10 minute presentation, not including the follow up Q&A. Expect at least one question, if not more. Why this data source? What would you like to do next?

Strict 10 minute limit

Practice transitioning speakers

Keep on person in control of the screen

No code on the slides, unless it’s really cool and prudent to explaining the project

Push everything to the main, anything left off will not be graded

Clean up the repo and keep it nice

Why you chose your project. High level descriptive statistics. Visualizations

DON’T MIX UP MEAN AND MEDIAN DUMMY

Project 1: Housing Affordability, The Real Estate Market, & The Economy

* Introduction, summary

**Economic Health** – income, unemployment levels, GDP(?)

**HAI**

**Real Estate Market** – house prices, qty houses sold

* Questions to be asked
  + Data source/clean up
    - US census API
    - Zillow API
    - Freddie Mac (interest rate)
  + How these questions relate to the industry
    - Real estate market is crucial to the health of the economy as it makes up a large portion of US GDP. Affordability plays a large factor in the real estate market.
* Question 1: problem and findings/visualizations
  + HAI & the Market
  + Data
    - Zillow
  + Stat analysis
    - Scatter plot of Housing affordability vs number of home sales
    - Scatter plot of median home price vs time
  + Conclusion
    - Affordability and homeownership
      * Homeownership and economic activity
    - How housing affordability effects rental market
* Question 2: problem and findings/visualizations
  + HAI & the Economy
  + Data
    - US census
    - Freddie Mac
  + Stat analysis
    - Scatter plot of Housing affordability vs unemployment
    - Scatter plot of Interest rate vs affordability
  + Conclusion
    - Government policy and how it effects affordability
      * Affordability and housing bubbles
* Big Picture, bringing all factors together
  + Line plot of NYC, LA, Houston, Miami affordability vs time
  + Heat map of US states where color represents affordability
  + Box plot of affordability vs time
* Conclusion
  + Any issues encountered and solutions
    - Missing data for some years
    - Merging data sets
    - Using the Zillow index vs raw data
  + Potential next steps
    - Predicting market activity based on HAI or vice versa

https://apps.bea.gov/iTable/?reqid=150&step=2&isuri=1&categories=gdpxind&\_gl=1\*16i9y2a\*\_ga\*MzA1NzYzNDc0LjE3MDI1MjI2Mjk.\*\_ga\_J4698JNNFT\*MTcwMjUyMjYyOS4xLjEuMTcwMjUyMjcxNy40Mi4wLjA.#eyJhcHBpZCI6MTUwLCJzdGVwcyI6WzEsMiwzXSwiZGF0YSI6W1siY2F0ZWdvcmllcyIsIkdkcHhJbmQiXSxbIlRhYmxlX0xpc3QiLCI1Il1dfQ==

Missing data filled with median values for that city. Data imputation. Makes it possible to perform calculations.

Median income data missing for 2007, 2008, 2023

Data names changed? That probably doesn’t matter

How does affordability change with location?

How do sales prices and list prices differ?

How do markers of economic performance affect home sales?

Interest rate

Unemployment

Income

The goal of this project is to explore the relationship between the housing markets and local economies of metropolitan areas in the United States through the lens of housing affordability. Metrics to represent the state of the housing market will include median house prices and number of homes sold (or rate of homeownership). The health of the economy will be represented by median income (for a family of 4?) and rates of unemployment (and GDP?). The data will be narrowed further to four major metropolitan areas—New York City, Los Angeles, Houston, and Miami to compare markets in different geographic regions of the US. The datasets will also be confined to the period between 2009 and 2022. **Insert transition sentence here.**

The housing market is closely linked to the economy as it has contributed roughly 12% of the GDP for the last five years. This makes it the current largest contributor to the economy, almost tied with manufacturing at 11%. When affordable housing is abundant, more Americans are likely to invest in becoming homeowners. Consequently, there will be more economic activity in an area, thus growing the market and, therefore, the economy. High rates of affordable housing also likely correspond with higher income levels and less unemployment. Data for the median income and unemployment levels was sourced from the US Census API while information regarding housing was pulled from the Zillow API. Another element involved in calculating affordability is the housing mortgage rate. The mortgage rates used in this project are calculated monthly by the Federal Home Loan Mortgage Corporation, or Freddie Mac.

The Housing Affordability Index (HAI) arose as shorthand for how likely a typical family would be able to afford the average mortgage in their area. HAI is calculated by dividing the Mean Family Income (MFI) by the Qualifying Income (QI) and multiplying that by 100. If the QI and the MFI are equal, that suggests the typical family can afford to pay one complete mortgage (an HAI index of 100). As the MFI decreases relative to the QI, a family would only be able to afford to partially pay the mortgage. The lower this number is, the less affordable a market is considered (an HAI of < 100). Conversely, an MFI greater than QI suggests that a single family could afford to pay for their mortgage and then some, implying a healthy economy (an HAI > 100).

The QI is a tool used to evaluate mortgage loan applications. It estimates how much income is required to afford a standard mortgage. Within lending institutions, there are many factors that go into calculating such a number, such as Debt to Income Ratio and miscellaneous housing expenses. However, grabbing that kind of data at the scale this project aims to is not feasible. For our purposes, the QI will represent what a typical 30-year mortgage on a how would look like. The formula for that is as follows:

*M = P[(r(1+r)n)/((1+r) n -1)]*

Where *M* is the monthly mortgage payment, *P* is the principal loan amount, *r* is the monthly interest rate, and *n* is the total number of loan payments (360, in our case).

The income required to afford a mortgage, or the qualifying income, is the amount needed so that mortgage payments on a 30-year fixed mortgage loan with a 20% down payment account for 25% of family income.