



Exploring the Barriers to Affordable Housing In Oregon

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MSDS Capstone Project 2024



Introduction

Oregon's growing population, housing crisis discussed at annual summit



Oregon legislature passes \$376M package for housing production boost

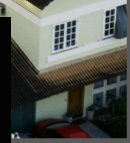
Portland program that requires developers build affordable housing is falling short, audit finds



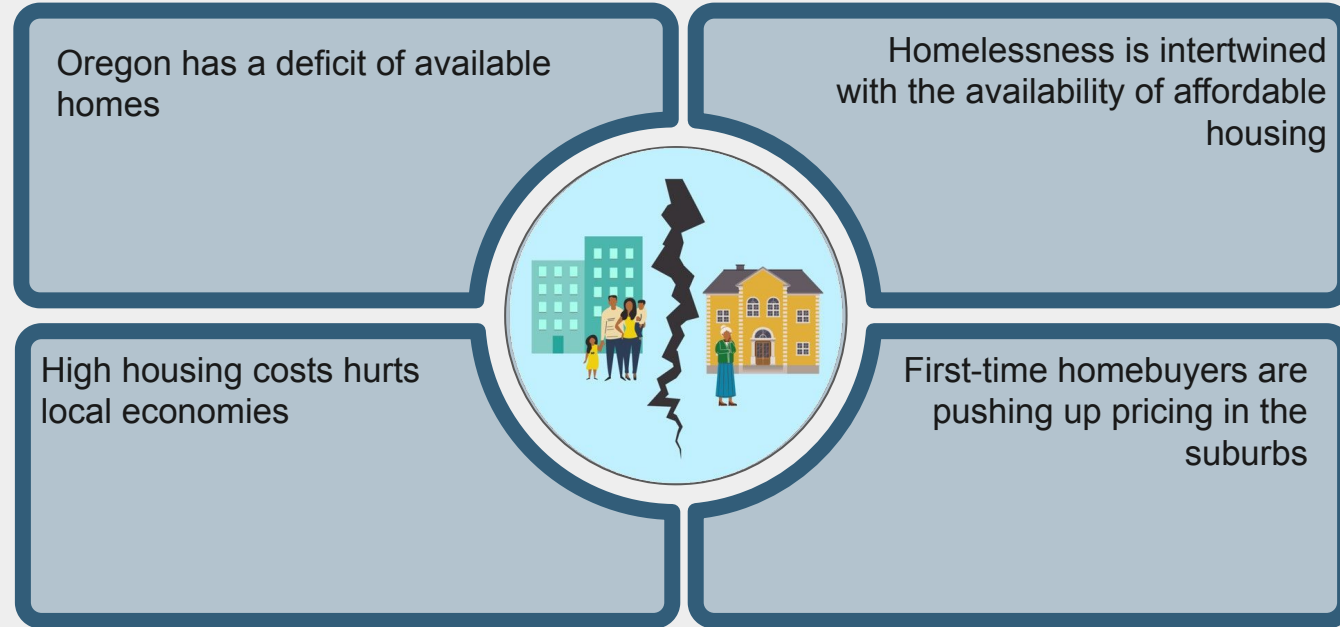
Oregon has an extreme housing shortage. Here's what could be done



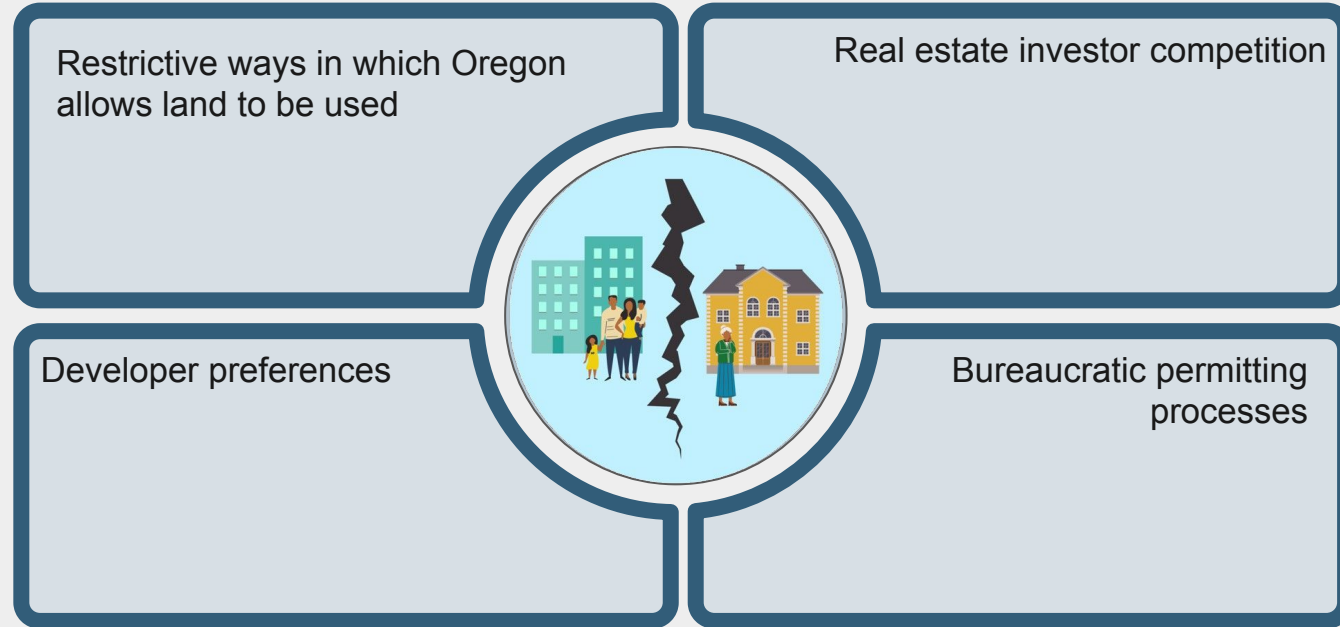
A housing shortage is testing Oregon's pioneering land use law. Lawmakers are set to tweak it



Background - Oregon's Housing Crisis



Background - Oregon's Housing Crisis





Background - Oregon's Housing Crisis



Housing Production

**Ending single family
zoning**

Streamlined Permitting

Reducing Regulations



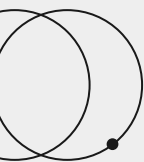
Housing Price

Tax Increment Financing

Density Bonuses

Community Land Trusts



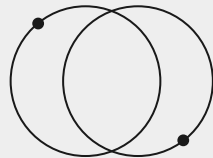


The Goal of Our Study

What strategies can balance growing demand with the need for affordable housing in Oregon?



The Data



Acquisition

- U.S. Census
- Redfin
- St. Louis Fed
- Portland State Population Research

Came in the form of CSVs

Cleaning

Cleaned monetary values denoted as strings.
Matched county names.
On data that presented weekly condensed to monthly.

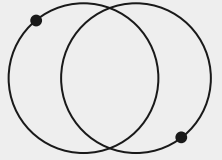
Storage

Created a postgres script and that created the database from a list of cleaned CSVs

After all joins, our date range common to all datasets is 10 years of data from 2013-2023



The Data - Ethical Thinking



Aggregation

- Unable to assess relationships at the individual level
- Loss of nuanced information

Biases

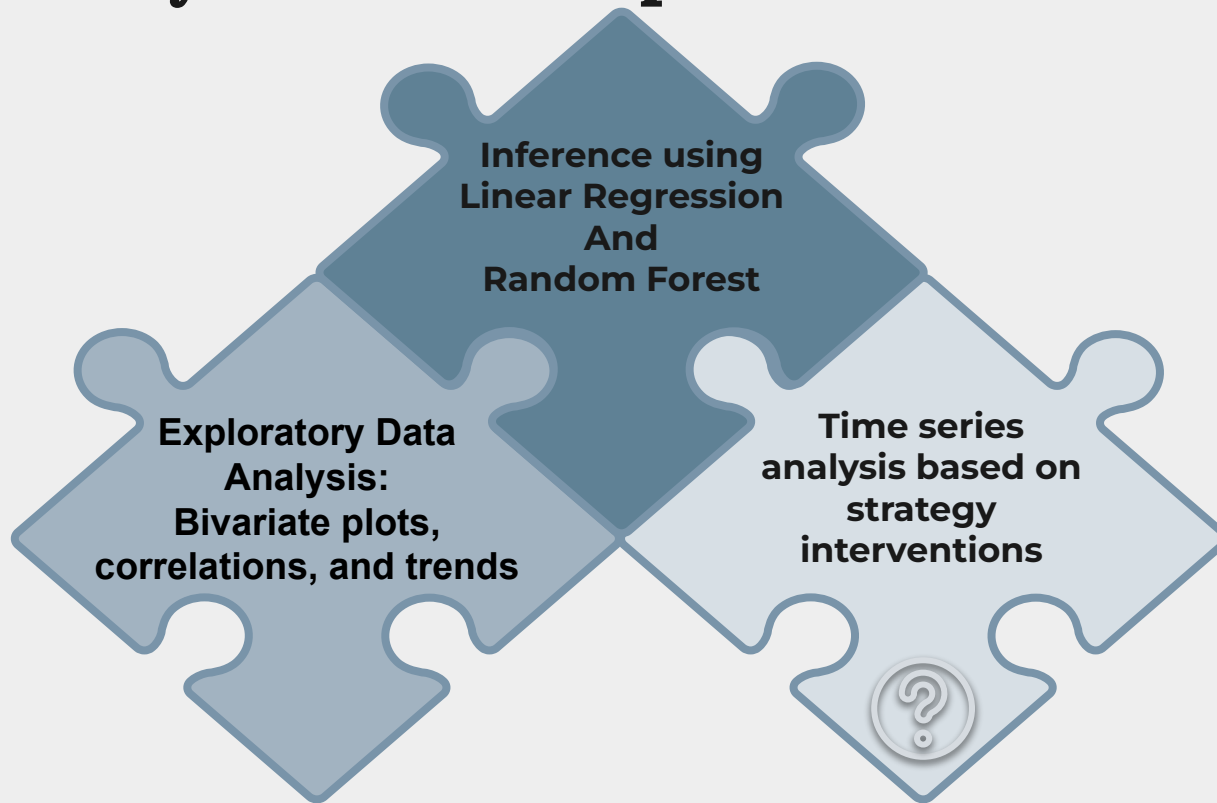
- Confirmation bias
- Availability bias
- Preprocessing bias
- Temporal bias

CAUTION





The Analysis Roadmap

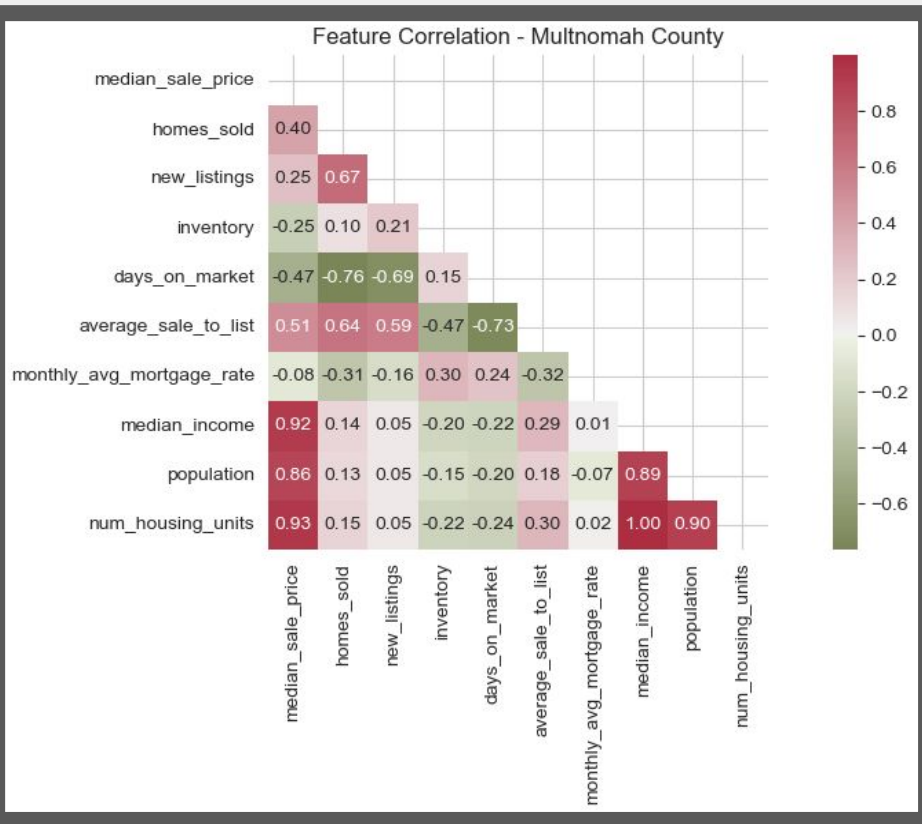


Correlations and Trends

**Dependent Variable:
Median House Sale Price**

**60% of Counties Represented
97% of Home Sales**

**Counties Show a Lot of
Variation**



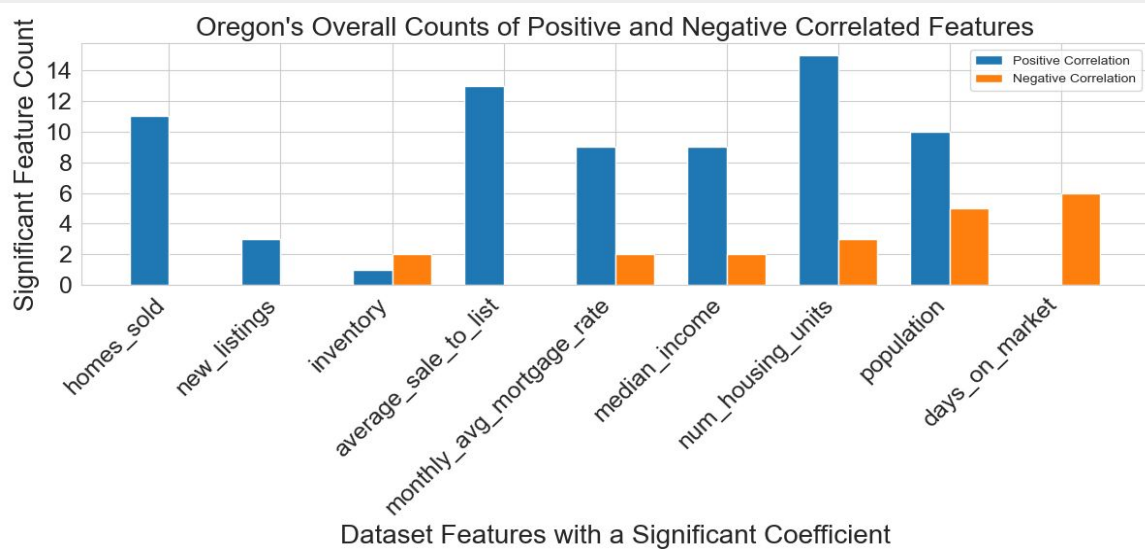
Feature Importance - Linear Regression

R^2 -adjusted range:
62% - 98%

Median = 93%

Mean Absolute Error range:
2.7% - 26%

Median = 6.4%



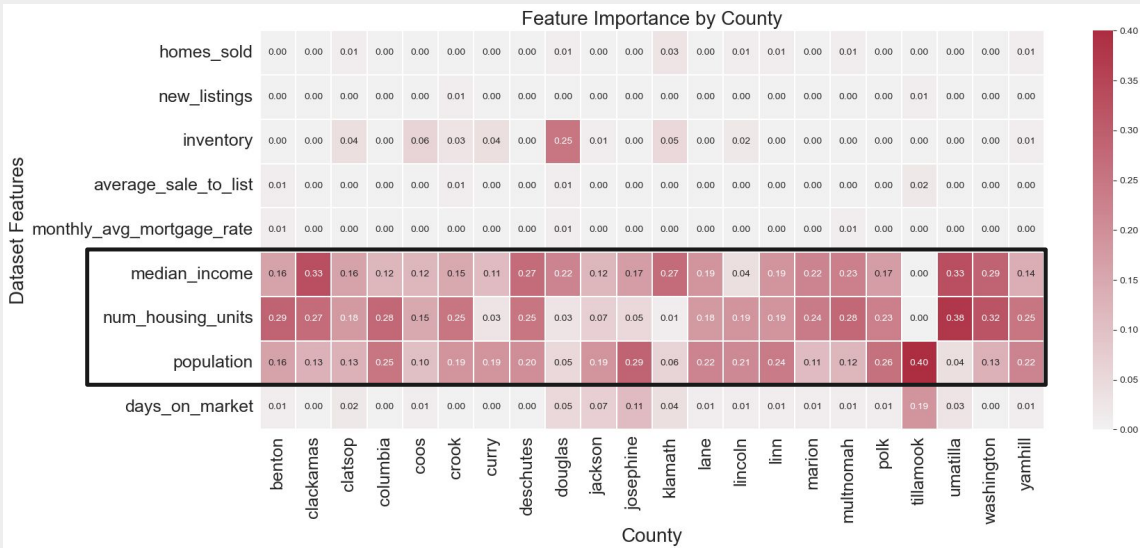
Feature Importance - Random Forest

R^2 score range:
68% - 98%

Median = 91%

Mean Absolute Error range:
2.2% - 12.8%

Median = 4.9%

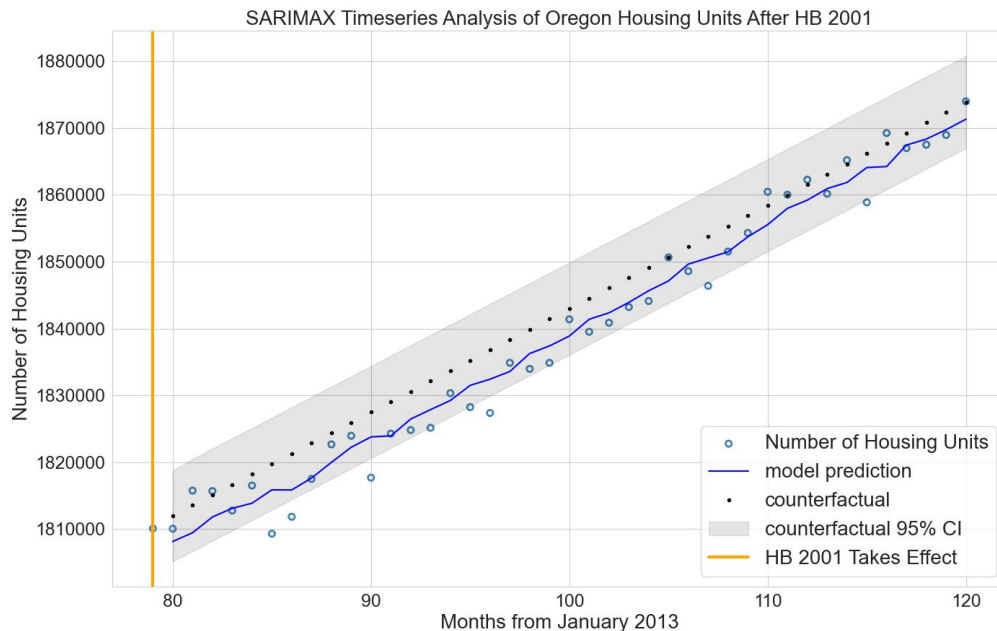


Time Series - A Type of A/B Test

Number of housing units was found to be significant and is in line with current strategy goals

Oregon passed House Bill 2001 in July, 2019

We found a small, but significant decrease in housing units after HB 2001



Conclusions, Limitations, and Future Work

- Research and implement strategies locally
- Be mindful of where you increase housing production
- COVID has lasting effects
- Data for all





References

Image on introduction slide attributed to Breno Assis

Oregon's growing population, housing crisis discussed at annual summit. (2023, January 20). KOIN.com. <https://www.koin.com/news/oregons-growing-population-housing-crisis-discussed-at-annual-summit/>

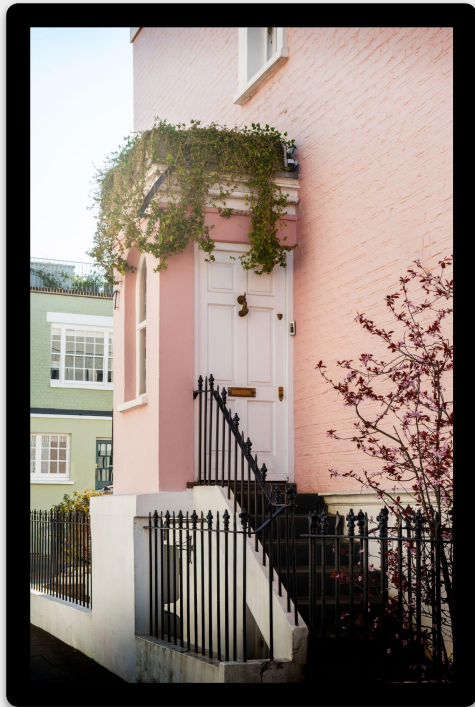
Portland program that requires developers build affordable housing is falling short, audit finds. (n.d.). Opb. <https://www.opb.org/article/2024/05/15/portland-oregon-housing-affordable-rent-inclusionary-audit/>

Bourgeois, M. (2024, March 4). *Oregon legislature passes \$376M package for housing production boost.* Yahoo! News. https://news.yahoo.com/news/oregon-legislature-passes-376m-package-023840848.html?guccounter=1&guce_referrer=aHR0cHM6Ly9kdWNrZHVja2dvLmNvbS8&guce_referrer_sig=AQAAAI7E0ZRGLZX1azPJhd6iNXjll7kHaYsd0gN6G3VImJqqqjgPcXZcrEyBxMEwjJSh4ZGPhj1B3HdH5I6-GFA6fLhISvSSTJrkHQ0YIQJ1EVMzlvGvneBw0EIYXRd0-s-e1_pKlrOAZnZiVs3WOi1gEFvSVNcAtbYL_1h3bef9DnH

Ehrlich, A. (2023, July 26). *Oregon has an extreme housing shortage. Here's what could be done.* OPB. <https://www.opb.org/article/2023/07/26/oregon-cost-of-living-housing-construction-building-land-use-high-rent/>

A housing shortage is testing Oregon's pioneering land use law. Lawmakers are set to tweak it. (2024, February 25). AP News. <https://apnews.com/article/oregon-land-use-law-urban-growth-boundary-housing-d85c2413f169cd02cbf6b15fd9c95329>





Thanks!

Do you have any questions?

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<https://cml-data.github.io/>

<https://1987jonathan.github.io/>

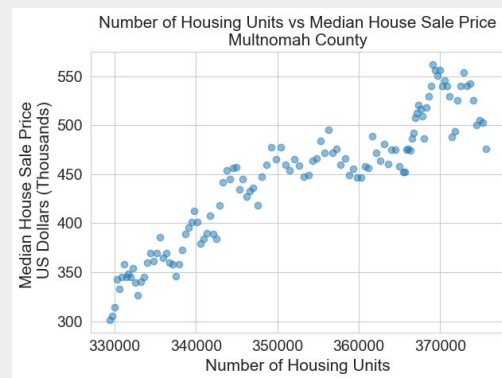
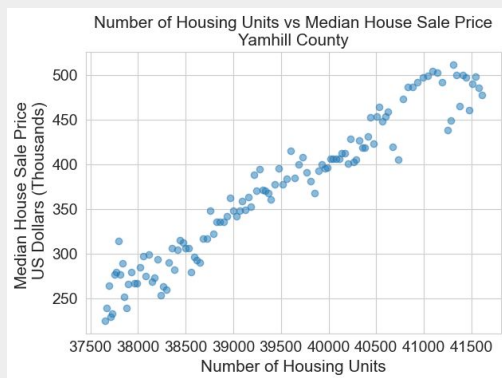
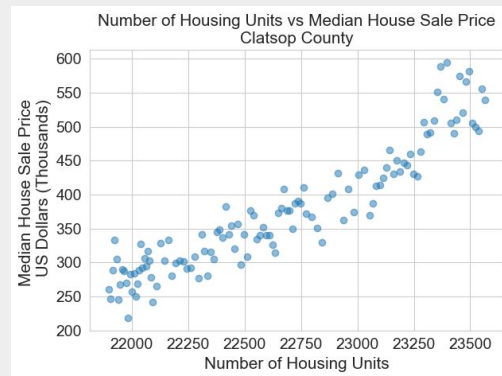
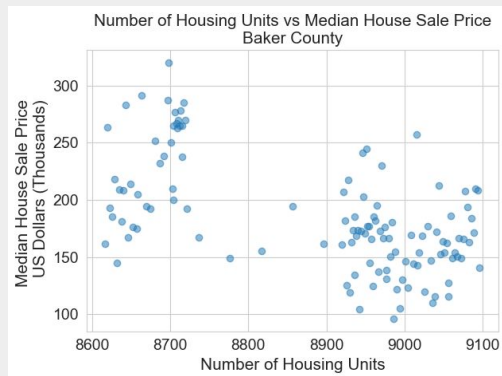
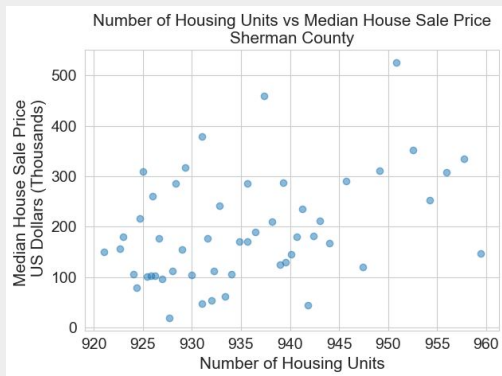
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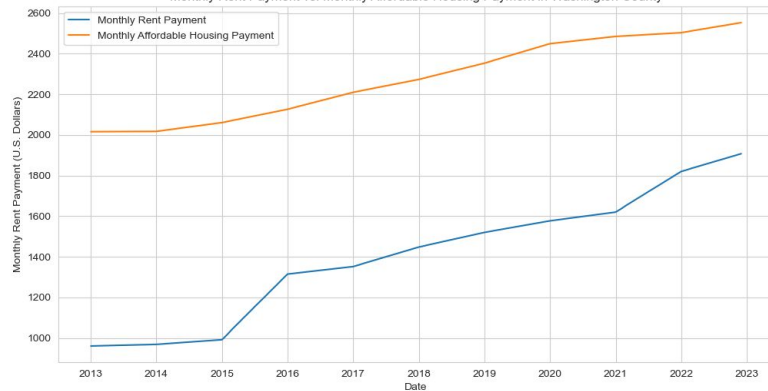
EDA - Scatterplots



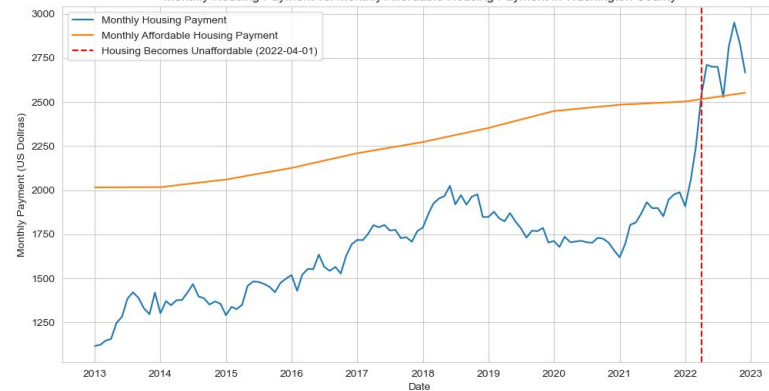


EDA - Trends


Monthly Rent Payment vs. Monthly Affordable Housing Payment in Washington County







Monthly Housing Payment vs. Monthly Affordable Housing Payment in Washington County



The Data - Entity Relationship Diagram

capstone.mortgage	
 date	date NOT NULL
123 monthly_avg_mortgage_rate	numeric

capstone.income_population_housingunits_rent	
 county	text NOT NULL
123  year	int4 NOT NULL
123 median_income	int4
123 median_rent_2bdrm	int4
123 num_housing_units	int4
123 population	int4
123 property_tax	int4
123 rental_vacancy	numeric

capstone.redfin	
 county	text NOT NULL
 date	date NOT NULL
123 average_sale_to_list	numeric
123 days_on_market	int4
123 homes_sold	int4
123 inventory	int4
123 median_sale_price	int4
123 new_listings	int4



The Data - Feature Engineering

To explore the affordability of rental and housing prices, we created the following features:

- Monthly median income - median income divided by 12
- Monthly Housing Payment - the principal and interest paid on a 30 year mortgage at a given interest rate with a 20% down payment
- Monthly Affordable Housing Payment - monthly median income times 30%



Other calculations done on the data:

- Smoothed yearly values to have a monthly cadence by adding the change over the year divided by 12 to each month of the previous year.
- Adjusted median sales price for inflation to 2022 dollars.

