Australasian Transport Research Forum 2013 Proceedings
2 - 4 October 2013, Brisbane, Australia
Publication website: http://www.patrec.org/atrf.aspx

The impact of Liverpool-Parramatta Transitway on housing price: a repeat sales approach

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Abstract

New public transport infrastructure is expected to improve the accessibility for local residents, and thus potentially contribute to the land value uplift. The contribution that a bus rapid transit (BRT) system can make to land value uplift is more uncertain with the literature mostly containing examples from developing country with extensive BRT networks. A BRT system named the "Liverpool-Parramatta Transitway" (LPT) was implemented in the South-West of Sydney in 2003. This is the first BRT system in Sydney and was designed to improve the north-south public transport accessibility in the local area

A repeat sales model is constructed to investigate the impact of the LPT on residential housing prices using repeat sales data from before and after the opening of the LPT. This identified little price difference between properties close to LPT stations and outside of the area that could be considered as affected by the LPT service coverage. This outcome is at variance with the theoretical underpinning of land value uplift and other empirical evidence relating to the LPT. Hedonic models using the same repeat sales data investigates the study area in more detail by stratifying the sample by housing type and by comparing separate before and after models. The research outcomes identify the extent to which the BRT system has an impact on local housing prices in the study area and provide a deeper understanding as to how the quantification of land value uplift from BRT represents one element of the wider economic benefits of a BRT system.

1. Introduction

Transport interventions are expected to create economic benefits and opportunities of land development. One of these economic benefits is the land value uplift following the implementation of transport infrastructure. Increasingly, governments are looking for new ways of funding transport infrastructure and capturing the land value uplift has been put forward as a potential funding source as well as being a measure of evaluating how successful a transport project has been. With transport interventions coming in many different forms and affecting and delivering new opportunities with different modes, it is important to understand whether different modes deliver different amounts of land value uplift.

Bus Rapid Transit (BRT) is a high capacity urban public transport system, typically with its own right of way (as for rail based modes) which is gaining in popularity in cities around the world because of its better cost effectiveness (vis a vis light rail), quicker implementation and its ability to provide for large numbers of passengers with high passenger attractiveness. However, the impact of BRT infrastructure on land value uplift is an area that has been relatively under-researched in the literature although a growing body of studies have been identified in cities with successful BRT systems but in developing countries.

As BRT has been drawing more attention from policy makers some cities have started to implement new BRT routes as a trial or as an alternative to other rapid public transport systems. These small-scale BRT systems have not yet been fully examined for their potential economic benefits on land values. Sydney, as an example, built its first BRT system in 2003 (the Liverpool-Parramatta Transitway (LPT)). The economic impact of the LPT in terms of its contribution to any land value uplift has not yet been evaluated although this could provide important policy information for the potential public transport projects under consideration in Sydney.

This paper examines the impact of the LPT on residential property prices using properties that have been sold more than once (repeat sales) between 2000 and 2006. Section 2 reviews the theoretical background of the association between land value and transport infrastructure as well providing a brief review of the international evidence. Section 3 introduces the study area and the LPT. Section 4 describes the methodology and data with Section 5 presenting the research findings. Section 6 concludes this paper.

2. Literature Review

The land rent theory, developed in an urban context by Alonso (1964) and Muth (1969), is the theoretical framework for the relationship between accessibility and land values. These theories purport that land rent (and therefore the underlying land values) reflects accessibility gradients with higher values of rent reflecting higher accessibility to goods and services.

A substantial body of literature has demonstrated that transport infrastructure provides improvements in accessibility and therefore land value uplift with uplift benefits being distributed in relation to the proximity of the location to the infrastructure and to both residential and commercial properties. The impact of new transport infrastructure can vary over time, with expectations increasing land values after the announcement of new transport infrastructure and before its completion giving rise to different short-term and long-term impacts. RICS (2002) and Smith and Gihring (2006) and Smith et al. (2009) reviewed over 100 international studies on the impact of public transport on property values, and these studies identified worldwide examples of the contribution of public transport infrastructure on property values.

Early studies on land value capture and public transport infrastructure have focussed on railed based systems including rail, light rail or metro investments (McDonald and Osuji, 1995; Cervero and Duncan, 2002; McMillen and McDonald, 2004; Du and Mulley, 2007). Rail based infrastructure is often perceived as fixed once built and so changes in accessibility are regarded as permanent. In contrast, Bus Rapid Transit (BRT), despite often having its own right of way, is perceived as more flexible and, as Rodriguez and Targa (2004, p.589) noted '*ironically, it is BRT's flexibility that also appears to be one of its main weaknesses*' with planners, funders and importantly users judging it as less permanent than an equivalent rail system. These perceptions may well impact on BRT's ability to capitalise accessibility into land values.

The contribution of BRT investments on land value has been receiving more attention recently. In Bogotá and Columbia where BRT has been hugely successful with an extensive network, property values have been identified as rising for properties close to BRT stations (Rodriguez and Targa, 2004; Munoz-Raskin, 2010). In Asian cities, Cervero and Kang (2011) found a land value premium of around 5 to 10 percent for residential properties within 300m of BRT stations in Seoul, Korea. Deng and Nelson (2010) found qualitative and quantitative evidence of the attractiveness of BRT on people's relocation choice as well as a significant impact on land value uplift in Beijing, China. BRT is becoming more common in developed countries and associated studies, such as Cervero and Duncan (2002) who investigated the effect of BRT in Los Angeles found no evidence of value uplift. Perk and Catala (2009) studied BRT in Pittsburgh where uplift values of around 16 percent were found and this is in excess of the uplift value attributed to new light rail, although they identified that other positive factors may have been responsible. Dubé et al. (2011) in Quebec, Canada, found value uplift of 3 percent to 7 percent but confined to properties located far enough away to avoid noise but close enough to use the BRT. The evidence suggests BRT may have a positive impact on land value, although this may not be evident in cities where BRT is not a major transport mode such as Los Angeles.

In term of the methodologies used for capturing the value uplift from transport intervention, the review by Salon and Shewmake (2011) suggested the simplest method is to compare the price change between the 'before' and 'after' of the intervention of new transport infrastructure for properties close to the transport infrastructure (the 'treatment' or 'catchment' area) and a 'control' area or areas which are similar but without the new infrastructure. However, house prices are not only affected by the intervention of transport infrastructure but also by other factors such as property attributes and neighbourhood characteristics. These factors cannot be simply captured by the before-and-after approach even when comparing catchment and control areas and a hedonic modelling approach has been commonly employed (McMillen and McDonald, 2004; Mikelbank, 2004; Rodriguez and Mojica, 2009; Cervero and Kang, 2011; Dube et al., 2011; Concas, 2013).

Another approach for land value uplift capture is to use repeat sales data (McMillen and McDonald, 2004; Billings, 2011; Billings and Thibodeau, 2011; Dube et al., 2011; Chatman et al., 2012). A repeat sales model estimates the difference between the price of the same properties sold before and after the transport intervention. This approach has the advantage of mitigating the omitted variable bias and endogeneity problems which may exist in hedonic models by eliminating the unobserved heterogeneity in the model estimation process through the use of this paired data. The disadvantage of a repeat sales approach is the potential selection bias if the housing market is not strong enough to generate sufficient repeat sales or if only particular types of property are more likely to be sold (Chatman et al., 2012).

3. Liverpool-Parramatta Transitway

3.1 Study area

The Liverpool-Parramatta Transitway (LPT), opened in February 2003, was the first BRT system in Sydney and connects the major centres of Liverpool and Parramatta in the South-West of Sydney as shown in Figure 1. The termini are in Liverpool Local Government Area (LGA) and Parramatta LGA respectively but the route traverses the LGAs of Fairfield and Holroyd. The intention of the infrastructure was to provide North-South public transport services connecting Liverpool in the south, Parramatta in the north and suburbs along the route to major employment in warehousing in particular, education and recreation centres (NSW Audit Office, 2005). The 31 km route with 33 stations includes 20 km of new dedicated bus-only infrastructure and 10 km of on-road bus priority. LPT stops were designed to emulate rail-based public transport rather than simple bus stops.

The aim of the LPT was to create a step change improvement in accessibility for south-west Sydney with this new north-south public transport link in an area where existing bus services provided local east-west links. The LPT uses dedicated infrastructure to provide a high quality public transport experience with faster, more reliable services. In the first year of operation, the actual patronage was just under one million passengers per annum and this rose to nearly 2 million in 2006. Patronage on the LPT continues to grow with the most recent figures for 20011/2012 showing patronage at 2.7 million (State Transit Authority, 2012).

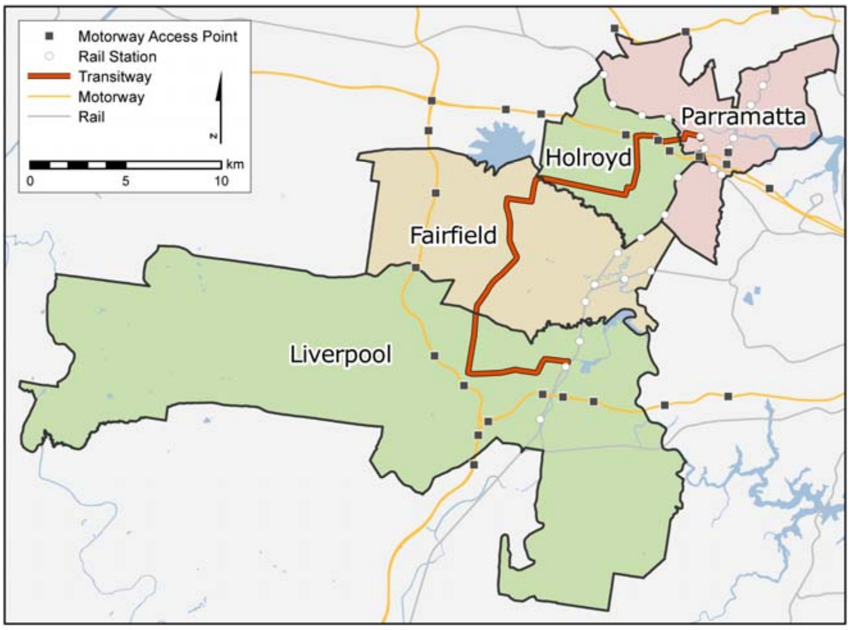

Figure 1. The Liverpool-Parramatta Transitway
(Source: developed from GIS layers)

3.2 Property Sales Data

This research uses the residential property sales data between 2000 and 2006 collected by a commercial firm, RP data. Properties sold more than once before and after the LPT opening in 2003 are identified as repeat sales data for this research. The catchment area of the LPT coverage is defined by a 1600m buffer around a LRT station following Chatman et al. (2012) who used one mile buffer to define the service catchment area.

The LPT and its service catchment area are shown in Figure 2. A total of 788 repeat sales properties in the catchment area were sold at least once before and after the LPT opening. Figure 2 distinguishes the property types where units (or apartments), coloured blue, are clustered around the major Western Sydney business centres of Parramatta and Liverpool with trains connecting to the Sydney Central Business District (CBD). In contrast, houses are widely distributed across the catchment area as residents living in the houses are more likely to have access to a car and with less reliance on easy access to trains for accessing their destinations. The distribution of houses and units in Figure 2 suggests that the travel behaviour of residents may be different and that differences in need to access public transport may influence the degree of price appreciation arising from the new LRT, and this is discussed further in Section 5.2.

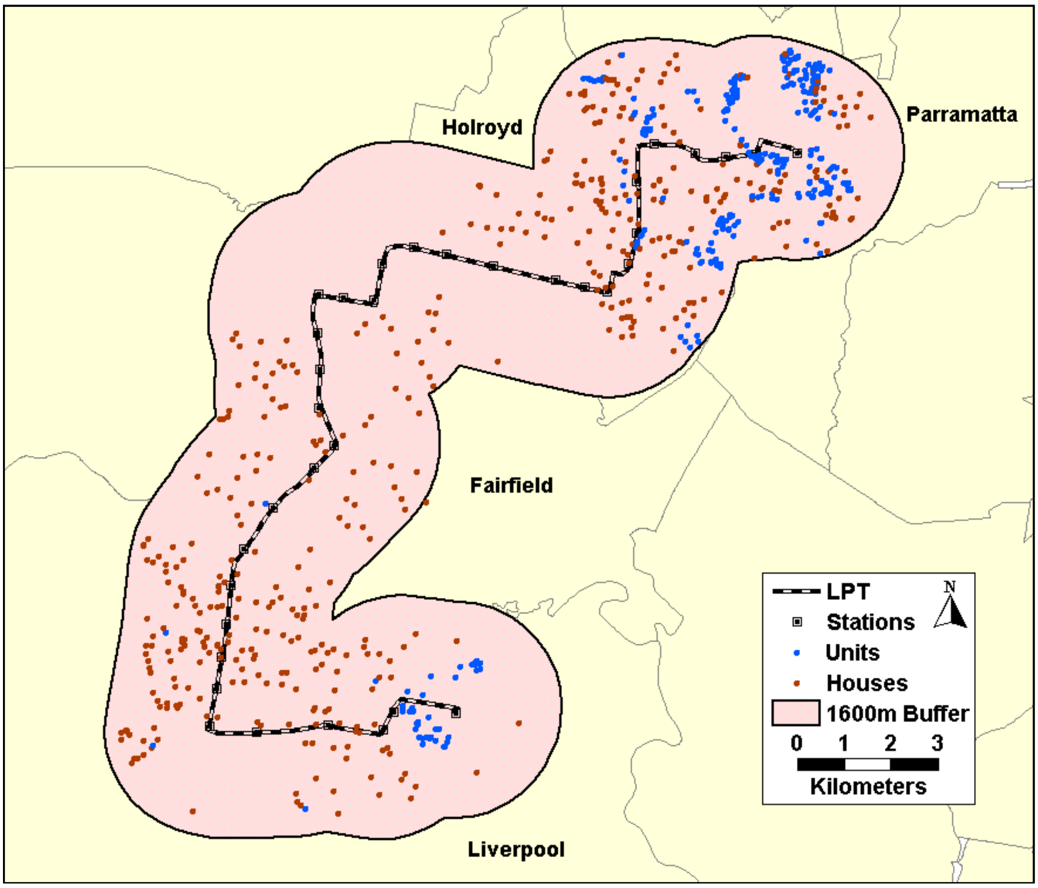

Figure 2. The Catchment area of Liverpool-Parramatta Transitway
(Source: developed from GIS layers)

4. The repeat sales model

The repeat sales model is defined in equation (1). The logged ratio of the price of a property sold before the LRT opening ($\boldsymbol{P_1}$) and after the opening ($\boldsymbol{P_2}$) is predicted by a vector of property attributes ($\boldsymbol{X}$), a vector of accessibility measures ($\boldsymbol{A}$), and a distance gradient ($\boldsymbol{G}$) measuring the distance from the property to the nearest LPT station, and error terms ($\boldsymbol{\varepsilon_i}$).

$$\ln(\frac{P_2}{P_1}) = constant + \sum_j \alpha_j X_j + \sum_j \beta_j A_j + \gamma \cdot G + \varepsilon_i \quad (1)$$

Conventionally, the time-invariant variables such as property attributes are not included in a repeat sales model which is constructed through differencing the price for the same properties. In equation 1, these variables are retained because a model incorporating the time-invariant variables has the advantage of controlling for selection bias from repeat sales (Chatman et al., 2012). It is also possible that the price appreciation of properties may vary by property types such as the number of bedrooms and bathrooms, and this can be captured by equation (1) which incorporates the property attributes.

In estimating equation 1, real prices are used (adjusted to 2000 real values using Australian Consumer Price Index of Established Houses). When a property was sold more than once before or after the LPT opening in 2003, the mean value of the sold prices in real terms is used to represent $\boldsymbol{P_1}$ or $\boldsymbol{P_2}$ in the dataset.

As the aim of the LPT was to provide improved accessibility of the study area with a rapid bus route connecting Liverpool and Parramatta through existing and developing areas of work and shopping, the impact of these accessibilities on price appreciation is particularly of interest. Accessibility measures represented in this vector in equation (1) include distance to Liverpool or Parramatta station, motorway entry points, warehouse, school, and shopping malls. The distance of each property to Sydney CBD is also included as a more general measurement of accessibility to the wider opportunities of the conurbation.

A distance gradient is used to identify whether the distance to the nearest LPT station has an impact on land value uplift. The hypothesis here is that properties closer to stations are expected to benefit more from the improved accessibility as compared to properties further away. Buffers of 400m, 800m, 1200m and 1600m around each LPT station are included in the model, identified using GIS, where the 800m buffer includes only properties further than 400m but less than 800m from the stop. A variable representing a 100m gradient is further included to investigate the possible negative impact on the price appreciation from noise or air pollution from the buses as a number of studies have found this significant, for example Du and Mulley (2007), Dubé et al. (2011). The full definitions and descriptive statistics of the data are summarised in Table 1.

Table 1. Definitions and Descriptive Statistics of Variables

Variable	Definition	Unit	Mean	s.d.	Min	Max
P_1	Average sold price before LPT opening	AU$	246,676	122,145	70,962	2,451,923
P_2	Average sold price after LPT opening	AU$	276,950	90,336	89,237	694,215
P_2/P_1	The ratio of P_2 to P_1		1.18	0.30	0.12	3.28
100m buffer	=1 if property located within 100m of LPT station		0.03	0.16	0.00	1.00
400m buffer	=1 if property located between 100m to 400m of LPT station		0.15	0.35	0.00	1.00
800m buffer	=1 if property located between 400m to 800m of LPT station		0.25	0.43	0.00	1.00
1200m buffer	=1 if property located between 1200m to 1600m of LPT station		0.29	0.46	0.00	1.00
1600m buffer	=1 if property located between 1200m to 1600m of LPT station		0.29	0.45	0.00	1.00
CBD	Distance to Sydney CBD	km	17.04	3.12	12.58	23.18
LIVPAR	Distance to Liverpool or Parramatta station, whichever is closer	km	2.50	1.57	0.23	7.16
Motorway	Distance to the nearest motorway entry point	km	1.60	0.96	0.07	5.26
Warehouse	Distance to the nearest employment area in the warehouse area	km	4.62	1.69	0.89	8.76
School	Distance to the nearest school	km	0.45	0.25	0.00	1.35
Shopping	Distance to the nearest shopping mall	km	1.94	1.04	0.16	5.00
Bedrooms	Number of bedrooms		2.76	0.94	1.00	13.00
Baths	Number of bathrooms		1.33	0.56	1.00	6.00
Parking	Number of parking spaces		0.95	0.81	0.00	6.00
Type	Property type (0=house; 1=unit)		0.45	0.50	0.00	1.00

5. Analysis results

5.1 The price ratio model

The objective of the repeat sales model is to identify property price changes following the introduction of the LPT. The hypothesis is that properties closer to a LPT station are more likely to benefit from the LPT and thus have significant greater price increase. Figure 3 shows the scatter plot of the price change of each property against its distance to the closest LPT station. It can be seen that there is little variation and the distance to LPT station does not appear to have a strong impact on the property price change.

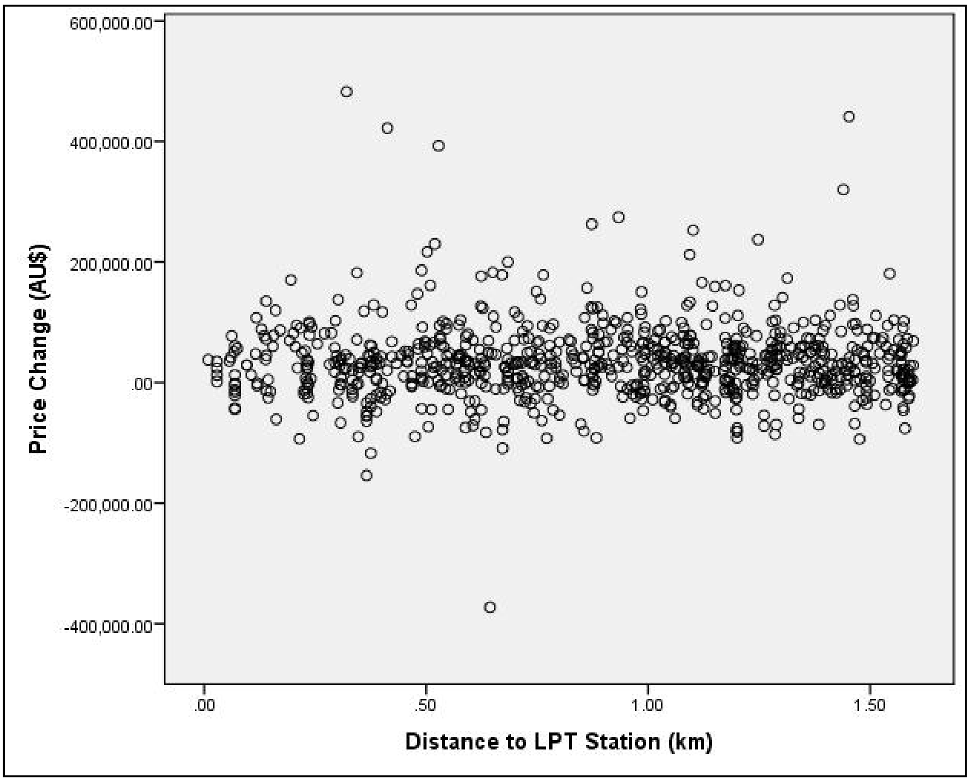

Figure 3. The Scatter Plot of Price Change versus Distance to LPT Station

The repeat sales model which incorporates other explanatory variables is estimated to identify the significance of the impact of distance to LPT station on price changes, as well controlling for other determinants of house price. The estimation results shown in Table 2 suggest that the repeat sales model has a low explanatory power given the adjusted R-square value of 0.058 (although this is statistically different from zero, p-value>0) which is unsurprising given the lack of variation in price change evident in Figure 3. However, some variables are significant identifying an influence on the price change. The distance gradient is significant for the 100m buffer with a negative sign, indicating that the average price increase of the properties within 100m of a LPT station is significantly lower than the properties located between 1200m and 1600m of a station (the reference group). This is likely a result of the negative environmental impact of the LPT such as noise and air pollution which make those properties less desirable. The other buffer variables of price gradient do not show significance which suggests that the price change of properties located between 100m and 1200m of a LPT station are not significantly different from the price change of properties located between 1200m and 1600m of a station, as the reference group.

The aim of the LPT was to improve accessibility in the study area. If successful, this effect should be captured by the accessibility variables in the repeat sales model. The distance to CBD is significant with a positive sign meaning that the price change is higher for properties further away from the CBD. This is possibly because the improved accessibility as a result of the LPT reduces the importance of accessing the CBD for the local residents so that properties located further away from the CBD can benefit more in terms of the price appreciation. The parameter of distance to CBD is at 0.02 which indicates that one kilometre increase in distance to CBD will contribute a two percent increase on the ratio of price increase.

The LPT also contributes significant benefit to changes in property prices of properties close to Liverpool and Parramatta stations given the significant negative sign of the parameter ($LIVPAR$). On average, being one kilometre closer to the Liverpool or Parramatta station is expected to increase the price ratio by 3.7 percent after the LPT opening. This finding shows that the Liverpool or Parramatta station becomes more important as a result of the implementation of BRT services (possibly through better integration of bus and train services), which is reflected in the house prices. The distance to warehouses as a place of employment is only significant at 90 percent confidence level: this is not discussed here because it may be subject to its correlation to other accessibility variables and further discussion is presented below in section 5.2.

The only significant parameter of the property attributes is the property type, which shows that changes in house prices are significant higher than that of units. Houses and units tend to have distinctive household structures and lifestyles and considering the locations of units are mostly close Liverpool and Parramatta stations, the analysis in the next section separately investigates the price change of houses and units.

Table 2. Estimation Results of the Repeat Sales Model

Dep. Variable: $\ln(P_2)-\ln(P_1)$	Coef.	s.e.	t
100mbuffer	-0.146	0.056	-2.60***
400mbuffer	-0.020	0.031	-0.64
800mbuffer	-0.011	0.026	-0.43
1200mbuffer	0.016	0.023	0.70
1600mbuffer		(Reference)	
CBD	0.020	0.008	2.71***
LIVPAR	-0.037	0.017	-2.13**
Motorway	0.001	0.014	0.08
Warehouse	-0.021	0.011	-1.93*
School	-0.010	0.036	-0.29
Shopping	0.016	0.012	1.38
Bedrooms	0.007	0.014	0.51
Baths	-0.002	0.017	-0.14
Parking	-0.015	0.011	-1.41
Type	-0.077	0.026	-3.00***
(Constant)	-0.018	0.076	-0.23
Adj. R-square	0.058		
Observations	788		
Prob.>F-statistics	0.000		

***p-value<0.01;**p-value<0.05;*p-value<0.10

5.2 Price models before and after the LPT opening

In the section above, whilst some of the accessibility variables are statistically different from zero, the 'type' of property is very significant in its impact with an absolute value twice as big as locating close to Parramatta or Liverpool station is estimated to add 3.7% to the change in house ratio at the mean.

This section treats houses and units as separate subsets of the same dataset to mitigate this heterogeneity. Moreover, instead of using the logged value of the price ratio which lacks variation, the section estimates the logged values of the house prices before and after the LPT opening to discuss the relative impact of the explanatory variables between houses and units. The repeat sales model (equation (1)) is modified by replacing the price ratio ($ln\ (P_2/P_1)$) in equation (1) by $ln\ (P_2)$ and $ln(P_1)$ respectively for two separate hedonic models for houses and units. The estimation results are summarised in Table 3. As this is a semi-log functional form, the interpretation of the estimated coefficients relates to their proportion (or when multiplied by 100, the percentage effect on price). Differences in the parameters between models are tested by two-sample t-test with the results shown in Table 4 for those accessibility variables that are significant in Table 3.

Table 3. Model Estimation Results for Houses and Units Sold before and after the LPT opening

Variable	House				Unit			
	Before		After		Before		After	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t
100mbuffer	0.226	1.98**	-0.171	-2.18**	-0.007	-0.08	-0.039	-0.67
400mbuffer	-0.036	-0.75	-0.049	-1.50	0.056	0.85	0.072	1.51
800mbuffer	0.000	-0.01	-0.011	-0.46	-0.026	-0.41	-0.017	-0.37
1200mbuffer	0.002	0.05	-0.008	-0.35	-0.039	-0.93	0.015	0.48
1600mbuffer	(Reference)		(Reference)		(Reference)		(Reference)	
CBD	-0.026	-2.18**	-0.012	-1.55	-0.071	-4.94***	-0.058	-5.62***
LIVPAR	0.055	2.26**	0.031	1.86*	0.232	3.20***	0.246	4.73***
Motorway	-0.067	-3.62***	-0.062	-4.91***	-0.045	-1.20	-0.041	-1.53
Warehouse	-0.012	-0.74	-0.024	-2.16**	0.042	1.71*	0.044	2.50**
School	0.113	2.17**	0.040	1.11	-0.015	-0.20	0.052	1.01
Shopping	-0.032	-2.14**	-0.021	-1.97**	-0.144	-2.20**	-0.150	-3.18***
Bedrooms	0.106	6.06***	0.110	9.20***	0.225	5.94***	0.236	8.66***
Baths	0.058	2.56***	0.089	5.67***	0.298	7.53***	0.208	7.30***
Parking	-0.002	-0.12	-0.008	-0.77	0.016	0.73	-0.022	-1.37
(Constant)	12.545	114.38	12.577	167.44	12.151	97.29	12.072	134.17
Adj. R-square	0.220		0.394		0.457		0.533	
Observations	435		435		353		353	
Prob.>F-statistics	0.000		0.000		0.000		0.000	

***p-value<0.01;**p-value<0.05;*p-value<0.10

Table 4. Results of Two Sample t-test for Accessibility Variables

Variable	House Before & After	Unit Before & After	Before House & Unit	After House & Unit
	t-value			
100m buffer	-18.85	Insignificant[1]	10.46	-7.09
CBD	2.06	1.58	5.49	6.73
LIVPAR	-2.47	0.75	-11.00	-15.75
Motorway	0.58	0.30	-1.81	-2.04
Warehouse	-1.52	0.18	-5.28	-7.79
School	-5.13	Insignificant[1]	7.15	Insignificant[1]
Shopping	1.45	-0.34	7.53	10.32

Note: Highlighted in bold if significant at 95% confidence level
[1]paremeters are insignificant in Table 3 and thus are not tested for their difference

For the house price models before and after the LPT opening, the most marked change is that the 100m buffer is positively significant before the LPT opening but becomes negatively significant after the opening. Before the LPT was built with its substantial amount of new infrastructure, the location of the stations of the LPT would have no relevance in terms of the public transport network. However, after the introduction of the LPT, houses within 100m of the LPT stations may be receiving a negative impact due to the environmental impacts, which is not evident in houses located between 100m and 1200m of the LPT stations. At the mean, the effect of being located close to a LPT station after implementation of the LPT is a decline of 17.1%. The other important finding is that some accessibility variables have smaller coefficients after the LPT opening such as the distance to CBD (from -0.026 to -0.012) and distance to Liverpool or Parramatta (from 0.055 to 0.031), as well as distance to the nearest primary school (from 0.113 to insignificant), with statistically significant differences as tested in Table 4. This finding implies that the introduction of the LPT appears to improve the local accessibility so that the accessibility variables become less important in determining house prices after the implementation of the LPT as compared to the price before the LPT opening.

In contrast, the impact of the accessibility changes on property prices is not evident for units, given that all the accessibility variables do not show any significant difference before and after opening of the LPT (Table 4). As shown in Figure 2, most units are located close to Liverpool or Parramatta stations and the introduction of LPT would not contribute to significant accessibility changes for these locations which would have benefited from good public transport access given to stations. This shows a distinctive difference in the LPT's contribution to accessibility improvement between houses and units and the importance of a more spatially based investigation and interpretation.

Comparing houses and units in terms of their price determinants in Table 3, it can be observed that the 100m buffer is insignificant for units in contrast to being significant for houses after the implementation of the LPT. This reflects the fact that more units are built close to Liverpool and Parramatta stations with good access to the existing train stations, and units which are in multi-floor buildings may be less influenced by the noise or air pollution due to buses than houses. Table 3 and Table 4 also show that the accessibility variables including distance to CBD, Liverpool or Parramatta, warehouse and shopping mall have larger coefficients and therefore greater proportional impact for units in absolute terms for both before and after the introduction of LPT. This higher requirement for accessibility by unit dwellers is likely to be the result of lower car ownership and more public transport users by unit residents. Another important finding is that the distances to motorway and school are insignificant for units in contrast to significant for houses and this too is likely to be linked to car ownership and use levels. It is also worth of note that the closeness to the nearest primary school is only significant in the before implementation estimation for houses although this is a variable significant in most other studies. For unit dwellers this may be more understandable since households in units are less likely to have children to attend primary schools and thus distance to the primary school is not a factor of the unit prices.

6. Conclusion

This paper uses a repeat sales model and segmented hedonic models to identify the effect of the LPT on residential property prices. The repeat sales model shows low explanatory power due to the lack of the variation in the price changes before and after the LPT opening but nevertheless does identify accessibility variables and the property type make a significant influence on the housing prices. However, combining houses and units in the same estimation appears to provide more average type values which confound the interpretation.

The segmented hedonic models for the houses and units before and after the introduction of the LPT provide more information about the relationship between house prices and the improved accessibility contributed by the LPT. Although the price gradients are insignificant except for the 100m buffer, the relative value of the accessibility parameters confirms the impact of the improved accessibility on house prices. Units do not appear to benefit as much as houses from the LPT in terms of their general location which had good accessibility to public transport prior the opening of LPT.

The hedonic models also identify the distinctively different requirements for accessibility between residents of houses and units. The estimated parameters of the accessibility measures including distance to CBD, distance to Liverpool or Parramatta, and shopping malls are significantly higher for units than houses, showing the higher requirement for accessibility for residents of units. Whilst motorway access and distance to primary school are less important for units than houses, this is balanced by access to employment and shopping have a greater proportional impact on unit prices than on house prices, possibly as a result of the preferred means of travel and household structures of unit residents. In general, the impacts of accessibility on property prices are distinctively different between houses and units.

As the first BRT system in Sydney, the impact of the transport intervention on property prices are not as substantial as noted in international evidence, where BRT systems appear more successful in Beijing, Seoul and Bogotá. The finding of this research is more similar to Cervero and Duncan (2002) who also found the BRT system in Los Angeles did not contribute significantly on residential housing prices. It is possible that the benefits of the LPT, as the first BRT system in Sydney, have been undervalued by the market through a lack of understanding of what BRT can offer. Alternatively, it may be the case that to achieve the highest benefits from a BRT system it needs to be the backbone of the wider transport network.

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