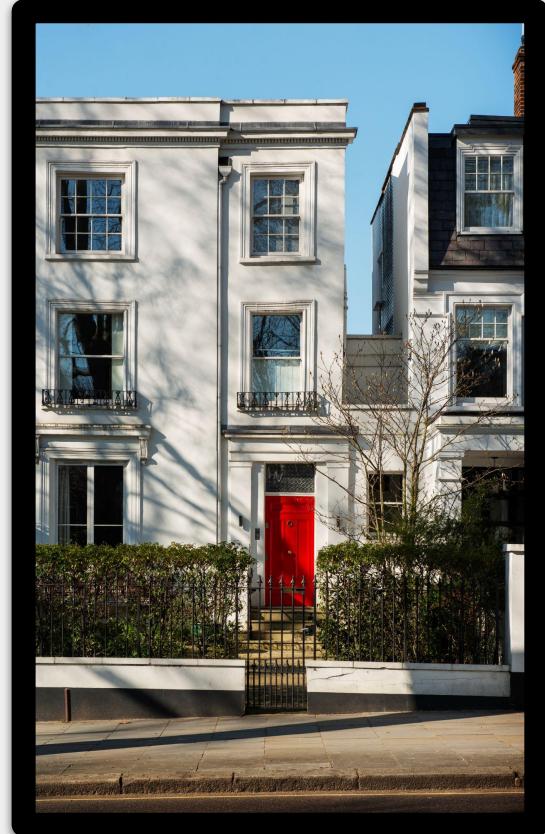




# Exploring the Barriers to Affordable Housing In Oregon

Christy Lawrence and Jonathan McGechie  
MSDS Capstone Project 2024

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# Introduction

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



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



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



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

Oregon has a deficit of available homes

Homelessness is intertwined with the availability of affordable housing

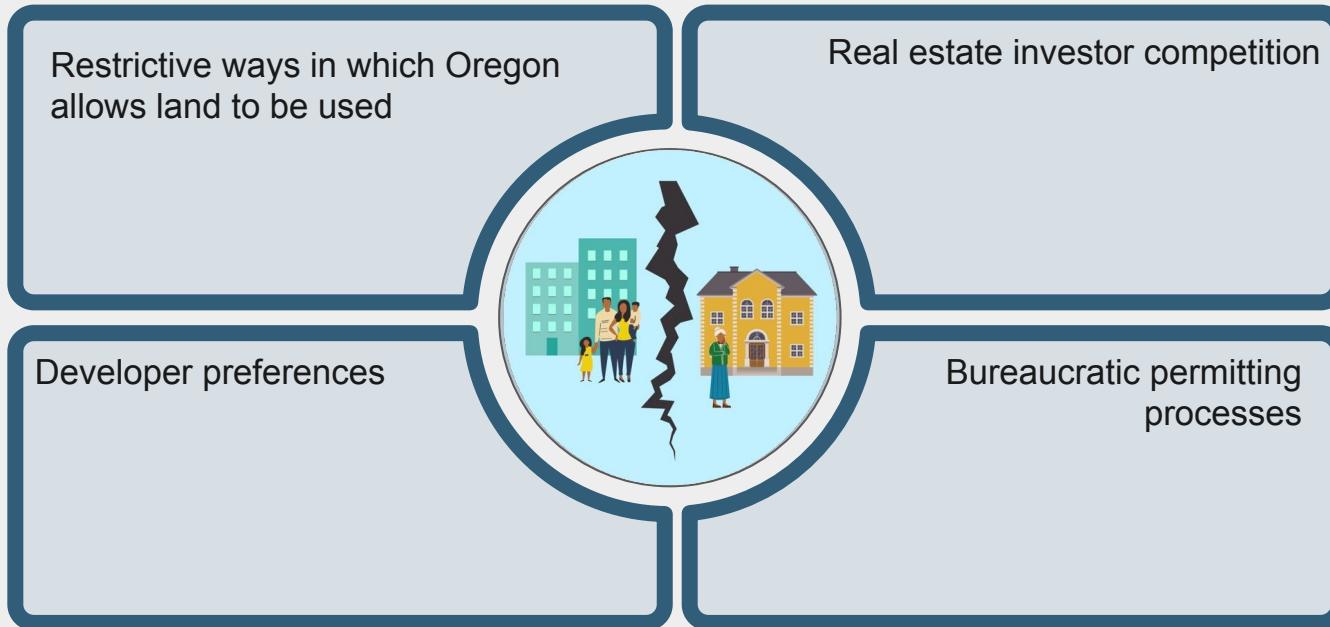
High housing costs hurts local economies

First-time homebuyers are pushing up pricing in the suburbs



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# Background - Oregon's Housing Crisis





# Background - Oregon's Housing Crisis



Housing Production



Housing Price

Ending single family  
zoning

Streamlined Permitting

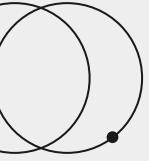
Reducing Regulations

Tax Increment Financing

Density Bonuses

Community Land Trusts





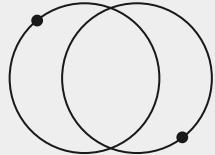
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# The Goal of Our Study

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.

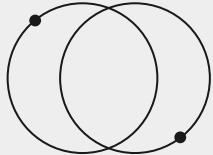
## Storage

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



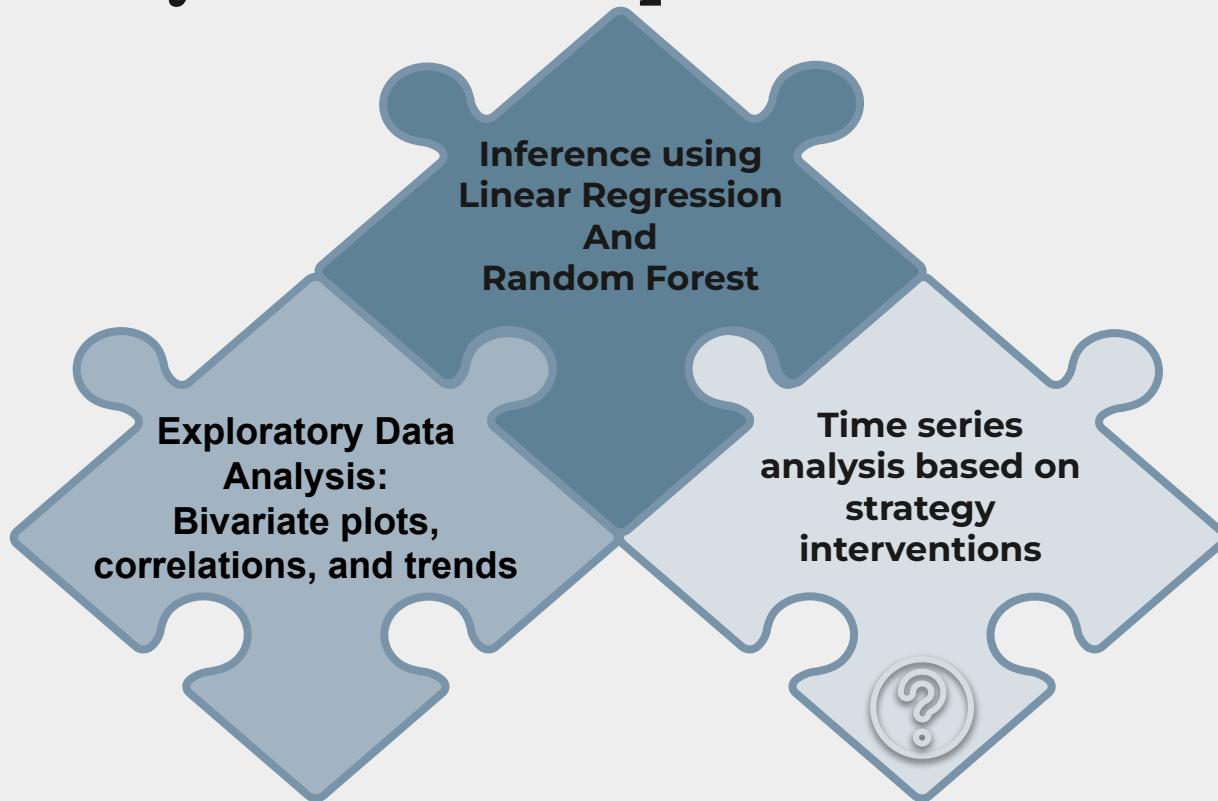
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**CAUTION**



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# The Analysis Roadmap

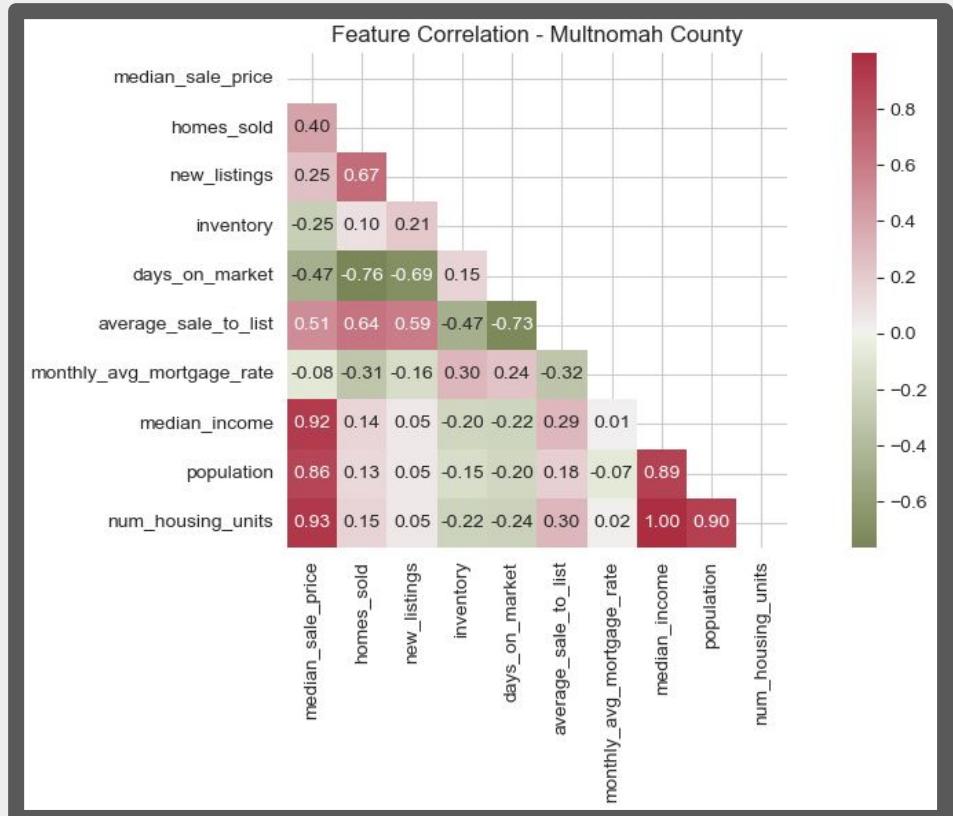


# Correlations and Trends

**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<sup>2</sup>-adjusted range:**

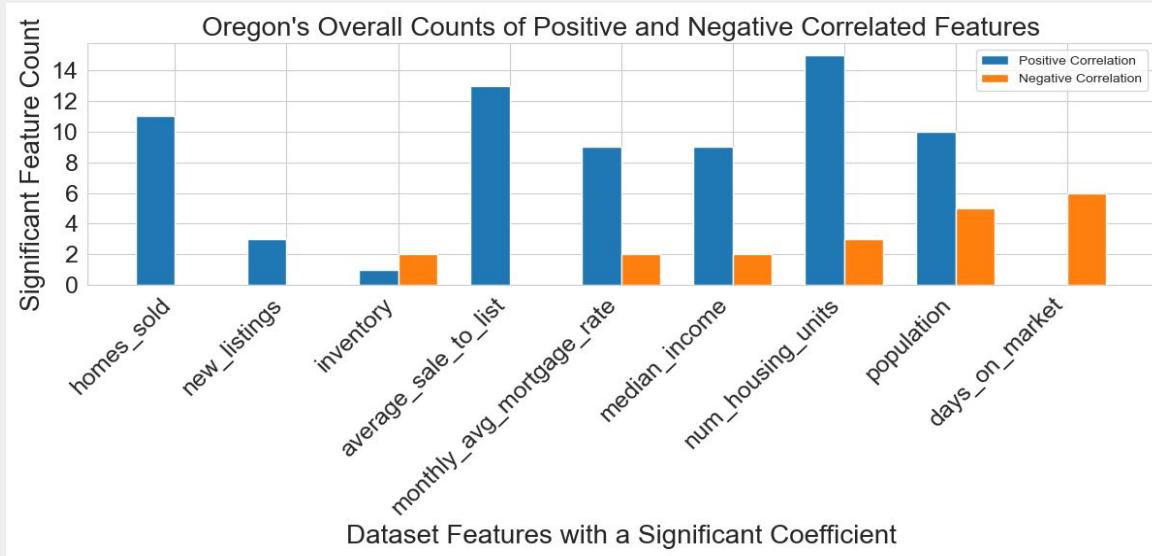
**62% - 98%**

**Median = 93%**

**Mean Absolute Error range:**

**2.7% - 26%**

**Median = 6.4%**



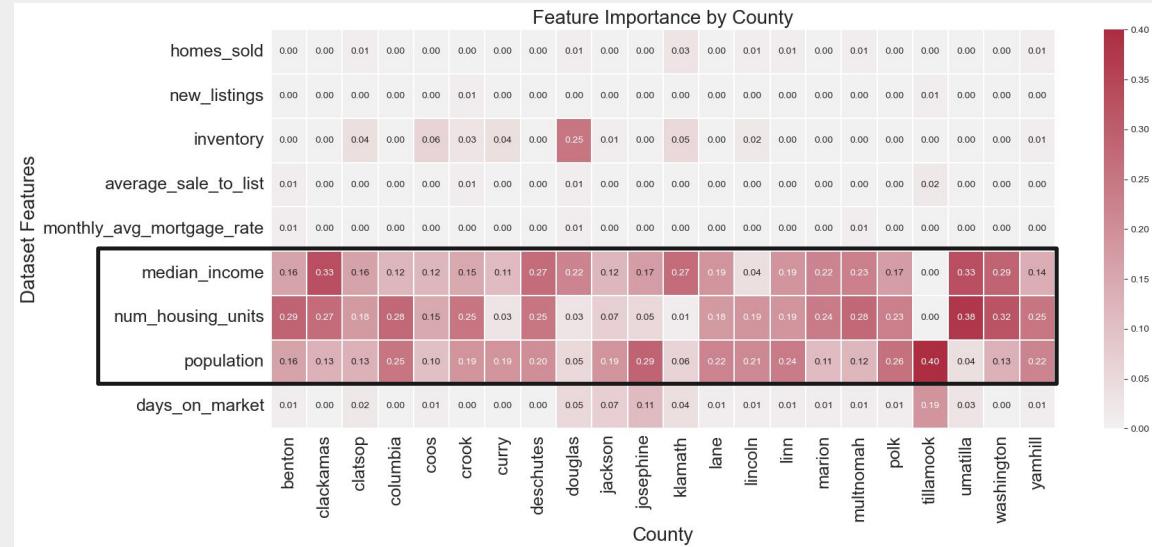
# Feature Importance - Random Forest

R<sup>2</sup> score range:  
68% - 98%

Median = 91%

Mean Absolute Error range:  
2.2% - 12.8%

Median = 4.9%

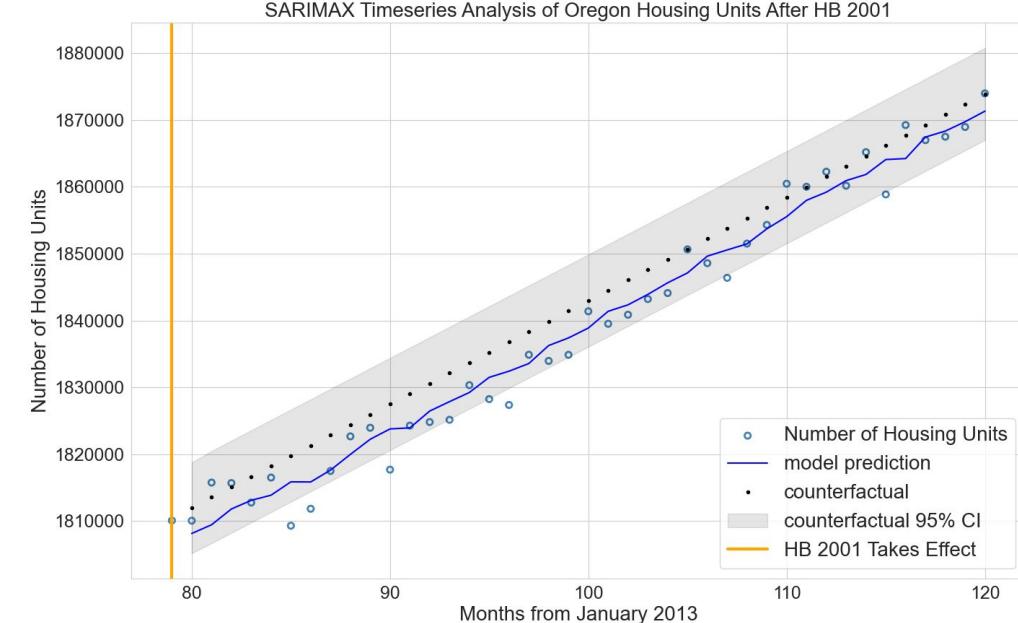


# Time Series - A Type of A/B Test

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

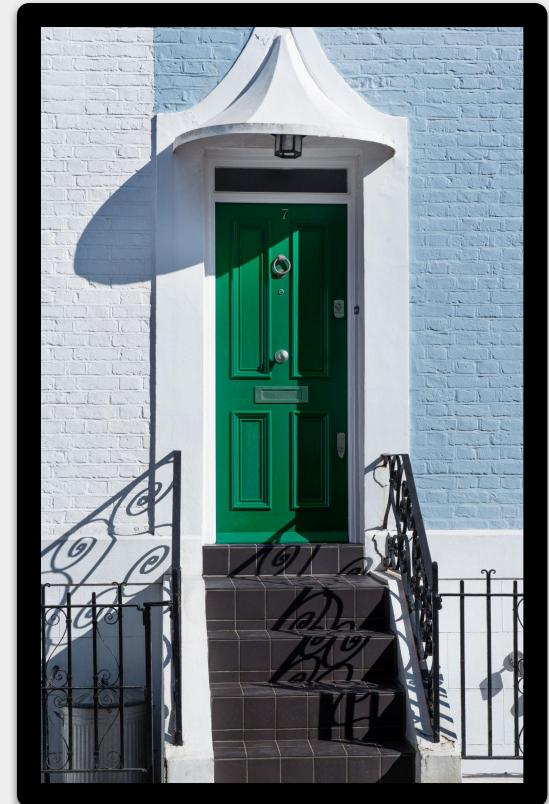
**Oregon passed House Bill 2001 in July, 2019**

**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

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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=AQAAAI7E0ZRGLZX1azPJhd6iNXjII7kHaYsd0gN6G3VlJqqqjgjPcXZcrEyBxMEwjJSh4ZGPhj1B3HdH5I6-GFA6fLhISvSSTJrkHQ0YIQJ1EVMzlvGvneBw0EIYXRd0-s-e1\\_pKlrOAZnZiVs3WOi1gEFvSVNcAtbYL\\_1h3bef9DnH](https://news.yahoo.com/news/oregon-legislature-passes-376m-package-023840848.html?guccounter=1&guce_referrer=aHR0cHM6Ly9kdWNrZHVja2dvLmNvbS8&guce_referrer_sig=AQAAAI7E0ZRGLZX1azPJhd6iNXjII7kHaYsd0gN6G3VlJqqqjgjPcXZcrEyBxMEwjJSh4ZGPhj1B3HdH5I6-GFA6fLhISvSSTJrkHQ0YIQJ1EVMzlvGvneBw0EIYXRd0-s-e1_pKlrOAZnZiVs3WOi1gEFvSVNcAtbYL_1h3bef9DnH)

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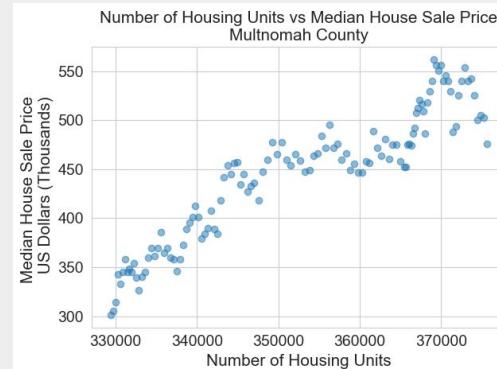
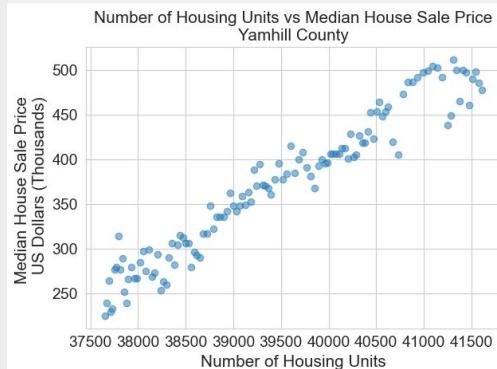
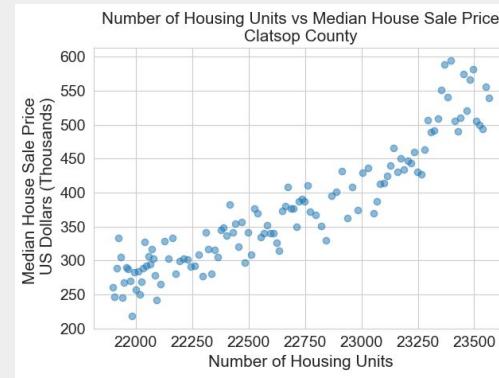
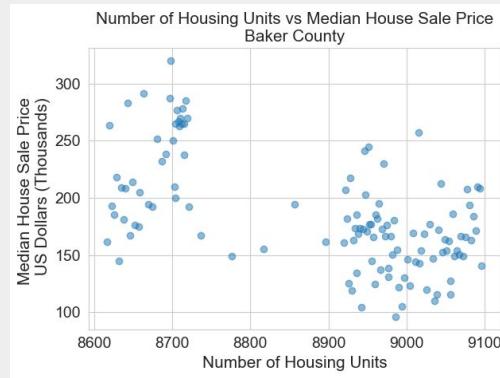
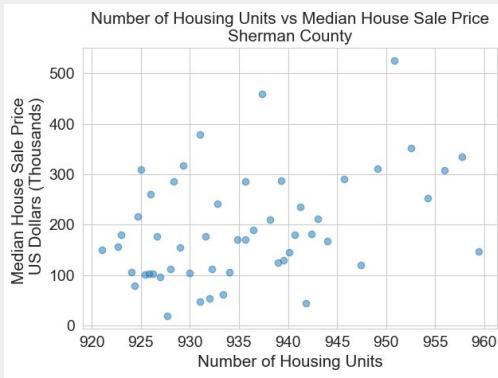
<https://1987jonathan.github.io/>

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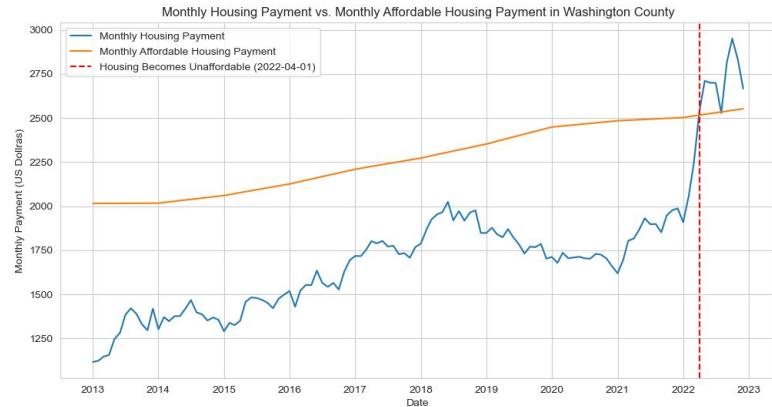
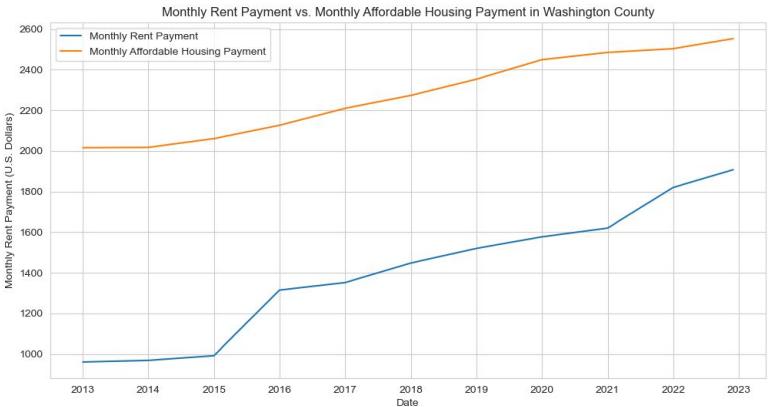
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# EDA - Scatterplots



# EDA - Trends





# 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
 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.



