A Dive into the Global Housing Market from 2015-2024

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4/26/25

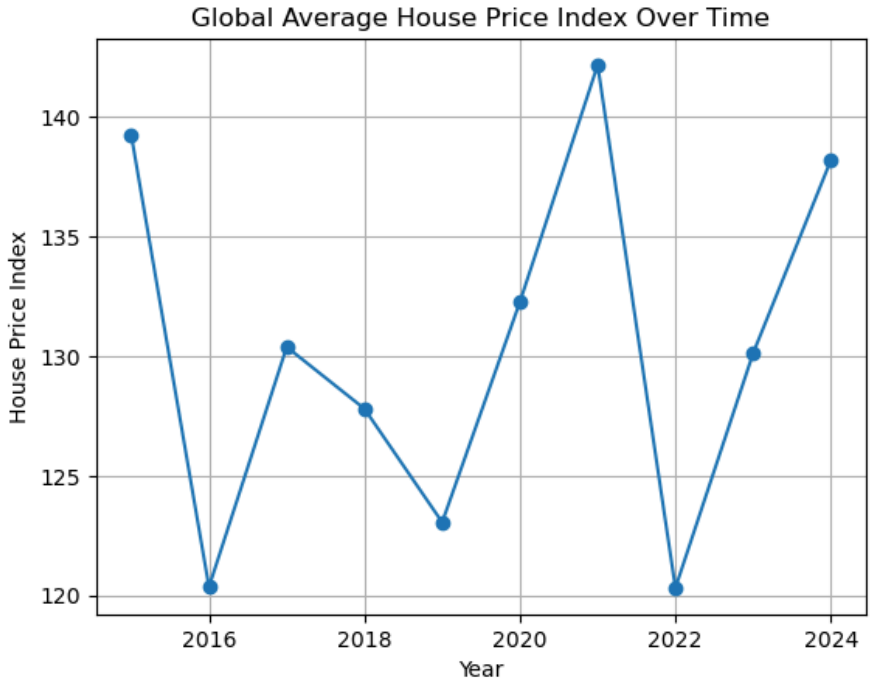
Objective: to analyze the global housing market data to identify trends, patterns, and anomalies. The analysis involves cleaning the data, creating visualizations, and interpreting the results. The global housing market is a critical sector that influences economic stability and growth. By understanding these trends, buyers and researchers can better navigate the complexities of the housing market and make educated predictions for the market. This report aims to provide an analysis of the global housing market data, focusing on key indicators such as the house price index, rent index, affordability ratio, mortgage rate, inflation rate, GDP growth, population growth, urbanization rate, and construction index. The analysis includes data cleaning, visualization, and interpretation to uncover meaningful insights.

Original Dataset: Global Housing Market Analysis (2015-2024)

Beginning, the Housing Market Dataset has a shape of 200 rows and 11 columns. The dataset included mostly numeric data types. This makes sense as this dataset follows the analysis of the housing market, which mostly has to deal with numbers. The first step in cleaning this dataset was to check for null values, and after doing that, I discovered that there were no null values. However, if there had been missing values, I would have addressed them differently based on the data type. For categorical data, I would have replaced missing values with "Unknown," and for numerical data, I would have calculated the average of the column to fill in the missing values.

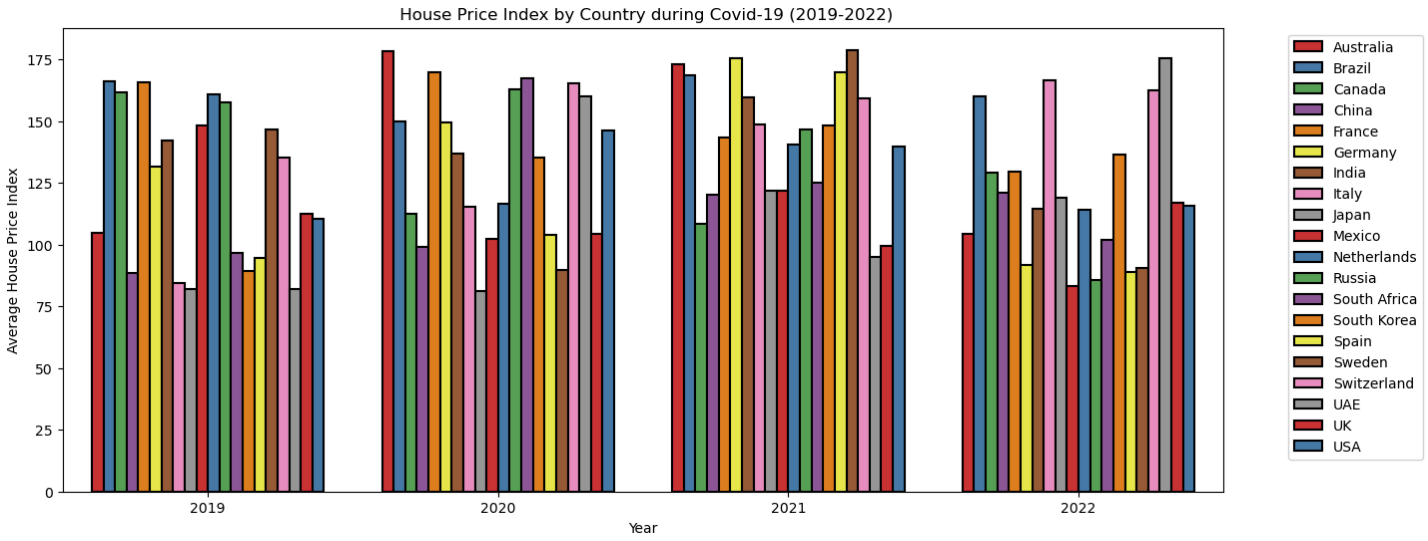
Next, I checked the dataset for duplicates and found that there were none. If duplicates were present, I would have used the `.drop_duplicates()` function to remove them. After checking the dataset, I then copied it into a new data frame to start my manipulation and visualization of the data. To begin, I modified the names of some columns to make them easier to work with. All I did was remove "(%)" from the column names because I found it tedious to work with.

After exploring the data and looking into some of the columns, I began to ask myself how COVID-19 might have affected the housing market. That's when I decided to analyze the trends and patterns from the years 2019-2022, I found that the best way to see this and analyze it was to visualize it in a line plot.



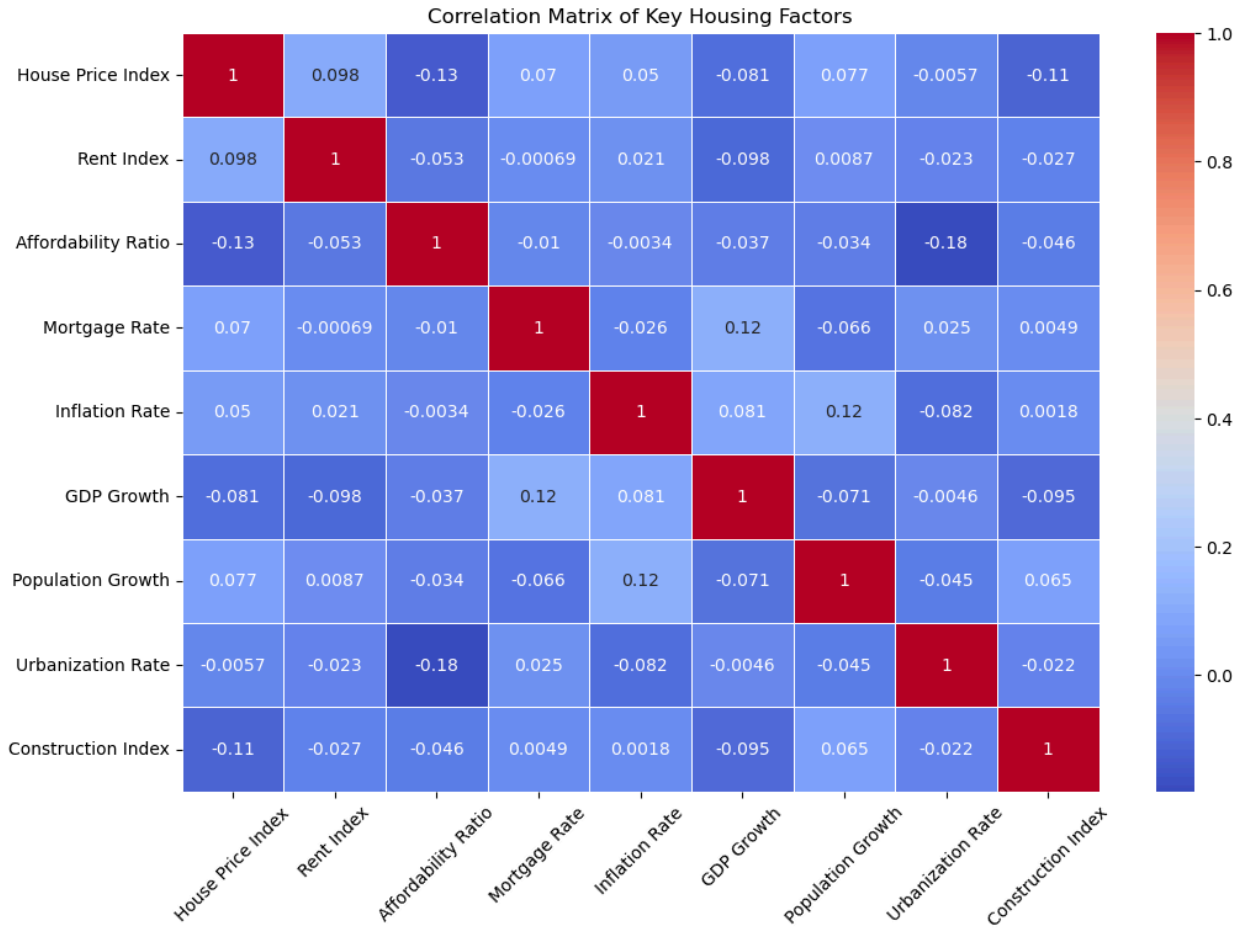
This line plot shows the Global Average House Price Index Over Time. Some observations to be noticed are that from 2015 to 2024, the global average house price index has generally increased, indicating rising housing costs worldwide. Then, during the COVID-19

pandemic years 2020–2021, instead of falling as would be expected during an economic recession, the average house price index rose sharply. And after the pandemic, the house price index continued to rise. This confirmed my idea that the pandemic did affect the housing market, and so I decided to analyze this a bit more and visualize what I found in more detail.



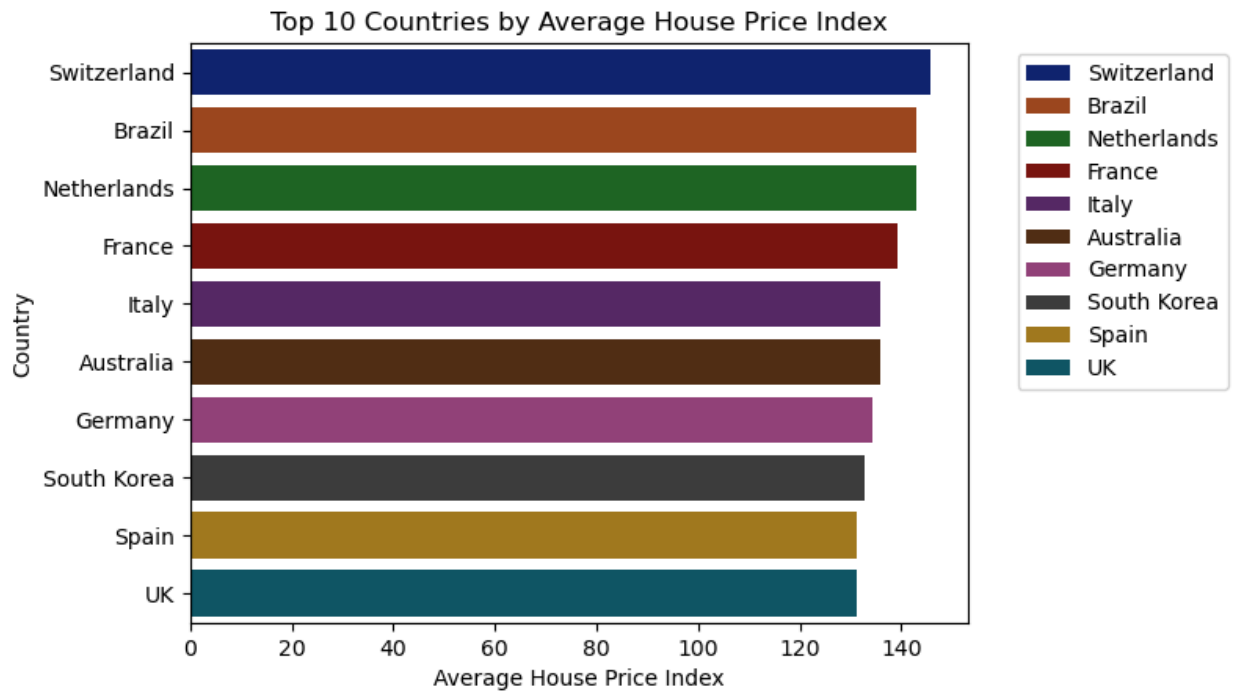
After noticing a sharp increase in the house price index during the years of the pandemic, I decided to look into it more thoroughly, looking at each country in the dataset. The Bar plot above further confirms that there was a sharp increase in the average House Price Index after 2020 across all countries due to the COVID-19 pandemic and the global economic recession that followed due to COVID-19. Another thing to notice is that most countries reached their peak housing prices in 2021, likely due to very low mortgage rates and lifestyle changes during the pandemic because of remote work.

Continuing, after looking into the Covid-19 years, I then moved on to look at the housing market using the whole time duration. I then decided to look into what key values affected each other. To learn this, I created a correlation matrix of these values, which will be displayed below:



Above, the correlation matrix of key housing factors shows a positive correlation between the House Price Index and Rent Index, indicating that as house prices rise, rent prices tend to follow. A negative correlation between GDP Growth and Inflation Rate can also be seen, which suggests that higher inflation is associated with lower economic growth. Overall, the matrix provides insights into the entanglement of housing market factors, which aids in informed decision-making and predictions of the housing market for the future.

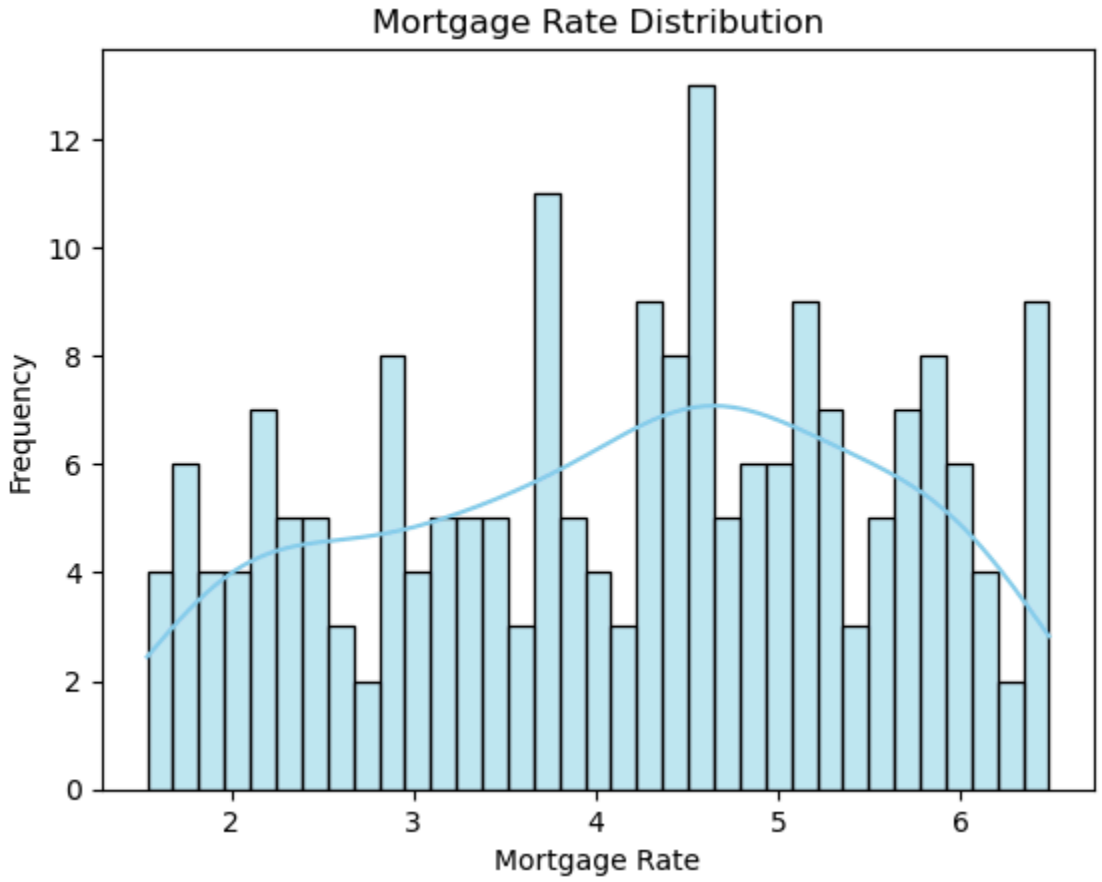
The next idea I wanted to look into was which countries had the highest house prices. So I did this by grouping the data by country and found the average Housing Price Index. I then visualized this data below:



The bar plot shows the Top 10 Countries by Average House Price Index, highlighting that nations like Switzerland, Brazil, and the Netherlands consistently have the highest housing prices from 2015 to 2024. This surprised me at first because I was fully expecting the USA to be included in this top 10. However, upon further thought, what makes these different from the USA is the size of the USA compared to these other countries. The USA is massive compared to most of these other countries, and due to that, there is a lot more variety in housing prices because a state like New York is vastly more expensive than a state like Wyoming. Also, the USA has more space to build housing, which allows the urban demand to match the supply here. These other countries are smaller and have a strong urban demand and a limited housing supply, thus making the housing price index higher.

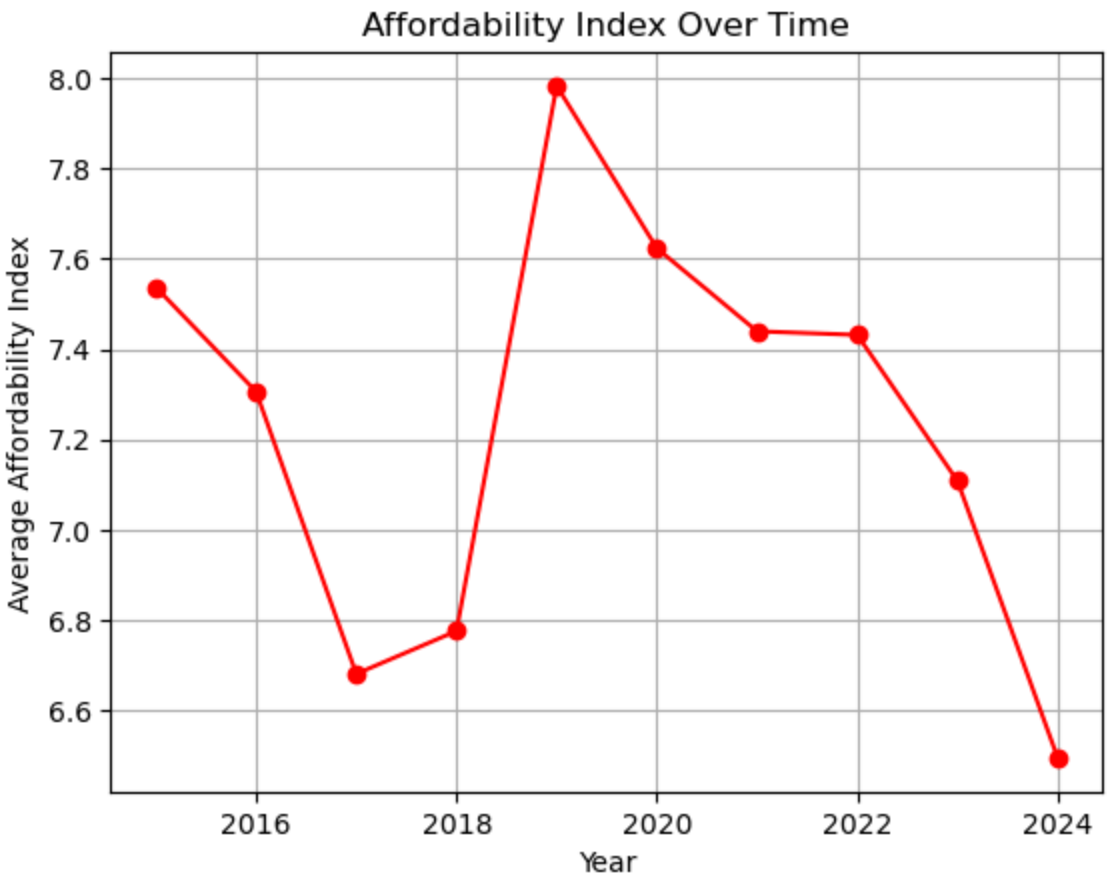
Next, I wanted to show and see how the mortgage rates looked during these periods because mortgage rates directly affect the housing price index because when mortgage rates are

lower the damned for housing goes up causing an increase in Housing prices. To show this, I created a histogram that can be seen below:



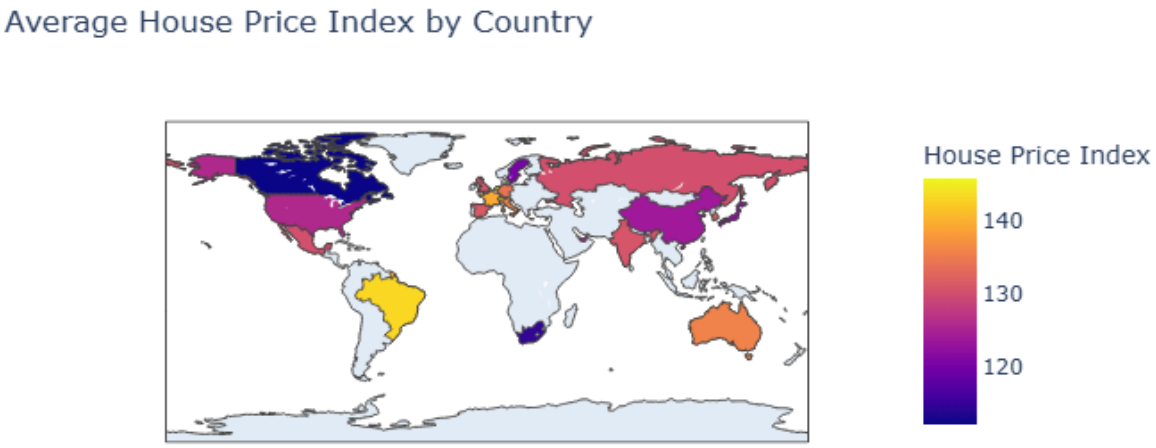
The distribution of mortgage rates shows that countries experienced moderately low mortgage rates, with the majority of rates clustered between 2% and 6%. There is a peak of around 4.5%, suggesting this was the most common mortgage rate during the 2015–2024 period. Also, this distribution supports the idea that low mortgage rates played a major role in causing housing prices to increase globally during 2015-2024 because they are staying at all-time lows.

The next crucial piece was to look into the average affordability index over the years and find when housing was the most expensive and cheapest. The line plot below shows the visualization.

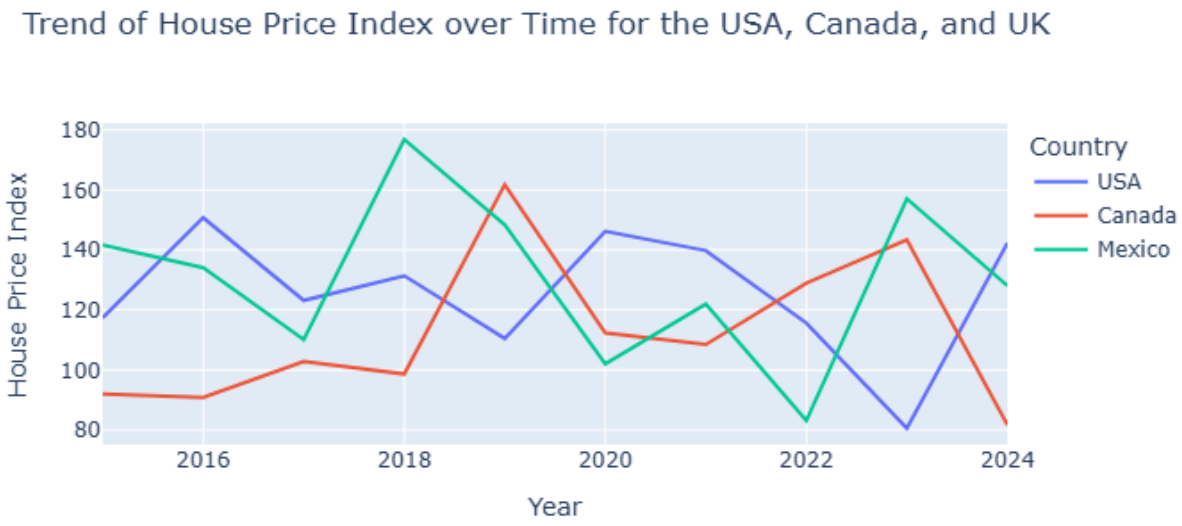


This line plot shows the Affordability Ratio over time. One thing noticed is that from 2015 to 2017 houses were more affordable, but from 2018 to 2020 shows an all-time high, which further suggests that the Covid-19 years had an extreme effect on housing prices, causing them to increase and affect the market globally. However, from 2022 to 2024, we can see the rates start to stabilize again and show that the housing market is becoming predictable again.

To further visualize the average housing prices around the world, I decided to make a geomap that would show each region and its average housing price index. To make it easier to see what each country's market looks like, specifically.



The choropleth geo map of the average house price index by country shows countries like the USA, Australia, and the UK have expected high house price indexes, displaying more expensive housing markets. However, countries such as Mexico and South Africa have lower indices, suggesting more affordable housing. One surprising thing to notice about North America is the very stark difference between the USA, Canada, and Mexico. The USA shows the highest price index, and I expect Canada to follow, but out of the whole of North America, they have the lowest price index. After noticing the vast difference in North American housing price indices, I decided to look into the USA, Canada, and Mexico specifically. To find their trends over time.



The line plot above displays the House Price Index trends for the USA, Canada, and Mexico from 2015 to 2024, revealing overall rising housing prices in all three countries in North America. The USA shows a steady increase with peaks around 2020 and 2024, showing a strong increase in house prices. Canada displays more sporadic changes, with fluctuations and a peak around 2019, followed by a decline, then a rise, then another decline. Mexico experiences sharp increases around 2018 and 2023, suggesting periods of fast increase. Overall, I was very surprised to see these vast differences because I'd imagined Canada to follow the USA in the housing price index, while Mexico remains lower due to the affordability issues in Mexico. However, I was wrong, and this visualization proved very useful in clearing that misconception.

To conclude, this analysis gives a glimpse of the importance of understanding the relationships between key housing factors and their influence on the market. I found significant trends, particularly in the decline in affordability, a rise in housing prices, and the correlation between housing costs and mortgage rates. However, some limitations that could be found with this data are the exclusion of certain countries, limiting the scope of data that can be analyzed to

find more significant trends. Overall, understanding the key relationships in housing prices is crucial to better navigating the housing market because it allows future buyers, researchers, or investors to make educated predictions for the market in the future and better understand why housing has been getting more expensive. This provides the needed tools to look into the housing market and learn how affordability issues might be solved and how we might slow the growth of housing prices for a more affordable future.

References/Acknowledgments:

***Global Housing Market Analysis (2015-2024)*. (2025, March 18). Kaggle. https://www.kaggle.com/datasets/atharvasoundankar/global-housing-market-analysis-2015-2024**

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