

Part 1: Data-mining and visualisation

Name : Lee Yen Kai

Date: 2023-08-28

Introduction

In every election season, there has always been dominant issues central to each campaign and party. In recent times, one such issue concerns that of housing, particularly the cost of HDBs. This is an issue that's pertinent to Singaporeans as it forms part of the debate around the increasing cost of living in Singapore. It is on this basis that we start our analysis into HDB resale prices and the factors behind them.

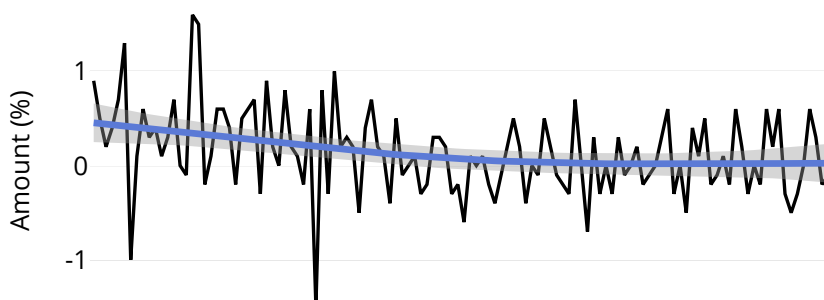
Insight 1: Did you know that housing in Singapore has gotten increasingly unaffordable, only cooling in recent years?

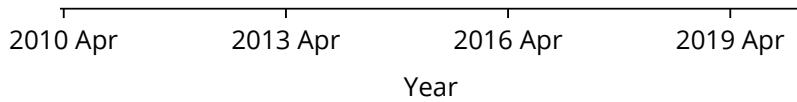
Analysis

Here, we are not merely talking about the nominal price of housing because natural increases are expected. Instead, we are talking about the fact that the cost of resale flats has far outpaced the rate of inflation, making HDBs unnaturally expensive.

The inflation rate is derived from changes in Consumer Price Index (CPI) and is defined as *a sustained increase in general price levels*. Here, we can see the rate of inflation declining in recent years, but holding mostly positive:

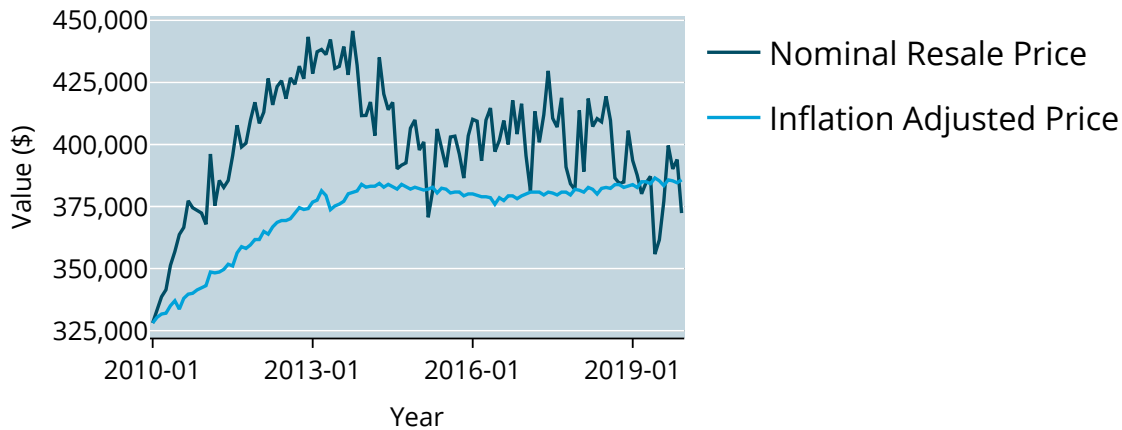
Inflation Rate (Month on Month)





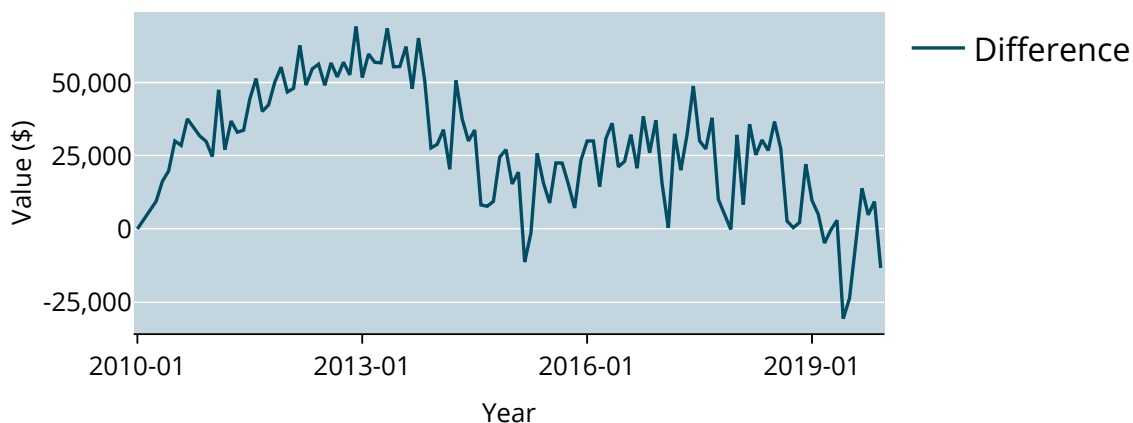
In theory, *ceteris paribus*, we should expect HDB resale prices to closely match the theoretical inflation-driven prices. However, that has not been the case as resale prices far outpaced the theoretical resale prices, peaking in 2013. Since then, we have seen a decline in nominal resale prices, only reaching the theoretical inflation-driven price in the last year.

Real vs Nominal property prices



In 2012, we see the difference between nominal resale prices and inflation-adjusted prices peaking at \$69,000. Although the difference declined in 2015, it peaked again in 2017 at \$49,000. **This means that buyers were paying up to \$69,000 more for flats!**

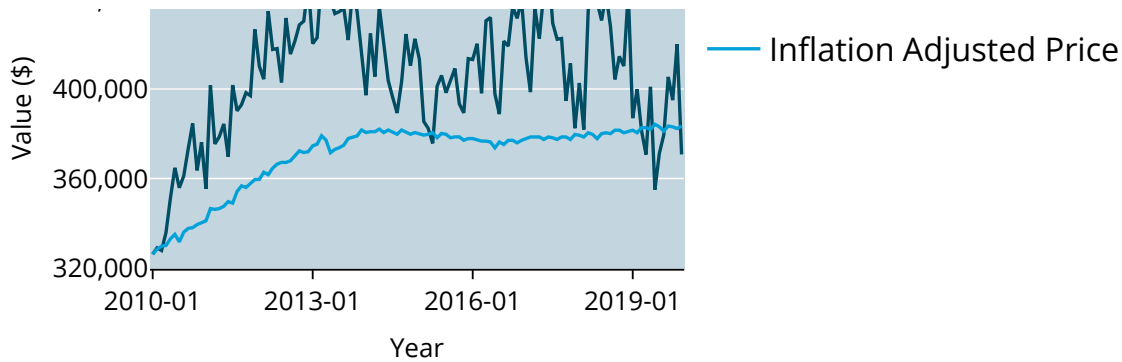
Difference between Nominal and Adjusted prices



In Ang Mo Kio, we see a "M" pattern, with two peaks in the resale price in 2013 and 2017.

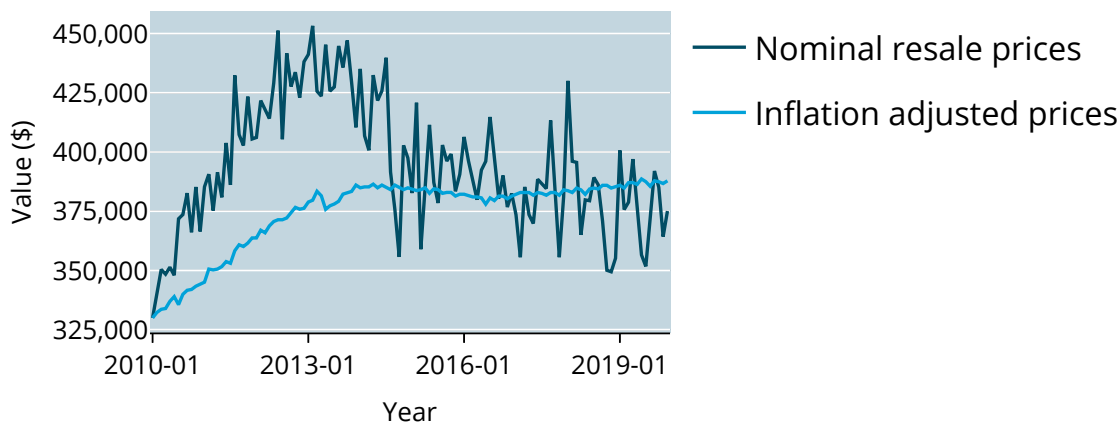
Real vs Nominal property prices in Ang Mo Kio





Although it experienced the rise in resale prices in 2012/13 like Ang Mo Kio, Bukit Batok's decline in the price of resale flats was sustained, without a noticeable rise after 2015. In fact, at certain times, the resale prices dipped below the inflation-adjusted price.

Real vs Nominal property prices in Bukit Batok



Insight 2: Did you know that the changes in the price of housing were mainly driven by supply and not any other factor?

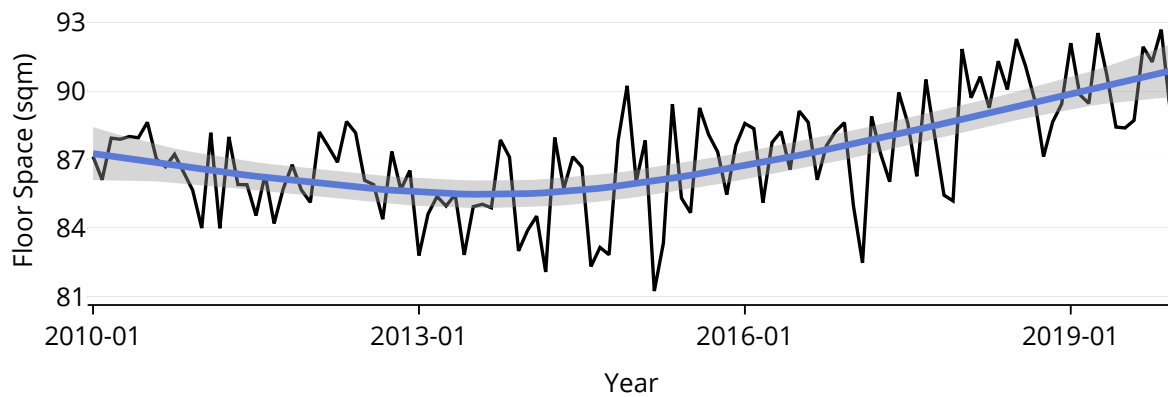
Analysis

Now that we have seen how prices have change, let's now analyse the key drivers behind such changes in price. Is it because flats have gotten bigger? Or that more 5-room flats are being sold?

Floor Space

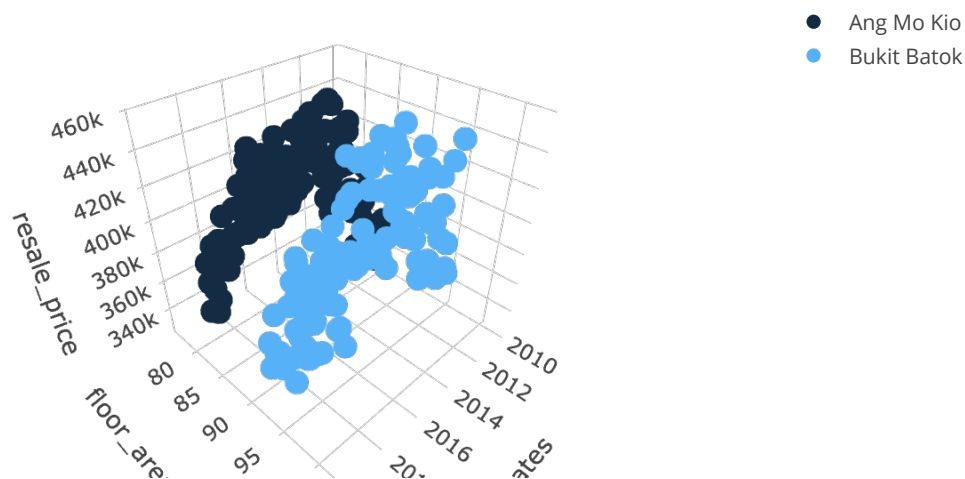
Let's first look at floor space as a factor. We see here that the average floor space of flats sold declined whilst prices rose in 2013. Conversely, as prices stabilised from 2015 onwards, floor space increased.

Average floor space of flats sold over time



We can also see from the following model that there seems to be no correlation between price and *mean* floor area, therefore the changes in resale prices in 2010-2019 were not caused by increased floor space in flats. Interestingly, flats sold in Bukit Batok tend to be larger.

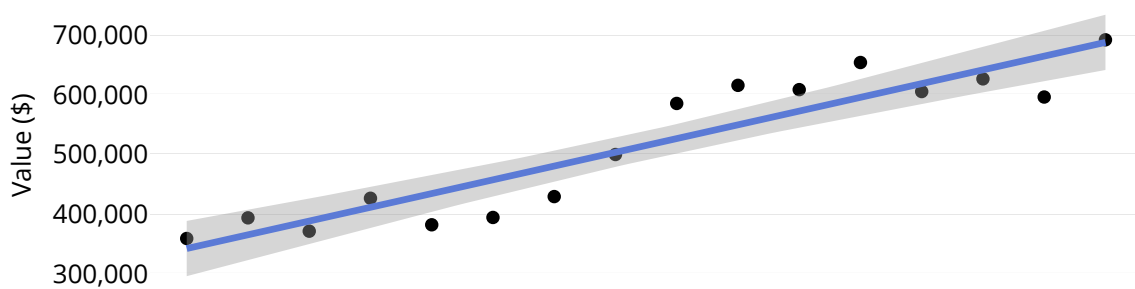
Changes in resale price by floor area over time



Height

Perhaps then the changes in price mainly stem from the increasing height of flats sold? We can clearly see a positive correlation between floor level and the mean resale price:

Relation between floor level and mean resale price

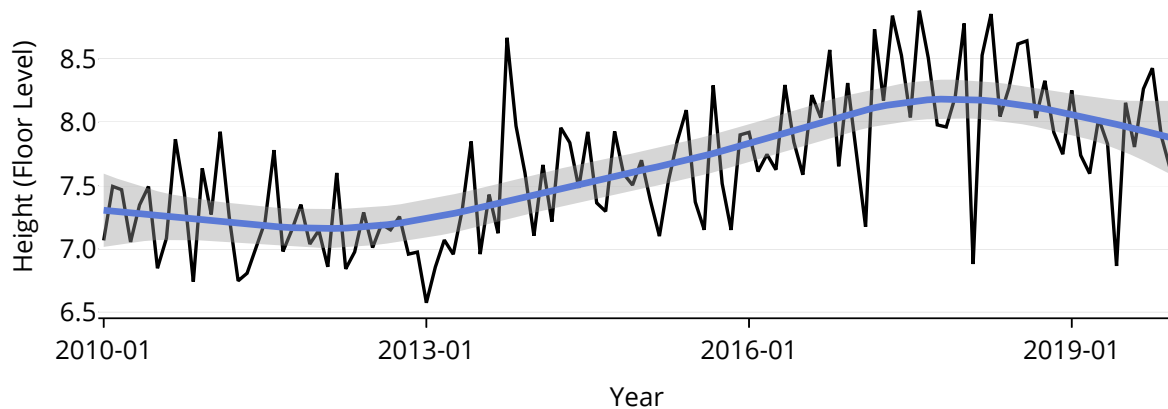


01 TO 03 06 TO 10 11 TO 15 16 TO 20 22 TO 24 28 TO 30

Floor Level

However, as prices rose in 2012/13, we also see the mean floor height of flats sold decreasing. On the other hand, as prices stabilized from 2015 onwards, the mean floor height increased. This shows us that floor level was not a big factor that contributed to the change in prices.

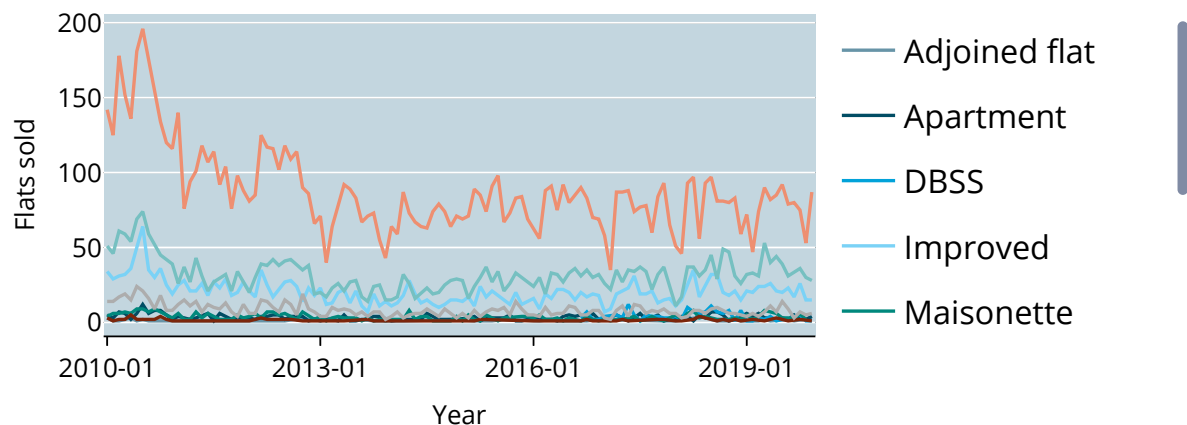
Mean Floor Height of flats sold over time



Flat Model

Next, we could analyse if the flat model caused the changes in the resale price. As we can see from the graph below, the rise in prices in 2013 corresponds with a drastic fall in supply of all flat models, suggesting a relationship. This fall in supply can be reflected the most in New Generation flats.

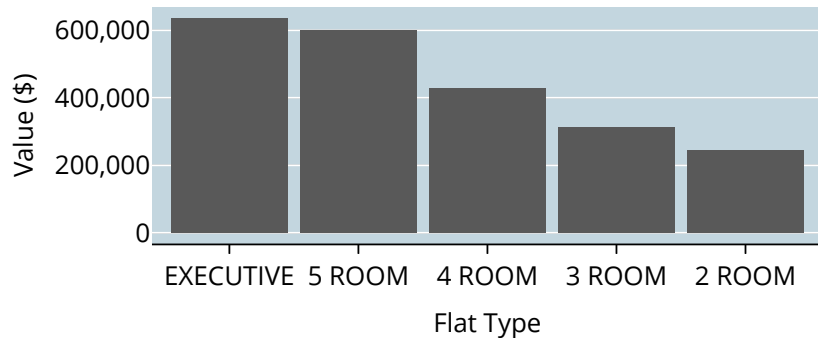
Supply of flats by model over time



Flat type

Lastly, let's look at how the different flat types influence resale prices. Here, we can see that different flat types occupy distinctive price groups, with the executive flats commanding the highest prices.

Price of flats by type



Likewise, with flat models, we see that the rise in resale prices in 2013 corresponds with a fall in supply of all flat types. **Thus, we can say that the changes in the price of resale flats between 2010-2019 were mainly caused by the changes in the supply of all flat types and models.**

Supply of flats by type over time

