

Investigation into the relationship between surrounding locale on property values of suburbs in Melbourne, Australia

by
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Introduction and Business Problem

As the property values continue to fall in Australia's capital cities, many Australians are seeing it as an opportunity to take advantage of the lower prices and purchase new property. Westpac bank recently reported a 11.8 % increase in respondents who think it's a good time to buy property, led by consumers in New South Wales and Victoria [1]. For those looking to buy property be it for first time home buyers, investors or business owners; location has one of the biggest impacts on purchase price, resale value or in determining if a business will do well, However, what makes good location or a bad one is a subjective topic depending on each individual's wants and needs.

This study is aimed towards informing home buyers and property investors of selected suburbs in the state of Victoria, Australia. Buyers will be able to use this information to aid them in making decision on purchasing properties in suburbs that are within their budget and explore popular venue categories in those areas while business owners are able to better decide which areas best suit their business model.

Objective

The objective of this paper is to investigate the relationship between the type of venues in the form of categories and the property values of houses and apartment units in Melbourne, Victoria.

Data Gathering

The data used for this analysis was obtained from two sources: the first are the suburb profiles collected from the 2016 census of population and housing performed by the Australian Bureau of Statistics (ABS). The data set is publicly available for download on the ABS website. This is a large dataset containing many features ranging from labour force status, family composition, occupation to qualifications for every suburb in the state of Victoria. For the purpose of this analysis only the dataset label '2016Census_G02_VIC_SSC' and '2016Census_G41_VIC_SSC' will be used. The first one contains the median values of certain feature for each suburb including age, mortgage monthly repay, personal income, household income, family weekly income, average household size and number of persons per bedroom. However, emphasis will be placed on weekly household income and age. It should be noted that the

data on incomes are from those who are 15 years or older and the survey form list income in ranges rather than requesting a specific amount. While the second dataset contains the total population for each suburb. An example of the data set is shown in figure 1 below (left). Population only counts those who are 1 year or older.

The second and third data sets that was used are the ones containing the median house and unit values for every suburb in Victoria. This data set comes from the Victorian State Government of Australia and is available from their website. It is important to note that because the last census was performed in 2016 and the next one is only scheduled for 2021, the 2016 version will be used for the analysis despite being outdated as this data is the most complete that is publicly available. The 2016 median house and unit prices will be used for consistency with the rest of the data. An example is shown in figure 1 (right).

A1											B C D E F G H I J											K L M N O P														
ESC_CODE_2016											ESC_CODE_2016											ESC_CODE_2016														
A	B	C	D	E	F	G	H	I	J		A	B	C	D	E	F	G	H	I	J		A	B	C	D	E	F	G	H	I	J					
ESC_CODE	Median_age_persons	Median_mortg	Median_tot_pr	Median_rent	Median_tot_fam	Average_nu	Median_tot_hhd	Average_household_size			Locality	Median	Median	Median	Median	Median	Median	Median	Median	Median	Median	Median	Median	Median	Median	Median	Median	Median	Median	Median	Median	Median				
1	0	0	0	0	0	0	0	0	0	0	ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	111	7.8												
2	0	0	0	0	0	0	0	0	0	0	ADAMSTOWN	720000	710000	780000	1040000	940000	850000	947000	1040000	1407000	1570000	1170000	84	6.9												
3	12	2142	1008	426	2409	1.1	2001	2.1			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	3	68	5.0											
4	12	2200	877	321	2802	0.9	2200	2.9			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	14	10.2												
5	0	0	0	0	0	0	0	0	0	0	ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	20	14.0	9.4											
6	12	2142	1008	426	2409	1.1	2001	2.1			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	14	10.2												
7	0	0	0	0	0	0	0	0	0	0	ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	21	17.4	16.8											
8	46	1170	660	0	1125	0.8	949	2.4			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	9	37	3.2											
9	1410	0	0	0	0	0	0	0	0	0	ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	9	37	3.2											
10	43	862	556	0	1187	0.7	900	2.4			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	15	12.9	8.4											
11	52	2596	427	0	900	0.6	831	2.2			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	26	12.7	8.7											
12	0	0	0	0	0	0	0	0	0	0	ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	14	13.0	8.8											
13	52	1517	851	309	1408	0.7	1187	2.1			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	14	13.0	8.8											
14	47	1400	0	0	1916	0.7	1625	2.6			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	31	31	2.7											
15	1900	0	0	0	1681	0.5	1485	1.7			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	12	12.9	8.7											
16	0	0	0	0	0	0	0	0	0	0	ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	15	15.6	9.8											
17	36	1151	438	0	900	0.9	1109	1.3			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	NA	NA	NA											
18	3000	1154	0	0	1154	0.7	2281	1.7			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	3	37.9	3.3											
19	50	1142	471	150	1187	0.7	950	2.1			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	3	33	2.9											
20	31	1500	518	284	1261	1.1	1016	2.4			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	12	12.9	8.7											
21	31	1500	518	284	1261	1.1	1016	2.4			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	12	12.9	8.7											
22	31	1500	518	284	1261	1.1	1016	2.4			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	12	12.9	8.7											
23	31	1500	518	284	1261	1.1	1016	2.4			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	12	12.9	8.7											
24	31	1500	518	284	1261	1.1	1016	2.4			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	12	12.9	8.7											
25	31	1500	518	284	1261	1.1	1016	2.4			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	12	12.9	8.7											
26	31	1500	518	284	1261	1.1	1016	2.4			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	12	12.9	8.7											
27	39	1470	671	240	1792	0.8	1478	1.7			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	11	68	5.3											
28	1385	0	0	0	1616	0.7	899	0.7			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	26	30	2.6											
29	45	1200	481	240	1792	0.8	1478	1.7			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	26	30	2.6											
30	44	1365	427	205	900	0.8	814	2.8			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	14	17.4	16.8											
31	0	0	0	0	0	0	0	0	0	0	ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	14	17.4	16.8											
32	47	1300	887	0	1541	0.7	1374	1.9			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	8	63	4.6											
33	38	2017	712	710	2862	0.9	2123	2.5			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	22	14.5	9.4											
34	2000	0	0	0	1916	0.8	1625	2.6			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	12	12.9	8.7											
35	38	1517	952	310	1586	0.8	1370	2.6			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	14	17.4	16.8											
36	2000	0	0	0	1478	0.9	1340	2.6			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	14	17.4	16.8											
37	0	0	0	0	1792	0.6	1145	2.4			ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	14	17.4	16.8											
38	0	0	0	0	0	0	0	0	0	0	ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	14	17.4	16.8											
39	0	0	0	0	0	0	0	0	0	0	ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	14	17.4	16.8											
40	0	0	0	0	0	0	0	0	0	0	ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	14	17.4	16.8											
41	0	0	0	0	0	0	0	0	0	0	ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	14	17.4	16.8											
42	0	0	0	0	0	0	0	0	0	0	ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	14	17.4	16.8											
43	0	0	0	0	0	0	0	0	0	0	ADAMSTOWN	607000	600000	640000	720000	720000	714000	702000	680000	1007000	1200000	950000	14	17.4	16.8											
44	0	0	0	0	0	0	0	0	0	0	ADAMSTOWN	607000	600000																							

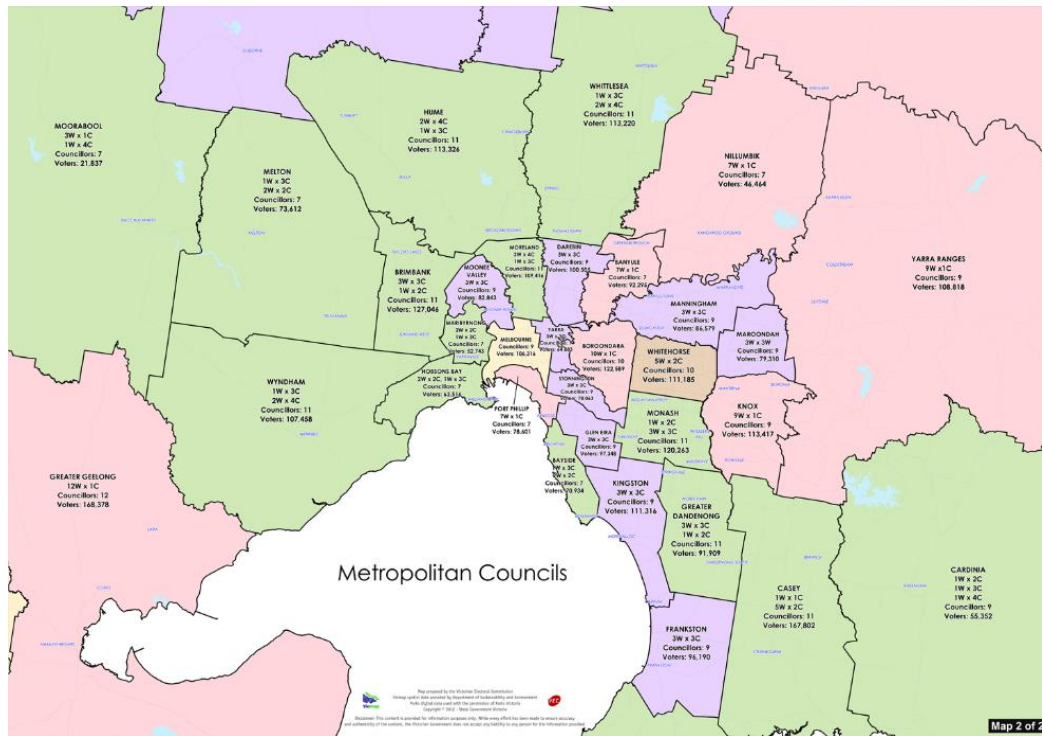


Figure 2: Map showing the city councils in Victoria [5].

The city councils chosen for this study are:

- City of Melbourne
- City of Port Phillip
- City of Yarra
- City of Boroondara
- City of Stonnington
- City of Monash
- City of Whitehorse
- City of Moonee Valley
- City of Maribyrnong
- City of Hobsons Bay
- City of Brimbank
- City of Greater Dandenong
- City of Darebin
- City of Moreland

These councils are in and around the city of Melbourne with more being on the eastern side and southern eastern part of the city and some on the western parts. This is to not bloat the analysis area by taking large land areas such as City of Melton, Hume and Wyndham, etc whilst covering a good portion of the Melbourne area.

Leveraging on Foursquare Places API

As part of the requirement of this Capstone course as laid out by IBM, Foursquare's place API is used to obtain location data for each suburb, this will be in the form of venues categories located around the suburbs of interest. Foursquare includes a "explore" method that returns venues for a user specified location. The datasets mentioned previously containing median housing values, median unit values and suburb profile data will be combined with the location data from Foursquare. Unsupervised learning will be applied to the newly formed datasets in order to group similar suburbs together. This will enable selection of suburbs based on property value and types of venues.