# DSI-SG-41 Project 2

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# Problem Statement

Determining the true sale price of an HDB resale flat in Singapore can be a complex task, influenced by a myriad of factors, including location, amenities, surrounding and future town developments, government policies, no. of rooms, etc…

Therefore, we set out on this Data Science project to predict HDB resale prices by building a prediction model (multilinear regression) that can accurately predict prices based on their relevant property attributes.

The given Dataset is an exceptionally detailed one with over 70 columns of different features relating to houses. As part of the process, we also interviewed a real estate agent to get some real-world business insights and to get some directions for where the model should point to.

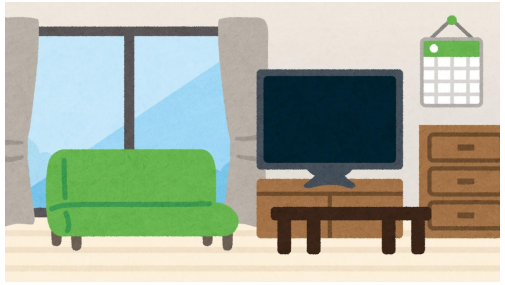
# Questions we will be answering

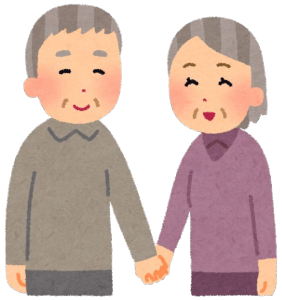
- Which features appear to add the most value to a home?
- Which features hurt the value of a home the most?
- What are things that homeowners could improve in their homes to increase the value?
- What neighbourhoods seem like they might be a good investment?
- Do we feel that our model will generalize to other cities?

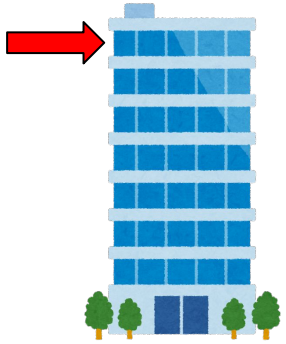
# Results from prediction model

The following features have strong positive association to the value of a property:

| FEATURES | KEY INSIGHTS |
|---|---|
| Floor Area (sqm) | Higher floor area intuitively relates to higher cost |
| Remaining Lease (years) | Preference to maintain ownership of property |
| Floor Level | Aesthetic/privacy preference |
| Presence of amenities (Hawker/Mall) | Convenience |
| Distance to branded secondary school* | Less necessity for closeness |



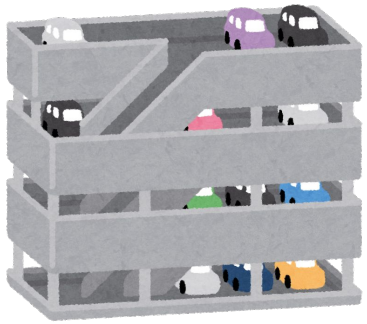


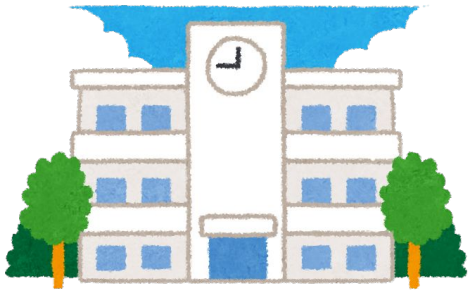


# Results from prediction model

The following features have less positive association to the value of a property:

| Features | Key insights |
|---|---|
| Multistorey carparks | Noise/aesthetic concern |
| 3-room units | Socio-economic implications |
| Distance from branded primary school* | Benefit from being near to the school |
| MRT Scores* | Accessibility to the city area is valued |





# Feature Engineering

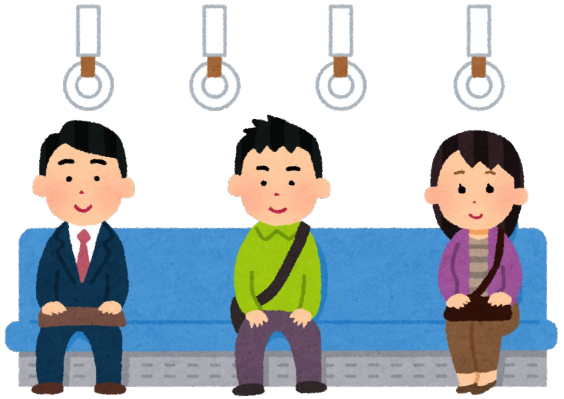
- Branded Schools

> “Every school, a good school.”
>
> - DPM Heng Swee Keat

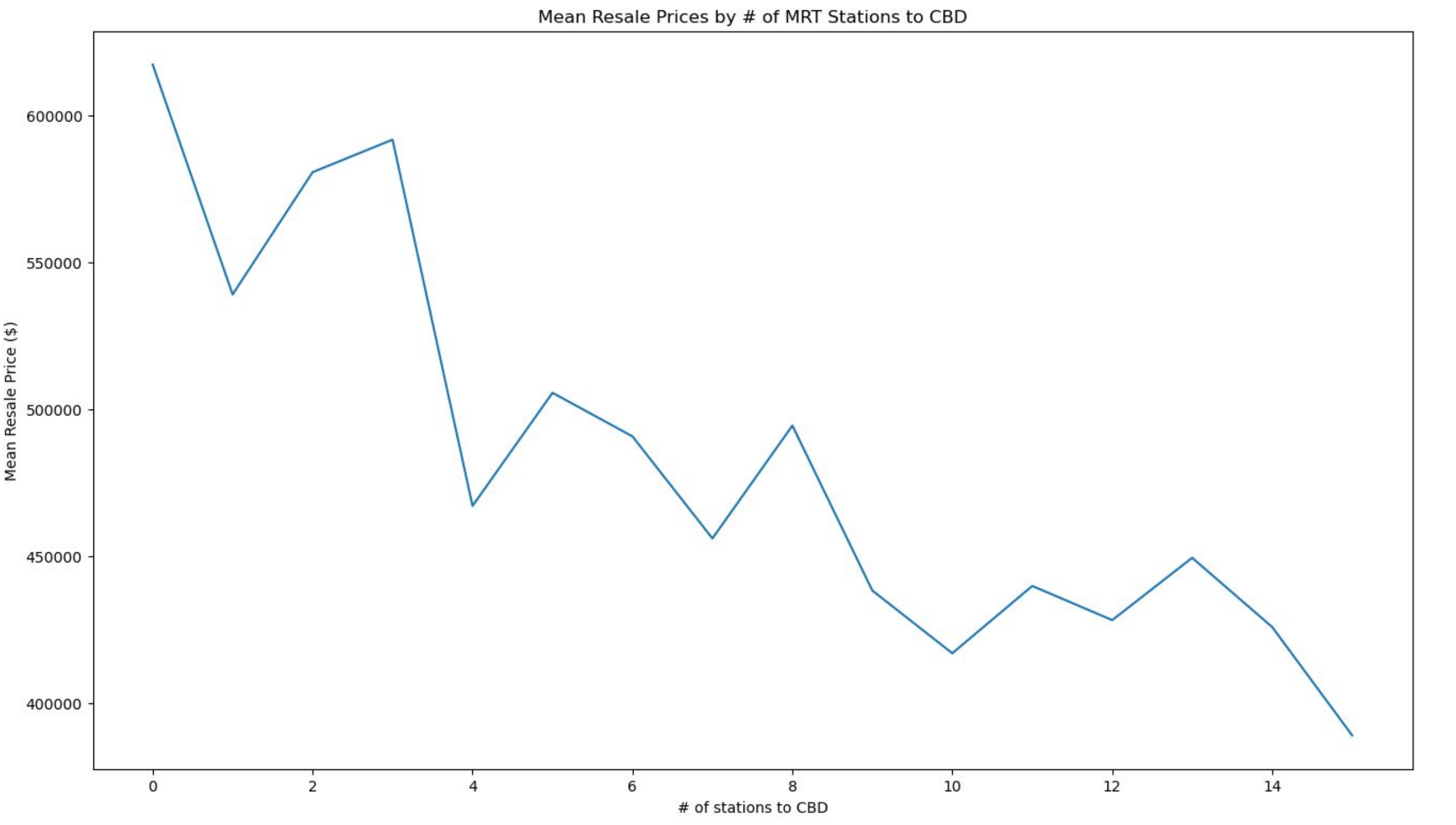
- Convenience of MRT commute

# What counts as a “CBD Station”?

| Line | Stations |
|---|---|
| NSL | Raffles Place, City Hall, Marina Bay |
| EWL | Outram Park, Tanjong Pagar, Raffles Place, City Hall |
| CCL | Telok Blangah, Harbourfront, Bayfront, Promenade, Esplanade, Marina Bay |
| DTL | Telok Ayer, Downtown, Bayfront, Promenade |
| TEL | Maxwell, Shenton Way, Marina Bay |



Woodlands North
Woodlands
Admiralty
Sembawang
Canberra
Marsiling
Woodlands South
Yishun
Springleaf
Khatib
Lentor
Kranji
Mayflower
Yio Chu Kang
Bright Hill
Ang Mo Kio
Bukit Panjang
Yew Tee
Cashew
Hillview
Upper Thomson
Marymount
Bishan
Lorong Chuan
Kovan
Serangoon
Tuas Link
Tuas West Road
Tuas Crescent
Gul Circle
Joo Koon
Pioneer
Boon Lay
Beauty World
King Albert Park
Sixth Avenue
Choa Chu Kang
Caldecott
Braddell
Toa Payoh
Woodleigh
Bartley
Bedok North
Bedok Reservoir
Tampines West
Pasir Ris
Tampines
Tampines East
Simei
Upper Changi
Expo
Changi Airport
Kaki Bukit
Tai Seng
Ubi
Bedok
Tanah Merah
Kembangan
Eunos
Paya Lebar
Bukit Gombak
Bukit Batok
Botanic Gardens
Tan Kah Kee
Stevens
Novena
Potong Pasir
Boon Keng
Napier
Newton
Farrer Road
Orchard Boulevard
Farrer Park
Holland Village
Orchard
Little India
Geylang Bahru
Bendemeer
Aljunied
Great World
Somerset
Rochor
Jalan Besar
Kallang
Dakota
Lakeside
Chinese Garden
Jurong East
Clementi
Dover
Buona Vista
Commonwealth
Havelock
Dhoby Ghaut
Bencoolen
Lavender
Mountbatten
one-north
Queenstown
Fort Canning
Bugis
Kent Ridge
Redhill
Clarke Quay
Bras Basah
Stadium
Tiong Bahru
Chinatown
Haw Par Villa
Nicoll Highway
Outram Park
City Hall
Esplanade
Pasir Panjang
Maxwell
Promenade
Labrador Park
Telok Ayer
Raffles Place
Tanjong Pagar
Telok Blangah
Downtown
Bayfront
Gardens by the Bay
Shenton Way
Marina Bay
HarbourFront
Marina South Pier
Sentosa
Samudera
Punggol Point
Nibong
Sam Kee
Sumang
Soo Teck
Thanggam
Kupang
Fernvale
Farmway
Cheng Lim
Layar
Tongkang
Renjong
Punggol
Damai
Oasis
Cove
Kadaloor
Meridian
Coral Edge
Riviera
Sengkang
Buangkok
Compassvale
Rumbia
Hougang
Ranggung
Kangkar
Bakau

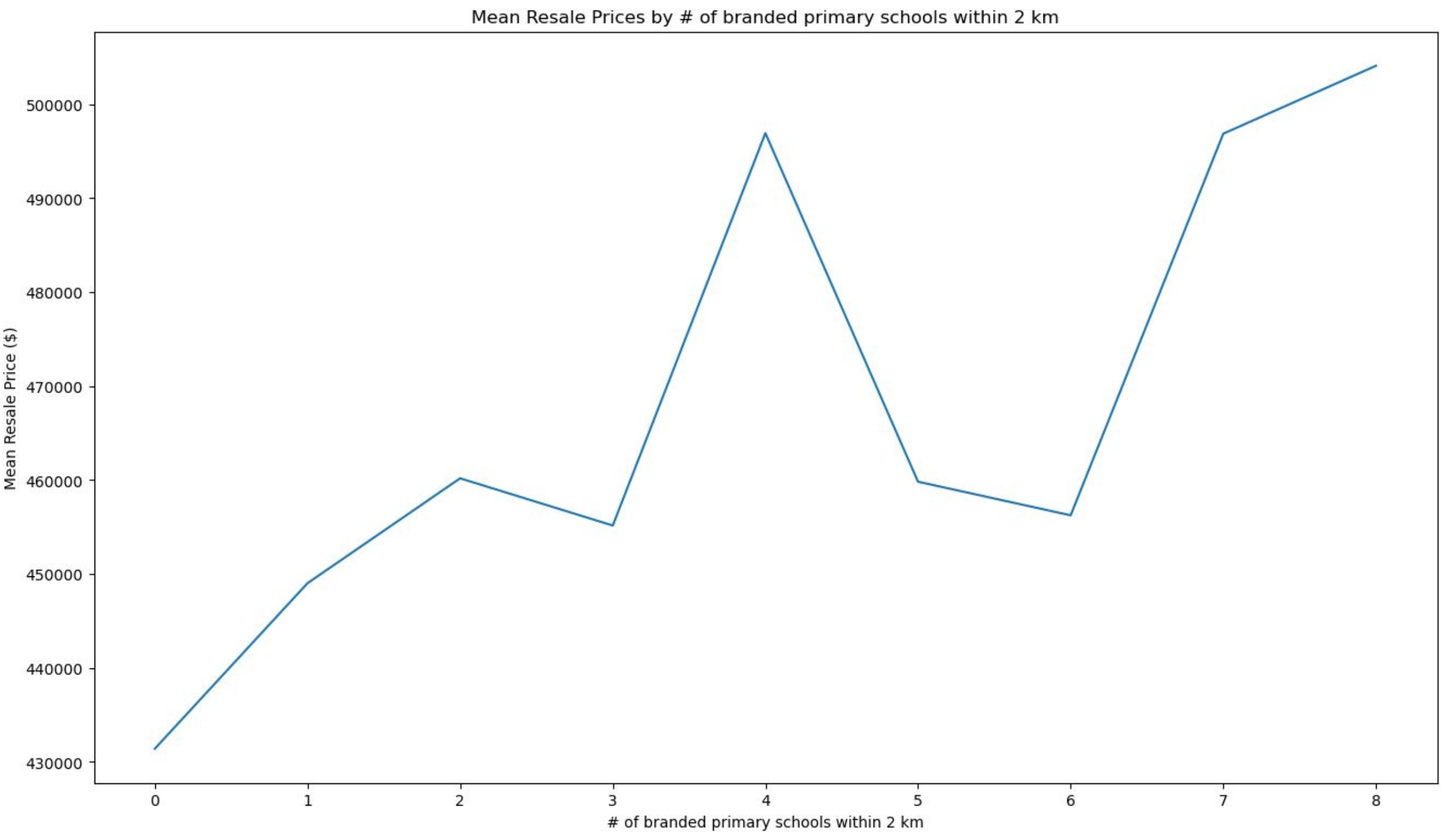

Mean Resale Prices by # of MRT Stations to CBD
600000
550000
500000
450000
400000
Mean Resale Price ($)
0
2
4
6
8
10
12
14
# of stations to CBD

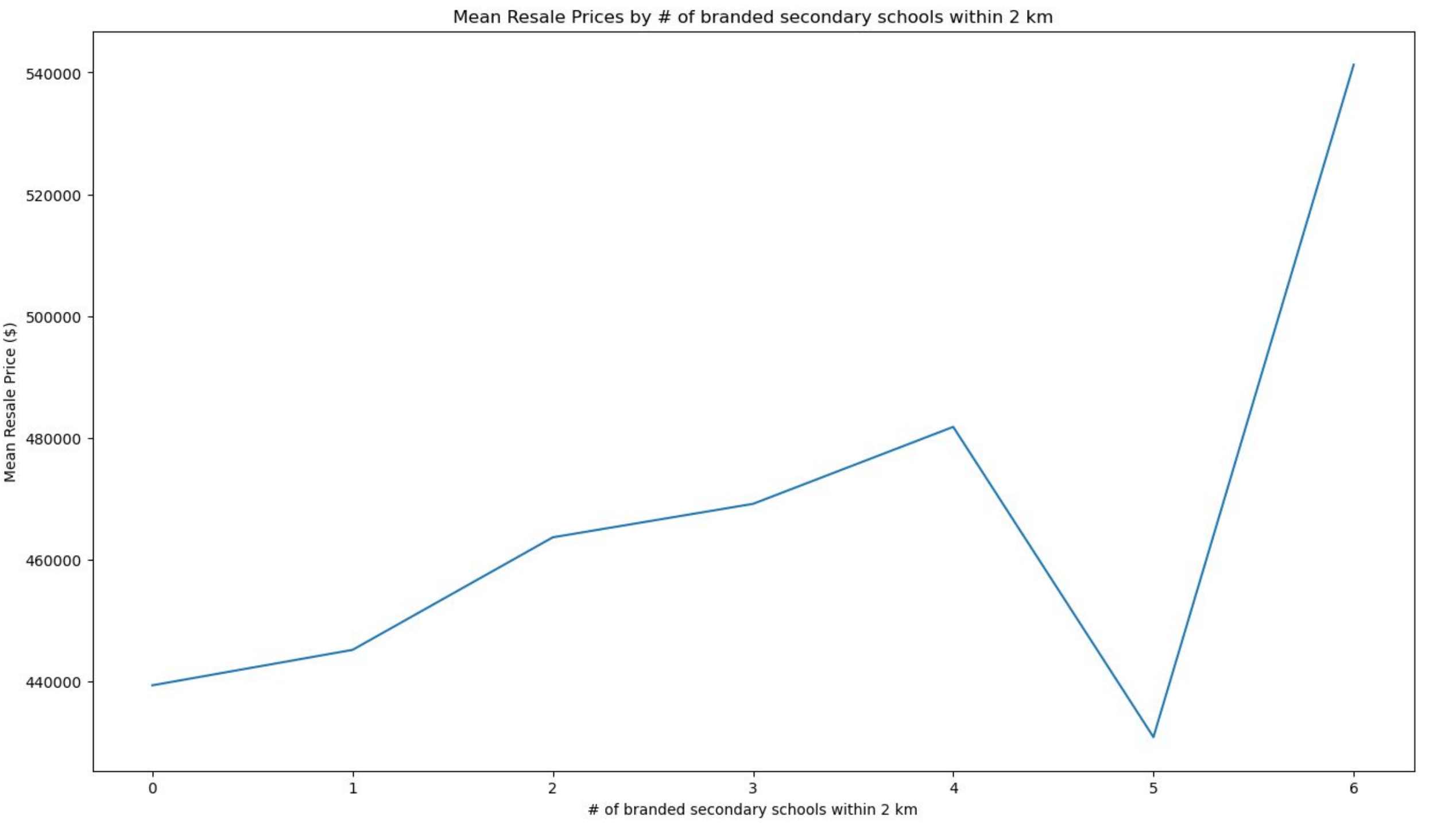
# Branded Schools - Definition

- **Primary:**
  - Schools that offer GEP;
  - Affiliated to IP schools;
  - Govt. aided.

- **Secondary:**
  - Schools that offer IP;
  - Govt. aided.

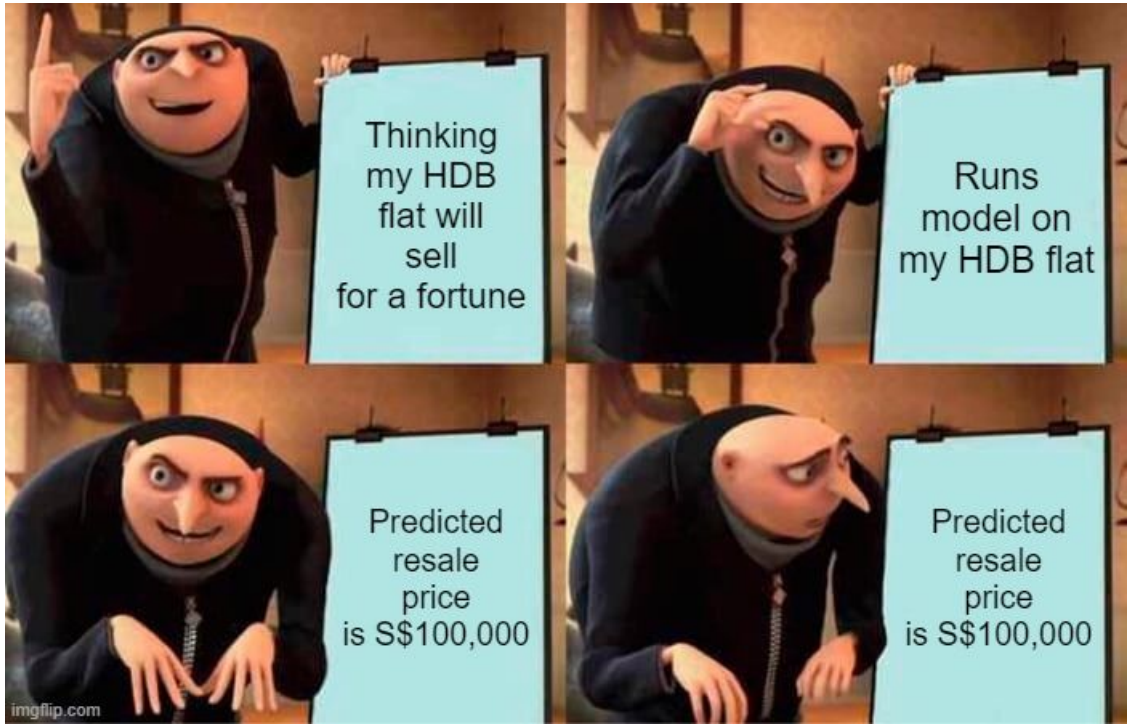
華僑中學
HWA CHONG
INSTITUTION


Mean Resale Prices by # of branded primary schools within 2 km
Mean Resale Price ($)
500000
490000
480000
470000
460000
450000
440000
430000
0
1
2
3
4
5
6
7
8
# of branded primary schools within 2 km


Mean Resale Prices by # of branded secondary schools within 2 km
Mean Resale Price ($)
540000
520000
500000
480000
460000
440000
0
1
2
3
4
5
6
# of branded secondary schools within 2 km

# How does our model perform?

- Predicts resale price to within ±8.5% of the actual value
- That’s around ±S$36,500!



# What are things that homeowners could improve in their homes to increase their value?

## *Improve Interior Furnishings*

**Finding from our model**

- Price premium associated with DBSS apartments

**Contextual background**

- DBSS (Design Build & Sell Scheme): HDB flats developed by private developers along the lines of condominiums

- DBSS price premium might be due to their more luxurious interior furnishings

*"... solid timber doors and high-quality bamboo-strip floorings, which looks better, feels cooler and lasts longer than ordinary parquet … designer kitchens, deluxe bathroom fittings and premium materials add a touch of luxury to everyday interiors… "* [1]

[1] Sales Brochure, Natura Loft @ Bishan. https://bishan-naturaloft.com/

DBSS : Natura Loft @ Bishan

# What neighbourhoods seem like they might be a good investment?

| Towns | Features |
|---|---|
| Bukit Timah | Proximity to nature reserves, low supply of HDB apartments |
| Marine Parade | Proximity to the sea, distinctive neighbourhoods (Katong, Joo Chiat) |
| Bishan | Proximity to well-known parks, nature reserves, small town |
| Queenstown | Relative tranquility |

- Our model reveals that these towns are associated with resale price premiums *even after* accounting for key features that are explicitly observable from our dataset (as discussed earlier)

- The resale price premiums associated with these towns may thus be due to their other distinctive features, as listed above

# Summary

**Features Adding Most Value / Features Hurting Value:**

Location Location Location

**Improvements to Increase Value:**

Homeowners could focus on internal improvements to shift their property into a higher flat type category if possible. Renovations that effectively utilize space could also be beneficial.

**Good Investment Neighborhoods:**

Bukit Timah, Marine Parade, Bishan, Queenstown have higher resale values, making them potentially good investment areas.

**Model Generalization to Other Cities:**

Our model is tailored to Singapore's unique housing market and may not generalize well to other cities without modifications. To make it more universal, we would need to adjust for local real estate factors, economic conditions, and geographical differences. Data from another city would require similar features (property type, size, age, location specifics) to build a comparable model.