Is Housing Affordable in Singapore?

> 🔍 Github link *to jupyter notebook:*
>
> https://github.com/jemyap91/Projects-Data-Science/tree/main/HDB

Datasets used

- Resale flat prices from 2000 to 2024 data

  https://beta.data.gov.sg/collections/189/view

- Assessable income of individuals between 2004 - 2022 https://beta.data.gov.sg/collections/271/view

Assumptions

- Period of interest is between years 2004 and 2022.

- Mean annual income would be representative of the average income of Singaporeans. Median would be more representative of the average income of Singaporeans given the right skewed nature of income distributions. However, the data set used only included total assessable income and number of individuals assessed. These two features only allow us to obtain mean annual income.

- 2004's housing prices are affordable and 2004's price to income ratio will serve as the benchmark for this analysis (i.e. to see if 2022's housing prices remain as affordable as 2004's relative to mean annual income).

Key Findings from Exploratory Data Analysis

Measuring price-to-income ratios for each flat type across the years

- Price-to-income ratio for all flat types stayed relatively constant between 2004 and 2022. Median resale prices were used for each flat type and they were divided against mean annual income to derive the price-to-income ratio metric.
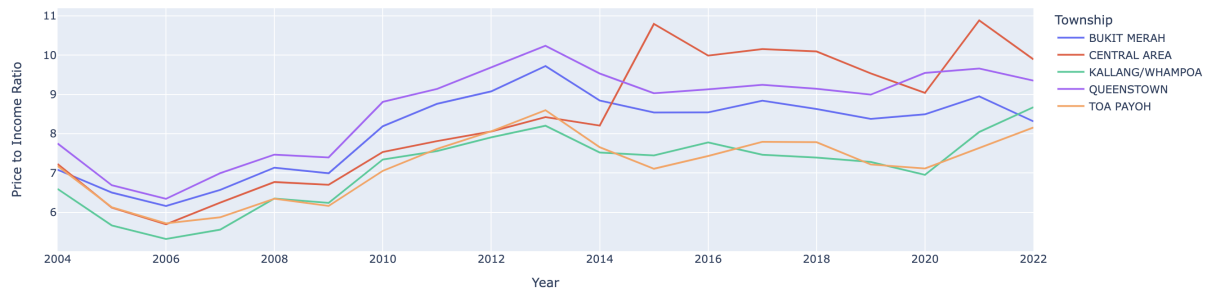

Price-to-Income Ratio Across Years for Each Flat Type
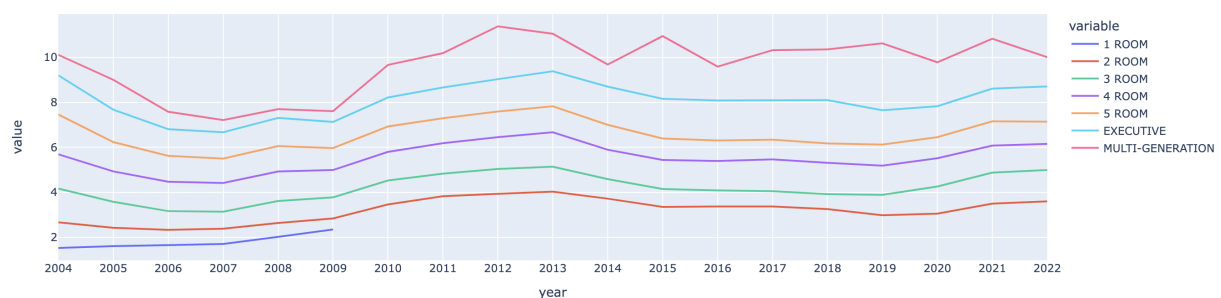
Measuring price-to-income ratios in various towns for 4-room flat type across the years

- The top 5 townships with the highest price-to-income ratios saw rather substantial increases between 2004 to 2022 in this ratio, with the Central Area seeing the largest increase from a low of 5.69 to a high of 10.88. This is almost a doubling in price-to-income ratio for the central area.

Price to Income Ratio Across Years for Each Township

- Townships with the highest price to income ratios tend to remain at the top across the years, especially for Queenstown and the Central Area.

Price to Income Ratio Across Years for Each Township
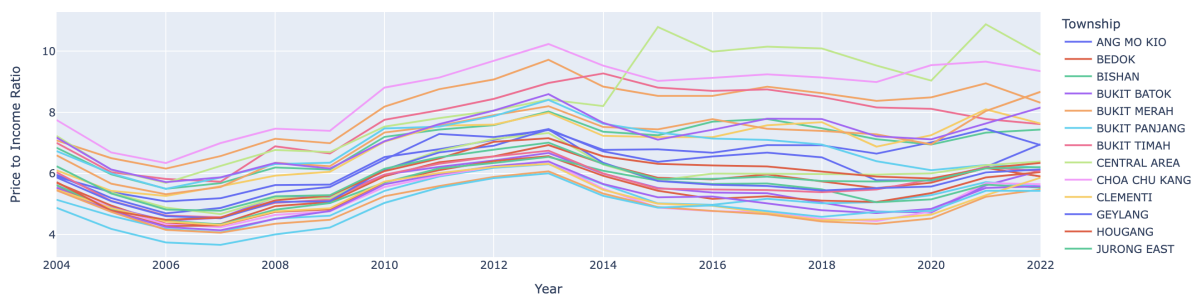
[For further exploration] Relationship between price-to-income ratios and years left on the lease

- Typically see an increase in the price-to-income ratios as the years left on the lease increase. In order to get a more nuanced assessment of public housing affordability, there is the potential to look at price-to-income ratios for a particular age of flats.
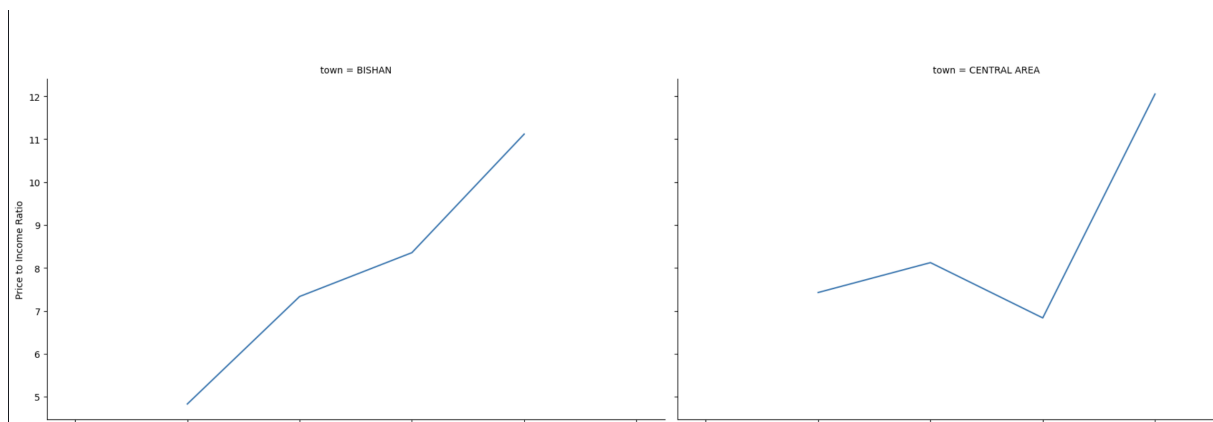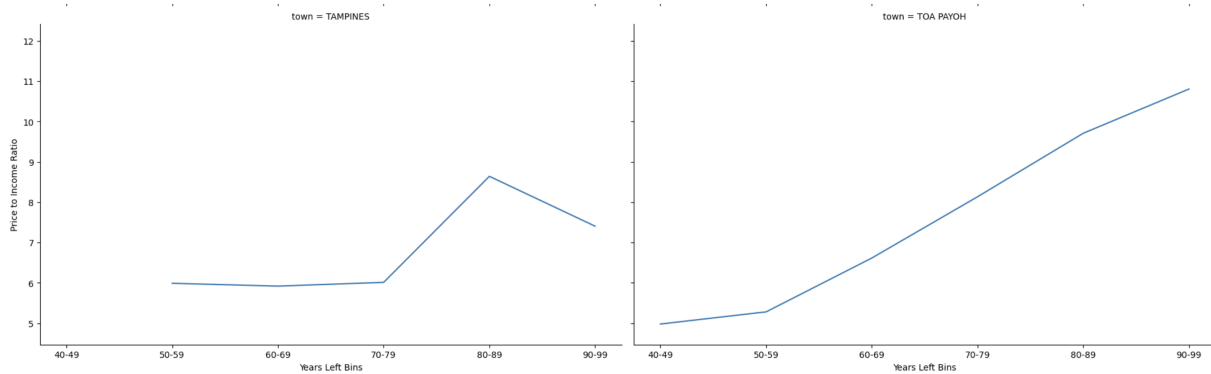
Conclusion

Looking at the time period between 2004 and 2022, and assuming public housing was deemed as affordable in 2004, public housing in Singapore appears to still be affordable in 2022, with price to income ratios remaining relatively stable.

However, there are a few caveats to this statement:

1. Not all townships have the same price-to-income ratios and some (e.g. Central Area) saw a substantial increase in this metric;

2. Number of years left on lease impacted resale prices substantially and consequently, would have a large impact on the price to income ratio metric;

3. Mean annual income of Singaporeans could misrepresent the income for the average Singaporean who lives in public housing as it is impacted by outliers to a greater extent than median annual income.

Further Enhancements to Analysis

- Median income would be a more appropriate statistical measure due to the tendency for income to have a right skewed distribution. Obtaining a dataset with median income across years would help to better answer the problem statement.

- Most of the analysis was done for 4-room flat type, the most popular flat type among first-time home owners. Further analyses can be done for the other flat types.

- Analysis did not fully take into account the number of years left on the lease and only took a median of flat prices for flats with at least 65 years left on their lease. Further analysis can be done on the affordability of newer flats which is a preference for first-time home owners.

- Potential deep dives into each township to explore reasons for difference in ratios. Conduct root-cause analysis on what Singaporeans value in public housing.

- Comparing price to income ratio with other cities with similar land-scarce constraints if the conversation on public housing affordability revolves around comparing Singapore with other cities.