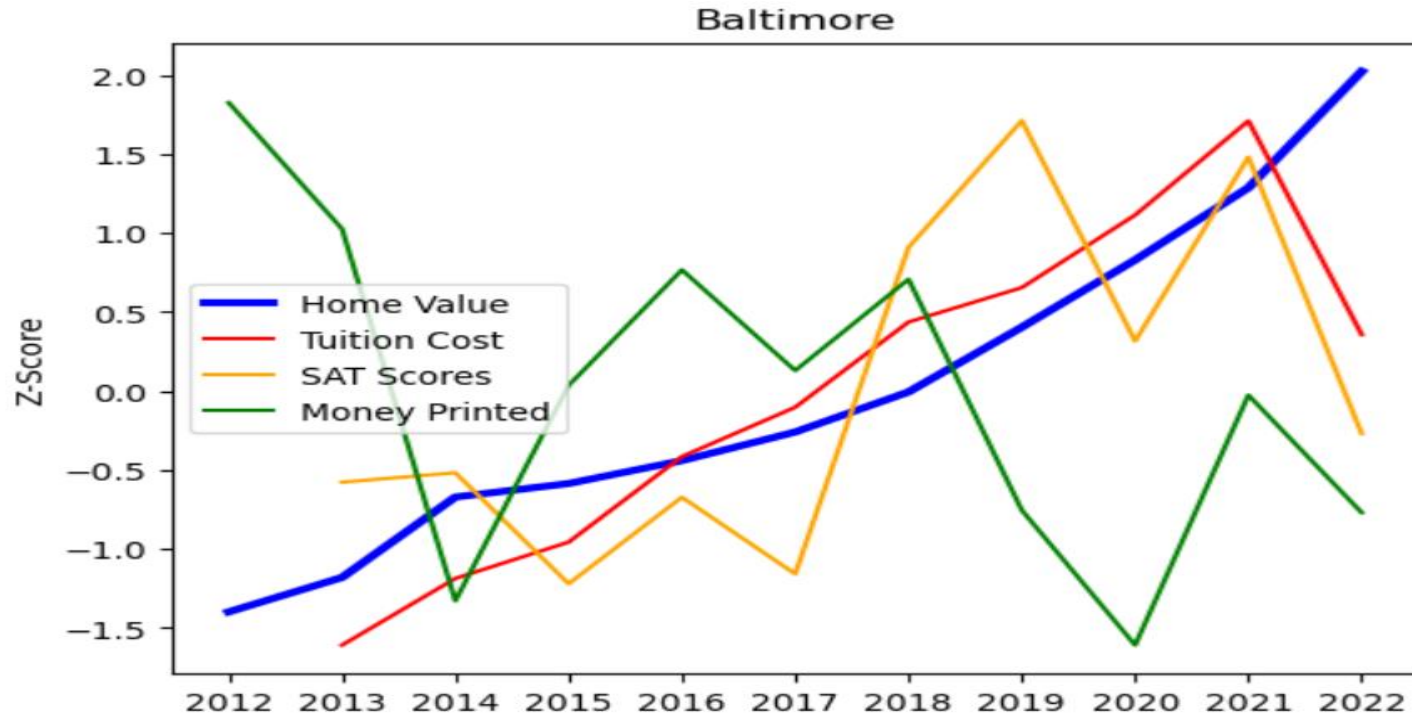
Z-score plots for comparison - New Orleans



Result/Conclusion

...or Baltimore, showing the same similarities.

Z-score plots for comparison - Baltimore



Project 1

Section

Summary

Analysis Summary

- The Best: The closest correlation being tuition cost and home values in 7 out of the 10 cities we looked at
- The Worst: The printing of money may be a hot topic of debate when it comes to the cause of inflation, but the production reports don't seem to indicate that it's actually related to the rise in home values at all.
- The Middle: SATs are just barely enough in the positive to call it a correlation. It's very minor correlation at best.

Project 1

Crime Dataset

**Does crime have an impact
on housing prices**

- Pearson Coefficients and corresponding crime data coefficients extracted for each city in the study.
- Values visually represented in a graph for comparative analysis.
- Graphical approach enables intuitive assessment of relationships between crime rates and other variables.
- Facilitates highlighting trends and anomalies effectively across different cities.

Crime Correlation

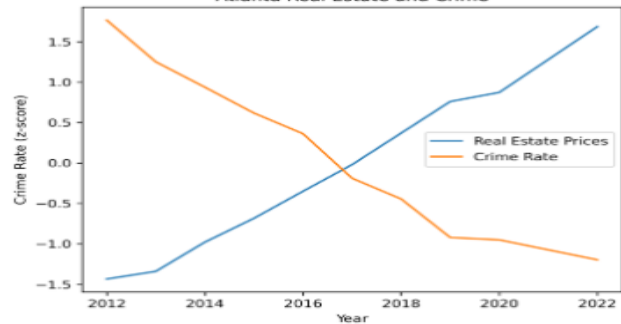
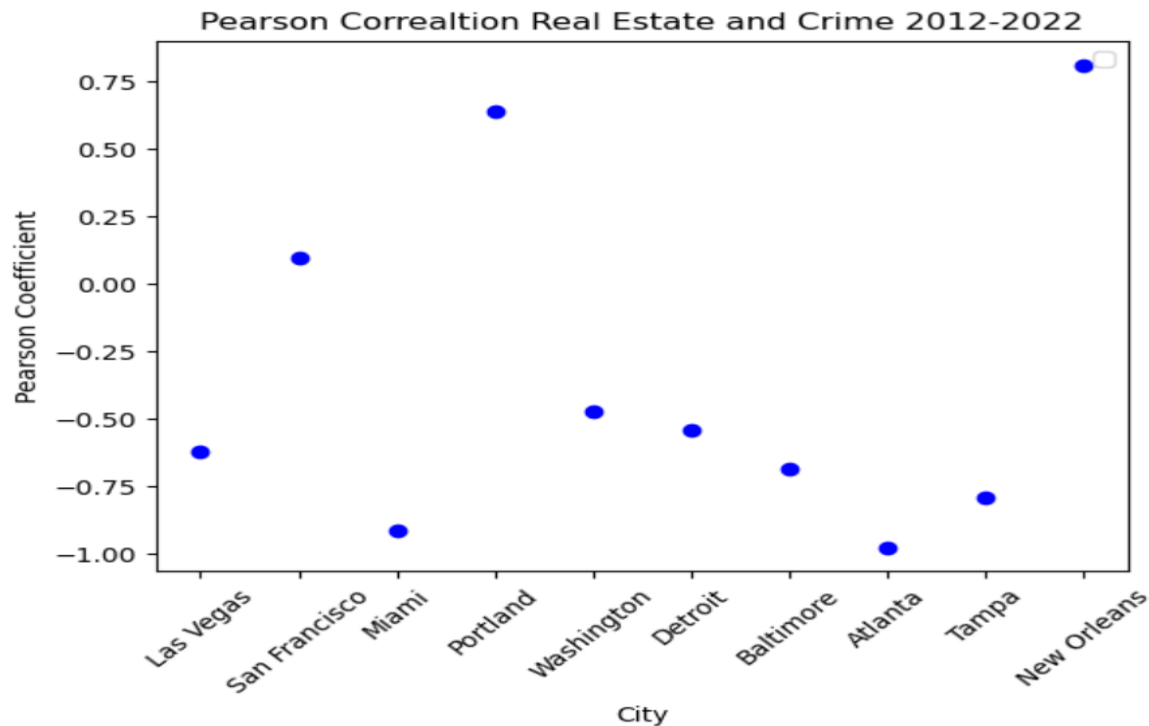
Crime-No Correlation

1 No correlation

5 Weak correlation

2 Strong negative

Does crime have an impact on housing prices



Project 1

Crime Dataset Overview

**Does crime have an impact
on housing prices**

Conclusion:

- Varied strengths and directions of correlation between crime rates and real estate prices observed.
- Universal increase in property values across cities suggests crime statistics alone unlikely to significantly determine real estate prices.

Project 1 Population Dataset

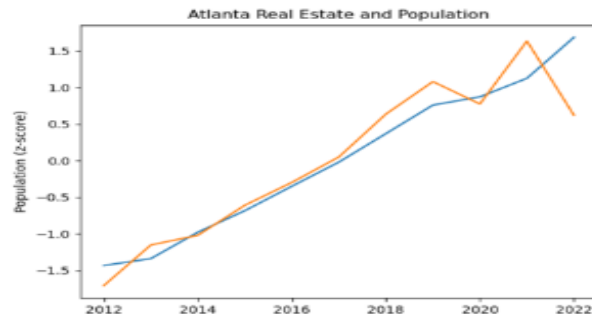
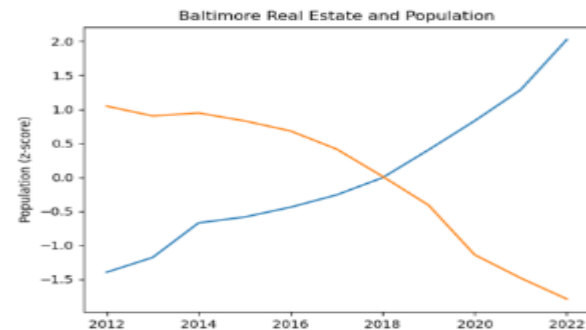
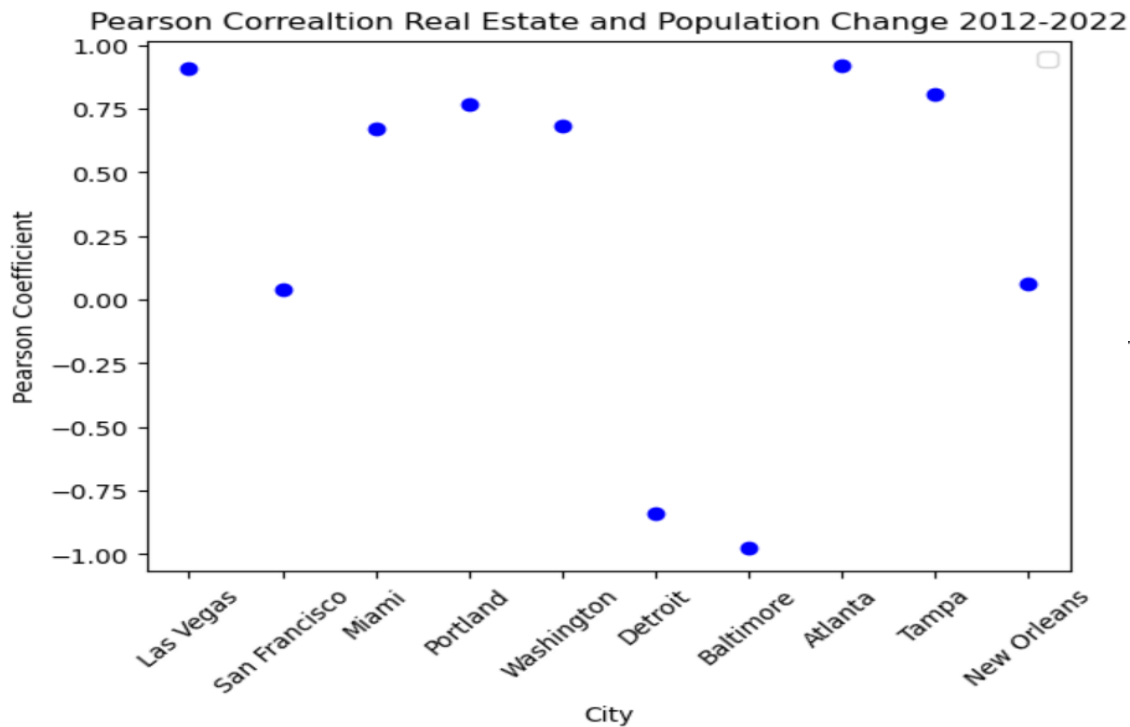
Does population change have an impact on housing prices

- Study analyzes population dynamics' impact on real estate prices.
- Utilizes comprehensive dataset primarily from FBI crime statistics and annual population data.
- Data includes decennial population counts from cities and towns, supplemented by Census Bureau estimates.
- Census Bureau estimates used to ensure dataset completeness when local data unavailable.
- Inclusion of 2021 enhances dataset completeness, boosting study's scope and reliability.
- Initial hypothesis: Population increases correlate with housing price rises.
- Economic principle: Limited housing supply + population growth-driven demand = higher prices.
- Subsequent sections detail data analysis methods and statistical test results.

Population Correlation

Population-Strong Positive Correlation
2 No correlation
6 Strong positive
2 Strong negative

Does population change have an impact on housing prices



Project 1 Population Summary

Does population change have an impact on housing prices

Strong Positive Correlations (Las Vegas, Miami, Portland, Washington, Atlanta, Tampa):

- Variable studied alongside housing prices contributes to or increases in conjunction with housing prices.
- Suggests potential areas for further investigation into causative factors or reinforcing trends.

Strong Negative Correlations (Detroit, Baltimore):

- Rising housing prices occur despite decreases in the other variable.
- Highlights resilience in the housing market or effectiveness of counteracting policy measures.

Negligible Correlations (San Francisco, New Orleans):

- Housing price increases appear decoupled from changes in the studied variable.
- Suggests other factors (economic, demographic, or policy-driven) influencing the housing markets.

Project 1 Homelessness Dataset

How does homelessness affect housing prices

Summary and Implications

- Strong Positive Correlations (Las Vegas, Miami, Portland, Washington, Atlanta, Tampa):
 - Variables studied alongside housing prices seem to contribute to or increase along with housing prices.
 - Indicates potential areas for further investigation into causative factors or reinforcing trends.
- Strong Negative Correlations (Detroit, Baltimore):
 - Rising housing prices occur despite decreases in the other variable.
 - May highlight resilience in the housing market or effectiveness of counteracting policy measures.
- Negligible Correlations (San Francisco, New Orleans):
 - Housing price increases seem decoupled from changes in the studied variable.
 - Suggests other factors (economic, demographic, or policy-driven) are influencing the housing markets.

Homelessness Correlation

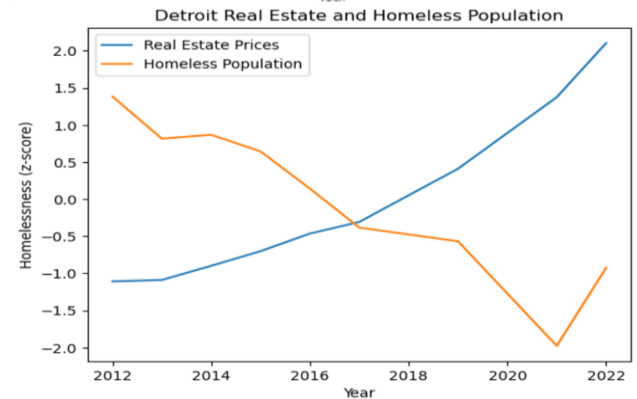
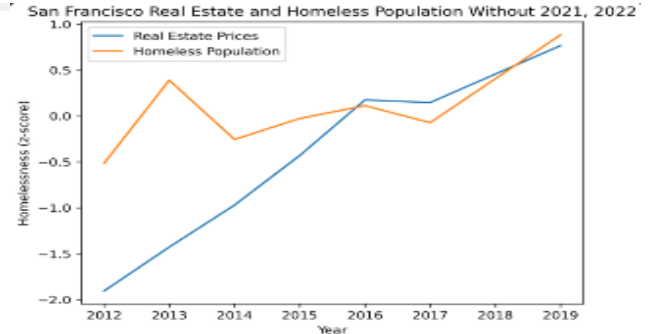
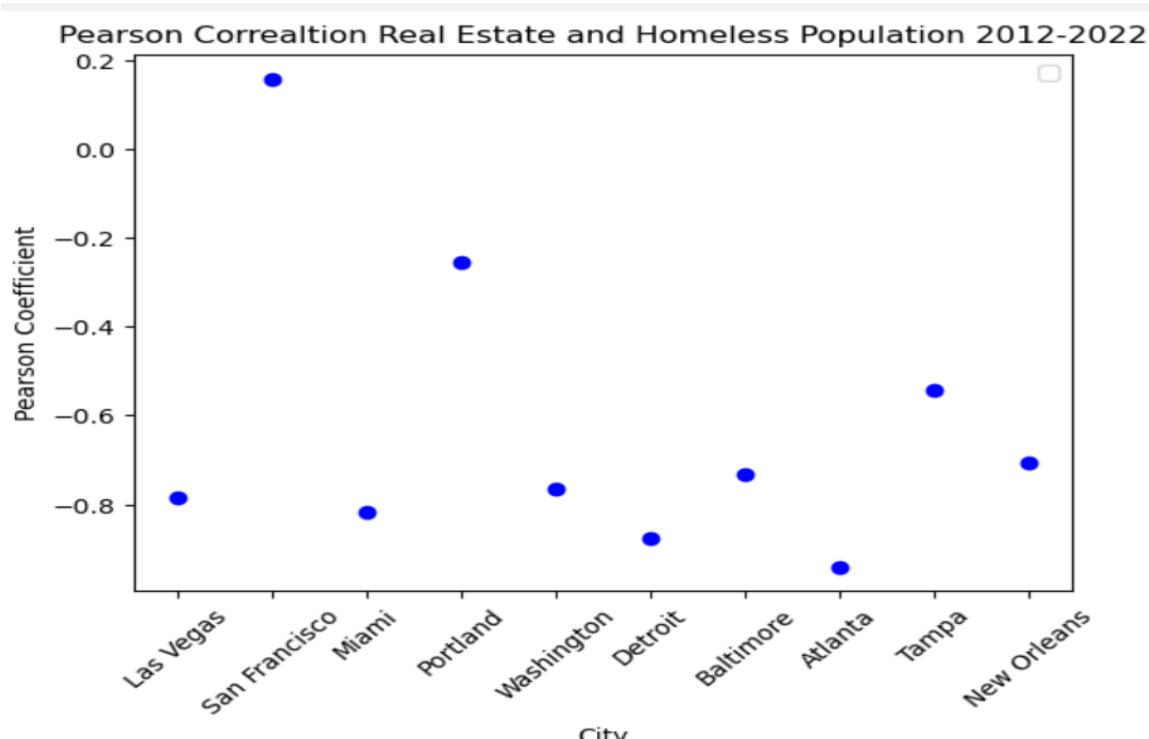
Homelessness-Strong Negative Correlation

2 No correlation

1 Weak negative

7 Strong positive

How does homelessness affect housing prices



Homelessness Correlation

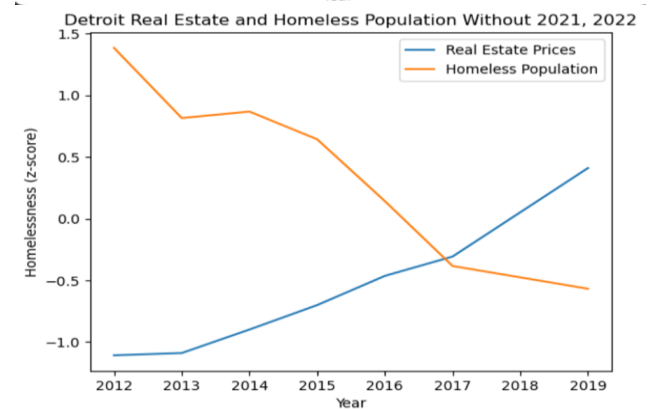
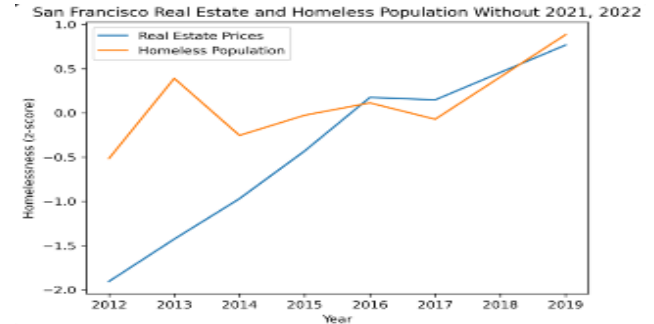
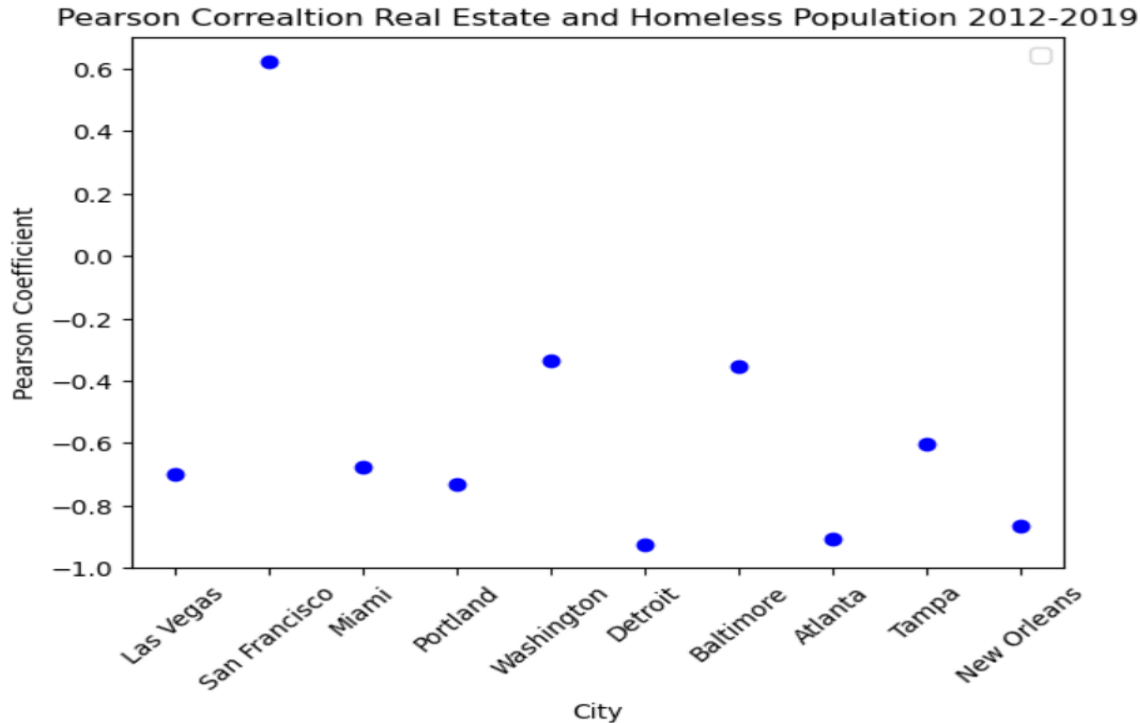
Homeless No Covid- Strong Negative Correlation

1 Strong positive

3 Weak negative

7 Strong negative

How does homelessness affect housing prices - Pre-Pandemic



Project 1 Homelessness Summary

How does homelessness affect housing prices

Summary and Implications:

- Notable decrease in homelessness observed across studied cities in 2022.
- Likely influenced by continuation or adaptation of pandemic-era housing interventions.
- Measures evolved in response to shifting conditions as we move away from the peak of the public health crisis.

Temporary Housing Initiatives:

- Deployment of hotels and unconventional temporary housing solutions persisted into 2022.
- Likely at a reduced scale as urgent need from early pandemic days diminished and vaccination rates rose.
- Potential reduction in immediate demand for emergency housing.

Limitations and Future Considerations

Study Limitations:

- Limited number of markets analyzed due to logistical constraints and project timeframe.
- Complexities of capturing diverse market influences within deadline.

Scope Expansion:

- Future endeavors could analyze all US markets for broader perspective on correlations.

Limited Examination of Influences:

- Examined only six potential market influences.
- Overlooked crucial factors like mortgage rates, short-term rentals, housing construction starts, and investor-owned properties due to data constraints.

Impact of Recent Developments:

- Recent market developments, such as Federal Reserve's actions to increase interest rates, introduced significant changes.
- Market variables may exhibit lag in response to adjustments.
- Monitoring recent occurrences like population declines in urban centers is essential for understanding real estate market dynamics.

Summary

Summary of Results:

- Tuition Prices: Weak positive correlation with housing prices.
- SAT Scores: Weak positive correlation observed.
- Monetary Expansion: No significant correlation found.
- Crime Rates: No significant correlation observed.
- Population Increase: Strong positive correlation supporting supply-demand explanation for housing price increases.
- Homelessness: Strong negative correlation.

Overall Insights:

- Real estate market complexity highlighted.
- Population growth identified as significant housing price influencer.
- Lack of correlations with crime and homelessness stresses need for intricate housing market understanding.
- Economic fundamentals, especially population dynamics, may directly impact housing prices more than believed.