

Airbnb's Growth Changes Residential Property Prices in Adelaide

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Abstract: In this research, the impact of Airbnb on residential property prices in Adelaide is assessed. Many previous European and American research have connected short-term rental, Airbnb and property market and made conclusion that short-term rentals (STR) are increasing housing prices and rents. However, there is no research about Airbnb and its effects on residential property prices in Adelaide. This research aims to fit this gap and makes Plan SA know more about Airbnb's effects.

This research used multiple linear regression model to examine the Airbnb activity's effects on housing prices in Greater Adelaide during a specific time period before COVID-19. This regression model has been utilised in 3 Airbnb hotspot suburbs, Adelaide, North Adelaide and Glenelg and 3 adjected suburbs with few Airbnb listings, Thebarton, Prospect and Glengowrie in Greater Adelaide; different results in these 3 pairs suburbs has been employed to understand Airbnb's different effects in housing prices.

According to the results of regression model in different suburbs, Airbnb hotspot areas, have higher R squares and unpopular areas have smaller R squares. Considering coefficients in Airbnb hotspot areas, the number of Airbnb listings can increase housing prices and Airbnb daily can decrease housing prices. However, in unpopular Airbnb areas, R square and sample size are too small to make correlation between Airbnb and housing prices. The further study should enlarge the size of sample to verify whether there is a correlation between Airbnb and residential property prices in Airbnb unpopular areas.

Keywords: Airbnb; Short-term rental (STR); Housing prices.

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1. Introduction

Since the 1970s energy crisis, advanced developed countries began to reduce their dependence on manufacturing and expand the service sectors, mainly tourism^[1]. In Australia, tourism is a very profitable industry. In 2019, tourism in Australia contributed 3.1% to the national GDP and \$60.8 billion to the Australian economy^[2]. With the development of tourism, the hospitality industry is facing an unprecedented boom.

Meanwhile, peer-to-peer online marketplaces, such as Airbnb and HomeAway, are catering to a rising trend and becoming popular quickly because they have connected demanders and suppliers to provide flexible short-term housing rental^[3]. This kind of short-term rentals (STRs) can not only provide extra income for the residents in the host destination but also increase the usage efficiency of residents and bring benefits to the whole host city^[4]. The visitors can live like a local without burdens on

neighbourhoods and communities^[5]. Short-term rentals have been defined as the mixed-use of tourism and housing and acknowledges the economic utility of short-term rentals^[6]. STRs, like other commercial innovation products, will exceed legislative limits in the process of rapid growth. Critics of short-term rentals state that short-term rentals create conflicts between locals and visitors^[7]. Short-term rentals interfere with the long-term rentals and displace the permanent housing in the host city. This phenomenon results in low-income people's displacement and some problems with housing affordability, which can also threaten the security of the communities.

2. Literature review

This section will focus on current research on the Airbnb and housing market, highlight the development of Airbnb, the appeal of Airbnb, Airbnb's negative influences, Airbnb in Adelaide, the Adelaide residential property market before COVID and Airbnb's housing market implications.

2.1 The development of Airbnb

Airbnb is a well-known online platform for short-term rentals that is often defined as peer-to-peer, sharing economy and digital.⁸ It is usually used for short-term rental rentals (STRs). Airbnb is a worldwide phenomenon that has a variety of circumstances in diverse regions^[8]. North America and Europe have the largest Airbnb markets, followed by Oceania and East Asia (Figure 2.1).

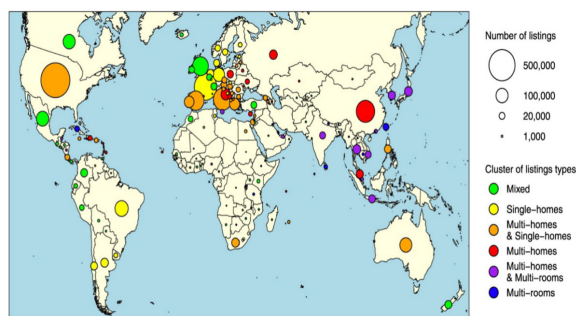


Figure 2.1 Distribution of Airbnb in 167 countries
Source⁸: Adamiak 2019

One-third of all Airbnb listings are in cities around the world.⁸ The remaining one-third are located near sea shores. According to previous research, sea shores are

defined as being within 10 kilometres of the sea but not within 10 kilometres of the city.⁸ However, due to the city of Adelaide's size, this term should be carefully studied in the Adelaide Airbnb market. In 2018, the number of Airbnb listings globally increased by 22.6 percent. Airbnb's geographical centre of gravity is shifting away from Europe and towards other continents^[8].

Airbnb has a great deal of potential as a part of the informal tourism accommodation sector^[9]. The primary reason for Airbnb's growth is that owners may run their businesses without having to invest in overhead; or employ professional management. Apart from being simple to establish and administer, researchers from University of Sydney claim that Airbnb can provide new types of housing and expand beyond tourism. Property owners have additional options when it comes to the types of properties they can market. They have the option of controlling a complete house, a single bedroom, or even a single bed. According to these types, property owners can run Airbnb when travelling or only have a vacant bedroom.⁷ In Oceania, the capacity of residential property is greater than in other countries^[8]. Airbnb's development has also been analysed from the consumers' perspectives.⁷ Airbnb is not only a place to live while travelling but also a good choice to fill the gap when they are moving house and doing check-out cleaning. Investors also promote the development of Airbnb because they are more likely to keep the property to earn profit with reasonable Airbnb listing prices in Oceania^[9]. Due to the continued high demand and supply of Airbnb, Airbnb will keep developing in the future virtually.

2.2 The appeal of Airbnb

According to current literature, the appeal of Airbnb usually comes from users^[10]. The main appeal of Airbnb is the economic perspectives for hosts and consumers^[11]. The hosts earn extra income at competitive prices by utilising their idle spaces^[10]. Consumers are likely to focus on their experiences while travelling rather than the expense of the Airbnb. Visitors can afford a leisure destination because they rethink the shared economy^[12].

The users' experience is as crucial as the financial

incentive when analysing the appeal of Airbnb^[10]. A study has been conducted in Berlin. In this research, consumers are not only focusing on the prices but also local experiences^[12]. This result supports the authenticity theory^[13]. This theory is a factor to describe engaging and satisfying city tourism. This authentic experience is the critical principle for Airbnb and is as important as prices for young travellers^[10]. The research results reveal that millennials are into this authentic culture^[10]. With the development of digital platforms, people can experience actual experiences like locals^[14].

Airbnb is attractive because it can minimise the effects on the environment^[10]. Airbnb promotes housing's sustainability and practical business, as does the sharing economy^[10]. Airbnb can also make residential property efficient. However, this appeal is related to Airbnb's location^[12]. Airbnb is concentrated in the city centre and suburbs near tourist attractions^[15]. Therefore, the residential property in these two kinds of locations can be prominent to show the effects of Airbnb. These two sorts of areas are the principle for selecting suburbs to understand Airbnb's effects on housing prices and rents in Greater Adelaide.

2.3 Airbnb's negative influences

Although Airbnb is attractive, it still shows its negative impacts. Wealthy travellers are demanding more local, green, ethical and authentic experiences, which are transforming the suburbs to the detriment of the local community. The suburbs have been changing to meet the wealthy consumers, residents and visitors' demand^[10]. Some of these changes are negative influences on the urban environment.

The first negative effect is the rent gap and increased housing prices. The rent gap theory was first mentioned by Smith in 1979 to explain the gentrification in New York City^[16]. This rent gap comes from the difference between potential income and actual income (Figure 2.2). As Airbnb has evolved, the investors or wealthy residents realise that they can get a reasonable income for the STRs. The Highest and Best Use is changing from residence to investment for travellers^[16]. Although the rent gap cannot

decrease the supply of the residents in the housing market, it reduces the tenants' choices in property and raises rents. In New York City, Airbnb creates a more significant rent gap, excluding residents from many areas^[16]. These investors also bring in capital into local neighbourhoods, which substantially increased housing prices.

The rent gap encourages owners to displace tenants and remove property from long-term rentals^[16]. The second negative effect is displacement and gentrification. Tenants have to pay more to have a chance to live in a property for a long time, or they have to move out of this community^[17]. High-income migrants are more flexible in choosing where they want to live or invest. As the displacement continues, the whole suburb can be replaced by a new group of high-income people. The displacement will result in reconstruction and luxury property. This condition will make the rent gap greater because the potential rents will be higher. This is a social influence, which is gentrification^[18]. This research points out that gentrification in some suburbs may lead to an unbalanced housing market and social security problems. Wachsmuth and Weisler's study also show that gentrification may intensify racial isolation because Airbnb increases rapidly in non-Hispanic neighbourhoods.

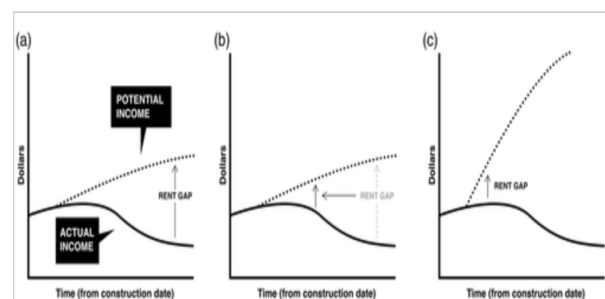


Figure 2.2: the theory of rent gap

Source¹⁶: Wachsmuth and Weisler 2018

Some researchers also evaluate Airbnb's negative influences from neighbours and local residents' perspectives^[10]. A research published in 2015, reported complaints about Airbnb, including excessive noise, security issues and conflict with hosts. Local people usually believe Airbnb's guests cannot be accurately identified and guarantee neighbours' security^[18]. The occupation of public resources is another argument against Airbnb. Many researchers explain that Airbnb does affect

the hotel industry through revenue shareholders' equity, employment and marketing plans^[19]. However, this sort of influence will not be included in this dissertation, which focuses on the residential property market rather than the whole economy.

2.4 Airbnb in Adelaide

The feature of the location of Airbnb listings in Adelaide is similar to European and American countries^[20]. The Airbnb listings are concentrated on the centre of Adelaide and coastal suburbs. Before COVID-19, active listings and demand for Airbnb are in a rising trend from August 2018 (Figure 2.3). Since early 2021, the Airbnb market in Adelaide has been recovering from the global pandemic^[20].

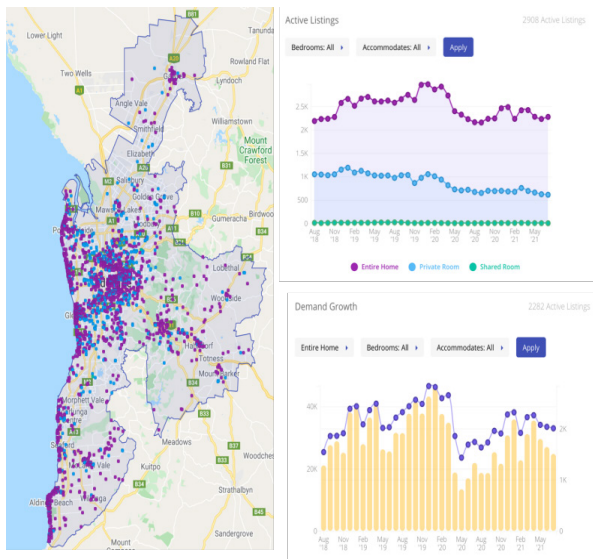


Figure 2.3: Location, supply and demand of Airbnb listings in Adelaide
Source²⁰: AirDNA 2021

When it comes to the regulation of Airbnb in Adelaide, unlike other cities, the legislation of Airbnb in South Australia is less clear^[21]. Based on the previous Development Plans, in the Greater Adelaide area, there were three councils that had limitations on shared houses^[22]. The Adelaide City Council limited Airbnb through requiring permits if the property had shared toilets, kitchens and bathrooms^[23]. The city of Burnside did not allow lodging houses without licences^[24]. City of Port Adelaide Enfield regulated the lodging houses whose capacity was over five people through licences^[25]. Airbnb is more likely to be seen on a business basis

because of its access to the public and ability to earn profits^[26]. However, this business basis is not seen as changes in land use, which should be applied through councils. With the abolishment of development plans in different councils, the Planning and Design Code does not have specific restrictions on the hotel, Airbnb, or sharing facilities with others. In this relatively new publication, the short-term accommodation seems to be recognised and recommended. For example, in the Capital City Zone, the code encourages developing mid and high-density dwellings, including short-term rentals, without any limitations in details. Therefore, Airbnb is not restricted in this area and has few regulations.

In Adelaide, Airbnb will also be limited by the title of land^[22]. Community Titles Act 1996 (SA) gives the power of Strata corporations to limit owners and residents. In section 34, the Strata corporation cannot prohibit all owners from leasing their property as short-term rentals, but it can forbid a less than two-month lease in South Australia. For Airbnb in Adelaide, the main conflicts are from nuisances. However, not all nuisances can complain unless neighbours can provide evidence that they have been affected. Moreover, complaints cannot be solved in a timely manner, so the property rights have usually been damaged. Limiting Airbnb by charging Airbnb owners and using the money raised from these charges to invest in the local area to benefit the locals^[27]. When it comes to the Torrens title, the property rights are greater than the strata title corporation's limitation. The options of property owners are greater, therefore limiting Airbnb on Torrens title has a long way to go in Adelaide.

2.5 Adelaide residential market before COVID

Up until the impact of COVID-19, residential property prices in Adelaide, were growing at a slow speed, so this sub-section will analyse Adelaide residential market before the global pandemic. Based on the ABS Established House Price Index, Adelaide's house prices increased by 3.8% before early 2020^[28]. The demand for residential property in Adelaide was soft but sentiment was improved in 2019^[29]. Detached houses were more popular than apartments before COVID that

this phenomenon would keep going. The pipeline of supply was shrinking and detached houses approvals decreased^[29]. When it comes to the rental market, the vacancy rate was at a low level, 0.8% in Greater Adelaide. The weekly rentals grew by 1.3% for houses in Greater Adelaide. The gross rental yield was 4.1% for detached houses. Due to a combination of low vacancy rates and high yield, Greater Adelaide was seen as a great area to invest. During the period from September 2018 to March 2020, rental housing market, especially rental detached houses, were showing very good ability to investment returns. The investment of short-term rentals, which is a kind of investment in rental market, were playing a role in providing income for property owners.

2.6 Airbnb's housing market implications research

Aiming to find the connection between Airbnb's growth and residential property prices in Adelaide, it is necessary to analyse the precedent studies about Airbnb's housing market implications. Airbnb's housing market implications usually come from the demand and supply side of the housing market. These two sides of the housing market contribute to the discovery of the relationship between Airbnb, rents and housing prices. The demand side of the housing market has been segmented into different types of rentals to satisfy other consumers' preferences^[30]. The segmentation of the supply side points out the shared-housing premium, which is the reason for increases in rents.

Consistent with the supply-side theory, a larger number of listed Airbnb properties led to fewer long-term rentals available. Researchers in this should be used the regression analysis to find the number of Airbnb listed and rental growth. On average, a 1% increase in Airbnb listings resulted in a 0.018% increase in indexed rental rates in US metropolitan areas.

Many academic articles have researched the relationship between Airbnb and rents. For example, a Bartik-like instrument approach that focused on the distance to the beach and typical tourist attractions has been involved in^[31]. This approach attempted to show

the influences of Airbnb's density on housing rents in Barcelona. With the growth of Airbnb, the rents increased by 4% between 2009 and 2016. The German research apply the regression results pointed out by research in New York City and they found a 1.4% rise in rents due to Airbnb's expansion in that city. There is a research based on the Boston housing market^[32]. They discovered a correlation between Airbnb prices and city rents in Boston.

Moreover, other research focused on the impact of Airbnb listings on house prices in New York City. This research applies not only a hedonic model but also a matched difference-in-differences approach to obtain the result that sold property prices had been increased by 3.5% while Airbnb was growing. Research in the USA applied a quasi-experimental approach to evaluate the effect of Airbnb listings on house prices in Los Angeles County. Their research showed that Airbnb's growth raised property sold prices by 3%^[33].

Some literature analyses Airbnb's housing market implications by people's factors. Demography data and spatial data analysis has been used to understand Airbnb's influences on the Madrid housing market. This research can aid in the understanding of Airbnb's effects on the economy and the gentrification in Madrid. The results of this research can be widely used in the gentrification study. Airbnb usually is tied with housing affordability in the host destination^[16]. This study aims to find a relationship between the development of Airbnb and local residents' daily lifestyles and happiness.

These current studies were more based on European and American cities, and few of them was based on Australia. After analysing European countries and America, they have different situations in housing market. The cities in European countries are smaller with less population^[3]. This characteristic is more similar to the city of Adelaide. In European countries, such as Spain, there are many historical building and heritages, which are seen as tourist attractions. Adelaide is a small city with a long coastal line, which is a great tourism resource. Therefore, the methodology in Madrid's research is more suitable to use in Adelaide.

3. Methodology

Many high-income travellers come into a city and bring extra income for landlords. In earlier studies, this additional income is a crucial factor in proving that Airbnb can increase the value of the property^[18]. From 2010, researchers are considered other factors, such as consumers satisfaction^[34] and nuisance in the community^[35]. Researchers from different countries have recognised more and more Airbnb factors within their theoretical framework and often use a regression analysis model^[35]. Therefore, the methodology in this dissertation will also use the regression model.

3.1 Multiple linear regression model

3.1.1 Hypothesis

The main hypothesis is the increase of Airbnb listings will increase the housing price in Adelaide. The period is from September 2018 to March 2020 to avoid the effect of the COVID because Australia closed its border from March 2020^[36]. The growth of residential property prices is affected by many factors, such as transportation, facilities and shopping centres^[37]. In this dissertation, these factors will not be considered. This research only considers two factors, which are the number of Airbnb listings and Airbnb daily prices.

3.1.2 Linear regression model building

The equation is made up of a dependent variable Y , a set of m independent variables X_i ($i=m$), coefficients, and an error^[37]. The coefficients a_0 , a_1 , a_2 and a_3 are non-random unknown quantities that need to be determined mathematically. They can minimise the error sum of residual's squares. The e is the error. Therefore, the equation can be:

$$Y = a_0 + a_1X_1 + a_2X_2 + a_3X_3 + e$$

In this dissertation, Y is the residential property price in one suburb. X_1 is the number of Airbnb listings in one suburb. X_2 is Airbnb overnight price in the same suburb. X_3 is an optional variable, which will not be used in this research. The coefficients a_0 , a_1 and a_2 will vary in

different suburbs. The error is 0.

3.1.3 Linear regression model practice

To utilise this model to understand the housing price and Airbnb's growth, the research will use the following steps.

First, this research will use 3 suburbs; Adelaide, North Adelaide and Glenelg, which are Airbnb hotspot areas, as well as another 3 adjacent suburbs; Thebarton, Prospect and Glengowrie, which have a limited number of Airbnb listings. The reason for selecting Adelaide, North Adelaide and Glenelg as Airbnb hotspot areas is trying to maintain variety of sample areas. Adelaide CBD has many facilities. North Adelaide is character suburb. Glenelg is the most famous beach in Adelaide. To understand the different relationships between the Airbnb market and residential property prices, one suburb in a hot area and one suburb nearby will be treated as a pair. The extent of Airbnb's effects on the housing market will vary in different suburbs with different situation of the Airbnb markets. The groupings of selected suburbs are Adelaide/Thebarton, North Adelaide/Prospect and Glenelg/Glengowrie.

Next, this research will use the number of Airbnb listings, Airbnb overnight prices and housing prices in these 6 suburbs in the period from September 2018 to March 2020. The Airbnb data will be sourced from AirDNA website. The growth of Airbnb will be shown by the increasing number of Airbnb listings and their changing prices. However, Airbnb is seasonal. Its overnight prices fluctuate. The changing housing prices will be sourced from website SQM research by postcode. Sometimes, the same postcode may cover many different suburbs, so postcode and suburbs have been selected thoughtfully to avoid the error.

This research will then use this data to create multiple linear regression equations in these 6 suburbs. The R square of the linear regression model will help explain the relationship between Airbnb market and housing prices. The higher R square, the more accurate multiple linear regression equations. Coefficients a_0 , a_1 , and a_2 , will illustrate the relationship between the change

in the Airbnb market and housing prices. The various coefficients will also indicate the extent of influences.

Finally, the census demographic data and living conditions can be used to analyse and help explain the coefficients in different suburbs. For example, in Adelaide, the large number of expensive restaurants could attract wealthier travellers and push the development of Airbnb. This is just one example of a coefficient explanation. Following the confirmation of the hypothesis by the linear regression model, some reasons for different coefficients will be discussed. Moreover, each pair of suburbs will be compared together to find trends.

3.2 Data collection

This research selected 6 suburbs and attempts to understand Airbnb's relevance to the residential property market. In this section, the regression analysis in the suburb of Adelaide and Thebarton are highlighted. The data of the other four suburbs is in the Appendices.

Table 3.1 Airbnb listings, prices and housing prices in Adelaide city

Adelaide 5000			
Month	Airbnb listings X1	Airbnb daily price X2	Housing prices Y
2018/09	365	\$159	\$587,058
2018/10	357	\$159	\$607,316
2018/11	347	\$178	\$628,822
2018/12	398	\$189	\$595,239
2019/01	417	\$185	\$585,640
2019/02	410	\$178	\$594,415
2019/03	447	\$186	\$594,707
2019/04	435	\$162	\$594,732
2019/05	422	\$148	\$593,733
2019/06	422	\$143	\$625,546
2019/07	437	\$148	\$615,548
2019/08	445	\$152	\$687,736
2019/09	461	\$150	\$681,483
2019/10	473	\$157	\$622,093
2019/11	463	\$167	\$629,597
2019/12	519	\$172	\$690,912
2020/01	520	\$166	\$694,872
2020/02	524	\$167	\$694,992
2020/03	545	\$161	\$694,999

Table 3.2 Regression statistics in Adelaide city

Regression Statistics				
Multiple R	0.766500313	ANOVA	df	SS
R Square	0.58752273	Regression	2	19459502138

Adjusted R Square	0.535963071	Residual	16	13661773246
Standard Error	29220.89711	Total	18	33121275384
Observations	19			

Table 3.3 Coefficients and Standard error in Adelaide city

	Coefficients	Standard Error	t Stat	P-value
Intercept	473165.8528	103311.9298	4.579973036	0.00030822
Airbnb listings X1	553.867433	122.1746964	4.533405436	0.00033929
Airbnb daily price X2	-520.3308962	501.6768572	-1.037183376	0.31507218

The linear regression model in Adelaide about Airbnb market and housing price is $Y_{\text{Adelaide}}(\text{Residential property prices in Adelaide}) = 473165.85 + 553.88X_1 - 520.33X_2$

The number of Airbnb listings in Adelaide is positive relevant to residential property prices in Adelaide. The Airbnb daily price in Adelaide is negative relevant to the housing prices.

Table 3.4 Airbnb listings, prices and housing prices in Thebarton

Thebarton 5031			
Month	Airbnb listings X1	Airbnb daily price X2	Housing prices Y
2018/09	3	\$100	\$564,085
2018/10	3	\$84	\$547,945
2018/11	3	\$96	\$591,123
2018/12	3	\$97	\$558,508
2019/01	4	\$103	\$559,594
2019/02	4	\$115	\$584,337
2019/03	4	\$118	\$593,642
2019/04	6	\$113	\$615,909
2019/05	4	\$78	\$592,635
2019/06	5	\$89	\$560,915
2019/07	5	\$91	\$576,807
2019/08	5	\$79	\$592,519
2019/09	5	\$95	\$617,368
2019/10	5	\$101	\$582,977
2019/11	7	\$88	\$587,108
2019/12	7	\$127	\$573,422
2020/01	8	\$119	\$570,786
2020/02	7	\$124	\$622,612
2020/03	7	\$128	\$570,776

Table 3.5 Regression statistics in Thebarton

Regression Statistics				
Multiple R	0.303881562	ANOVA	df	SS

R Square	0.092344004	Regression	2	725378377.6
Adjusted R Square	-0.021112996	Residual	16	7129797370
Standard Error	21109.53187	Total	18	7855175748
Observations	19			

Table 3.6 Coefficients and Standard error in Thebarton

	Coefficients	Standard Error	t Stat	P-value
Intercept	561288.6115	32070.87596	17.5015055	7.4089E-12
Airbnb listings X1	3893.192706	3619.281121	1.07568121	0.29802348
Airbnb daily price X2	14.77176072	360.0381351	0.04102832	0.96778094

The linear regression model in Thebarton about Airbnb market and housing price is $Y_{\text{Thebarton}}$ (Residential property prices in Thebarton) = $561288.61 + 3893.19X_1 + 14.77X_2$

According to this regression equation, the number of Airbnb listings in Thebarton is positive relevant to residential property prices in Adelaide. The Airbnb daily price in Thebarton is also positive relevant to the housing prices. However, the R square in Thebarton is less than 30% which means the regression equation in Thebarton has a very weak ability to explain the relationship between Airbnb market and housing prices. This equation will be affected by other factors easily.

4. Results

4.1 Graphic evidence

The graphic evidence can illustrate Airbnb's influence on the housing market from a broad perspective before considering the results of the regression model. Figure 4.1 shows a substantial correlation between the number of Airbnb listings and home prices in an Adelaide neighbourhood. From November 2019 to March 2020, this tendency became more visible, as house prices and Airbnb listings both increased dramatically. In Adelaide, the changing property prices and the changing number of Airbnb listings both showed comparable growth tendencies. However, the correlation between Airbnb overnight prices and housing prices is weak, and the

degree of correlation cannot be obtained directly from this data.

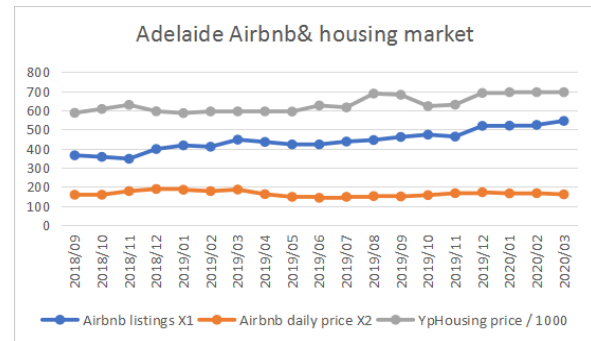


Figure 4.1 Airbnb listings, Airbnb daily prices and housing prices in

Adelaide city
Source: Author

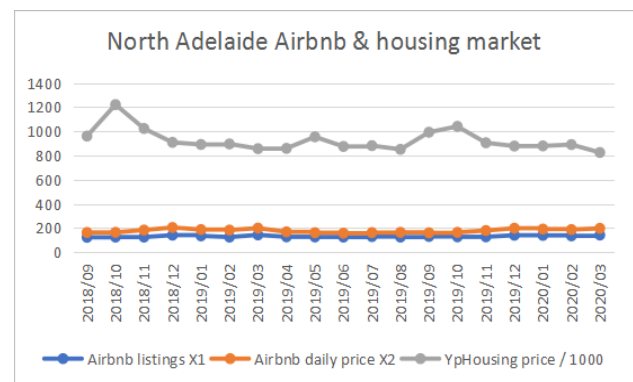


Figure 4.2 Airbnb listings, Airbnb daily prices and housing prices in

North Adelaide
Source: Author

One of the reasons that housing prices in North Adelaide (Figure 4.2) are higher than in Adelaide city is because the gross floor space in these areas is larger. As tiny variations in the number and prices of Airbnb may be obscured when housing prices rise, a simple line chart cannot clearly depict the association between the Airbnb market and residential pricing. Any correlation should be visible in the statistics results of a regression model. To understand the relationship between Airbnb daily prices and housing prices, the regression model and analysis can show more detailed information.

4.2 Adelaide city

According to the results of the regression model, which has been described in the previous data analysis part of this research, the suburb of Adelaide has exhibited a similar situation to European countries and the USA.

The R square of the Airbnb market and housing prices is 58%, which means the Airbnb market is strongly connected to housing prices. The larger the R square, the higher the relevance between Airbnb's growth and housing prices. This R square is large enough to indicate the relationship between the number of Airbnb listings, Airbnb daily prices and housing prices with less errors or other factors' effect.

According to the table of coefficients, the formula can be built in the suburb of Adelaide as Y_{Adelaide} (Residential property prices in Adelaide) = $473165.85 + 553.88X_1 - 520.33X_2$, the increasing the number of Airbnb listings is correlated with an increase in the housing price in the suburb of Adelaide. This equation is stating that for each Airbnb listing added, the housing prices in Adelaide increases \$553. The Airbnb overnight prices are negatively correlated with housing prices. Each dollar increases in Airbnb daily prices, the housing prices will decrease \$520.33.

4.3 Thebarton

Thebarton's regression model result was mentioned in the previous section. As Thebarton's R square is 9%, the Airbnb and residential property markets have a low coefficient. To put it another way, the Airbnb market is not a big factor in Thebarton. In Thebarton, the ownership of land, facilities, infrastructure, and property condition may have a greater impact on home prices. Despite the fact that Airbnb is not a major contributor, it has impacts on housing prices when the housing market is not affected by other factors. According to the coefficient results, the number of Airbnb listings and Airbnb overnight prices can be illustrated as equation $Y_{\text{Thebarton}}$ (Residential property prices in Thebarton) = $561288.61 + 3893.19X_1 + 14.77X_2$. Each additional Airbnb listing in Thebarton will raise housing prices by \$3,839,19. Meanwhile, each dollar added to Airbnb overnight prices raises housing prices in Thebarton by \$14.77. This phenomenon is the polar opposite of what happens in Adelaide.

4.4 North Adelaide

The regression model has been applied to data

relating to North Adelaide. From the tables, the R square between Airbnb market and housing market of North Adelaide, is 19%, which means the number of Airbnb is relevant to housing prices, but Airbnb's growth will not greatly impact housing prices in North Adelaide. When it comes to the specific impacts on housing prices, North Adelaide has its special equation. $Y_{\text{North Adelaide}}$ (Residential property prices in North Adelaide) = $1690039 - 5458.78X_1 - 244.7X_2$. In this formula, the coefficient of X_1 is -5458.78. The negative coefficient means for each Airbnb listing added, the housing prices in North Adelaide will decrease by \$5,458.78. The Airbnb daily prices can also decrease the housing prices.

4.5 Prospect

In Prospect, the R square between housing market and Airbnb market is 1.2%, which means the number of Airbnb listings and Airbnb daily prices almost do not have a correlation with housing prices in Prospect. Airbnb listings are not vital for housing market in this area.

According to the coefficients in Prospect, Y_{Prospect} (Residential property prices in Prospect) = $487192.493 + 1017.63X_1 + 677.65X_2$. In this formula, the coefficient of X_1 is 1017.63. The negative coefficient means for each Airbnb listing added, the housing prices in Prospect will be increase by \$1,017.63. Each dollar increases in Airbnb overnight prices, the housing prices increase \$677.65. The degree of accuracy of this equation will be increased after involving in more externals.

4.6 Glenelg

According to the data from utilisation of regression analysis in Glenelg, the Airbnb market has a quite strong coefficient with housing prices. The R square is 36%, which means Airbnb market is relevant to housing prices. The coefficient results of the regression model in Glenelg can confirm this relationship.

The Airbnb market and housing prices equation can be written as Y_{Glenelg} (Residential property prices in Glenelg) = $316285.72 + 2528.28X_1 - 74.13X_2$. Each Airbnb listings added can increase \$2,528 in housing prices in Glenelg.

4.7 Glengowrie

The evidence from regression statistics results confirms that R square in Glengowrie is 3%, which means the Airbnb market has virtually no correlation with housing prices. This lack of correlation can be attributed that travellers being less likely to choose to stay in this suburb.

According to the results of coefficients in Glengowrie, the Airbnb market and housing prices equation can be written as $Y_{\text{Glengowrie}}$ (Residential property prices in Glengowrie) = $648400.7 + 3037.33X_1 + 47.6X_2$. Each Airbnb listings added can increase \$3,037.33 in housing prices in Glengowrie. Each dollar added in Airbnb daily prices can increase in housing prices in Glengowrie by \$47.60. This equation cannot be the only evidence when analysing the reason for changes in housing prices.

5. Discussion

5.1 Adelaide city

In Adelaide city, the number of Airbnb listings have a positive coefficient and Airbnb daily prices have a negative coefficient with housing prices. The characteristics of Adelaide city and the features of Airbnb market in Adelaide city can be used to help explain the reason for these two different coefficients. Infrastructure and facilities can help explain the positive correlation between Airbnb growth and housing prices^[18]. In the suburb of Adelaide, there are many popular attractions, such as Rundle Mall, Central Market and Botanic Garden. Travellers are more likely to be attracted by these locations and decide to stay near these places, even though Airbnb daily prices are higher than other areas. Many restaurants and department stores can also be found, and this that plays a role in attracting travellers. From the Airbnb travellers' view, they can have easy access to more facilities if they stay in the suburb of Adelaide. Figure 5.1 shows the locations of Airbnb listings^[20]. Airbnb listings in Adelaide city are centred at the north-east side of Adelaide and near China Town. The density of Airbnb listings in the southern of Adelaide city is much lower than the northern side.

As Airbnb listings are popular in Adelaide city, more landlords could be attracted by extra income from Airbnb and change their properties to short-term rental. The residential property in Adelaide, which can be used as long-term rental, will be decreased as many of them have become Airbnb. Changing the supply of property is time-consumed due to property need time to be constructed, so the tenants, who want to stay longer will need to pay higher rents to escape from replacement^[10]. Poor tenants, who cannot afford the increasing rents, have to move out this property or this community^[3]. This phenomenon may result in gentrification in Adelaide city. While tenants want to pay more rents to have a long-term lease contract, the value of investment could be realised by more landlords that increases residential property prices in Adelaide city.

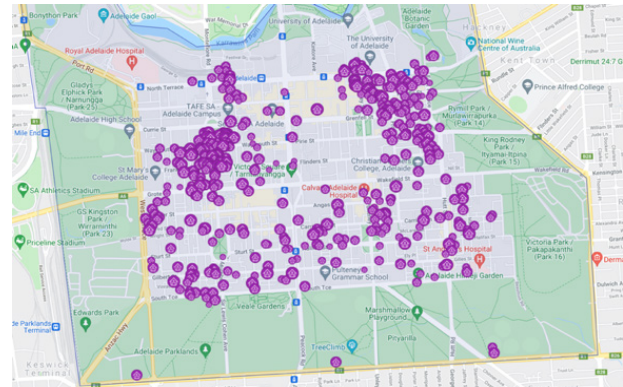


Figure 5.1 Location of Airbnb listings in Adelaide city

Source³: AirDNA 2021

The high density of Airbnb listings and the sharing economy can also help explain the negative correlation between Airbnb overnight prices and housing prices^[3]. In suburb of Adelaide, the density of residential property is high and have more neighbours. High overnight prices can mean high demand of Airbnb. However, while the demand of Airbnb is increasing, the neighbours are facing more risks in relation to security and peace and quiet. As local residents usually believe Airbnb's guests cannot be accurately identified and guarantee neighbours' security, the dwelling in specific area in a suburb may be less likely to be purchased^[10]. They should be tolerant of different neighbours, strangers and noisy parties until mid-night. Meanwhile, the public resources in the city or community, such as parks and roads, will be partly occupied by Airbnb travellers^[18]. The limited public resources in a community

can also decrease potential purchasers. Therefore, the coefficient between Airbnb overnight prices and housing prices is negative in Airbnb hot spots, if considering the feeling of local residents.

5.2 Thebarton

The data in Thebarton differs significantly from that in Adelaide. The correlation between Airbnb market and housing prices is very weak in this area. Despite the fact that Thebarton is only 0.91km from the Adelaide city, there are far less Airbnb listings^[38].

The distance to stores, restaurants, and shopping malls is a crucial factor of Airbnb in Adelaide, and the map of Airbnb listings in Adelaide City confirms this. This principle of Airbnb listings' location, however, does not operate in Thebarton. There are no retail malls or a concentration of restaurants in this area. Thebarton is not a tourist destination that can draw visitors. When it comes to property appearance in Thebarton, most properties appear to be old and in need of maintenance. When it comes to services and amenities, wealthy travellers are less inclined to prefer short-term rentals in this area because amenities are few. The landlords' pursuit of rental income, rather than external factors, is more likely to be the reason for renting out as Airbnb in Thebarton.

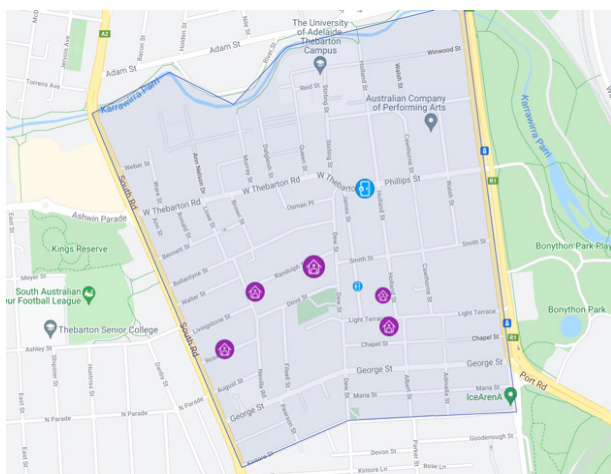


Figure 5.2 Airbnb listings in Thebarton
Source²⁰: AirDNA 2021

Aside from the behaviour of landlords, travellers' ideas also assist researchers in understanding the results of the interaction between Airbnb and the housing market, as travellers reduce the supply of property in the local

market. As the supply of property declining, the housing prices may increase. Thebarton has less than 10 Airbnb listings from September 2018 to March 2020, so the supply of long-term rental dwellings will not decrease sharply by short-term rentals in this period. The changes of housing prices will not be affected by the number of Airbnb listings. The reviews on the Airbnb website can be utilised to determine why travellers chose this suburb. A two-bedroom house with a garden, for example, has been on the market since August of 2018. (Figure 5.3). Considering the feedback from those travellers who stayed in this property, location and transportation are words which are used most frequently. This property is next to the main road and five minutes walking distance to the bus stop^[20]. The cheap overnight prices, clean environment and quiet sleeping area were also mentioned by consumers. These factors, which have been mentioned by consumers, can be the new factors when analysing the Airbnb's impacts in suburbs with few Airbnb listings.

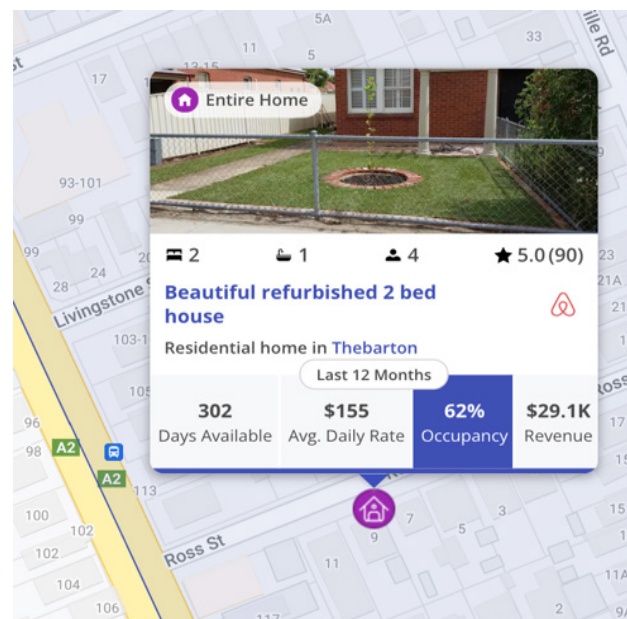


Figure 5.3 An example of Airbnb listings in Thebarton
Source²⁰: AirDNA 2021

However, the sample size of Airbnb listings in Thebarton is very small and Thebarton is not a very hot property market or investment location. According to census statistics from 2016, more than half of the residents live in their own home^[39], indicating that property in this area is used for living rather than investment. Therefore,

housing prices in Thebarton may not be affected by Airbnb listings, which are a short-term investment. The regression equations should consider more externals in this suburb.

5.3 North Adelaide

Both the number of Airbnb listings and Airbnb daily prices have negative coefficients with housing prices in the regression model equation this may be explained by the character buildings in North Adelaide (Figure 5.4)^[40].

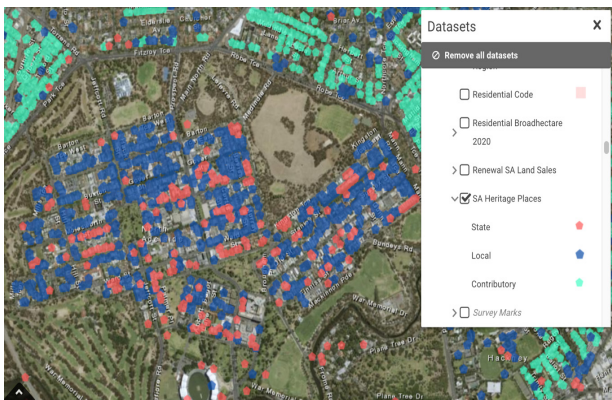


Figure 5.4 Heritage buildings in North Adelaide

Source⁴⁰: SA viewer 2021

Due to the high number of character buildings in this area, the house prices will not only be affected by the housing condition, but also be affected by purchasers' preference. The character buildings have special attraction which can increase the housing value. These character buildings usually have a hundred-year history and have been depreciated; character buildings are more likely to be damaged due to travellers' visiting behaviours. The landlords of these character buildings need to spend more money to fix the properties if character properties are damaged by short-term tenants. The correlation between Airbnb daily prices and housing prices in North Adelaide is negative. The Airbnb daily prices increasing means more travellers coming and high demand, which may increase the potential risks of repairing on these character buildings. The neighbours may not accept overnight accommodation provided for travellers near their character properties because travellers, especially international travellers, may not understand the importance of character buildings. Therefore, a greater number of Airbnb listings

and Airbnb daily prices, the lower housing prices in North Adelaide, is a special situation in the Adelaide Airbnb and housing market.

5.4 Prospect

A possible explanation for no correlation between the number and prices of Airbnb and housing prices in Prospect is that Airbnb is unpopular in this suburb. The size sample of Airbnb listings here is not big enough to avoid errors or Airbnb is not a key point in Prospect. Prospect is 5.1 Km away from the Adelaide city^[41]. Due to the longer distance, Airbnb travellers are more likely to select to stay in North Adelaide or Adelaide city rather than Prospect. Airbnb consumers have some negative feedback on the Airbnb listings in Prospect regarding public transport. In some areas in this suburb, consumers felt it is hard to connect with public transportation^[41]. Transportation is one of the most vital factors of Airbnb^[20]. Airbnb listings cannot be developed with poor public transport. When it comes to the surrounding environment of Airbnb listings, Prospect is a traditional residential area with a lower level of commerce. It also has weak connection with tourist attractions, which is another important aspect usually considered by travellers. According to lack of key factors to develop Airbnb, Airbnb market in Prospect is not changed a lot. Therefore, in Prospect, Airbnb market with little growth has an extreme tiny influence on housing prices.

The lack of correlation between Airbnb market and housing prices in Prospect can also be explained by the economic motivations^[16]. Prospect is a suburb of residences rather than investment. The data on the AirDNA shows that Prospect is not a hot area for Airbnb. Therefore, as few Airbnb listings are being listed, Airbnb listings and daily prices will not change housing prices directly. As Prospect has few Airbnb listings and is not a hot area for short-term rent, the extra income will not result in a sharp increase in the number of Airbnb listings and reduce supply of residential property. The extra income from increasing Airbnb daily prices can provide a premium for few landlords but it is not a common in Prospect.

5.5 Glenelg

Glenelg, which has comprehensive facilities, is one of the most famous beaches in Adelaide. It has a good transportation connection and good ability to attract travellers. The number of travellers is a key factor when analysing the development of self-catered accommodation^[18]. According to the tourism data on the Australian Bureau of Statistics, the number of travellers was at a high level with some fluctuations before Australia closed its borders. The number of Airbnb listings had the similar trend to the number of travellers, so the impacts of Airbnb is more relative to the travellers' behaviours in Glenelg.

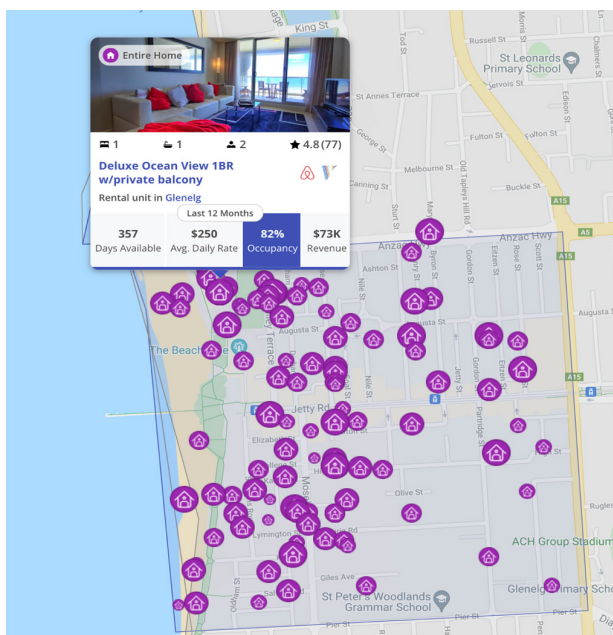


Figure 5.5 Airbnb listings in Glenelg

Source²⁰: AirDNA 2021

In Glenelg, Airbnb is popular in apartments which have better sea views. According to the location of the Airbnb listings in Glenelg, the western area has more Airbnb listings than the eastern area (Figure 5.5). This situation is most likely due to the fact that the beach is to the west. As travellers are more likely to live near sea, the problems of Airbnb should be more obvious. Noises, parties and security issues are more common in the western side of Glenelg. The capacity of the units and apartments is not very big, so these issues will not be too great. The strata title corporation has rights to limit the number of people and parties. Therefore, these

issues could reduce housing prices and reduce conflicts between neighbours. There is a large coefficient between Airbnb listings and housing prices. It can be attributed to the lower risk of operating Airbnb and Airbnb limitation policies. Apartments and units, which are popular for wealthy travellers, have been limited by policy, so conflicts with local residents could decrease. The growth of Airbnb will increase housing prices due to this explanation. Glenelg is a hot area of Airbnb. As demand of Airbnb listings increasing and supply of Airbnb is maintained, the increase of Airbnb overnight prices reflects the growing Airbnb demand. High Airbnb demand is possible to exceed the supply of short-term rent. The housing prices in Glenelg can be decreased by increasing Airbnb daily prices.

5.6 Glengowrie

Glengowrie is a suburb near Glenelg. According to the demography data on Property value website^[42], Glengowrie has a middle-class income, with 71.8% of dwellings being owner-occupied. The percentage of owner-occupied dwellings was increased from 2011. In the research period, the Airbnb listings in Glengowrie was in a decreased trend. This phenomenon can be attributed to the increase owner-occupied property. The high rate of ownership of dwellings here and lower demand of Airbnb listings is going to explain this lack of correlation between housing prices and the development of Airbnb. Most of dwellings here are owner-occupied so most properties are used for residential purposes. From the number of Airbnb listings during period, the Airbnb market in Glengowrie has not developed, so the stable Airbnb market cannot be connected to changing housing prices. Due to the distance to Glenelg beach, Glengowrie is not the first choice for travellers, so the demand of Airbnb is not high enough to attract more supply of Airbnb. Few Airbnb listings are less likely to make nuisance, which will not affect the housing prices greatly.35 Airbnb daily prices were fluctuated because of holiday without dramatic increase. Therefore, both the number of Airbnb listings and the Airbnb daily prices had tiny changes and could not be linked to housing prices in Glengowrie.

5.7 Comparison of Airbnb hotspot

As Adelaide city and Glenelg have meaningful R squares, the coefficients here are more accurate. The development of Airbnb will increase the housing prices in these areas with less error. The specific number can be showed by coefficients. While comparing the coefficient of Airbnb listings and housing prices, Adelaide and Glenelg have positive coefficients, and North Adelaide has a negative coefficient. This phenomenon is due to the large number of character dwellings in North Adelaide. The premium in housing prices in North Adelaide are not influenced by extra income but by consumer preferences. In spite of being in Airbnb hotspot area, the number of Airbnb listings is not always the key factor to affect housing prices. The housing prices will still be affected by character dwellings. When it comes to the coefficients of Airbnb listings in Adelaide and Glenelg, they are all positive. Adelaide city has a lower coefficient than Glenelg because Adelaide city has smaller gross floor area, so housing prices will not be affected as much as Glenelg.

5.8 Comparison of Airbnb unpopular areas

The six suburbs studied can be treated as three pairs. There are Adelaide/Thebarton, North Adelaide/Prospect and Glenelg/Glengowrie. Adelaide, North Adelaide and Glenelg are defined as Airbnb hotspot areas. Thebarton, Prospect and Glengowrie are defined as unpopular Airbnb areas. When comparing different Airbnb areas, the evidence is stating that in Airbnb hotspot areas. Changes in the number of listings and daily prices, will affect housing prices more than unpopular areas. In unpopular areas, the R square is too small to make an accurate determination. The number of Airbnb listings can increase housing prices in all hotspot areas, other than North Adelaide. The Airbnb daily prices in Airbnb hotspot areas may decrease housing prices in all hotspot areas.

6. Limitation and further research

According to the results of regression model, the regression model cannot be used in all suburbs. In the unpopular Airbnb areas selected, the R square is usually

less than 10%, which make the correlation is meaningless in these areas. When analysing the reason for these meaningless R squares, this research has some limitations and problem as using regression model. These problems need to be solved in future to get a high degree of accurate correlation between the development of Airbnb and residential property market.

The first limitation is the sample of size. In the unpopular areas, the number of Airbnb listings is usually fewer than 10. Due to the small size of Airbnb, the changes on the Airbnb market are too small to avoid other factors' effects. Moreover, the small changes in the Airbnb seems to be ignored by the large changes of housing prices. The ignored changes seem to be reason for low R square and weak correlation between Airbnb and housing prices. When it comes to the further research, unpopular Airbnb areas with few Airbnb listings can be combined together to increase the size of the sample to avoid noisy error in housing prices.

The second limitation is the selected areas is quite near to Adelaide city. The data from some suburbs in Greater Adelaide, which are far away from Adelaide city, such as Brighton, has not been use to analyse the correlation between Airbnb market and housing prices. Therefore, the further research can use the data in suburbs, which have long distance from Adelaide city, to understand the Airbnb's influences on housing prices in Greater Adelaide. Meanwhile, the number of selected suburbs can be more to reduce errors in Airbnb market analysis.

The third limitation in this research is that the involved factors in model are only the number of Airbnb listings and Airbnb daily prices. However, the Airbnb market is affected by many externals. The accuracy of model and regression equation will be affected by enough number of externals. These only two factors will reduce the accuracy of the regression model. Therefore, the further research should consider more factors, such as housing condition and facilities. While comparing different unpopular Airbnb suburbs, the transportation can be one of key factors, because more public transportation options in this suburb seems lead to larger R square

between Airbnb market and housing prices. According to the feedback on Airbnb website, the transportation is one of the most frequent words. This can be a new factor which can be thought carefully and involved in the regression model in the future. The feedback from Airbnb website is important to find the new externals of Airbnb market or housing market. However, it is difficult to use new factors or externals because every new factor should be quantitative. Therefore, the new factors should be thought carefully in the further study.

7. Conclusion

In many early research, the development of Airbnb makes contributions to reduce the cost of travelling, increase the residential property usage efficiency and strength housing sustainably by shared economy. However, the disadvantages of Airbnb have been mentioned as well. Nuisances in community, security and replacement of poor people are usually pointed by researchers who are interesting in Airbnb. The one of the most important things is replacement that is usually attributed to increased housing prices. Authority in many countries is looking for solution to control increased housing prices. Indeed, Airbnb can be a new factor with popular shared economy and be noticed by planning authority. Therefore, many researchers begin to find out the relationship between Airbnb growth and housing prices.

In Adelaide, the Airbnb listings are usually gathering in Adelaide city and coast lines. This characteristic is similar to many European countries. The number of Airbnb listings is in an increase trend with some small fluctuations. The demand of Airbnb in Adelaide is in an increase trend as well. The historical market revenue kept increasing and reached peak at January 2020. Before COVID, the Airbnb market in Adelaide was developing quickly that should had influences on Adelaide residential property prices.

In this research, the relationship between Airbnb and housing prices has been show by regression model. According to the results of regression model, the R square and coefficients between Airbnb factors and housing

prices attempt to answer the research question. This research only considered two Airbnb factors, they are the number of Airbnb listings and Airbnb overnight prices. The assumption of this research is housing prices are only affected by the number Airbnb listings and Airbnb daily prices. Under this premise, in the Airbnb hotspot suburbs without character properties, the number of Airbnb listings will increase housing prices in these areas because supply of long-term rental property decreases and tenants need to pay more to stay. The increasing Airbnb overnight prices will decrease housing prices because Airbnb may increase potential risk to purchasers. In the Airbnb hotspot suburbs with character properties, both number of Airbnb listings and Airbnb overnight prices can decrease housing prices. Character property is vulnerable that is more likely to be damaged by travellers. However, in the cold Airbnb suburbs, the correlation between Airbnb and housing prices is too weak to be linked together because size of sample is too small to avoid errors. The first thing for further study is enlarge the size of sample to make sure whether Airbnb can increase housing prices. Some new factors are also need to be considered to increase the accuracy of correlation between Airbnb and residential property prices in Adelaide.

This research can fix gap that there is no research on Airbnb and its effects on residential property prices in Adelaide. The number of Airbnb listings can increase housing prices in Adelaide city and Glenelg that can make Plan SA pay more attention to limit the Airbnb market in these suburbs while updating the Planning and Design Code.

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