RE1702

Colonial Names and Real Estate Prices

Exhibition of street names, National Library, 2012.
Photo by Peter Tan.

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Colonial Names and Real Estate Prices in Singapore

Background

History is a discipline of interest that interacts with real estate. Singapore was a British colony. Much of her built heritage stems from her colonial past, such as architecture and street names. Singapore associates things with the British as prestigious, reflecting a favourable attitude that Singapore has towards her colonial master. Famous theatres, hotels and schools are named after the British. Singapore is a unique nation that keeps and glorify the ex-colonial master's names, unlike Myanmar and Vietnam that erased many of the European names (McDermott, 1997).

This study is to analyse the relationship between colonial names with property prices in Singapore, thus affirming or dismissing a favourable effect colonial heritage has on the real estate market.

Data

A list of 3,970 street names is taken from REALIS. This list is compared to a list of 992 British town, 88 county names taken from an online source (Marks, 2012), and a list of 36 British governors and monarchs during the colonial period. A total of 256 streets match the criteria, 23,599 residential addresses and prices from HDB and REALIS are selected for sampling.

Geographical location is the main confounder in this study, as it is associated both to the address and to the property price. One way of fixing for that is to use the URA Planning Areas, however, they are still too geographically unspecific, such as the more expensive landed Serangoon Gardens estates and the Serangoon North heartland estate both being included into the Serangoon Planning Area. To try to further fix for locational confounding, 10 clusters of localities

with high concentrations of British named streets are identified for spatial proximity (See ***Figure 1***). 2 of them will be ignored due to the lack of available data; the Sembawang-Seletar (I) and Changi (J) cluster which contain only conservation state properties that are short-term leased.

Marketing of properties is another confounder. Developers often affix the address to the property name as part of a modern condominium marketing concept. An example would be One Devonshire at 1 Devonshire Rd or Butterworth 8 at 6 Butterworth Ln. Marketing is hence associated to both the street name and property prices. The design of study adjusts for that as both well-marketed and badly marketed properties are randomised into both British and Non-British named addresses case-control groups.

Another data limitation is time as the property market is cyclical. Data from beginning of Q1 2010 to end of Q4 2019 will be used as it covers almost the full cycle, giving rise to a normal distribution of price. (Sean, 2020).

Colonial history present in architecture and built heritage are ignored in this study. Only names are analysed.

Results

Based on sample mean, all clusters except for B (Little India-Farrer Park cluster) have higher prices (psf) for their British named addresses than the Non-British named addresses.

Taken from Table 1			
British Name Cluster		Mean (S$)	Standard Deviation
A	Y	2090.993	639.5106
	N	1944.913	332.4138
B	Y	1236.78	239.0905
	N	1347.539	287.4771
C	Y	1471.175	404.3161
	N	1442.911	300.443
D	Y	1550.164	331.3533
	N	1483.03	364.6443
E	Y	678.4117	185.3634
	N	424.1511	104.8096
F	Y	1328	325.4458
	N	1180.48	318.9382
G	Y	1503.136	349.1008
	N	1409.67	350.8144
H	Y	1124.507	272.5289
	N	1066.225	292.3729

However due to data variability (***Figure 2***), the difference in the means will have

to be further tested for statistical significance.

In each cluster, 10 randomly selected British named streets are paired to 10 non-British named streets adjacent to them or in their vicinity (for instance Leedon Park is paired to adjacent Jalan Sampurna, both of which are Good Class Bungalow addresses, (***Figure 1***) and the difference between their transaction prices (psf) will be hypothesis tested for whether there is 0.05 statistical significance:

H_0 : $\mu_{\text{difference of means}} = 0$

H_1 : $\mu_{\text{difference of means}} > 0$

$$t_0 = \frac{\bar{d} - 0}{\frac{s_d}{\sqrt{n}}} = \frac{22.012}{\frac{438.686}{\sqrt{80}}} = \mathbf{0.448}$$

$t_\alpha = 1.664, \qquad t_0 < t_\alpha$

Another test is conducted on the difference of 30 randomly selected British named addresses and their non-British-named addresses paired based on planning area:

$$t_0 = \frac{\bar{d} - 0}{\frac{s_d}{\sqrt{n}}} = \frac{331.6}{\frac{600.06}{\sqrt{30}}} = 3.027$$

$t_\alpha = 1.699, \qquad t_0 > t_\alpha$

There is insufficient evidence to reject the null hypothesis at 0.05 significance level when the addresses are paired based on spatial proximity stratified by clusters. However, there is sufficient evidence to reject the null hypothesis at 0.05 significance level when the addresses are compared stratified by the planning areas. (Matched pairs hypothesis testing is relevant because the selection of the non-British named addresses is dependent on the spatial proximity for the first test and the planning area of the British named addresses for the second test.)

A simple way to interpret the first hypothesis test is that a house in a British named street is not more expensive than its neighbours' house in its adjacent non-British named street. For the second test, a house in a British

named street will be more expensive than another house in a non-British named street in its planning area.

A whole Singapore, two independent means hypothesis testing is conducted on 30 randomly selected British and Non-British named addresses (it is independent because there is no matching criteria, so this estimates two different population means, one of British named addresses and another of non-British named addresses):

$H_0 : \mu_{British} = \mu_{Non\text{-}British}$

$H_1 : \mu_{British} > \mu_{Non\text{-}British}$

$$t_0 = \frac{(\overline{x_B} - \bar{x}_N) - 0}{\sqrt{\frac{s_B^2}{n_B} + \frac{s_N^2}{n_N}}} = \frac{(1860.9 - 1367.6)}{\sqrt{\frac{446.6^2}{30} + \frac{507.6^2}{30}}} = \mathbf{2.538}$$

$$t_\alpha = 1.699, \qquad t_0 > t_\alpha$$

We have sufficient evidence to reject the null hypothesis and infer that on average British named addresses are more expensive than non-British named addresses in a whole Singapore perspective.

Are British named addresses more expensive than non-British named addresses?		
By Adjacent Street	Within Planning Area	Whole of Singapore
Statistically Insignificant	More expensive	More expensive
$\mu_d = 0$	$\mu_d > 0$	$\mu_B > \mu_N$

A scatter plot (***figure 3***) and regression analysis is drawn based on the number of British-named streets in a planning area and the median property prices (psf) of the planning area derived from a secondary source (Khoo, 2020). There is a correlation coefficient of **0.408** with an R^2 of **0.166**. The low R^2 cautions that only 16.6% of the variation is explained for in the regression. Nonetheless, there is a moderate positive correlation between number of British names and median price (psf) of the planning area.

Despite the low R^2 which likely occurred due to outliers, it is still factual to state that planning areas that are more expensive tend to have more British named streets. This can be seen in ***Figure 4***.

Implications and Conclusion

While the average price (psf) of the British named addresses are generally higher than their non-British named counterparts, they are not significantly higher when compared to neighbours adjacent to them, but are significantly higher when compared to their planning areas and to the whole of Singapore. This inferred from the three hypothesis tests and is visualised in ***Figure 5***.

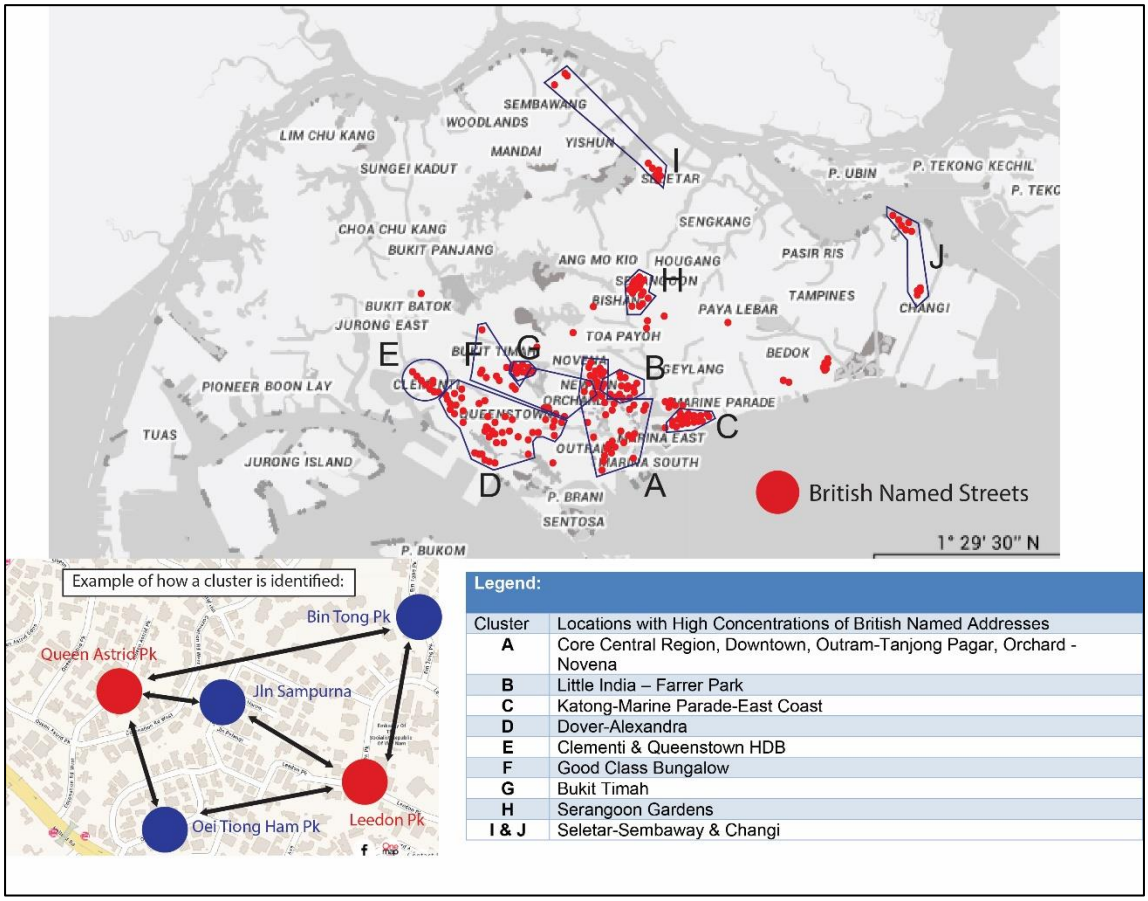
The reason for that is because British names are not the cause of higher prices, but location is still the main factor determining price, which is a confounder. British names are merely correlated to the pricier locations.

Relating to the bigger real estate problem of how colonial heritage impacts the real estate industry, this study cannot affirm a favourable effect, as colonial heritage strictly in British names do not cause higher property prices, unlike built heritage and architecture which likely have causal effects on property price, but they are not examined here. Another limitation in studying the impact of colonial heritage on the real estate industry is that it is studied based on quantitative prices and categorical explanatory variable colonial heritage, and more is required to study qualitative taste and preferences in relation to other manifestations of colonial heritage.

All these can be useful insights for real estate marketing, an example of a development branding itself with colonial heritage is Park Colonial at Woodleigh, which incorporates colonial architecture into the condominium (Park Colonial, 2018). Woodleigh is a British name, but colonial heritage in the form of architecture is the condominium’s main selling point, and this study affirms that the British name will not have a direct causal impact on price.

Appendix

Figure 1: British Name Clusters (Approximate)



Legend:	
Cluster	Locations with High Concentrations of British Named Addresses
A	Core Central Region, Downtown, Outram-Tanjong Pagar, Orchard - Novena
B	Little India – Farrer Park
C	Katong-Marine Parade-East Coast
D	Dover-Alexandra
E	Clementi & Queenstown HDB
F	Good Class Bungalow
G	Bukit Timah
H	Serangoon Gardens
I & J	Seletar-Sembaway & Changi

Map Image Source: OneMap Grey Basemap

Figure 2: Box-plot Diagram showing data variability of British vs Non-British named street transaction prices compared within spatial proximity

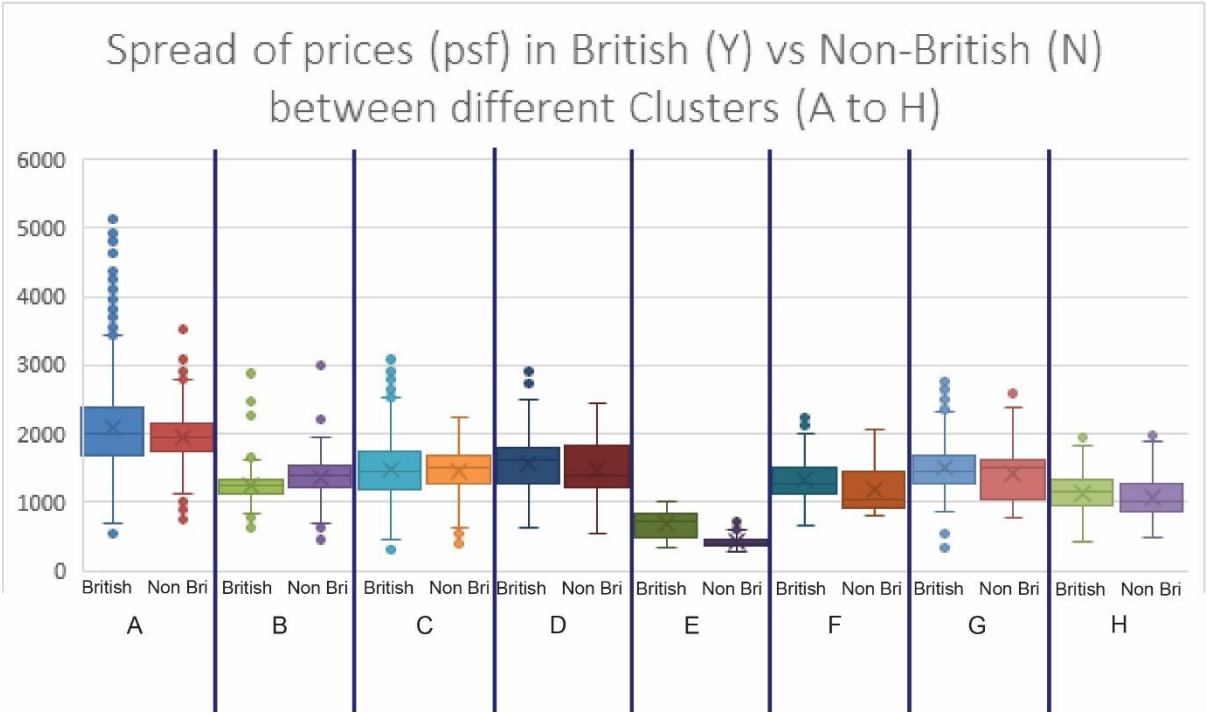


Table 1: Descriptive Statistics of Cluster

British Name Cluster		Mean	Standard Error	Median	Mode	Standard Deviation	Sample Variance	Skewness	Range	Minimum	Maximum	Sum	Count	Confidence Level(95.0%)
A	Y	2090.993	10.0107	1991	1858	639.5106	408973.9	0.909268	4577	548	5125	8533343	4081	19.62644
	N	1944.913	7.560719	1940	1858	332.4138	110498.9	0.142952	2778	754	3532	3759516	1933	14.82803
B	Y	1236.78	12.15365	1239	1239	239.0905	57164.28	2.325531	2256	635	2891	478634	387	23.89565
	N	1347.539	14.5013	1375	1548	287.4771	82643.1	-0.12262	2523	461	2984	529583	393	28.51006
C	Y	1471.175	8.09442	1435	1548	404.3161	163471.5	0.638792	2864	318	3182	3670581	2495	15.87247
	N	1442.911	6.279704	1512	1744	300.443	90265.98	-0.81881	1827	397	2224	3302824	2289	12.31451
D	Y	1550.164	4.203448	1618	1670	331.3533	109795	-0.23619	2250	642	2892	9632717	6214	8.240212
	N	1483.03	11.08551	1402	1394	364.6443	132965.4	0.222145	1904	533	2437	1604638	1082	21.75156
E	Y	678.4117	9.034058	712.5155	722.8418	185.3634	34359.58	-0.3282	686.0441	321.7043	1007.748	285611.3	421	17.7576
	N	424.1511	2.924951	388.1178	383.8694	104.8096	10985.06	1.595813	516.4852	277.8002	794.2855	544610	1284	5.738212
F	Y	1328	39.17907	1271	1117	325.4458	105915	0.841614	1595	648	2243	91632	69	78.18062
	N	1180.48	63.78765	1040	#N/A	318.9382	101721.6	1.021987	1253	810	2063	29512	25	131.6512
G	Y	1503.136	10.48299	1441	1320	349.1008	121871.3	1.085969	2433	326	2759	1666978	1109	20.56874
	N	1409.67	16.50092	1499.5	1503	350.8144	123070.7	0.389136	1923	769	2692	637171	452	32.42823
H	Y	1124.507	9.213158	1165	1330	272.5289	74271.99	-0.26591	1505	425	1930	983944	875	18.0825
	N	1066.225	13.22156	1007	920	292.3729	85481.92	0.637864	1513	469	1982	521384	489	25.97821

Figure 3: Median Price (psf) and No. of British Named Streets by Planning Area

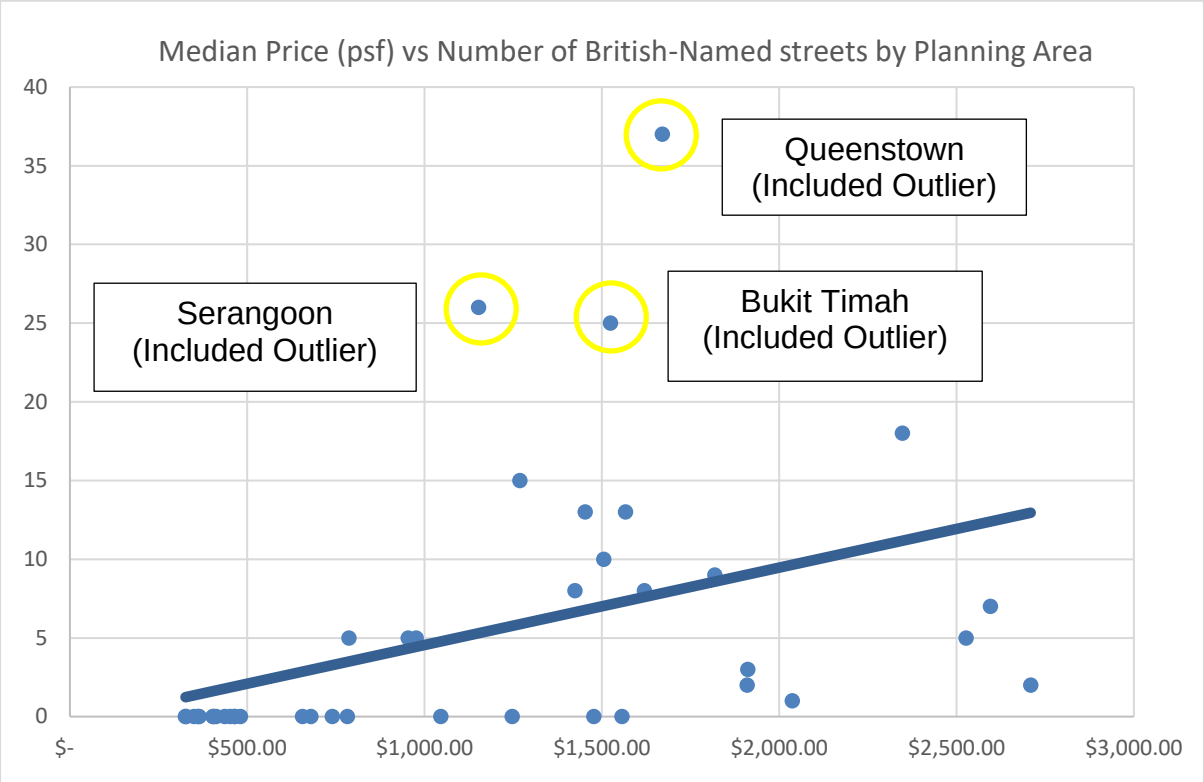
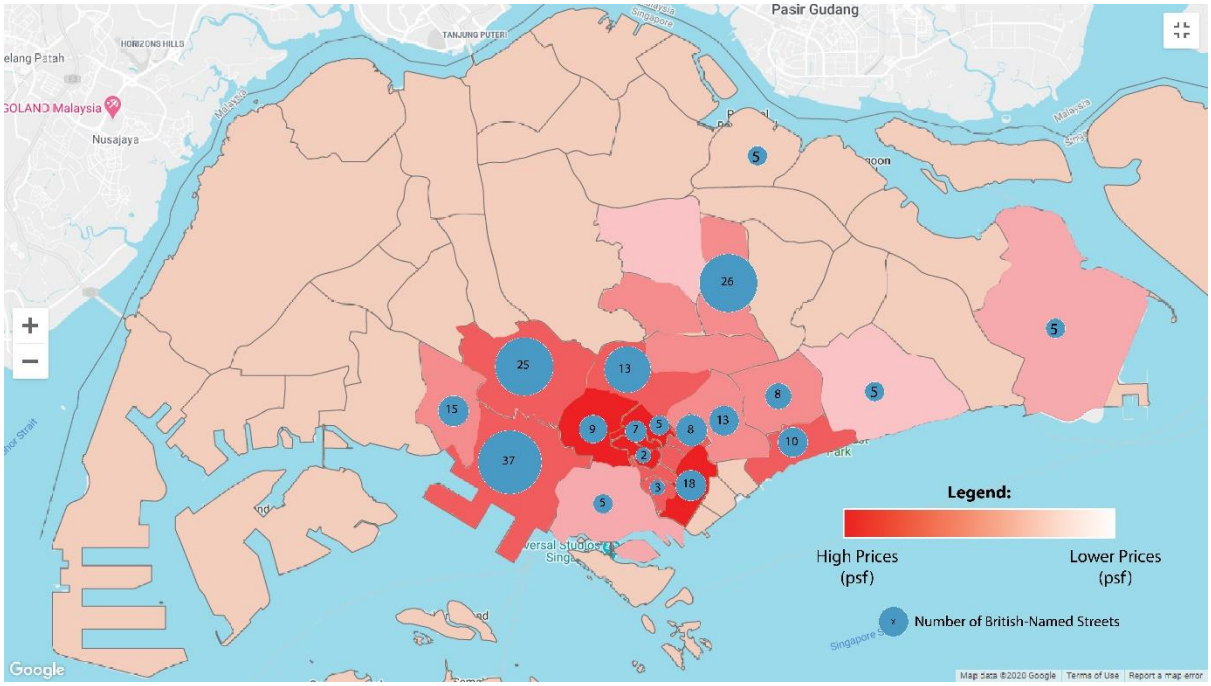
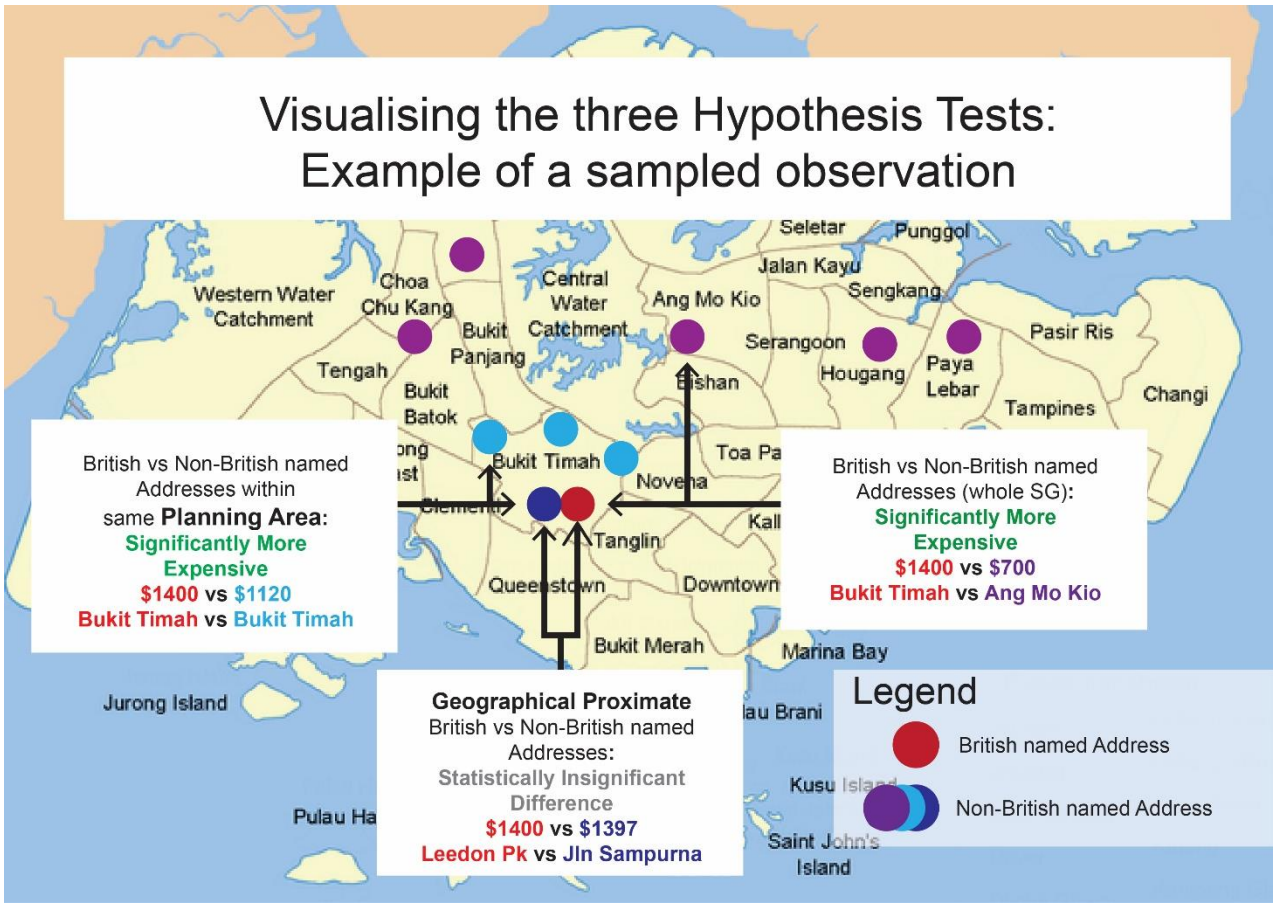


Figure 4: The Number of British Named Streets and Median psf Price (by Planning Area)



Map Image Source: Data.gov.sg

Figure 5: A visual representation of what the three hypothesis tests means



Map Image Source: Wikiprojects Singapore

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