

BE A REALIST: Uncover The Truth in Singapore Private Property Market

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Abstract— The Singapore government closely observes the property market and occasionally implements new policies as cooling measures to prevent the market from heating up too quickly. Even though several government and non-government organizations already created visualization tools to explain the property market in Singapore, they are unable to reveal more information from the property market which has a complicated nature. Thus, there is still much potential in using new tools to advance the understanding and visualizations of changes in the market.

Through the integration of R packages, our application will help users to discover patterns and compare differences between property prices in different administrative areas over time. Firstly, we used plotly to chart the comparison between total units sold and SIBOR (Singapore Interbank Offered Rate) which serves as a main factor of fluctuation in number of units sold. Secondly, by creating the geofacet map for Singapore, we visualised changes in median unit price over time from the perspective of planning areas and postal districts. Thirdly, by coordinating the views between two visualizations, we used a treemap as a user interface to update the ridgelines plot which zooms into the distribution of prices in a specific region by property type and type of sale. Lastly, we used the Local Indicators for Spatial Autocorrelation (LISA) analysis to reveal clusters of properties in Singapore by their median unit price, and incorporated the results into an interactive map using the tmap package. For the ridgelines plot and LISA analysis mentioned above, all the private property types such as apartment, condominium, executive condominium, detached house, semi-detached house, terrace house as well as different type of sales such as new sale, resale and sub-sale were provided for users to drill down into.

Index Terms— SIBOR (Singapore Interbank Offered Rate), Geofacet, Ridgelines, Local Indicators for Spatial Autocorrelation (LISA), Data Visualization, Geo-spatial Temporal Analysis.

MOTIVATION

In Singapore, as well as many other nations of the world, housing markets are characterised by the co-existence of a freely priced part of the market with a part that is subject to varying degrees and forms of government intervention and regulation. The Singapore housing market has an especially complex institutional structure with its large regulated public housing sub-sectors. The private housing price are affected by the standard determinants of supply and demand as well as by many government policies. However, the extent of the effects varies across locations, time, property type, type of sales and is influenced by factors like SIBOR (Singapore Interbank Offered Rate).

Property transactions in Singapore require buyers to pay BSD (Buyers Stamp Duty) for documents executed for the sale and purchase of property. Liable buyers are required to pay ABSD (Additional Buyers Stamp Duty) on top of the existing BSD. ABSD and BSD are computed on the purchase price as stated in the dutiable document or the market value of the property.

Over the last twenty to thirty years, the property prices had witnessed a roller coaster of changes. The changes follow changes in SIBOR and introductions of new government policies. In the most recent decade, the economy of Singapore had rebounded back after the 2008 financial crisis. As a result, Singapore private market prices had heat up significantly since 2009, and they only started cooling down when the Singapore government announced that the property tax rates will be made more progressive over two years from January 2014. After a four-year slump until the end of 2017, the property market started to bounce back and the prices had shown an increasing trend. On the other hand, the US Federal Reserve's interest-rate had increased five times ever since President Trump took office in Jan 2017, and there will be 2 more increases happening in 2018. These news had already made substantial impact to Singapore's overall economy; when Federal Reserve Interest Rate increases, the Singapore Interbank Offered Rate (SIBOR) will increase accordingly. IRAS (Inland Revenue Authority of Singapore) made an announcement in February 2018 that the property tax would increase to 4% for properties with house price over 1 million SGD. Furthermore, on 6th July 2018, the ABSD had increased drastically

yet again, and we are interested to see if this cooling measure will have a strong impact on the Singapore property market.

OBJECTIVE

Private property prices in Singapore cannot be easily analysed by recourse either through analysis of private-sector supply and demand or simple trend-line forecasting. Therefore, it is imperative to analyse prices with a more thorough approach. Currently, there is no tool which can provide an interactive and unbiased visualization for property market. Most of the published data are still presented in static tables and the accompanying visualizations are quite basic. Different types of trends are illustrated statically and graphs are not explanatory enough to show the full picture of the dataset, which prevents readers from getting any useful insights and findings.

Our objectives for this project can thus be summarized into the following points:

1. Visualize the relationship between units sold and SIBOR on a yearly, quarterly and monthly basis.
2. Provide visualizations that illustrate price trends across all administrative areas in Singapore
3. Provide an interactive and coordinated tool which shows the density of the total number of units sold in locations, together with the drilled-down distribution of median unit prices for a specified area.
4. Reveal clusters of properties by their median unit price using the Local Indicators of Spatial Autocorrelation (LISA) analysis.
5. Present all the above visualizations into a scalable, portable and easy-to-use web application through the integration of R packages and the usage of R Shiny framework.

REVIEW AND CRITIQUE OF PAST WORKS

1.1 Private Property Index by URA

The Urban Redevelopment Authority provides a quarterly price index for private residential property which is presented as a static graph that starts from the first quarter of 1993. The drawback of the