A short horizontal bar with a green segment on the left and an orange segment on the right, positioned above the title.

Analysis of HDB Resale Market

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Building a robust predictive price model for HDB Resale Flats

Our Goal:

- **Empower Agents:** Provide a data-driven tool.
- **Competitive Pricing Advice:** For buyers and sellers.
- **Accurate Valuation:** Estimate HDB resale flat values by type and location.

Resale Prices Trend over Time

HDB Median Resale Prices Over Time

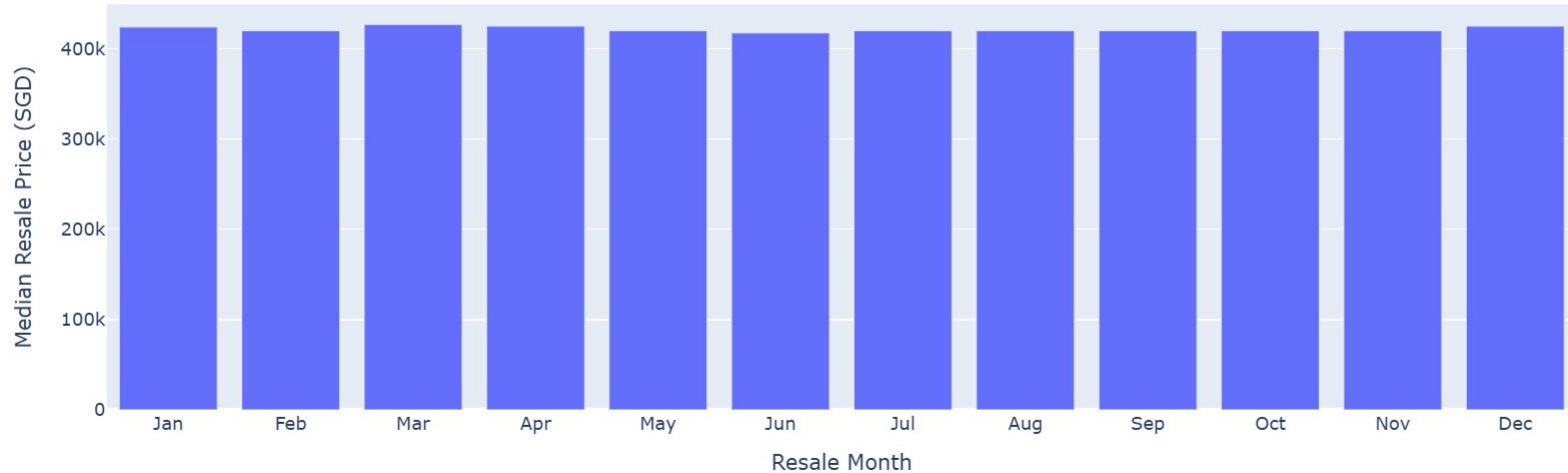


The HDB resale market experienced a strong surge in 2012-2013, followed by a sustained decline until mid-2015. There was a significant and rapid recovery from 2019 onwards that pushed prices back to record-highs.

Resale Prices Trend over Time



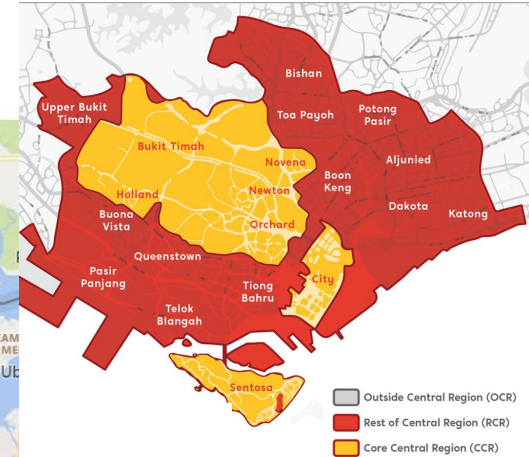
HDB Median Resale Prices by Month



The prices show no significant monthly variation/seasonality.

Distribution of HDB resale flats

Region Category ● Core Central Region ● Outside Central Region ● Rest of Central Region



Transaction Volumes by Region

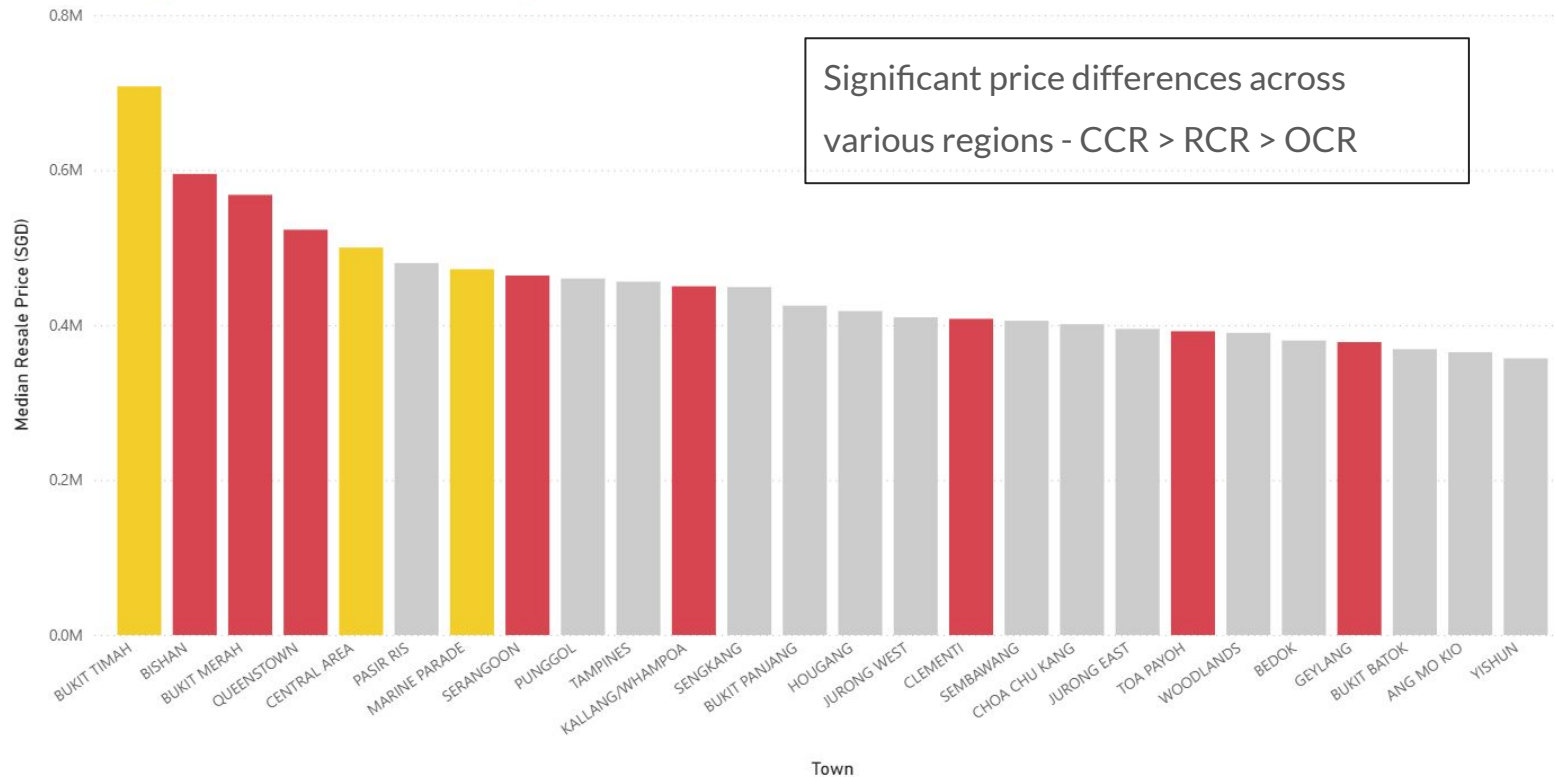
Region Category ● Core Central Region ● Outside Central Region ● Rest of Central Region



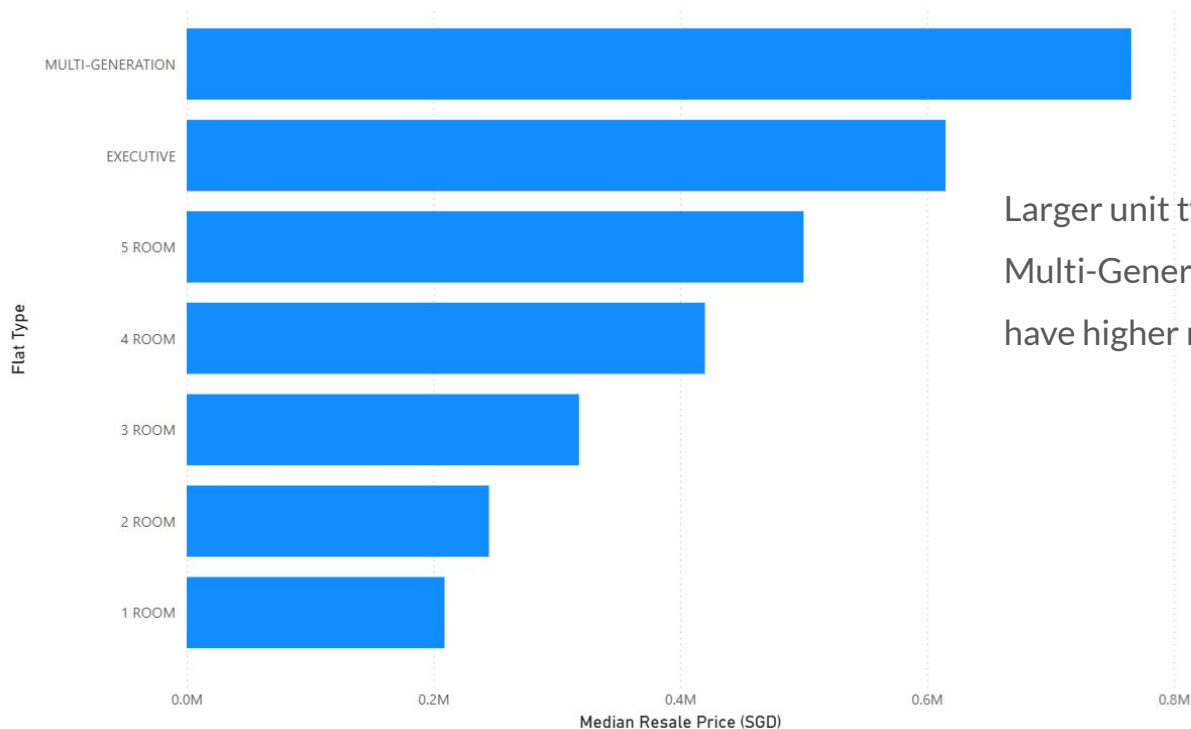
Identifying key factors that influences HDB Resale Prices

Median Resale Prices by Region

Region Category ● Core Central Region ● Outside Central Region ● Rest of Central Region

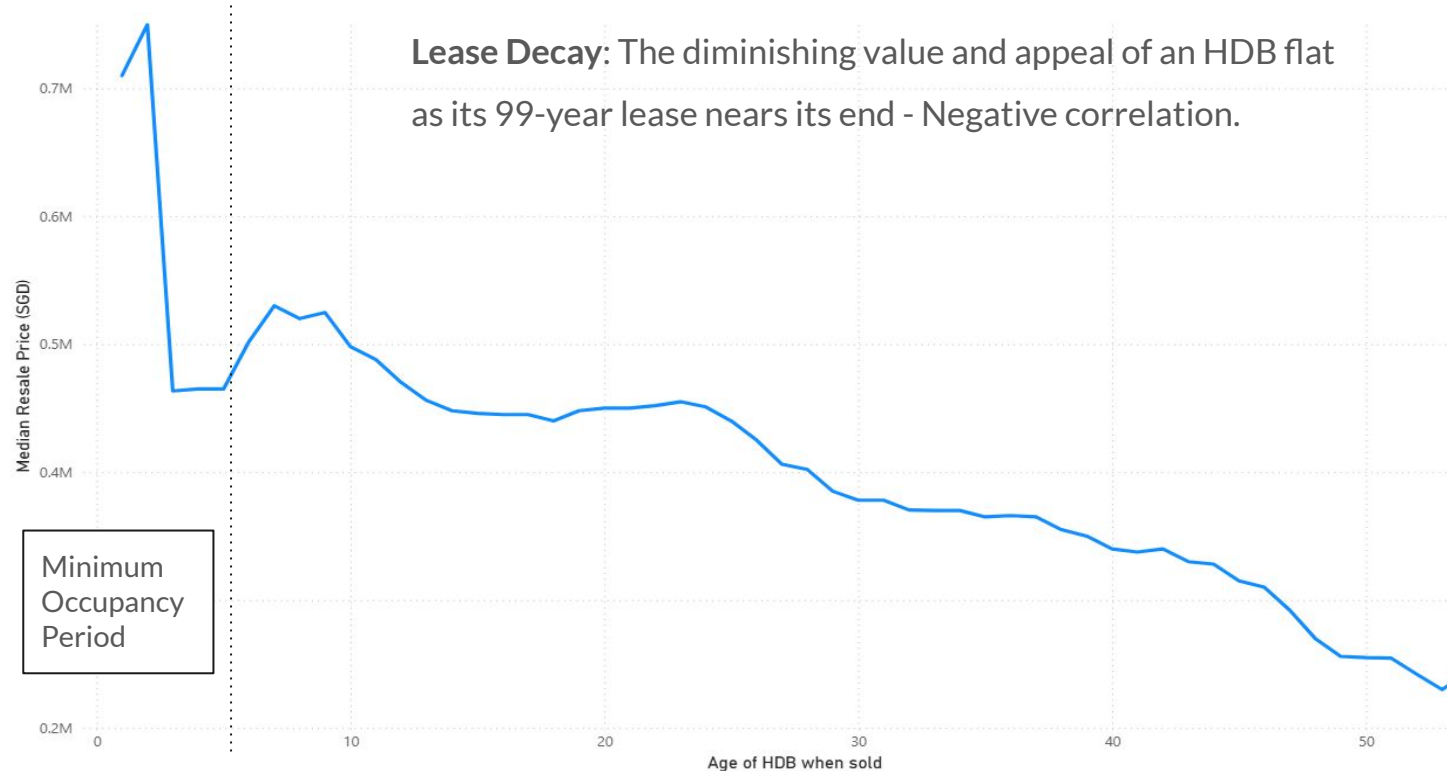


Median Resale Prices by Flat Type

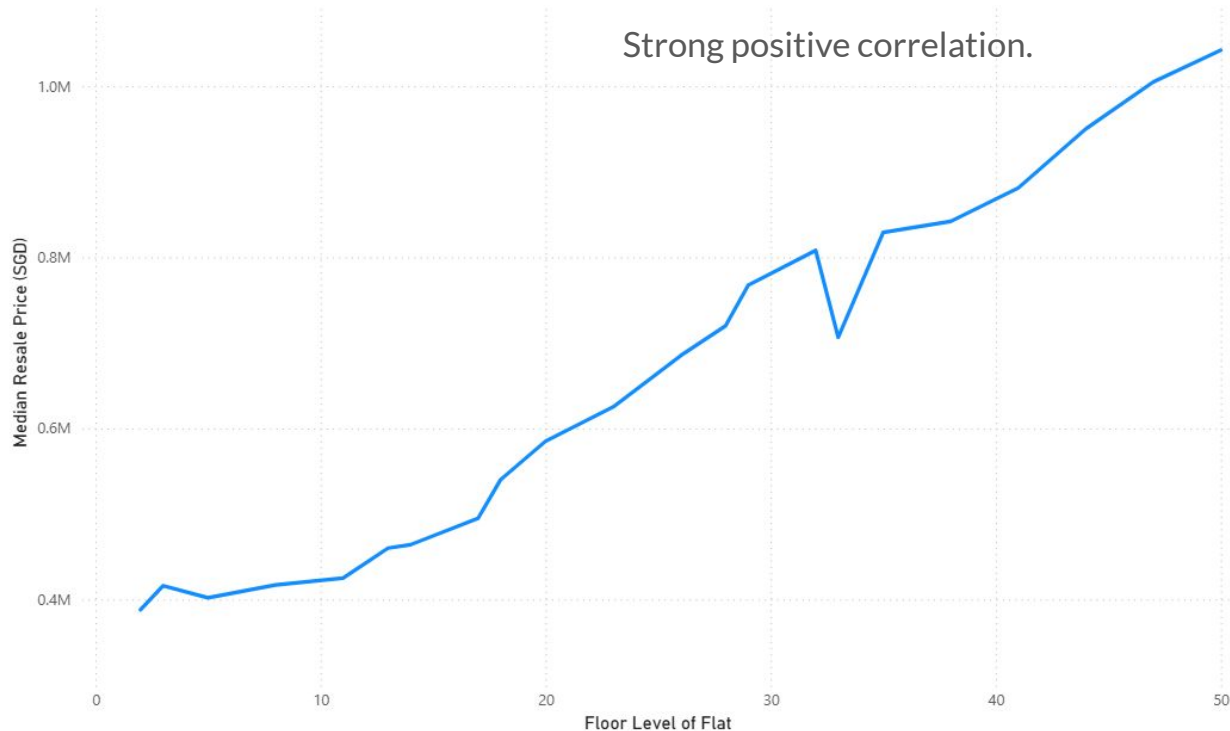


Larger unit types, such as Multi-Generation and Executive flats, have higher median prices.

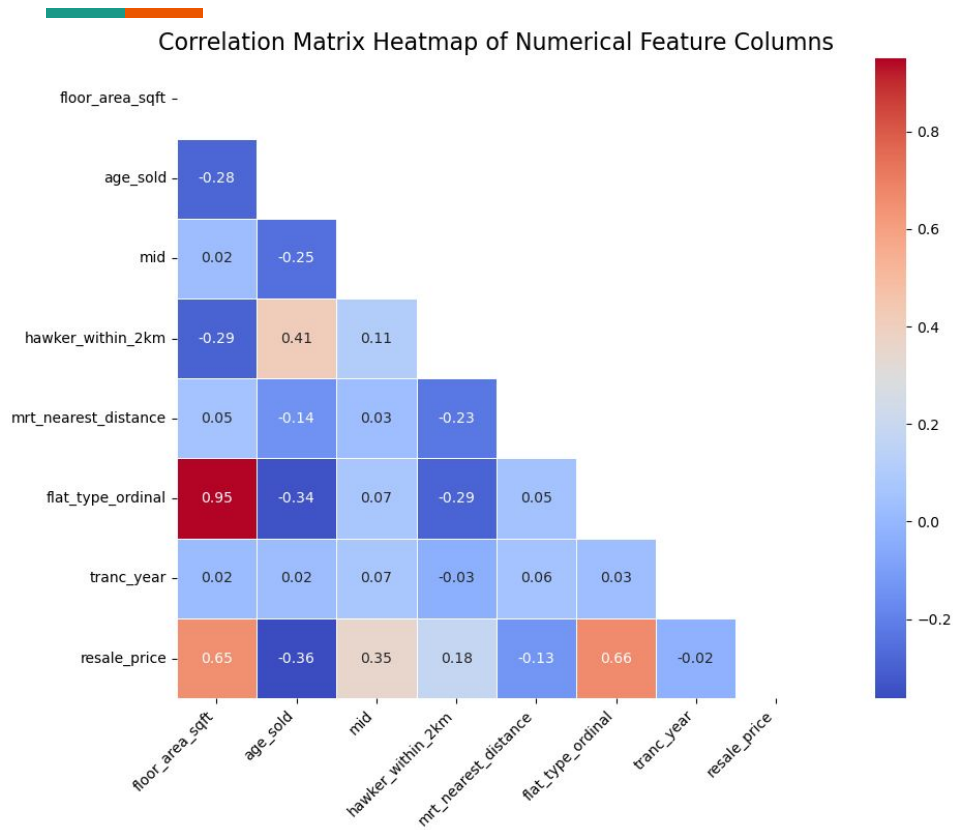
Median Resale Prices by Lease Years



Median Resale Prices by Floor Level



Key Drivers of HDB Resale Prices



When we identify such strong **collinearity**, like between 'floor_area_sqft' and 'flat_type', we will only be **including just one of them in the model**. This ensures our model is both powerful for prediction and as interpretable as possible.

Our Predictive Model

Feature Selection using Linear Regression Model

Predicted vs Actual Values (Linear Regression)



Feature Combination 1

1. Floor_area_sqft
2. Age_sold
3. Mid (floor)
4. Hawker_within_2km
5. MRT_nearest_distance
6. Towns: one-hot encoded

RMSE Score: \$54852
R² Score: 0.853

Feature Combination 2

1. Floor_area_sqft
2. Age_sold
3. Mid (floor)
4. Hawker_within_2km
5. MRT_nearest_distance
6. **Towns: removed 15 towns with low correlation to resale price**

RMSE Score: \$64225
R² Score: 0.798

Feature Combination 3

1. Floor_area_sqft
2. Age_sold
3. Mid (floor)
4. **Hawker_nearest_distance**
5. MRT_nearest_distance
6. **Vacancy (primary)**
7. **Cut-off point (secondary)**
8. Towns: one-hot encoded

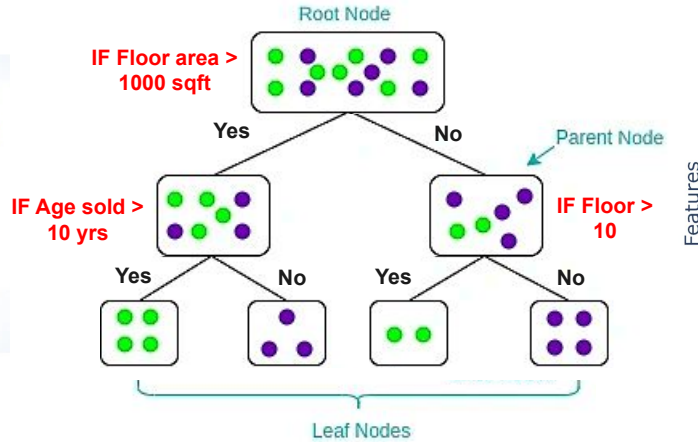
RMSE Score: \$54762
R² Score: 0.853

Feature Combination 4

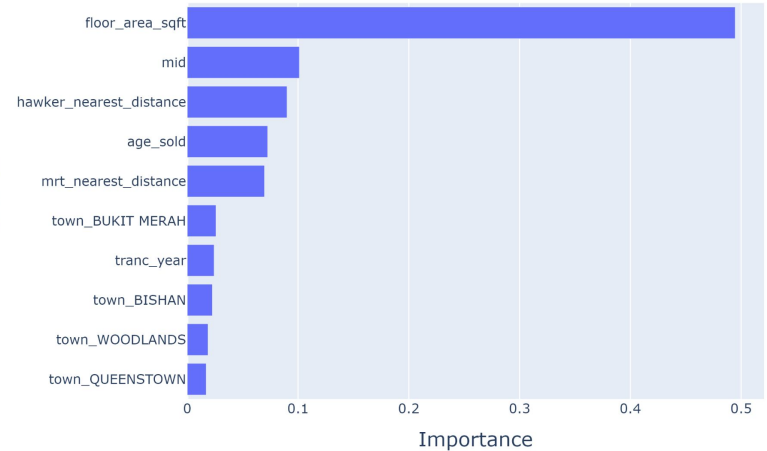
1. Floor_area_sqft
2. Age_sold
3. Mid (floor)
4. Hawker_nearest_distance
5. MRT_nearest_distance
6. **Transaction year**
7. Towns, one-hot encoded

RMSE Score: \$54748
R² Score: 0.853

Decision Tree Regressor Model



Feature Importance in Decision Tree Regressor



Train Dataset:

RMSE Score: \$35332
R² Score: 0.939

Test Dataset:

RMSE Score: \$33916
R² Score: 0.944

Hyperparameter
Tuning



Train Dataset:

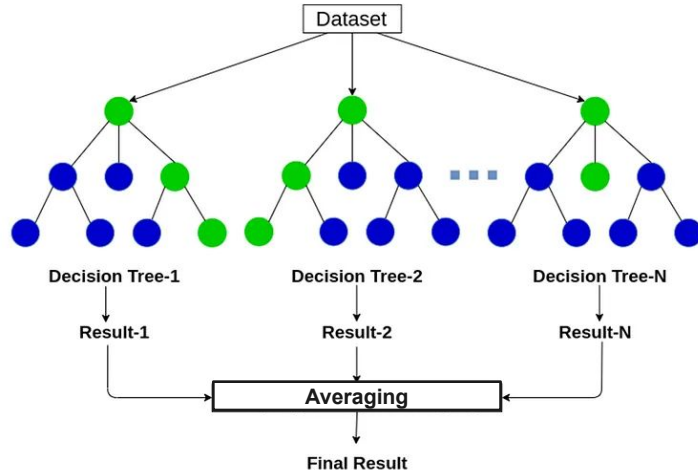
RMSE Score: \$32691
R² Score: 0.948

Test Dataset:

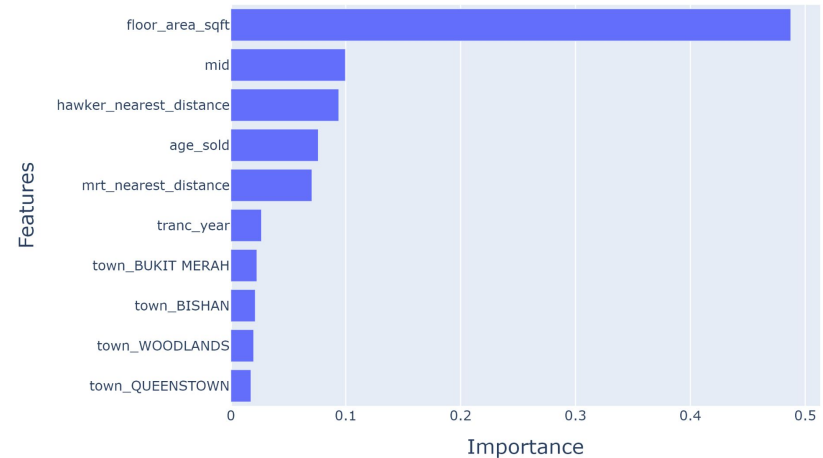
RMSE Score: \$31189
R² Score: 0.953

- From linear to decision tree regressor model, significant improvement in RMSE score from **\$54762 to \$31189** and R² Score from **0.853 to 0.953**.

Random Forest Regressor Model



Feature Importance in Random Forest Regressor



Train Dataset:

RMSE Score: S\$26157

R² Score: 0.967

Test Dataset:

RMSE Score: S\$25818

R² Score: 0.968

Hyperparameter
Tuning



Train Dataset:

RMSE Score: S\$26103

R² Score: 0.967

Test Dataset:

RMSE Score: S\$25699

R² Score: 0.968

- From decision tree to random forest regressor model, further improvement in RMSE score from **S\$31189** to **S\$25699** and R² Score from **0.953** to **0.968**.
- Chosen model for app.

Pros and Cons of Random Forest Model

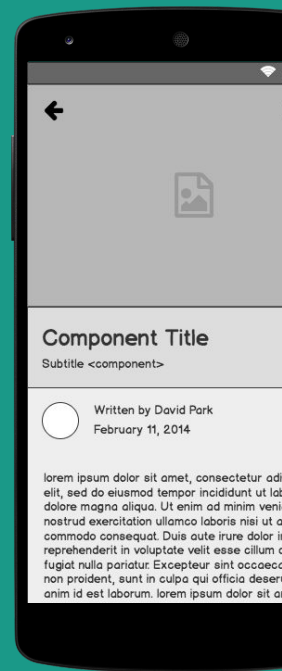
Pros

- High accuracy
- Robust to overfitting
- Handles non-linearity and complex interactions very well

Cons

- Slower training and prediction
- High computational cost due to large memory usage
- Less interpretable

App Showcase



External Factors Impacting HDB Resale Prices

This new set of measures will:

- ✓ Encourage prudent borrowing for HDB flat purchases
- ✓ Further stabilise the resale market
- ✓ Improve affordability for lower-to-middle income first-time home buyers

Government Policies: How are HDB resale prices affected?

- **Reduced Loan-to-Value (LTV) ratio:** max. loan amount a buyer can secure relative to a property's price, meaning buyers need to pay a larger down payment.
- **Additional Buyer Stamp Duty (ABSD):** imposes higher taxes on subsequent residential property purchases (different tiers based on citizenship & no. of subsequent properties).

2021 DEC

- Higher ABSD
- Reduced LTV ratio from 90% to 85%

2022 SEP

- Lower LTV Limit from 85% to 80%
- 15-month wait out period for private property owners buying HDB flats

2023 APR

Higher ABSD

2024 AUG

Lower LTV Limit from 80% to 75% (same as bank loans)



Dynamics of HDB resale market

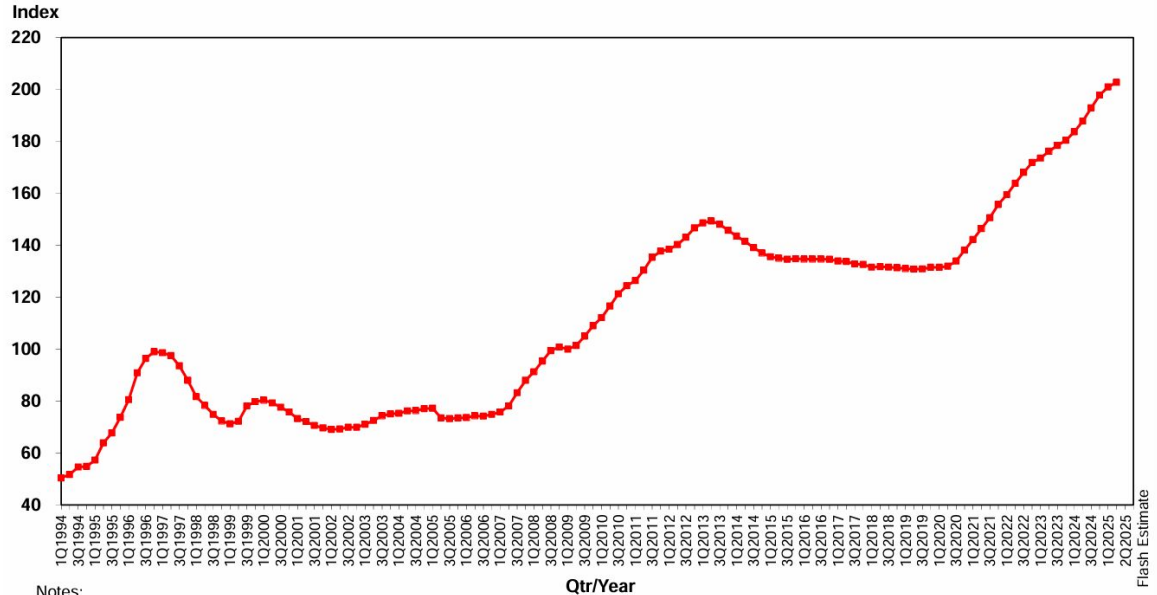
- **Interest Rates:** With potential rate hikes, mortgage costs could rise, possibly cooling the market or shifting buyer preferences towards more affordable options.
- **Supply and Demand:** The government's ongoing efforts to increase the supply of BTO flats might ease some pressure on the resale market, although prime locations will always command a premium - Fewer flats reaching MOP in 2025 is projected, potentially further tightening the supply and putting upward pressure on prices.
- **Economic Stability:** Singapore's economic health will continue to be a barometer for real estate. Stability encourages investment, while any downturn could see a dip in property transactions.

Resale Price Index (RPI)

Tracks the overall price movement of resale public housing flats in SG.

In Q2' 2025, the index is estimated to have increased by 0.9% to 202.8, which is a slower growth compared to the previous quarter of 1.6%. This marks the 3rd consecutive quarter of slowing price growth.

PRICE INDEX OF HDB RESALE FLATS



Notes:

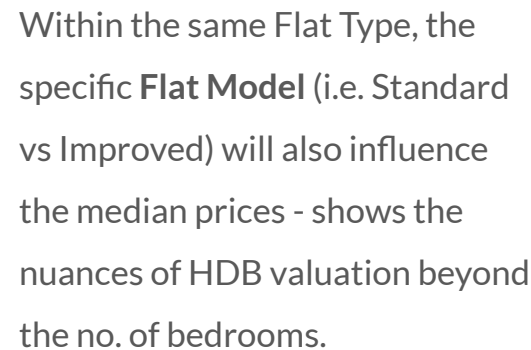
- 1) 1Q2009 is the base period with index at 100.
- 2) The index from 4Q2014 onwards is computed using the stratified hedonic regression method.
- 3) The 2Q2025 index is a flash estimate.

Recommendations

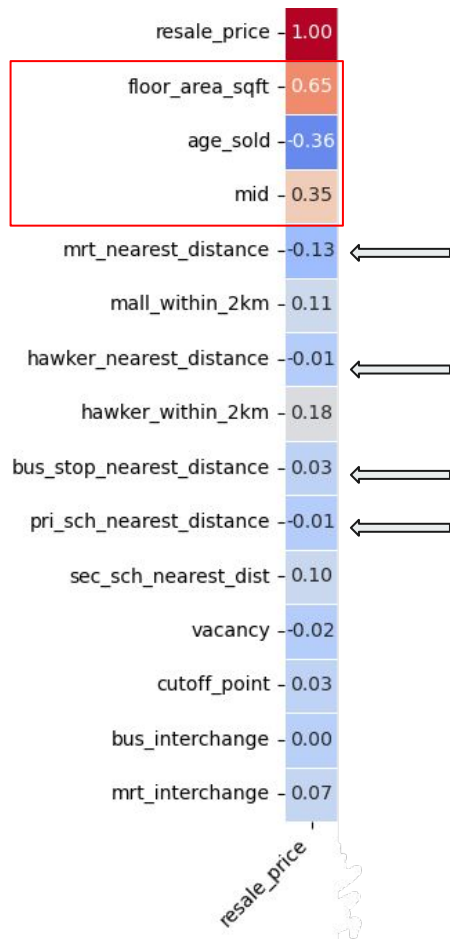
- Clients with HDB units in Bukit Timah, Bishan, Bukit Merah, Queenstown, and the central area should aim to price them at a higher resale price of between S\$500k to S\$700k.
- For clients selling larger unit types, such as Multi-Generation and Executive flats, price them at higher resale prices of between S\$500k to S\$750k.
- Clients should try to sell their HDB units within 5-10 years of lease commencement to fetch higher resale prices as the unit depreciates with age.
- Clients with HDB units on higher floors should aim to sell at higher prices. For example, units above 35 floors are priced above S\$800k.

Questions?

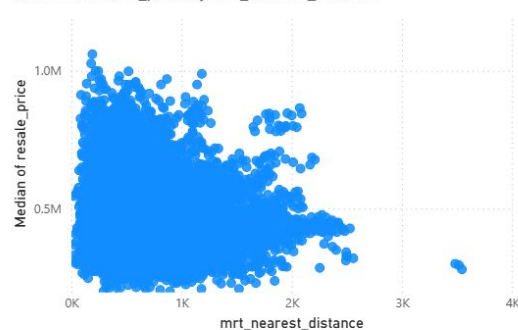
Additional Slides



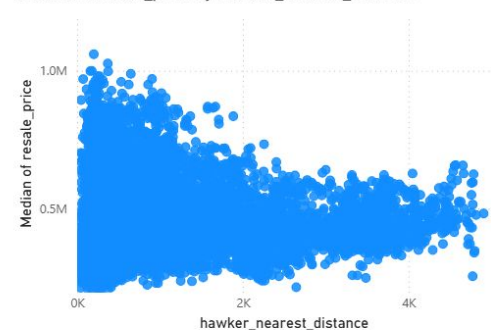
Other Numerical Factors



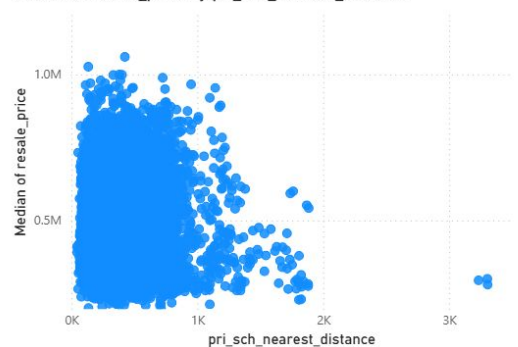
Median of resale_price by mrt_nearest_distance



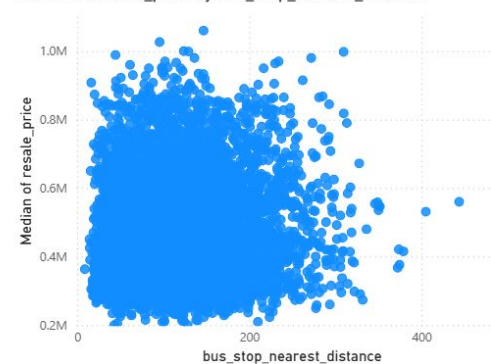
Median of resale_price by hawker_nearest_distance



Median of resale_price by pri_sch_nearest_distance



Median of resale_price by bus_stop_nearest_distance



Government Policies:

How are HDB resale prices affected?



Singapore

The impact of cooling measures: How HDB resale prices have changed in every Singapore town

After cooling measures in September 2022, the average quarterly resale volume of HDB flats fell by 3.6 per cent, but prices rose by 1.6 per cent.

Prof Qian said those two rounds of cooling measures in December 2021 and September 2022 have reduced market transaction volume and slowed the growth of prices in the private and HDB resale market, although price levels continue to rise.

Analysts also pointed out that there were other factors affecting the HDB resale market, including the rise in loan interest rates and increasing supply.