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Does residential property price benefit from light rail in Sydney?

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ABSTRACT

Land rent theory identifies that unimproved land value is determined by its accessibility to goods and services. In theory, therefore, public transport provision which increases accessibility should in turn increase land values. The objective of this paper is to identify if land values in the neighbourhood of a light rail have sustained long run price increases due to the presence of the light rail. The motivation for the paper is whether public transport infrastructure creates sufficient uplift to land values that if it were captured it would make a significant contribution to the investment plans of government. This is especially important in contemporary Sydney as plans are being rolled out to implement new light rail systems by the NSW Government which, in common with many other governments, is subject to budgetary constraints which limits the implementation of all the transport infrastructure evaluated as good value for money.

The case study of this paper is Sydney's Inner West Light Rail line which was built along the right of way of a former goods line. This line is 7.2 km light long with 14 stops and takes 28 min to travel from end to end.

Using transaction house prices from 2011 as the dependent variable, this paper uses Geographically Weighted Regression (GWR) to identify the uplift attributable to the presence of the light rail. The attributes of the residential property (e.g. number of bedrooms, bathrooms etc) and neighbourhood effects, as measured by census data, are used as controlling independent variables to expose the value of the underlying unimproved land through its accessibility to public transport. The GWR methodology provides a global model as a first stage with the second stage of GWR providing a local model to examine the spatial distribution of the uplift to residential properties.

The results show the expected and significant spatial variation in the value of accessibility. Overall, the light rail has had more impact outside the areas of the city centre. The analysis and discussion includes the different valuation of accessibility to bus services vis à vis accessibility to light rail services.

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1. Introduction

Land rent theory identifies that unimproved land value is determined by its accessibility to goods and services. In theory, therefore, public transport provision which increases accessibility should in turn increase land values. The objective of this paper is to identify if land values in the neighbourhood of a light rail have sustained long run price increases due to the presence of the light rail. The motivation for the paper is whether public transport infrastructure creates sufficient uplift to land values that if it were captured it would make a significant contribution to the

investment plans of government. This is especially important in contemporary Sydney as plans are being rolled out to implement new light rail systems by the NSW Government which, in common with many other governments, is subject to budgetary constraints which limits the implementation of all the transport infrastructure evaluated as good value for money.

The case study of this paper is Sydney's Inner West Light Rail line which was built along the right of way of a former goods line. Using transaction house prices from 2011 and Geographically Weighted Regression (GWR) to identify the uplift attributable to the presence of the light rail, this paper contributes to the literature through identifying how uplift varies spatially.

The rest of the paper is organized as follows. The next section synthesises the literature with respect to studies measuring uplift from the implementation of different public transport modes. This

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is followed by a description of the case study in Sydney, and the methodological approach followed. The methodology sections outlines the criteria that makes GWR an appropriate methodology and identifies and provides a commentary on the data employed and a discussion about the functional form estimated. The penultimate section provides the results and some discussion of the global and local models with the final section providing some concluding comments.

2. Literature review

Identifying the uplift in land values created by transport infrastructure investments has been the subject of a large body of research. [Smith, Gihring, and Litman \(2013\)](#) and [RICS \(2002\)](#) review more than 200 documents that explore the value created by public transport investments and methodologies that could be used to capture that value. This wide body of research has shown the theoretical underpinnings to value capture (improved accessibility leads to increases in land value) are empirically validated through generally positive impacts on land values resulting from improvements in transport access.

The interest in the land value impacts of increased transport infrastructure stems from the possibility of capturing some of the value created by a transport infrastructure project in order to pay for part or all of the costs of that project. [Doherty \(2004\)](#) conducted a thorough review of methods that could be used to capture land value increases and the suitability of each method for funding transport infrastructure in Australia. He concluded that pressure for finding a way of raising capital is growing as governments dislike increasing debt and noted that, for Australia, the success of value capture will be dependent on associated urban consolidation programs that allow higher patronage at lower infrastructure cost. However, the discussion of how to capture any increased value of land must be preceded by how much land value does increase. This is the focus of this paper.

Amongst this wide selection of studies, several have been concerned specifically with the impacts of proximity to light rail (LRT). [Knaap, Ding, and Hopkins \(2001\)](#) found that the announcement of a LRT extension resulted in an increase in the value of vacant residential lots in a suburb of Portland, Oregon, US by a huge 70% within the year of announcement of the scheme but this was not maintained, suggesting that maybe there were developers 'standing by'. [Hess and Almeida \(2007\)](#) examined many studies and found up to 32 per cent premium in some sites but a much more modest gains in a long term cross sectional study for Buffalo, New York of between 2 and 5 per cent which is attributed to the way this area was in significant decline. In San Diego, California, a study by [Duncan \(2011\)](#) showed land value uplift around light rail appeared conditional on land zoning that was permissive to greater development densities around stations. [Kim and Lahr \(2014\)](#) investigated the Hudson-Bergen light rail in Hudson county using repeat sales data showed uplift around stations which dissipated at about 400 m from the stations. Thus the evidence is dominated by US evidence: there is no light rail study in Australia with which to compare the results of this paper.

There is limited research evaluating how the quality of the service provided effects the impact that a new line has on land values. [Ryan \(1999\)](#) found that transport infrastructure improvements only have an impact on land values when the improvement has a significant impact on travel times. New infrastructure that does not have an impact on travel times should not be expected to have a significant impact on the land values of properties nearby. [Debrezion, Pels, and Rietveld \(2011\)](#) examined the impact of a service quality index on property prices and found that the index had a significant impact in some areas. The index took into account

the frequency of service, the connectivity to the rest of the network, travel times to other locations on the network and the fares charged to get to other locations on the network. This maybe relevant for this case study as some point to point journey times are longer than alternatives because of the way in which the service operates on a former freight line with point to point distances being longer than the current street network distances. In addition, [Debrezion et al. \(2011\)](#) also compared the impact of distance to the closest rail station to the impact of the distance to the most frequently used rail station in the area. In the more urbanised areas, the most frequently chosen station had a more significant impact on real estate prices than the nearest one.

This study is concerned with an area in Sydney, NSW where there is accessibility to both bus and LRT. [Barker \(1998\)](#) has found some evidence of local bus services having an impact on land values but this is somewhat anecdotal and does not provide information for bus services where there is also access to LRT. However, it is clear that when there are transport services and infrastructure that provide only marginal increases in accessibility this may have a minor impact on property values and be a small effect which is difficult to detect.

Overall, these results highlight the fact that the increases in property values resulting from transport infrastructure improvements are related not to the infrastructure itself, but to the access provided by that infrastructure. This paper looks at the value uplift provided by the LRT system in Sydney in the context of access to the infrastructure of the LRT and access to the bus system. In this way the paper contributes to the literature by looking at valuations placed on different modes but in the same geographical location.

3. Case study-the Sydney Inner West Light Rail

Sydney's Inner West Light Rail line was built along the right of way of a former goods line. Trains ceased operating on the Darling Harbour line in 1984 and on the section between Darling Harbour and Rozelle Bay in 1996. The line was then converted to LRT, with the first stage, to Wentworth Park, opening in 1997 followed by the extension to Lilyfield in 2000 ([Brooker & Uddin, 2011](#); [Transport NSW, 2010](#)). The section of the goods line between Rozelle Bay and Dulwich Hill closed in 2009 and LRT service on this section opened 27 March 2014 ([Transport NSW, 2014a](#)), extending the line 5.6 km and adding nine stops.

This extension was not open during the study period covered by this paper as the data used in this study is from 2011. The paper therefore covers the period after the announcement of the expansion in 2010 ([Transport NSW, 2010](#)) but before opening of the extension. It is likely that the announcement of the extension in practice will not have had any significant impact on the value of proximity to the line since the announcement was made by an outgoing government renowned for announcing and cancelling projects ([Moutou & Mulley, 2012](#)). The new government announced that the project would still be built, but would be significantly delayed ([Saulwick, 2011](#)).

Services on the Inner West Light Rail line run every 15 min between 6:00 a.m. and 11:00 p.m., with later services provided on Friday and Saturday nights. Service between the Star, a casino located in Pyrmont, and Central are provided through to the early hours of the night every day of the week ([Transport NSW, 2014a](#)).

The 7.2 km LRT line has 14 stops and takes 28 min end to end ([Transport NSW, 2014d](#)). This is an average speed of just over 15 km per hour. As [Fig. 1](#) shows, the line begins at Central Station, the station that all City bound suburban rail services pass through as well as being the starting location for many of Sydney's intercity services. From Central the line passes by Haymarket and Sydney's Chinatown. The line then continues around the peninsula and

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