The State of the US Housing Market(East Coast)

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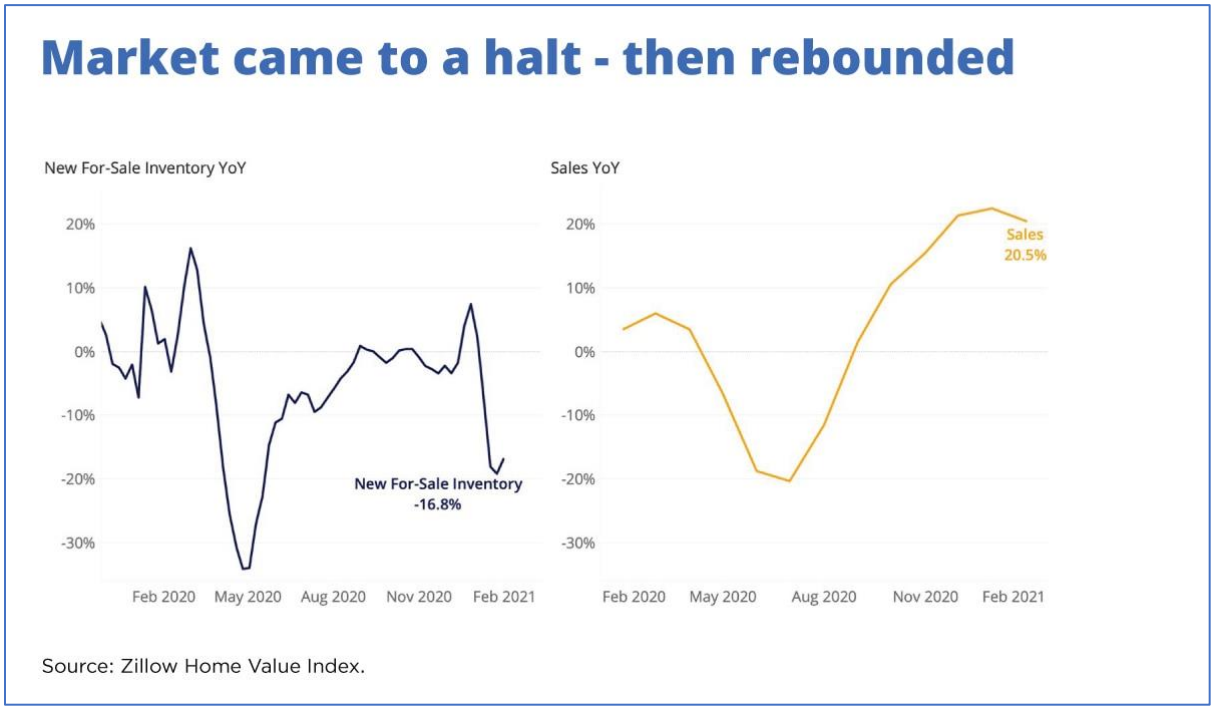
Introduction:

Among many other things, COVID-19 had an immense and unpredictable impact on the US housing market. In the early days of the pandemic and lockdown, it brought the housing market to a screeching halt, and later, as the work from home became a trend, coupled with low-interest rates for most of 2021 and a shortage of supply, the housing prices exploded in late 2021 and most of 2022.



Since then, the Fed has tried to put some pressure on the housing market through higher interest rates, but the effects have started to wear off.

I experienced the effects of this as we were looking to buy our first house last year. So, this topic hits home with me. In this project, I plan to analyze the housing data, i.e., house value, inventory, and sales prices, to predict the state of the housing market in 2023.

Problem Statement and Stakeholders:

In my project, I plan to analyze the US housing market from the lens of the following stakeholders:

1.1 **Homebuyer:** It is a tricky situation for homebuyers right now. Housing prices are unpredictable, interest rates have been fluctuating, competition is high, and guidelines on remote work are evolving. So, it is hard to determine when the time is right to buy and where to buy. Through data analysis, we can help a prospective Homebuyer identify potential cities/towns to buy a house and when to buy it.

1.2 **Investor:** Similar to the Homebuyer, Investors are also looking to identify the right properties to invest. Through data analysis, we can help a prospective Investor identify cities/towns/properties with higher growth potential, thus, helping him maximize investment.

1.3 **Government:** In the last decade, the issue of housing unaffordability has become a mainstream issue. For congress to enact a meaningful policy, they must understand the sales and inventory patterns across the country.

Due to time limitations, I will be focusing my analysis on Metro Cities from East Coast states only and will address the below-mentioned questions to help the stakeholders:

1. What will be the home value trends for the next year 2023?
2. In which cities is it better to rent vs. buy?
3. What are the emerging cities/towns for property investment?
4. What will be the inventory patterns? Are there regions with a critically low inventory?
5. What will be the state of housing affordability, and whether policy intervention required?

East Coast states consider for this analysis are as follows:

Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, and Florida.

Description of the dataset

To perform my analysis, the dataset I am referring to are from three different sources:

ZILLOW:

a) **Zillow Home Value Index (ZHVI):** This is an xlsx formatted file containing smoothed, seasonally adjusted measures of the typical home value and market changes across a given region and housing type. It reflects the typical value for homes in the 35th to 65th percentile range. The data is at the city and monthly level for the time period of 2000-2022.

   Data Type = ZHVI; All Homes (SFR, Condo/Co-op); Time Series, Smoothed Seasonally Adjusted($), Geography = Metro & US.

https://files.zillowstatic.com/research/public_csvs/zhvi/Metro_zhvi_uc_sfrcondo_tier_0.33_0.67_sm_sa_month.csv?t=1676850425

b) **Inventory(For-Sale Inventory):** This is an xlsx file containing the count of unique listings active at any time in each month in a state. The data is available only at the state and month level for the time period of 2018-2022.

Data Type = For-Sale Inventory (Smoothed , All Homes, Monthly); Geography = Metro & US.
https://files.zillowstatic.com/research/public_csvs/invt_fs/Metro_invt_fs_uc_sfrcondo_sm_month.csv?t=1675705162

c) **Median Sale Price:** This is an xlsx file containing the median sale price of the houses. The data is available only at the state and month level for the time period of 2018-2022.

Data Type = Median Sale Price (Smooth & Seasonally Adjusted , All Homes, Monthly)); Geography = Metro & US.
https://files.zillowstatic.com/research/public_csvs/median_sale_price/Metro_median_sale_price_uc_sfrcondo_sm_sa_month.csv?t=1675705162

d) **Rental**: This is an xlsx file containing a smoothed measure of the typical observed market rate rent across a given region. The data is available at the city and month level for the time period of 2015-2022.

Data Type = ZORI Smoothed All Homes Plus Multifamily Time Series($); Geography = Metro & US.
https://files.zillowstatic.com/research/public_csvs/zori/Metro_zori_sm_month.csv?t=1676850425

US Census Bureau Data:

a) **Income Data:**
For the affordability analysis, I will also need the Income data. I will use the latest Income data from the US Census Bureau. The data is available for the period 2018 – 2021.
https://data.census.gov/table?t=Income+(Households,+Families,+Individuals)&g=0400000US09$1600000,10$1600000,12$1600000,13$1600000,23$1600000,24$1600000,25$1600000,33$1600000,34$1600000,36$1600000,37$1600000,44$1600000,45$1600000,51$1600000&y=2018&tid=ACSST1Y2018.S1902
In this assignment, I have considered data from Metro Cities from the East Coast States. Hence, the data I fetch from the US census bureau is only for the East Coast States. Please refer file with the naming convention as **ACSST5Y<YEAR>.S1902-Data.csv.** I have enclosed this data in the zip file.

State Property Tax:

Property tax is a crucial factor to consider when deciding whether to rent or buy a home.
https://www.rocketmortgage.com/learn/property-taxes-by-state
I have enclosed this data in the zip file.

Analysis And Result

Dashboard Description

I begin my analysis with an overview of the current housing trend in the East coast states. Figure 1 shows that there has been a steady decline in the housing inventory since the COVID-19 lockdown began in March-2020. Since then, the housing values have increased by a whooping ~42%.

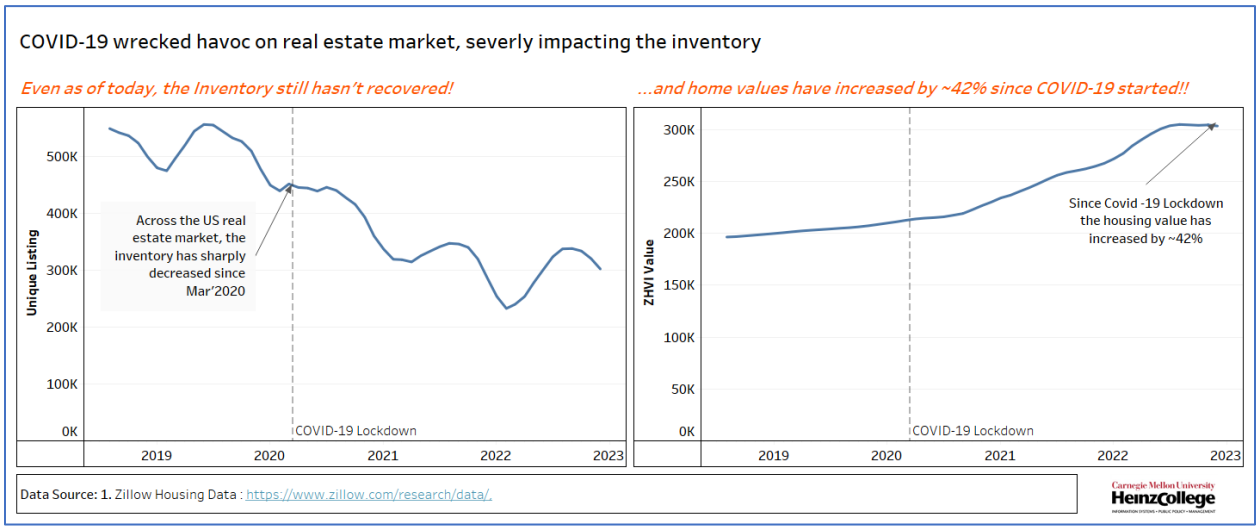


Figure 1: Covid-19 Impact on Housing Inventory and its Value.

At the same time, the income growth has been nowhere close to the explosion in housing values. Figure 2 (Left) shows that the home values are growing ~3x the income growth, thus, worsening affordability.

However, despite the rising housing costs, homes are selling for over their worth due to a shortage in inventory. Figure 2 (right) shows that the average median sales price exceeds the home value marginally.

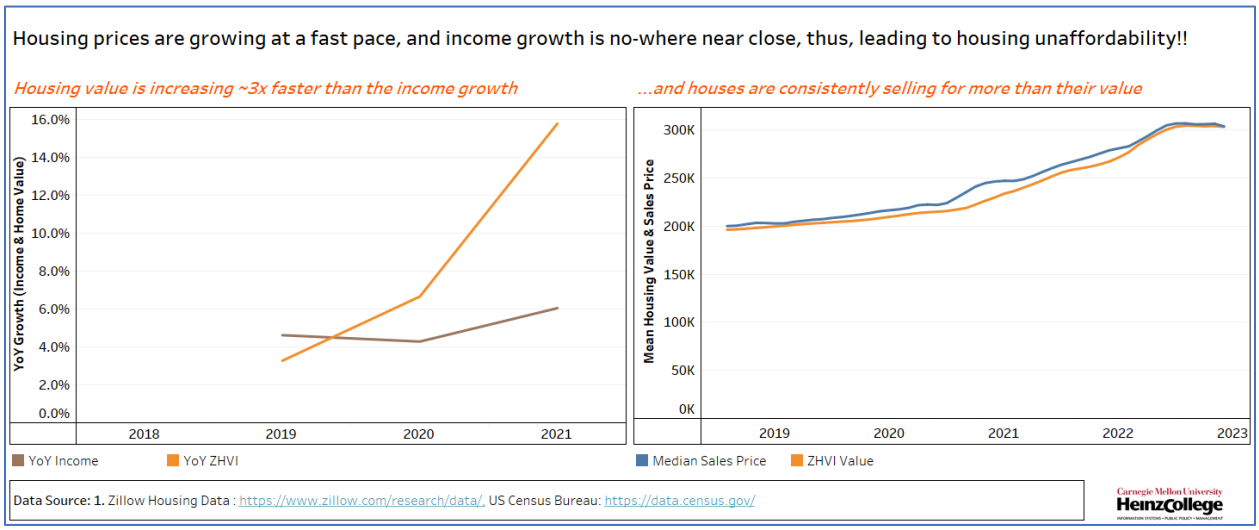


Figure 2: Housing Value Vs Sales Price & Year-Over-Year Income Vs Housing Value Growth

Now that we have aligned on the issue, let's get into the questions we want to answer.

Question 1. What will be the home value trends for the next year 2023?
Figure 3 (left) shows the forecasted Avg. ZHVI value (Zillow Home Value Index). The forecast is based on historical ZHVI data from August 2018 to November 2022 and is forecasted for the next 12 months (December 2022 to November 2023).

The initial value for the forecasted average ZHVI value in December 2022 is 305,574 ± 4,502. It is expected to decrease by 2,906 units over the forecast period, thus, indicating almost a flat line over the year. The statistics do not indicate any substantial seasonal effects, and the forecast is of "ok" quality.

Next, I ran similar analysis for the Top 5 and the Bottom 5 cities determined on the basis of their ZHVI value. The conclusion is similar, as shown in Figure 3 (right).

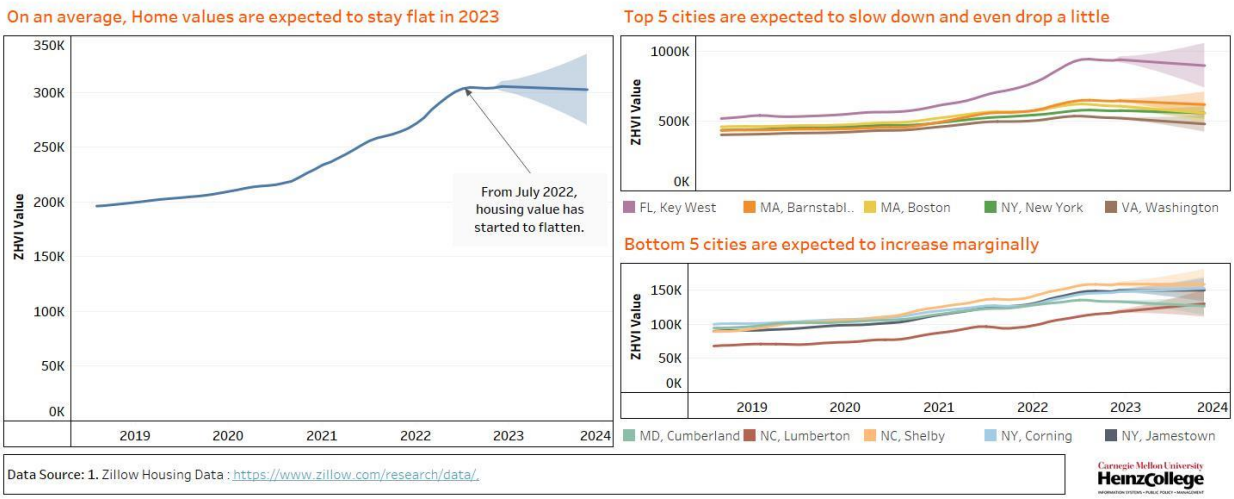


Figure 3: Home Value forecast for next year 2023

Question 2. In which cities is it cheaper to rent vs. buy?
Now, to determine whether it is cheaper to rent or buy, let's first calculate Avg. spent on renting a home or buying a home.

For renting, we have this information available in the Zillow data. For buying, I will calculate the total cost of owning a home as Avg. mortgage payment + Property taxes + home insurance cost. Here is the approach used to calculate each component.
Mortgage payment = Assumed no down payment, 5% interest rate, and a mortgage term of 30 years to calculate a mortgage payment on ZHVI value.
Property taxes = Using the state tax rates, I'll calculate the expected taxes to be paid. For simplicity, I have used the latest tax rates across 2018 – 2022.
Home insurance = Assumed a monthly spend of $100.

Note: Interest rate, Mortgage term, and Home insurance value are parameters and can be reset by the user of the dashboard.

Using the above analysis, Figure 4 (left) shows in each state the number of cities where it is cheaper to buy (green) or rent (orange). At a 5% interest rate, it is cheaper to rent in most cities. Further, by clicking on a state on the left, the user of the dashboard can see the exact dollar difference in buying vs. renting in Figure 4 (right).

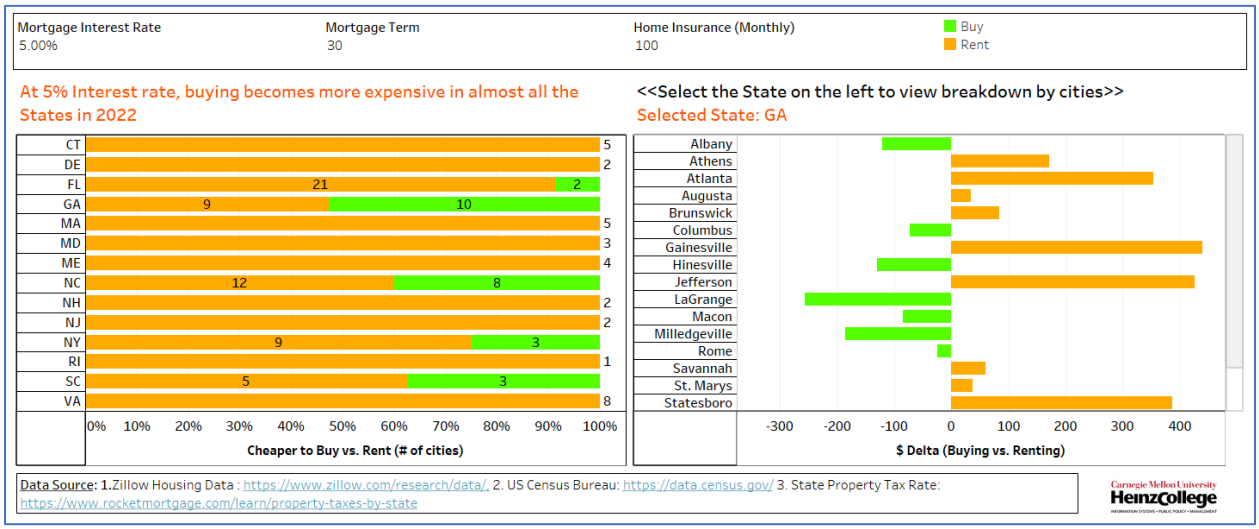


Figure 4: Buying Vs Renting House in East Coast States

Question 3. What are the emerging cities/towns for property investment?
Next, we will analyze this data from the perspective of a potential investor. For that, I will use the metric - Compound Annual Growth Rate (CAGR). It shows the mean annual growth of an investment over time. In my case, I will calculate CAGR for rent and home value increase over the period 2018 – 2022.

Figure 5 (left) shows that rent and home values have been increasing at an impressive CAGR of 8.42% and 10.41%, respectively. The highlighted group of cities, termed the Top cities, shows the cities with above-average rent and home value increase.

Figure 5 (right) shows the median rent and home value in these Top cities, along with inventory (bubble size). It is interesting to see most of these cities are in Florida, with Miami emerging as a great option for investors.

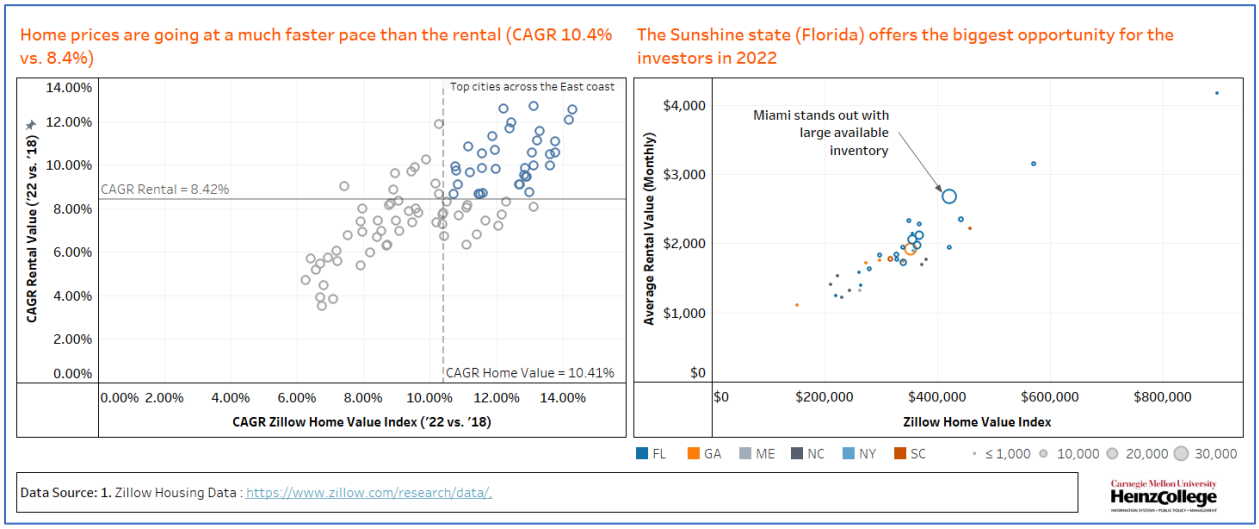


Figure 5: Emerging Cities and Towns for Property Investment

Question 4. What will be the inventory patterns? Are there regions with a critically low inventory?

To understand the inventory patterns, I created a polynomial trend model of degree 3 for Unique Listing given month. The R-squared value of the model is 0.916 for all east coast cities combined and 0.985375 for the Top 5 cities, which indicates the model can explain a lot of variation. The p-value is less than 0.0001 in both cases, which shows that the model is statistically significant with 99% confidence.

Figure 6 (left & right) shows that inventory started to decline around the same time COVID-19 lockdowns began and started to recover around March 2022. As per the model, the inventory will continue to increase in 2023 and will likely take a year to reach the pre-pandemic levels. However, Figure 6 (right) shows us that the rate of recovery will vary by city, and not all cities will be able to fully recover in 2023.

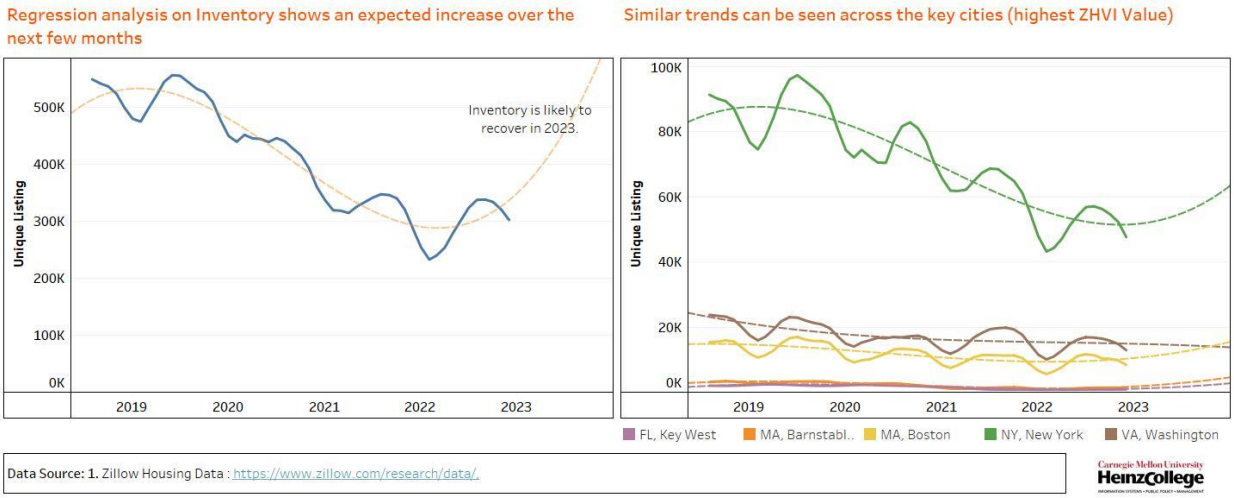


Figure 6: Inventory Pattern

Question 5. What will be the state of housing affordability, and whether policy intervention required?

Lastly, I will analyze housing affordability. For this analysis, I will look at the annual spending of a household on rent or home ownership (mortgage + property tax + insurance) and compare that with the median income in their state.

Figure 7 (left) shows the % of the income households are spending on renting across major east coast cities. We see a couple of large clusters in orange and blue. I will call them the Least and the Medium expensive cities because they are lesser than the typically used guideline of spending <30% of income on housing. A few cities are over this threshold, I will call them the Most expensive cities to rent cluster.

Similarly, Figure 7 (right) shows a similar analysis of the homeownership cost. Interestingly, the spread is much higher (from ~12% to 60%) and, on average, closer to the 30% guideline. Since I have four clusters here, I have divided them into Least, Less, More, and Most expensive buckets. Both More and Most expensive clusters are over the 30% guideline.

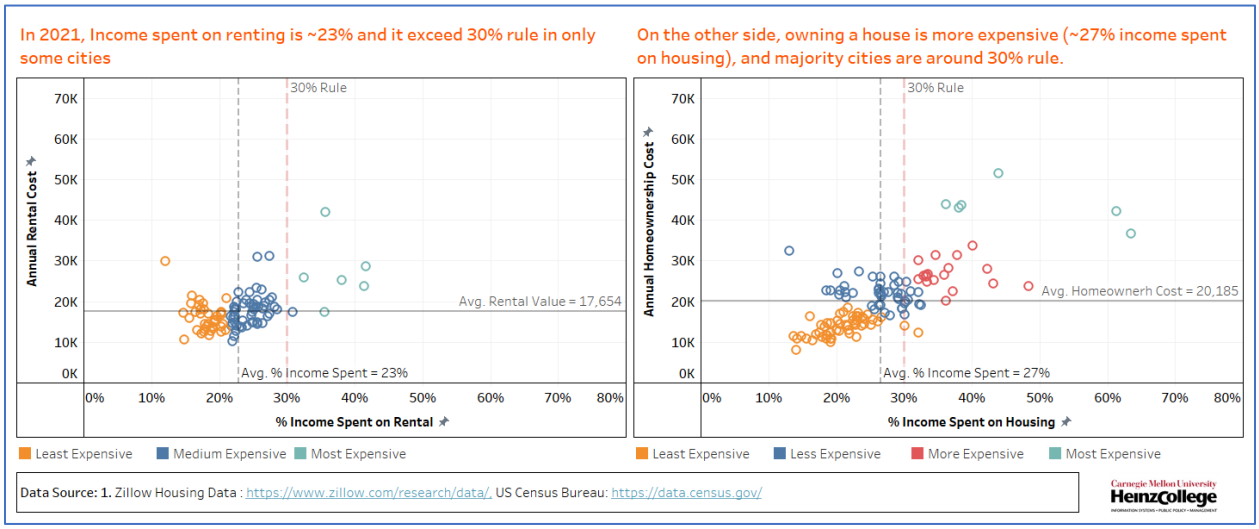


Figure 7: State of Housing Affordability

Conclusion

Based on the above analysis, we can draw the following conclusions about the state of the US housing market on the East Coast:

1. COVID-19 had a massive impact. It sent the inventory up for a toss which skyrocketed the home values. Since Mar'2020, home prices have increased by >40%.
2. We can see from the latest trends that the market has slowed down in the last six months, as the mortgage interest rates have gone from a record low (~2%) to a record high (~6%). Even in our simulation of Buy vs. rent, we noticed that a 1% increase in the mortgage rates could quickly reverse the recommendations from Buy to rent.
3. The inventory has shown signs of recovery and is expected to keep increasing throughout 2023.
4. The current market scenario seems ideal for investors. The rent and home values are increasing at a very healthy CAGR rate of ~8.4% and 10.4%, respectively. Further, from my analysis, Florida is the best state to make real estate investments.
5. Lastly, from the government's perspective, my affordability analysis indicates that we have already reached a stage where it is very difficult for people to own a house. On average, people would have to spend ~27% of their income on housing. Further, we also see in the data that home values are increasing ~3x the income growth, which will make this situation even worse. Rents seem to be following suit.

Limitations

Despite the comprehensive data from Zillow and the US Census Bureau, there are a few data limitations.

1. Zillow Home Value Index and Rental statistics were available at the city level for all cities but other datasets, like inventory listings and sales prices, were only available for metro cities. Hence, I limited my analysis to metro cities only.
2. US Census Bureau had income data only until 2021. Thus, I have to limit my affordability analysis to 2021.
3. For the Inventory analysis, I had to rely on unique listings in a month, but Inventory on hand would have been a much better metric because I could compare large and small cities at the same scale. Unfortunately, I couldn't find the data to calculate that metric at Zillow.

Future Work

In the future, I would love to incorporate a few additional ideas into this analysis.

1. Migration patterns and their impact on the housing demand. Like housing, COVID-19 has also changed migration patterns and pushed people out of the cities and into towns. This factor could help reduce pressure on the housing demand in the cities and cool off the prices.
2. Affordable housing supply. In the last decade, there has been a trend to build more luxurious houses instead of more affordable houses. Hence, the supply of affordable houses has always been behind and will likely take even more time to recover. It could potentially be an avenue for the government to step in and incentivize investors to beef up the supply of affordable houses.