International Housing Market Report

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Objective

The objective behind this project is to examine how affordable it is to buy a home. This was done through a series of charts comparing different factors that have to do with housing costs, but mainly looking at the House Price Index and the Affordability Ratio. This project was also able to compare the different variables across years and various countries. Understanding the trend of housing prices is an important look at economics and the state of the world.

Introduction

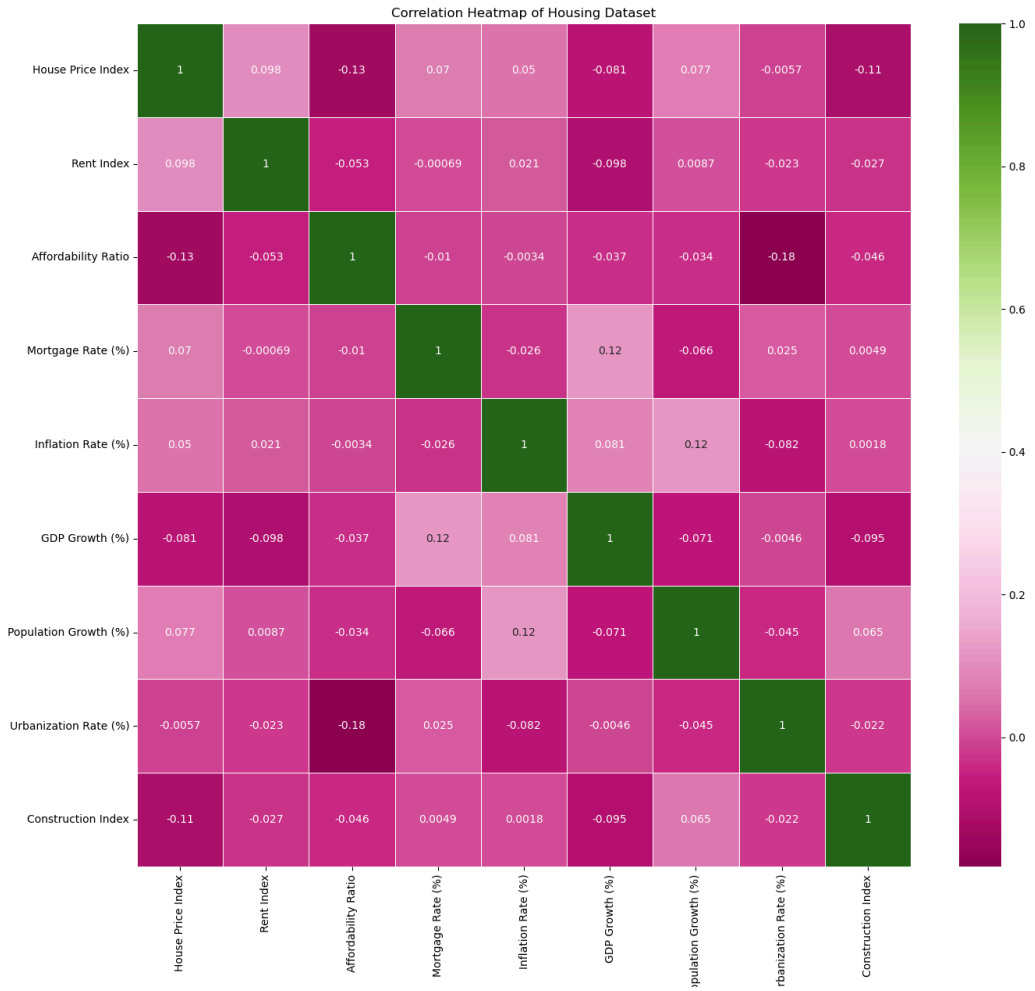
The dataset was compiled by using publicly available financial and real estate documents. This dataset includes various economic factors from 2015 to 2024 for different countries. It includes things such as mortgage rate, rent index, affordability, and much more. The dataset gives insight into what factors someone purchasing a house in different countries would face. The dataset was found on the website Kaggle and is titled “global_housing_market_extended”. (Soundankar, 2025).

Method

The Data in this dataset were already clean and ready, pretty much. There were no missing values, no duplicates, and no outliers. All of the data looked reasonable. The min, 25%, 50%, 75%, and max are all built off of each other normally. There was one issue, though, the “Year” column was counted as an integer. In order to more effectively use the “Year” column, it was turned into a category. This made it easier to showcase the changes over time in graphs. The “Year” being a category was saved to a new csv file titled “new_housing_market.csv”.

Storytelling

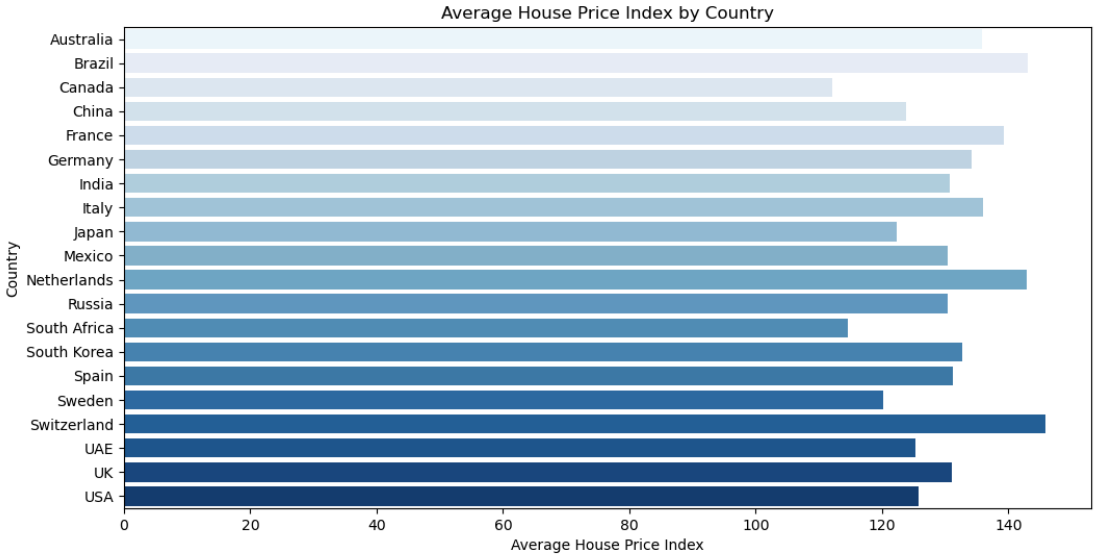
Correlation Heat Map



The purpose of creating the Heat Map is to view correlations. There are not any strong correlations. The strongest for a positive correlation are GDP Growth % and Mortgage Rate % at 0.12, and Population Growth % and Inflation Rate % at 0.12, Rent Index and Price Index at 0.098. The strongest for negative correlation are House Price Index and Affordability Ratio at -0.13, Urbanization Rate and Affordability Ratio -0.18, and Construction Index and House Price Index -0.11. All of these weak correlations hint that instead of one main factor that has a lot of

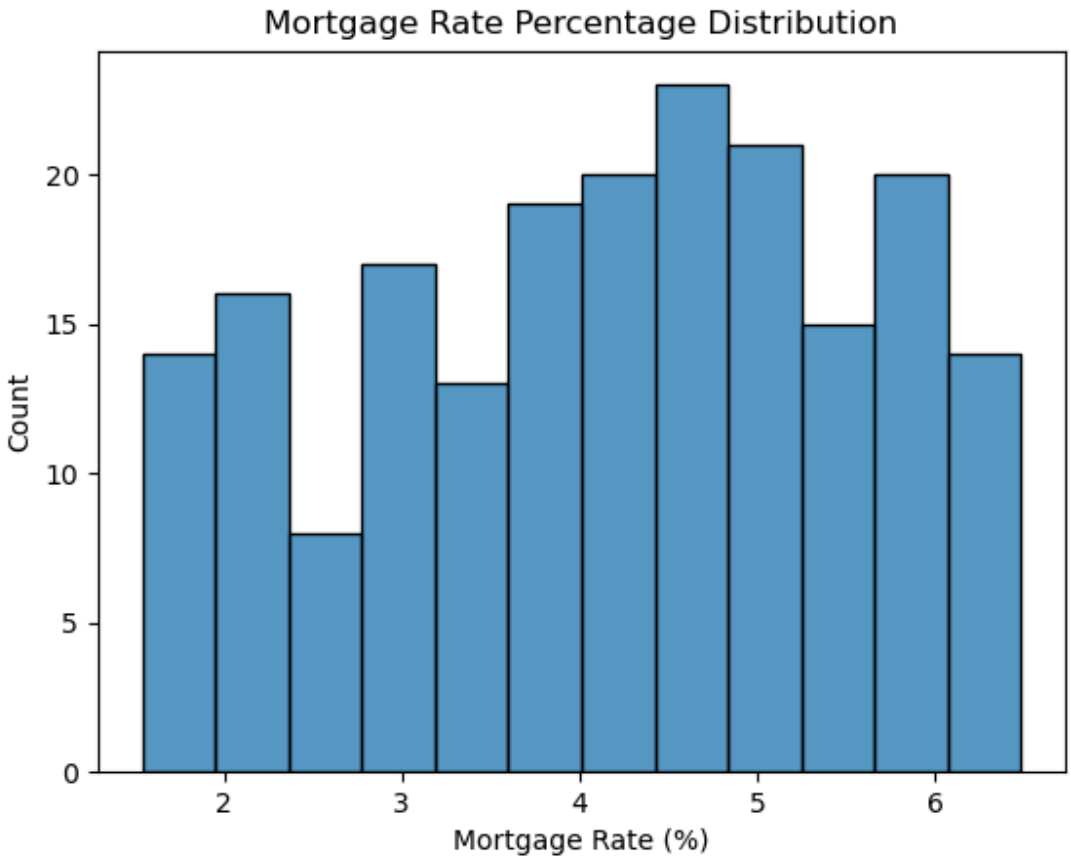
influence over housing prices. It is actually multiple smaller, loosely related factors that influence the global housing market.

House Price Index Bar Plot



The House Price Index tracks the changes in house prices over time. It shows changes in home values. The barplot shows the average House Price Index per country. Looking at the plot most countries' Indexes are over 120; the two countries that fall below it are Canada and South Africa. A low House Price Index indicates homes are more inexpensive compared to the median income of that country. This implies that houses are more affordable in Canada and South Africa. Some of the highest House Price Indexes are above 140. Those countries are Brazil, the Netherlands, and Switzerland. A high House Price Index indicates homes are more expensive compared to the median income of that country. Housing in these three countries are pricey. Most of the countries fall between 120 to 140 because of this it makes most of the countries look like they are closer to being on the expensive end when it comes to home prices.

Mortgage Rate Percentage Distribution



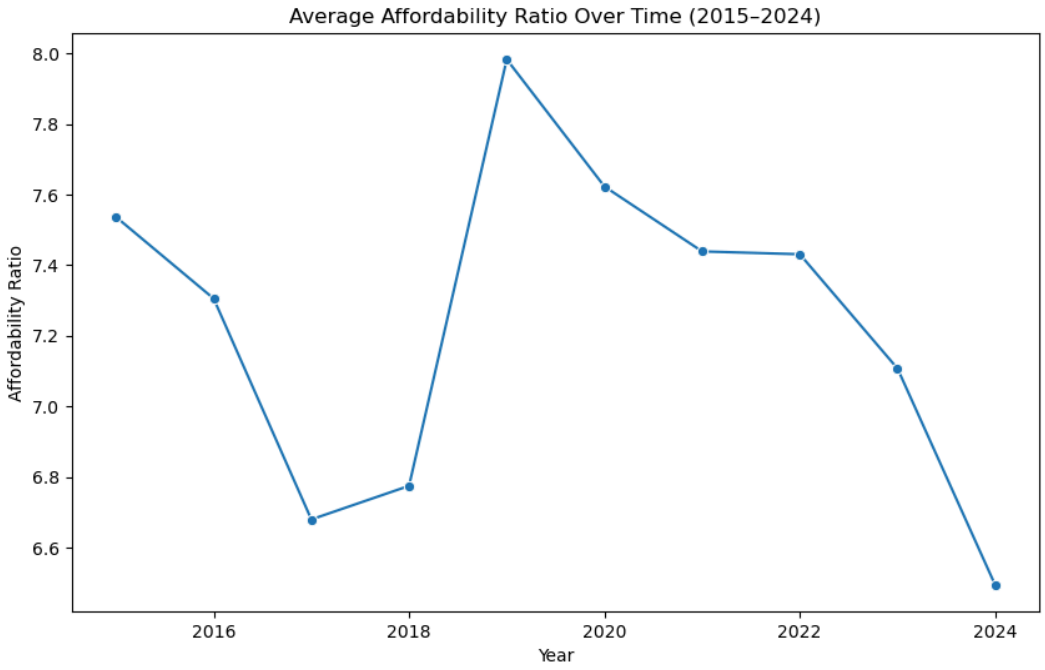
This histogram looks at the frequency of Mortgage Rate % at different levels. A Mortgage Rate is the percentage of a loan someone pay to the loan lender in order to own their home. The Mortgage Rate percentages are under seven and contain decimal points. This can be seen in the graph due to multiple bars being in between whole numbers. The highest count of the Mortgage Rate % is between 4 to 5. It raises the question of why so many countries have mortgages between 4 and 5. The lowest count is between 2 and 3, it is the only one under the count of 10. Most of the different levels of Rates are above 10. There are four in between 10 to 15 and seven above 15. Based on the highest counts being between 4 to 5 it looks like a good portion of countries pay that Mortgage Rate Percentage.

House Price Index vs. Rent Index

The Rent Index is a measure that studies the change in rent prices over time. The House Price Index tracks the changes in house prices over time. Looking at the Scatter plot there does not seem to be a strong correlation between the Rent Index and the House Price Index. The data points on the plot look very spread out with no real pattern. Looking at the Heat Map the Rent Index and House Price Index has a 0.098 correlation which is a weak correlation. Circling back to the Scatter Plot, the Rent Index region with the most white would be in between 60 and 70. It did not really seem to matter what the House Price Index was the data points in this region seem fewer. There seems to be more of a population in between the 50 through 60 Rent Index,

especially near the 100 for the House Price Index. In general, examining this scatter plot feels like grasping at straws. There does not seem to be much to work with for this chart.

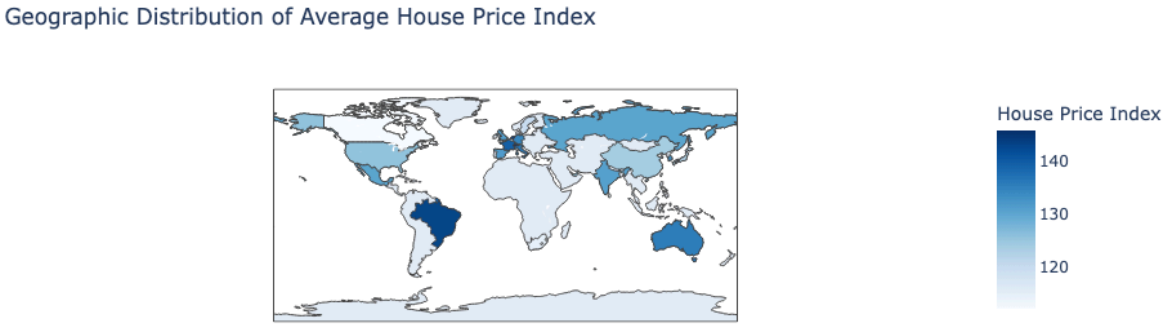
Affordability Ratio Over Time



The Affordability Ratio is a metric used to measure a household's ability to afford things relating to goods, services, and housing. A high Affordability Ratio means that housing is less affordable. Whereas a low affordability ratio means it is easier to afford things. It is notable that the lowest the Affordability Ratio was, was in 2024 being at 6.5 for Affordability Ratio. It makes one wonder what was lowering prices globally during 2024. The year 2019 was the most expensive, just slightly below 8. But after 2019 there is a steady decline of the Affordability Ratio until 2024. The year 2024 was a drop compared to 2023. The global event that comes to mind that may have impacted the Affordability Ratio around 2019 and 2020 was the Covid-19 Pandemic. However, this dataset does not have columns for world events, so it is harder to connect the two events, but speculations can be made. Another aspect to consider is the incline

from 2018 to 2019, it goes from just under 6.8 to just under 8. To summarize, the line plot 2015 to 2017 declines from under 7.6 to around 6.7. Then there is an incline 2017 to 2019, from around 6.7 to slightly under 8. Then there's a drop from 2019 to 2024, from under 8 to 6.5. This entire line plot implies that the pendulum swings both ways. Houses may be affordable for a couple of years then get expensive for some time then go back to being cheaper.

Geo Map House Price Index

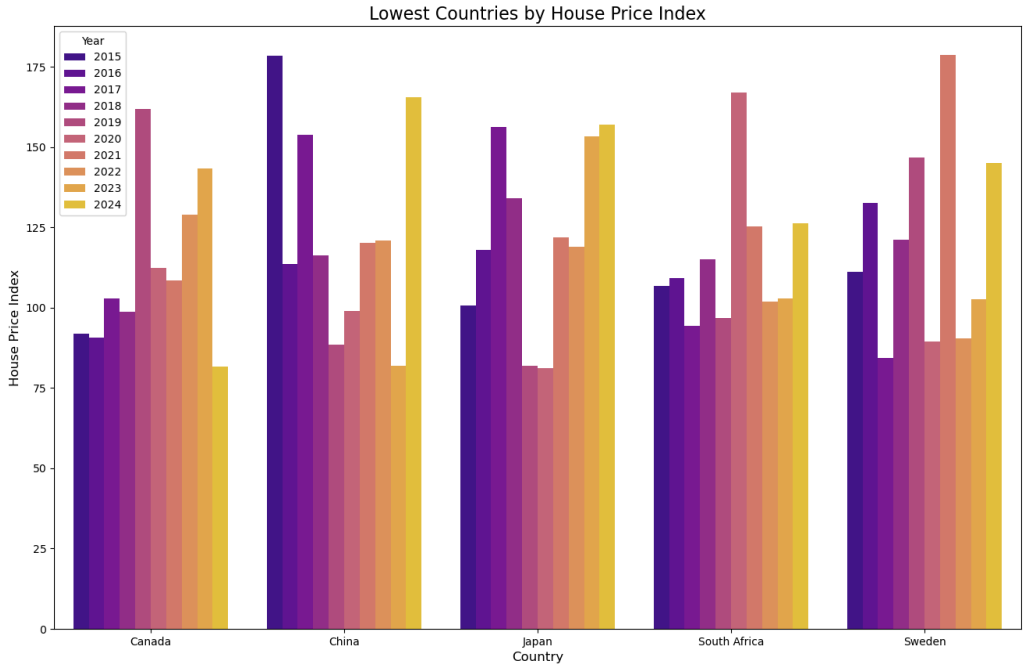


Examining the Geo Map it is seen that the Highest House Price Index belongs to Brazil, the Netherlands, and Switzerland. A high House Price Index indicates homes are more expensive compared to the median income of that country. Brazil, the Netherlands, and Switzerland are very expensive in regards to housing. A low House Price Index indicates homes are more inexpensive compared to the median income of that country. Canada and South Africa are the cheapest by this measure. One of the issues with using a Geo Map is that it is harder to see the color of some of the smaller countries. Looking at this map in order to see Europe clearly, it needed to be zoomed in. This dataset only has 20 countries, so the countries that are colored on the map are very few. But this allows one to better visually compare Countries. The cluster of darker countries seems to be in Europe, indicating higher prices for buying homes.

Top Countries by House Price Index

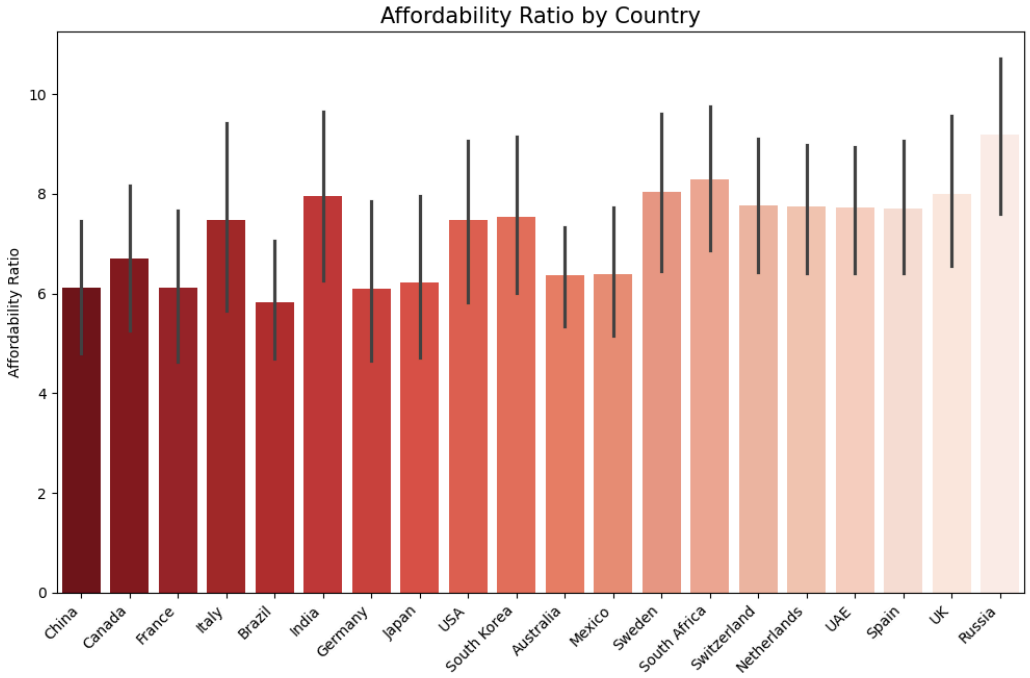
The Top Countries by House Price Index are the most expensive. A high House Price Index indicates homes are more expensive compared to the median income of that country. This graph was made to examine both the years and countries when it comes to the House Price Index. For most of these countries, it seems that 2024 was a more expensive year, except for Brazil and Switzerland. It seems that in more recent years, Switzerland has lowered its prices. France and Italy seem to have a more consistent incline of raising costs compared to the other countries. 2015 seems like a notable year for Italy, Brazil, and the Netherlands because they all seem to be higher for the countries, then afterwards, there is a drop.

Bottom Countries by House Price Index



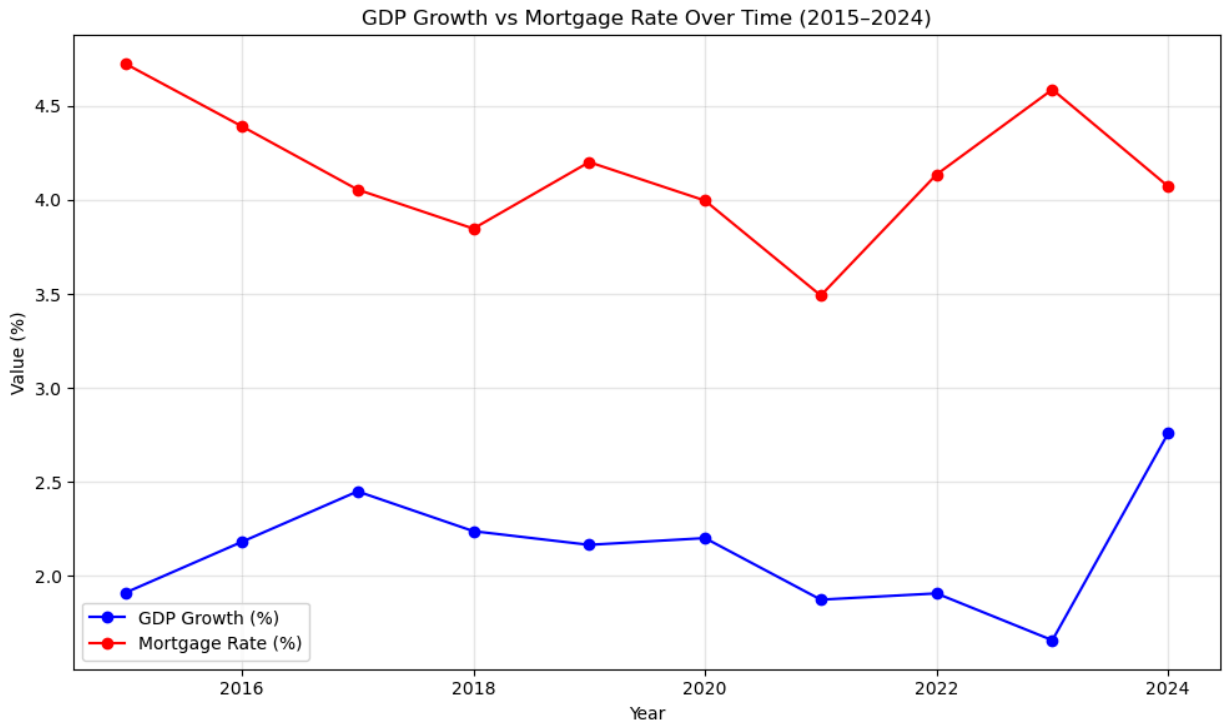
A low House Price Index indicates homes are more affordable compared to the median income of that country. Examining the Bottom House Price Index for the most part, there is less frequent change with these countries as compared to the top House Price Index. It seems, however, that prices increased for most of these countries in 2024, except in Canada. Japan and Sweden seemed to have a lower House Price Index around 2020. This could potentially be explained by the Covid 19 pandemic. It is also notable that in 2015 most countries in this plot are lower except for China. It makes one ponder if there was a world event connecting these countries. The lowest any of these countries reaches is slightly above 75 and it is Japan.

Affordability Ratio by Country



The Affordability Ratio is a metric used to measure a household's ability to afford things relating to goods, services, and housing. A high Affordability Ratio means that housing is less affordable. Whereas a low affordability ratio means it is easier to afford things. It is interesting that Brazil is the lowest Affordability Ratio because on the Geo Map, it indicated a high Price Index which means housing is more expensive. It implies that it is easy to purchase most things except a house. The highest Affordability Ratio is Russia, which is interesting because that country did not seem to stand out in other charts. It makes one question why most things are harder to purchase. For most countries the Affordability Ratio is between 6 to 8.

GDP Growth vs. Mortgage Rate



The GDP Growth % indicates a change in the value of goods and services produced. A high GDP Growth % shows that a country's economy is doing well or experiencing a boost. A low GDP Growth % shows an economy is in decline. A Mortgage Rate is the percentage of a loan someone pay to the loan lender in order to own their home. The reason why this chart was created is that there is a correlation between GDP Growth % and Mortgage Rate % at 0.12. Looking at the line chart it is clear that the lines mirror each other to some extent, or is an inverse. When the GDP increases, the Mortgage Rate decreases. When the GDP decreases, it seems the Mortgage Rate increases. Some areas of the lines correlation are harder to see than others like in 2017 to 2018. That time frame seems to be when they both decrease. The lines do not intersect at any point. The Mortgage Rate is higher overall than the GDP Growth %. It seems that something good was happening in 2024 because the GDP Growth % goes up and the

Mortgage Rate % goes down. That means in 2024, more countries experienced a growing economy, and their Mortgage Rates decreased. That seems like a great year.

Conclusion

The charts in this project were created in order to compare and contrast different economic factors, mainly related to housing to see what it costs to live around the world. The heatmap was created to explore correlation; all of the variables have weak correlations. This implies that many small, barely connected factors are what influences the global housing market. The House Price Index by Country Bar Plot has most countries over 120, which implies that more countries are on the pricier end than the cheap end when it comes to housing. The Mortgage Rate % Distribution had a higher count in between 4 to 5. This means that many countries have mortgage rates between those numbers. The House Price Index vs. Rent Index scatter plot was essentially all over the place; it proved that they had a weak correlation and not much else. The Affordability Ratio line plot showed a significant decline from 2019 to 2024, which means that more things globally became less expensive. The Geo Map also shows the House Price Index by Country but because it physically shows the countries it is easier to compare them. But it has the exact same results as the House Price Index Bar Plot. The Top Countries by House Price Index examined the top five highest countries in House Price Index and looked at the fluctuations throughout the years. The same goes for the Bottom Countries by House Price Index except it was meant for the countries with the lowest House Price Index. The Top House Price Index found for most countries, 2024 was a more expensive year. The Bottom Countries for the House Price Index also found that things became more expensive in 2024. The Affordability Ratio by Country found that most countries' affordability ratios are between 6 and 8. The GDP Growth vs. Mortgage Rate plot implied a correlation between the two factors.

Overall, all of these factors have very little correlation with each other. But it is nice to examine how different variables affect different countries. When it comes to countries it seems like there are some countries that have higher cost, some with lower, and some in the middle it all seems pretty standard. It is notable that for different graphs the year 2024 kept coming up as a significant year in terms of GDP Growth Rate, Mortgage Rate, House Price Index, and Affordability Ratio.

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References

Soundankar, A. (2025). “global_housing_market_extended”. *Global Housing Market Analysis (2015-2024)*.https://www.kaggle.com/datasets/atharvasoundankar/global-housing-market-analysis-2015-2024