The Routledge Handbook of Public Transport
Corinne Mulley, John D. Nelson, Stephen Ison

Land value gains and value capture

Publication details
Corinne Mulley, Barbara T.H. Yen, Min Zhang
Published online on: 13 May 2021

How to cite :- Corinne Mulley, Barbara T.H. Yen, Min Zhang. 13 May 2021, Land value gains and value capture from: The Routledge Handbook of Public Transport Routledge
Accessed on: 14 Sep 2023

PLEASE SCROLL DOWN FOR DOCUMENT
10
LAND VALUE GAINS AND VALUE CAPTURE

The potential for financing public transport infrastructure

Corinne Mulley, Barbara T.H. Yen and Min Zhang

Introduction

Cities are the economic powerhouses of today, where an efficient cost-effective public transport system plays an essential role. It facilitates the economically productive agglomerations of firms and improves accessibility to goods, services and activities, which are central to transport activity. Better public transport and transport infrastructure generate benefits for users and help manage urban congestion and climate change, contributing to the goal of greater urban sustainability. Notwithstanding, modern transport system infrastructures are expensive and challenging for governments to finance, competing as they do with the other demands on government. As a result, one of the most challenging problems for transport planning is how to finance public transport investment from land value gains (known as value capture). Value capture is where the benefits from land value gains are monetised to pay for transport infrastructure developments. The implementation of value capture provides the opportunity to open up new and equitable financing because the burden is spread between beneficiaries.

The following section provides a brief overview of the theory as to why developments in transport infrastructure can lead to land value gains. The chapter then turns to the size of those gains, because these underpin the potential for success for value capture mechanisms; this is followed by a discussion of value capture strategies and an evaluation of them against a number of normative criteria. As value capture is predicated on capturing the uplift following the implementation of new infrastructure, it is imperative that an ex-ante estimate of such uplift be available for policy-makers. The penultimate section presents new empirical work to predict value uplift showing how value capture policies can be evidenced based on the likely value uplift using a case study from Brisbane, Australia. A final section concludes the chapter and identifies areas for further research.

Land value uplift

Land rent theory, developed by Alonso (1964) and Muth (1969), is the theoretical framework linking accessibility to goods and services and land values. These theories hold that land rent (and therefore the underlying land value) reflect accessibility gradients, with higher values
of rent reflecting higher accessibility. There is a well-established literature demonstrating that new or extended transport infrastructure provides improvements in accessibility and therefore increases in land value – termed land value uplift – with uplift benefits being distributed in relation to the proximity of the location to the infrastructure and both residential and commercial properties.

Determining the uplift turns out to be more difficult than the relatively simple theory suggests. The theory identifies land value uplift as coming from changes in accessibility, which in turn changes the underlying land value (or what is called the unimproved land value). However, the underlying land value for residential properties is what is termed the unimproved land value, whereas the residential land values observed by the market are the unimproved land value which has been ‘improved’ by the building of property. This means there are two ways of measuring value uplift: using the market price of residential land (but then the method must control for the way in which the property increases the land value) or using unimproved land values, which are often established for taxation purposes. In some countries, market price is replaced by advertised (or asking) price when market prices are not available, but in practice, market and advertised prices are highly correlated. There are difficulties with either approach since, although market valuations need to be adjusted, the use of unimproved land values assumes that these valuations are correct.

Once data issues are resolved, there are a number of possible methods to estimate the extent of uplift. The earliest studies replicated experimental methods and used comparative methods to look at house values before and after the infrastructure was put in place. The method was simple and required average price changes of smallish areas to be compared: these did not take into account the complexities that drive house prices such as the sociodemographic nature of the area, the local amenities or indeed that bigger properties usually achieve higher prices. More sophisticated attempts at measuring uplift then began to use hedonic modelling, which controls for the complexity of house price determination by valuing the different components which make up a house price – the number of bedrooms, bathrooms, and parking; neighbourhood effects and the accessibility of the property to different destinations. Hedonic modelling, in its most basic form, uses multiple regression methodology, which requires strict assumptions which are often broken when modelling house prices, because, for example, there are spatial connections between how desirable a house is and where it is located. With advances in computing power, some of these spatial problems with hedonic models have been overcome by using spatial modelling which controls for the spatial autocorrelation that gives rise to problems. These models give better estimates of the value uplift, but the boundaries of the areas of interest have to be chosen by the modeller. In practice, these tend to be politically driven, for example, local authority boundaries or census areas which have no real relationship to the underlying housing market. A technique called geographical weighted regression (GWR) avoids this by separately considering each data point, but this method is less good at resolving other spatial problems and is data hungry. Finally, difference-in-difference (DID) methods have had an upsurge of interest recently and employ a quasi-experimental design using time series data analysing control and treatment groups to measure an appropriate counterfactual – in this case new public transport infrastructure – to estimate a causal effect. DID can be thought of as a superior form of the earlier comparison methods, usually using a regression method where the measurement of effect is by an interaction term between time and the treatment group dummy variable.

The published evidence on uplift appears to be context dependent. The values obtained for uplift are mixed, and some of this difference must come from the difference in method used. RICS (2002), Smith and Gihring (2006, 2009), and Medda (2012) have reviewed over
100 international studies on the impact of public transport on property values, focusing mainly on the impact of heavy rail, metro and light rail. However, a short list of influencing factors includes whether the property is commercial or residential, the mode under consideration, the nature of the neighbourhood and the quality of the infrastructure and its service. Also important is the timing of the uplift and whether generating a network effect, whereby improvements to the network provide access to more destinations, gives value uplift benefits. These are considered in turn in the following sections.

**Residential versus commercial**

In principle, land value will increase with increased accessibility whether it is residential or commercial land. Commercial uplift is in some ways easier to capture, as it might be expected that the commercial entrepreneur would anticipate the uplift and be able to internalise it in their plans: in these cases, the planning approval processes tend to extract the uplift through planning gain, whereby the developer includes elements of a project beneficial to the community in exchange for planning permission. Higgins and Kanaroglou (2016) identify that just over 20% of all land value uplift studies are on commercial property values, including Ko and Cao (2013), Deng and Nelson (2010) and a meta-analysis by Debrezion et al. (2007). As the majority of value uplift studies are concerned with residential properties, the evidence presented in the remainder of this chapter relates primarily to residential property value uplift.

**Mode**

The reviews by Smith and Gihring (2006, 2009) identify the value uplift literature for public transport rail-based projects, and the evidence is strengthened by a more recent review paper that considers only studies from the United States and effects on single-family houses (Higgins & Kanaroglou, 2016). Summarising the results suggests that for heavy rail transit (HRT), uplift appears to fall from the station to 800 m out, suggesting the value uplift is falling over the typical walking distance. Light rapid transit (LRT) has lower overall value uplift and appears more variable, although this is partly because the analysis includes LRT systems on dedicated rights of way and LRT systems in mixed traffic.

The contribution of new bus-based infrastructure to land value uplift is an area that is less apparent in the literature, despite the progressive implementation of bus rapid transit (BRT) (see also Chapter 13). A meta-analysis of BRT found BRT has mixed outcomes in terms of land value uplift and typically lower value uplift than rail-based infrastructure (Zhang & Yen, 2020). Rodriguez and Targa (2004) and Munoz-Raskin (2009) both studied the impact of BRT in a developing country context, focusing on the Transmilenio in Bogota, Colombia, and found that, as for rail, the housing market placed value premiums between 6.8% and 9% on residential properties in the immediate walking proximity of feeder lines to the BRT service. As BRT penetration increases, more studies have become available (Deng & Nelson, 2010, for Beijing, China, with 2.3% annual growth, and Cervero and Kang, 2011, for Seoul, Korea, with between 5% and 10%). Also, whilst LRT and HRT studies have typically been in developed countries, BRT or bus-based infrastructure evidence has typically come from the less-developed countries – particularly South America. This makes comparison less easy. But this highlights one of the important underpinnings of value uplift – that of capitalisation of accessibility. It appears that once built, rail-based infrastructure is regarded as fixed and the improvements in accessibility regarded as permanent. In contrast, despite gaining in popularity due to having greater cost effectiveness
BRT, as a high-capacity urban public transport system, typically with its own right of way (as for rail-based modes), is not seen as permanent as rail-based systems and so does not realise as great a value uplift.

In the developed world, BRT has made a significant contribution to public transport mode share in Brisbane, the only Australian capital city where BRT features prominently. There have been a number of studies in Australia; for example, for the Liverpool Paramatta Transitway (LPT) in North-West Sydney, a repeat sales method identified that houses between 100 and 400 m and units between 800 and 1200 m of the LPT benefit but with negative impact for properties within 100 m of BRT, with the uplift occurring after opening (Mulley & Tsai, 2016). A negative impact was also noted in Mulley (2014), with property prices also declining on average by 9.2% when located within 100 m of the LPT. In Brisbane, a GWR approach showed an average uplift of 0.13% for each 100 m closer to the station, provided residential properties are not too close. Access to train stations was on average negative (Mulley et al., 2016). This negative effect is not uncommon in Brisbane and may be due to poor levels of service for trains, the effect of crime and/or noise from freight lines and the effects of flooding. However, as GWR offers the opportunity to investigate the spatial distribution of value uplift, Mulley et al. (2016) found that the value uplift for distance to BRT stations is relatively stronger at stations further away from the central business district (CBD), with non-significant effects for some BRT stations closer to the CBD. These results align well with other findings and could be expected because more travel time can be saved through use of the BRT by residents living further away from the CBD.

Other developed countries’ experience for BRT is more mixed. In Quebec, Canada: only properties located far enough away to avoid noise but close enough to use the BRT experienced value uplift of between 3% and 7% (Dubé et al., 2018). In Pittsburgh, US: uplift of around 16% was identified, but other positive factors were also present (Perk & Catala, 2009), but in Los Angeles, US, no evidence of uplift was found (Cervero & Duncan, 2002).

Uplift for the ferry mode is virtually absent in the literature. A study in Brisbane, another GWR study, showed an average of 4% uplift for properties closer to the ferry and 2% for properties closer to the CBD (a 1-km decrease in distance from ferry terminal/CBD leads to a 4%/2% increase in price) (Tsai et al., 2017). For spatial distribution, the uplift was restricted to mature ferry terminals with immature wharfs, where building being new or currently underway not having positive uplift, although this might come as the area matures.

The nature of the neighbourhood and the role of quality in creating value uplift

‘Location, location, location’ is a common saying in relation to the value put on property. This flows through to identifying uplift as different neighbourhood areas and different quality systems appear to attract different levels of uplift. Areas in decline do not achieve the highest value uplift, with, for example, a meta-study of rail finding up to a 32% premium but more modest uplift in the poorer area of Buffalo, New York (Hess & Almeida, 2007). Value uplift only seems to occur when the improvement has a significant impact on travel times (Ryan, 1999). Higher-quality services in general lead to more uplift. Meta-analysis by Debrezion et al. (2007) and Zhang and Yen (2020) shows a positive correlation between value uplift and service quality indices such as frequency, connectivity and travel times. In terms of spatial distribution, value uplift occurs around stations where access was by walk or public transport, whereas park-and-ride stations were associated with disamenity, and walkable areas in a transit-oriented development (TOD) study found value uplift only when TOD replaced
Land value gains and value capture

Park and Ride (Kahn, 2007; Mathur & Ferrell, 2013). Finally, higher uplift is associated with higher densities and greater amenities (Atkinson-Palombo, 2010).

**Timing of value uplift**

Cross-sectional studies cannot address when uplift occurs – whether this is upon announcement of the project, when the project build starts or when service commences. The pool of studies looking at this issue of timing is relatively small. However, if uplift is to be captured, it is important to know when the value uplift happens. Ignoring timing issues might well bias the estimation of value uplift, as uplift is not guaranteed to rise linearly. This means that generally, longitudinal studies should be preferred.

The evidence that exists is mixed, with little consistency. For Chicago’s rapid transit, the market appeared to anticipate uplift, but uplift was stronger after the line opened (McMillen & McDonald, 2004). With heavy rail in Puerto Rico, there was, in contrast, no impact on land values until operational (Loomis et al., 2012); this was also true in Sydney, Australia, where the Liverpool Paramatta Transitway uplift of 11% occurred after opening (Mulley & Tsai, 2016). In Phoenix, US, the LRT achieved value uplift at each stage of development, more than nine years before opening (Golub et al., 2012), whereas the LR in Portland, US, had uplift for vacant plots after announcement (an increase or up to 70%), but the uplift fell back to 20% after year 2 (Dueker & Bianco, 1999). In the Gold Coast, Queensland, Australia, a longitudinal analysis shows that property prices around the new LRT started to increase right after announcement, with the highest increment to value uplift occurring after solid financial commitments had been made by government (Yen et al., 2018), and then property prices slowed during construction and operation periods. The model also shows uplift effect differences for different sections of the catchment, with the highest increment being for properties with greatest accessibility to LRT stations. Interestingly, this analysis shows that properties sold in 2016 would have a higher price if located closer to the HRT station which was planned for an interchange in the second stage of the Gold Coast LRT, thus suggesting that this stage two might experience value uplift impacts on property prices immediately construction began.

**The network effect**

In practice, much new infrastructure is an addition to a network rather than the creation of a totally new network. The additional value to properties from network extensions is rarely studied and quantified. A recent study in Australia looks at this issue in the context of the BRT Busways in Brisbane, Queensland. The BRT Busways in Brisbane are the result of various network extensions with the first part of the network being the Busway to the southeast (SE) of the city. Mulley et al. (2017) look at the value of the network effect to the residents living close to this SE Busway as a result of the northern and eastern Busway extensions being made. The study suggests the value of the uplift is approximately 3% to the properties close to the SE Busway although the actual timing of this uplift is less certain.

**Implications of value uplift for value capture**

The empirical analysis shows clear spatial variation, suggesting a uniform value capture tax is unlikely to achieve horizontal equity. Whether vertical equity is achieved is uncertain, although as income and property values are positively correlated, there will be confounding effects that may prejudice vertical equity.
The empirical studies demonstrate that method and context influence the estimated value uplift. The studies also show that new infrastructure forming a backbone to the network, such as the Busways in Brisbane, Queensland, Australia, do better than when the same mode is more tangential to the network, such as the Liverpool Paramatta Transitway in Sydney, NSW, Australia. Importantly, and underresearched, are the value uplift from the network effects from public transport system extensions: this suggests that value capture policies should take a wider rather than narrow spatial viewpoint. However, empirical studies are valuing uplift ex post: for value capture policies to be effective, some estimate of value uplift needs to be made ex ante. The penultimate part of this chapter proposes such an estimation process.

Value capture

Governments’ financing systems to date emphasise user fees, which are primarily fares in the case of public transport infrastructure. However, the need for greater investment has resulted in searches for new methods to aid or replace user fees. Value capture relies on recovering the uplift received by property owners (residential and commercial) from enhanced accessibility brought about by new infrastructure. Knowing the uplift is clearly a prerequisite to its capture. Interest in value capture is increasing, see, for example, Aveline-Dubach & Blandeau, 2019; Mathur, 2019; Salon et al., 2019.

Value capture policies, as with all taxes, have different characteristics. In this section, six value capture strategies are briefly evaluated in terms of their economic efficiency (is the cost to taxpayers related to the benefits they receive?), equity (how does it affect different income groups and different geographies) and ability to pay a sustainable and predictable revenue and feasibility (political and administrative transparency, perceptions of taxpayers). In terms of applications in a public transport context, value capture to date has taken a number of forms, of which the following are the more frequently used:

1. **Land value tax** has been used in many jurisdictions to raise finance. This could be enhanced for value capture purposes and would be best based on unimproved land values, assuming that unimproved values are identified as broadly related to underlying market values. Land taxes are relatively economically efficient and are sustainable, although they are likely to be regressive and politically unpopular.

2. **Tax increment financing (TIF)** levies a tax on the future increment in property value to finance development-related costs. It has rarely been used for transport projects, and there is not much information about its efficiency. It has good feasibility and is regarded as equitable, although there may be some spatial equity issues if overlapping government areas do not benefit from a single TIF area.

3. **Special assessments** impose charges on property owners based on their geographic proximity to the new infrastructure. It is an economically efficient measure which is generally good on equity (unless the charge is linked to property value, when it tends to be regressive). It is low on sustainability since it has a narrow tax base but often politically acceptable to businesses, although homeowners find it less palatable.

4. **Transit-focused development fees** are one-time charges on new developments to contribute to costs of growth-related public services such as a public transport system. Other forms of development fees have been common in planning, for example, negotiated payments or planning gain, which are an in-kind contribution to local roads, new parks or other public goods as a condition of planning approval but do not specifically address financing of new
Land value gains and value capture

public transport. It is an efficient way of raising money, as the highest charge is to those most likely to benefit (if charged to developers, it is in effect passed on to the new owners), and equitable, as payments are roughly proportional to benefits. It is sustainable for single development and, as it is low visibility when implemented, politically feasible and regarded as ‘paying their way’.

5 Joint development occurs when a transport facility and adjacent private real estate development are developed together, with the private sector partner making a financial contribution to offset the costs of the transport facility. It is usually good on efficiency grounds, as contributions align with expected benefits and the voluntary nature of payment encourages equity. Revenues are not necessarily sustainable as related to the state of the real estate market but politically palatable to implement.

6 Transit-focused property transaction fees are collected when properties are sold. The collection rate fluctuates with the real estate market. This can be efficient but could be regressive. However, it is simple to administer and does well in terms of keeping pace with inflation.

Other value capture strategies have been used in transport but not specifically public transport financing. These include transportation utility fees, where transport networks, like other utilities, are primarily financed from user fees and air rights agreements and establish development rights above or below a transport facility in exchange for a financial contribution and/or future stream of revenue from land/property or income taxes. No obvious public transport investment has been financed from air rights so far, although the complicated arrangement in Hong Kong between the public transport operator and the government come close to this.

The evaluation of these strategies are summarised in Table 10.1. This shows that there is not an overall winner in terms of a strategy that scores well on all of the characteristics. However, as Table 10.1 illustrates, these strategies have been applied, and, as with many policy deliberations, there is no ideal option, and it has become a question of choosing the most suitable when making the choice for capturing the value uplift consequential on new public transport infrastructure.

### Predicting value uplift for value capture

The review of the value uplift literature demonstrates how it has varied considerably depending on mode, neighbourhood features and other factors that constitute the context of the public transport investment being considered. A sensible value capture policy must be based on likely value uplift since the policy of capture is in place before the public transport investment is made. This means that an ex-ante forecast of likely uplift is necessary, taking into account as many of the contextual factors as possible. This section proposes a three-stage modelling procedure to predict land value uplift effects in a case study, as shown in Figure 10.1. Underpinning this approach is that if the catchment area of the new transport infrastructure matches the characteristics of the existing infrastructure in terms of mode share and neighbourhood characteristics, the new infrastructure development will bring the same house price impact to its catchment area. The case study location is South East Brisbane (SEB), Brisbane, Australia.

### Step 1: Transport system development match at system level

Since the new infrastructure does not exist, a transport planning model evaluates the future transport impact in terms of mode share, which is the yardstick used to evaluate the development of the
Table 10.1 Summary of value capture mechanisms

<table>
<thead>
<tr>
<th>Schemes</th>
<th>Efficiency</th>
<th>Equity</th>
<th>Ability to pay</th>
<th>Sustainability</th>
<th>Feasibility</th>
<th>Administrative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Price signals, economic growth</td>
<td>Cost/benefit to payers</td>
<td>Ability to pay</td>
<td>Adequacy, growth potential, stability</td>
<td>Political</td>
<td>Administrative</td>
</tr>
<tr>
<td>Land value tax</td>
<td>Good</td>
<td>Good</td>
<td>Slightly regressive</td>
<td>Broad base, modest growth, fairly stable</td>
<td>Low</td>
<td>Fairly simple</td>
</tr>
<tr>
<td>Tax increment financing</td>
<td>Little evidence for transportation use</td>
<td>Good</td>
<td>Possibly regressive</td>
<td>Narrow, for limited projects; keeps pace with inflation, incomes</td>
<td>High</td>
<td>Complex, costly</td>
</tr>
<tr>
<td>Special assessments</td>
<td>Good</td>
<td>Depend on structure and exemption</td>
<td>Slightly regressive</td>
<td>Narrow base, limited revenue, one-off opportunity</td>
<td>Low</td>
<td>Difficult to establish</td>
</tr>
<tr>
<td>Transit-focused development fees</td>
<td>Good potential</td>
<td>Good</td>
<td>Probably neutral</td>
<td>Narrow; adjustable for growth; cyclical</td>
<td>High</td>
<td>Low costs</td>
</tr>
<tr>
<td>Joint development</td>
<td>Good</td>
<td>Good</td>
<td>Neutral or slightly progressive</td>
<td>Narrow base, limited revenue; cyclical</td>
<td>High</td>
<td>Complex</td>
</tr>
<tr>
<td>Transit-focused real estate fee</td>
<td>Good potential</td>
<td>Good</td>
<td>Possibly regressive</td>
<td>Narrow base, adjustable for growth, one-off opportunity</td>
<td>High</td>
<td>Low costs</td>
</tr>
</tbody>
</table>

Case studies:
- Urban infrastructure in São Paulo, Brazil, and Crossrail, London, UK
- MetroRail Red Line, Texas, US; Crossrail, London, UK; and Subway 7 Line Extension, New York, US
- Crossrail, London, UK, and Grand Paris Express, Paris, France
- Subway 7 Line Extension, New York, US
Land value gains and value capture

Figure 10.1  Model procedures for future infrastructure land value uplift

target transport system and identify when the target transport system (SEB extension in this case) has the same anticipated mode share as the existing transport system (current SEB in this case).

The standard four-stage model follows the sequence of trip generation, trip distribution, mode choice and traffic assignment to predict mode share (Rosenbaum & Koenig, 1997). Trip generation modelling determines the number of trips entering and leaving each zone, known as attraction and production, respectively. Trip distribution then predicts the movement of passenger trips between each origin and destination zones pair (Solecka & Zak, 2014). Next, mode choice allocates trips to available transport modes (PTV, 2016). Finally, traffic assignment is determined by trip assignment modelling, which assigns origin and destination (OD) pairs to available routes. These mode OD matrices are loaded onto the transport network, giving mode share as the output.

Step 2: Transport system development match in neighbourhood level

Step 2 has two parts; the first part estimates neighbourhood characteristics for future transport investment. For example, if the four-stage model reports the SEB extension needs 10 years to reach current SEB levels, the neighbourhood characteristics would be predicted for 10 years later for the catchment areas of SEB extension. The second part is neighbourhood matching after estimating the neighbourhood characteristics. Both parts are described in more detail subsequently.
Census data is used to estimate neighbourhood characteristics in the first part of this step. In this example, the 2011 census data is used to estimate the neighbourhood characteristics of each statistical area Level 1 (SA1) by the date (denoted by 20XX) when the new transport infrastructure will be operating at the same level as existing infrastructure. The SA1 is the new base unit of output geography for the 2011 Census in the Australian Bureau of Statistics (ABS). It is the smallest level at which census data is reported, with an average population of 400 persons. Data for projected population at that date comes from Queensland government statistics (Queensland Government Statistician’s Office, n.d.) for this case study, whilst other neighbourhood characteristics are projections based on linear regression modelling using Australian Bureau of Statistics census data of 1996, 2001, 2006, 2011 and 2016 (Australian Bureau of Statistics, n.d.). This finally gives a predicted set of neighbourhood characteristics for 20XX so that neighbourhood matching can be undertaken (i.e., percentage of older people (>65 years old), young people (<18 years old), unemployed population, high-income population, married population, indigenous population, population with college and higher qualifications), environmental characteristics (i.e., distance to Brisbane/Logan CBD, percentage of commercial use area and residential use area) and BRT accessibility (i.e., distance from geometric centre of SA1 to the nearest BRT station).

Neighbourhood matching uses a statistical technique called propensity score matching (PSM) which matches the future neighbourhood characteristics to existing characteristics. In this example, existing SEB SA1s are matched to the SEB extension SA1s using the neighbourhood characteristics that are predicted in the previous step as independent variables, with the dependent variable being an indicator variable for a neighbourhood being located within 1600 m of the SEB stations.

**Step 3: Land value uplift evaluation**

This step identifies the land value uplift for each neighbourhood in the existing transport system catchment areas. Determining the corresponding land value uplift for the matching neighbourhood in the target transport system catchment areas can then be done. Figure 10.2 shows the three-step procedure that is elaborated on with a case study of SEB, discussed in the following section.

As an example, consider SEB in Figure 10.2. The process matches each existing SEB neighbourhood area (SA1 in solid line boundary) of the existing SEB catchment to one or more SA1s in the larger area of the SEB extension (this is shown by the lighter grey SA1 within the dashed line boundary of the SEB extension). Using the SA1 as the unit of analysis to predict the property value uplift, the value uplift from BRT accessibility for the two (or more) matched areas (i.e., SA1 in solid line boundary and SA1 in dash line boundary) is assumed to be the same. In order to finally predict the uplift, there needs to be an estimated land value uplift for each of the SA1s in the existing SEB. A number of studies may exist, as for the following case study. In this case, the method uses the results from Zhang et al. (2020) as the evidence base to predict the impact of SEB extension, since this estimates it on the basis of the open-system operation characteristic of the SEB system.

**An empirical example for South East Brisbane**

Step 1 requires predicting when the SEB extension will achieve the same mode share as the current SEB – this is anticipated as an extension to SEB which would play a critical role in better connections of the Logan area to Brisbane and the Gold Coast. This study uses the four-stage modelling
results from Kuang et al. (2019) as the evidence base to predict the public transport mode share of SEB extension areas. The four-stage transport planning model prediction shows that for the base year 2018 (without the SEB extension), the market share of public transport is relatively low at 7.66%, rising to 8.09% in 2031. The four-stage model predicts that with the SEB extension in 2031, public transport mode share is estimated at 14.12%. Using the predictions from the four-stage models, the SEB extension is predicted to be operating at the same level as the SEB in 2031 (so 20XX previously is 2031 in this case) (see the description of Step 2 in the previous section).

Turning next to value uplift, the first part of Step 2 identifies appropriate neighbourhood characteristics and predicts future values using linear regression and historical census data. In the second part of Step 2, PSM is adopted to match the SA1 areas in the catchment areas for the existing SEB and the 2031 SEB extension so that it can be assumed the matched areas will achieve the same uplift. The results of this are illustrated in Figure 10.3.

In Step 3, the uplift for the new infrastructure is estimated. Zhang et al. (2020) identify that proximity to SEB stations (defined as a property within 1600 m) places an average premium of AU$ 26,747 on the property value in 2011. Moreover, every metre moving closer to the SEB corridor increases the property price by a further AU$144, giving an overall average of 4.3% in 2011 but with significant spatial variation, as shown in Figure 10.3 within the solid-line boundary.
Figure 10.3  Property value uplifts within SEB extension catchment area in 2031
Land value gains and value capture

The dashed-line area presents the predicted value uplifts for 2031 SEB extension. Property value uplifts are reported as increases in percentage for every 1 km closer to BRT station. The most significant uplift is shown by the areas shaded black, where, for 1 km closer to a BRT station, the property values increase by up to 11.8%. It can also be seen that the areas closer to the route of the SEB and its extension generally have lower uplift (grey or white colour). While the value uplift for SEB in 2011 is estimated at an average of 4.3%, the value uplift estimated by 2031 for the extension is lower (3.5%). The uplift is lower in 2031 because there is spatial variation exhibited in the SA1s of the SEB, and the process of matching areas between the SEB and the SEB extension gives rise to more low areas of uplift as compared to the current SEB. This is likely because the SEB extension is peripheral to the economic centre of the Brisbane CBD, which will be enhancing the value uplift of the current SEB. Overall, this estimation of uplift shows that most of the SEB extension area would enjoy price premiums between 1.61% to 3.98%.

An understanding of value uplift estimates allows value capture policies to be put in place that would provide either partial or full funding for the SEB extension. This empirical demonstration shows how an ex-ante forecast of value uplift can be established to underpin policy implementation.

Conclusions

This chapter has outlined how land increases in value as a result of investment in public transport, drawing on a literature review to establish how empirical work, in ex-post studies, has valued this land value uplift in relation to a number of different criteria. Different strategies to ‘capture’ the land value uplift were evaluated in relation to normative criteria and illustrated by reference to public transport investments which have been implemented.

Value capture strategies are, however, more difficult in practice than it appears at first sight. Importantly, how can you capture value uplift if you do not know its quantity? The penultimate section provides an example of how to predict uplift. Moreover, it is difficult to achieve both horizontal and vertical equity, and many strategies attract political opposition. However, not capturing value uplift will often lead to bigger inequalities, with individuals benefitting hugely from investment paid for by the public purse and, of course, not providing a stream of revenue to help finance the new infrastructure.

Areas for future research must include achieving some consensus on the method to use for value uplift so that estimates become less dependent on methodology, and this includes a consistent way of identifying how catchment areas may vary by mode. This will in turn allow for better prediction of likely uplift to better provide an evidence base for value capture. For value capture, future research needs to identify and catalogue good and not-so-good practice, particularly in terms of how context should alter the way in which policy is applied and how better equity can be achieved as compared to basing funding on user fees and income-based taxation.

As a final note, this chapter was written before the global outbreak of the COVID-19 pandemic and the lockdown regulations that ensued. At the time of writing, the pandemic has had far-reaching and potentially long-lasting consequences for the provision and usage of public transport. If new infrastructure continues to offer fewer benefits in accessibility, then this will be reflected in the uplift value to properties near these infrastructures, which, in turn, means the opportunities offered by value capture will be lessened. From a research point of view, this emphasises the need to undertake longitudinal studies where the impact of the pandemic can be included in the econometric modelling.
References


Land value gains and value capture


RICS. (2002). *Land value and public transport stage 1 – summary of findings.* RICS Policy Unit, Royal Institute of Chartered Surveyors.


Solecka, K., & Żak, J. (2014). Integration of the urban public transportation system with the application of traffic simulation. *Transportation Research Procedia, 3*, 259–268.


