Capturing the value of transport infrastructure

Submission
by
Bus Industry Confederation

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About the Bus Industry Confederation of Australia

The Bus Industry Confederation (BIC) is the peak national body representing the interests of Australian bus and coach operators and suppliers to the industry. As the primary voice of the bus and coach industry the BIC works with all levels of Government, regulatory authorities, strategic partners, our industry and the community to:

- Encourage investment in public transport infrastructure and services.
- Coordinate and make more effective existing Federal, State and Local Government policies and programs that relate to passenger transport.
- Improve public understanding of the contribution made by the bus and coach industry to Australia's economy, society and environment.
- Ensure that the accessibility and mobility needs of Australians are met, regardless of where they live or their circumstances.
- Ensure that buses and coaches operate safely and effectively.

The purpose of this paper is to consider various approaches to the funding of urban public transport initiatives both in Australia and internationally. The paper examines funding mechanisms that may be suited to supporting (increased) spending on public transport, and proposes a set of principles which are relevant in choosing the merits of each funding mechanism. The paper concludes by identifying, according to these principles, the most effective funding mechanism for public transport in Australia over both the short and long term.

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Funding of public transport

1. Context

> *'The art of taxation consists in so plucking the goose as to obtain the largest possible amount of feathers with the smallest possible amount of hissing'.*
> *(Jean Baptiste Colbert, French economist and Minister of Finance under Louis XIV).*

Strategic long term land use transport plans need to be complemented by rolling implementation plans, which set out details of major project initiatives and other categories of works that will be delivered over the next ten or so years. Cities such as Vancouver and London adopt this nested approach. Implementation plans need to include details of how projects and programs of works will be financed and funded. *Financing* refers to the way projects/programs will be paid for at the time they are undertaken (e.g., by selling assets, raising equity or debt). *Funding* refers to how the costs of such financing will be met over time. For example, if a major new road is financed by raising additional debt, funding refers to how that debt will be repaid over time, such as through tolls levied on those who use the road.

In terms of financing major infrastructure projects, good project planning (e.g., projects emerging from a well-developed infrastructure pipeline, with rigorous use of cost-benefit analysis and open engagement around benefits and costs), together with effective project delivery, which sees revenue streams and costs meet expectations, is encouraging for potential investors. Where the projects in question are transport projects, planning depends, in turn, on the relevant projects emerging from high quality, integrated strategic land use transport plans that have involved meaningful and extensive community engagement, rather than simply being projects that are, in effect, imposed on land use plans.

As well as good project planning and delivery, the availability of long term debt on competitive conditions is very important for infrastructure project financing. One such model, for example, is provided by the US Transport Infrastructure Financing and Innovation Act (TIFIA) but other approaches to such 'credit enhancement' can also be used. Some of the US projects supported through TIFIA include the Washington Metro Capital Improvement Program, the Transurban Capital Beltway Hot Lanes Project and the Miami Intermodal Centre. These are typically projects of about $US2b scale, with about 10-30 per cent of costs the subject of some form of TIFIA loan support (e.g., direct loan, guaranteed loan).

With substantial sums available internationally for financing of good infrastructure projects[i], *funding* is generally seen as a more significant barrier to implementing long term land use transport plans, particularly in developed economies. This submission therefore focuses on funding, considering how urban public transport services might be funded. While some cities are able to operate self-funding public transport services, this is unusual, particularly in low density North American and Australian cities but also in cities such as London, where the London Underground about meets its operating costs, but not capital, and bus services cover about seventy per cent of their operating costs. Dealing with the specifics of the important public transport application area provides a convenient way to illustrate the types of issues that need to be considered by policy makers when developing funding programs, such as integrated land use transport plans.

In many cities, a case can be made for increasing the provision of public transport services, because of the benefits these deliver for service users but also, and perhaps more importantly, because of the wider economic, social and environmental benefits they are expected to deliver. These benefits include enhancing urban agglomeration economies, lowering road congestion costs, cutting transport greenhouse gas emissions, improving urban air quality, supporting social inclusion, lowering the road toll, improving health and reducing energy insecurity (Stopher and Stanley 2014). However, the financial cost-recovery rate of urban public transport systems in major cities in Australia, the US and Canada, where densities are relatively low, is typically 30-60 per cent of operating costs, as illustrated later in this chapter, which will not permit internal funding of service growth. At the same time, Stanley and Hensher (2011) have argued that the benefits of urban route bus services in Melbourne are about ten times the value of fare revenue collections, suggesting a vast divergence between economic viability and financial viability. **The scale of such economic benefits, which arise from externalities, suggests there should be potential funding opportunities that can be tapped to both improve financial cost recovery rates and support delivery of improved services, given the political courage to pursue such funding opportunities**.

This submission examines some funding mechanisms that might be suited to supporting (increased) spending on public transport capital and operational requirements in relatively low density cities and also includes some consideration of funding low income/social housing. Section 2 discusses funding mechanisms in general terms, including the important question of valuation. Section 3 explores the broad mechanisms used to fund public transport services in Australian, Canadian and US cities. Section 4 puts forward a set of principles that are relevant to choosing between alternative possible funding measures. Section 5 then considers a range of such measures for funding public transport services, illustrating their use, rating them against the various proposed criteria, Section 6 drawing some conclusions on bundling of measures in to packages.

2. Funding sources and valuation

Major categories of funding

There are three main sources of potential capital/operating funding for transport (public and private) and similar initiatives:

1. government, on behalf of the community. This funding could be from any level of government
2. users (e.g., via public transport fares, road user charges, congestion taxes, road tolls)
3. other beneficiaries (e.g., landowners who benefit from a nearby transport improvement being levied for value capture, or levying a toll on freeway or bridge users who benefit from a nearby transit improvement).

The second and third of these funding sources are aimed at different *beneficiaries* of an infrastructure or service improvement and, together, constitute *beneficiary pays* funding approaches. Where there are substantial 'external' costs or benefits involved, which are costs or benefits that accrue, or will accrue, to third parties from the implementation of the action being considered rather than solely to the parties directly involved in the transaction, Government usually needs to play a role in *monetizing* these benefits or costs if they are to be available for (public transport or other) funding purposes.

In the case of public transport, some direct *government funding* might be justified on grounds of the absence of *polluter pays* pricing of the external costs of road use and the associated benefits that transit creates in terms of lowering these external

costs. It might also be justified because of the social safety net function that transit frequently performs (for example, half of London's bus users benefit from free travel).

As a general principle for utility pricing, THE BIC believes that beneficiary pays approaches to funding should be used to pay for infrastructure and services before resort is made to government support funding. The major reason for this ordering is because of the signals that beneficiary pays mechanisms can provide for efficient provision and use of infrastructure and services. Also, beneficiary pays funding accords with widely accepted community notions of fairness: those who benefit should pay, in some way related to the size of the benefits they gain. This prioritisation of funding sources (*beneficiary pays* before government funding) then enables government funding to be reserved for infrastructure projects/programs that generate sufficient total net benefits, relative to their costs, but do not generate sufficient benefits that are readily monetised. This includes improvements that are intended to support social inclusion, a common government objective. Section 5 explores such matters in more detail.

Application of the notion of beneficiary pays is relatively straight forward when the beneficiary is the user but is more complex for non-user beneficiaries. Valuation in such circumstances deserves a book in its own right but we include a summary of some key considerations, from a welfare economic perspective.

Benefit valuation

If a beneficiary pays approach to funding is to be applied, them some means of identifying relevant beneficiaries and valuing their benefits is fundamental to potential monetization and value capture. The benefit valuation principle usually applied in cost-benefit analysis (CBA) is useful here. This is the principle of *willingness-to-pay* for a benefit (or *willingness-to-accept compensation* for a loss). In a CBA setting, the link between willingness-to-pay and capacity to pay reinforces the importance of understanding who gains (or loses) when benefit (or cost) valuation is being undertaken, recognizing that a dollar gain is typically of lesser value (for example) to someone with a lot of dollars than to someone with few. This leads to the idea of equity-weighting in CBA (Stanley and Stopher 2014). In a funding context, the identity of the beneficiary is obviously important to ensure that the right person is charged if a beneficiary pays approach is being pursued.

A number of different valuation techniques have been used in CBA to value or monetize different types of benefits (or costs) and can help to provide a basis for beneficiary pays funding. The most common examples are:

- market prices, which provide the most straight forward basis for valuation, if available, since a change in market prices provides a simple way of measuring the relevant unit benefit (or amount of value gained) from an action that leads to price changes, or conversely for a cost. Well established approaches are available to apply market price measures to new demand generated by an initiative under consideration, where the unit value is obviously less than the full extent of price change (the economists' rule-of-a-half)
- hedonic prices, which in a land use transport setting are prices imputed from analysis of the determinants of land values, including factors that will drive changes in land values when the initiative under consideration is implemented. Hedonic pricing can be used, for example, to suggest how changes in site accessibility will impact site value, which is the most common focus for land value capture associated with major urban transport projects
- some prices or values may be imputed from behaviour in other choice settings. Revealed preference techniques, for example, are often used to impute values for the time people spend travelling, different values usually emerging for in-vehicle time than for transfer time and for waiting time. Travel time reliability values can also be estimated this way
- stated preference techniques can be used when there is no behavioural setting that approximates an individual choice situation and/or can be used to sharpen values derived from behavioural (revealed) choices. Stated preference techniques explore hypothetical choices and trade-offs among prospective choice variables through questionnaires and can often impute values based on the results
- techniques that associate a value with the cost of taking remedial action to treat some particular damage (sometimes known as an avoidance cost). For example, the cost of installing double glazing might be seen as part of the cost of traffic noise or aircraft noise.

The direct costs of facilitating a particular land use transport initiative, in accord with established regulatory or other governmental requirements, might be seen as implying a value to associated benefits in some contexts. For example, infrastructure/service levies on new land development are a common requirement, usually linked in some way to the costs of providing such infrastructure and/or services. This can be seen as a socially sanctioned measure of part of the benefit

expected to accrue to the developer from the development in question. The London association of development densities with public transport accessibility levels (PTALs) is a relevant example. If a major proposed development breaches the density/PTAL guidelines, then the developer may be required to contribute to improved public transport service levels.

It is beyond the scope of the present submission to explore these methods in detail, suffice to recognize their existence and wide use, which suggests they may be of assistance in application of beneficiary pays funding, depending on the nature of the initiative being considered.

If benefit (or cost) valuation in money terms is not possible, or not considered worth the cost in the context of the decisions under consideration, then physical measures of expected impact and a description of those impacts that are inherently qualitative, commensurate with the significance of the issue under consideration, are often undertaken in CBA. These provide a very weak base for beneficiary pays charging but may help provide a basis for a decision on government action and/or government funding.

Value capture related to land value increases

The major focus of most (non-user) beneficiary pays in transport funding, in particular, has been associated with the idea of land value capture, where hedonic pricing techniques (for example) can be used. Land prices reflect, inter alia, the value of public goods and services available from the site and it has long been recognized that major transport projects, such as rail upgrades to central business districts or bus rapid transit facilities, usually increase land values, linked to the resulting accessibility improvements. Research on effective density and agglomeration economies recognizes these connections (Graham 2007). Land value is where value gain will be focused, rather than on the value of buildings on site, which should be unaffected by changing accessibility per se, so land value change should be the main focus of value capture. More broadly, increasing governmental charges on land, rather than on property, can be expected to encourage relatively greater land development and more compact settlement patterns.

A number of studies have examined links between public transport service provision and land/property values. Mohammad et al. (2013) present a meta-analysis of studies looking at the impact of rail projects on land and property values, showing that the result depends on a range of factors, such as type of land use, type of rail service, rail system life cycle maturity, distance to stations, geographical location, accessibility to roads, data specification, methodological characteristics, together with whether the affected entity is land or property. While the mean value impact they identified was an 8 per cent gain, these influencing factors mean that there is a large variation in the range of impact values. Some of their findings include the following:

- impacts on land prices (unsurprisingly) tend to be relatively larger than on property prices
- commuter rail has a higher impact than light rail
- value changes tend to be highest at distances from 500-800 metres of a station and may extend to 1000 metres for residential areas and sometimes even further
- closer than 500 metres, negative effects such as noise, pollution and perceived risk of crime offset potential value increases
- impacts extend over shorter distances in commercial areas
- value gains are weaker, or non-existent, when there is a good car alternative (being correspondingly higher in more congested areas).

This benefit quantification work suggests a value capture opportunity, to help fund major rail upgrades that are expected to generate value increases, but also indicates that it requires a nuanced approach to identify areas where value increases will be achieved and to estimate the likely scale of impact.

Studies on land/property value changes associated with improved bus services in developed countries are relatively rare. Dube et al. (2011) summarize a few relevant analyses and present their own research on a bus rapid transit service in Quebec City. They find that properties in areas of higher residential density, located within walking distance, and far enough away to avoid adverse local amenity impact (as with the findings from rail studies), experienced a significant lift in sale price. Importantly, they found that this lift in value exceeded project cost and that increases in local government revenues on the higher property values were significant. The increases in property values that they measured ranged from 2.9 to 6.9 per cent.

Mulley (2014) has looked at the impact of Sydney's Liverpool to Parramatta Transitway (LPT) on property values. In terms of improved employment accessibility, Mulley found that, at the mean, a one minute saving in travel time to a local shopping or employment centre added about $1590 to the mean house price across the corridor (0.7 per cent of the mean house price), with localized effects of up to 2.9 per cent. For housing within 100 metres of the transitway, she found a statistically significant reduction in house prices. Overall, her results are slightly smaller than those found for Quebec by Dube et al, Mulley suggesting that the different locations of the respective facilities within their respective cities may have contributed to this result (the LPT being in suburban Sydney but Quebec's facility serving the central metropolis). Mulley's localized analysis of impacts shows the difficulty of striking a single charging rate to capture some of the value uplift associated with an improved bus rapid transit service.

Various ways in which value capture might be realized are summarized in Section 5, these all being intended in varying ways to capture part of the increase in land value that flows from some particular initiative, such as a major urban rail project (like London's Crossrail or the future Melbourne Metro project), so that it can help to pay for the costs of the project over time (e.g., to help repay loan finance). That Section provides examples of where various techniques have been applied. The demonstrated reality of land value increases from major public transport projects supports the idea of seeking some funding

from the relevant beneficiaries. The research results, however, show the challenges in targeting a charge, both spatially and in terms of quantum. These complexities perhaps suggest the merits of low rate value capture charges, applied extensively, except for the biggest projects, where more specific targeting on a negotiated basis may be most appropriate. London's Northern Line extension is a prominent example of the latter, as outlined in Section 5.

Some other opportunities for non-user value capture

Land value capture is probably the main *non-user beneficiary pays* opportunity that is considered for infrastructure funding, particularly in the land transport sector. However, it is by no means the only such opportunity for 'value capture'. Users of other facilities, rather than of the facility that is being upgraded, are another suitable opportunity for 'non-user' value capture. A commonly used approach, for example, is to capture part of the benefit that accrues to users of a congested transport facility when the congestion that is experienced is relieved by a nearby transport improvement. For example, a new bus rapid transit service may ease congestion on an adjacent freeway, by attracting some of the road traffic away from the freeway. Imposition of a toll or other charge on traffic that still uses the freeway (making it no longer 'free'!), would both further ease congestion and capture some of the benefit (primarily travel time, reliability and vehicle cost savings) to traffic that remains on that road. This revenue (captured value) could then be used to help fund the rail or bus improvement that generated some of the congestion savings (the toll generating further such savings). Another common example is where a new road improvement eases congestion on an adjacent link, with tolling on the adjacent link providing a way of capturing the (non-user) benefit of the new link: the benefit is a non-user benefit because it does not accrue to users of the improved facility but to others.

The idea of value capture of a non-user benefit can be extended even more widely. For example, land use and transport improvements that encourage greater walking and/or cycling will tend to improve the health of those who use these opportunities to walk or cycle more. This provides a direct user benefit. However, improved health also means lower health care costs. This represents a non-user benefit, much of which will accrue to government as a health care provider. Similarly, public transport improvements that reduce social exclusion, by facilitating better mobility opportunities, are likely to reduce health care costs, lower the incidence of crime and other anti-social behaviour and reduce unemployment and , although the BIC has helped fund research that has measured the value of benefits to those at risk of social exclusion (see, for example Stanley et al. 2012). The existence of these wider benefits from reducing risks of social exclusion, however, represents an argument supporting some form of funding from the level of government which benefits from the resulting lower service costs. Quantification would help to dimension the size of funding support attributable to thus source of non-user benefit.

3. Funding urban public transport

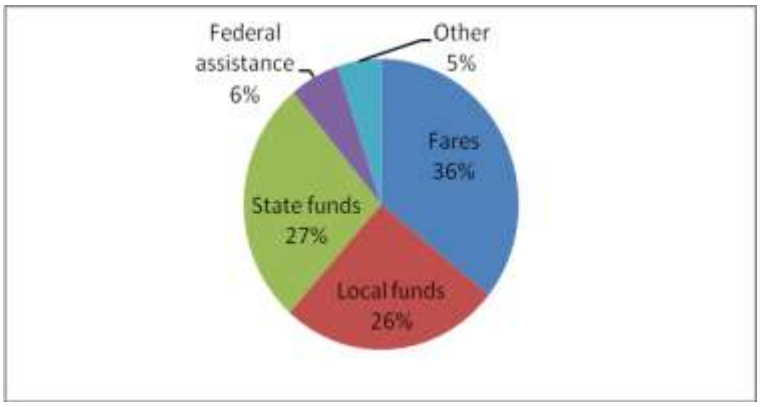
Public transport operating cost funding in Australian and North American cities

To illustrate ways in which public transport services are funded, arrangements in Canada, the US and Australia are summarized. Australia's capital city public transport services recover a relatively small proportion of their operating costs from fares. DIT (2012) suggests that the mainland state capital cities typically recover less than 40 per cent of operating costs and more commonly around 30 per cent. By implication, funding is thus needed for two-thirds plus of operating costs in most Australian capital city public transport systems, plus capital. This funding is primarily sourced from State Government revenue streams, with occasional Federal capital assistance (substantial in amount for some projects, like Melbourne's Regional Rail Link at over $A3b).

Figures 1 to 3 show, at an aggregate level, how public transport operating costs are met in US and Canadian cities. For the top 50 public transport agencies in the US, Figure 1 shows that the cost recovery rate was of a similar order to, or slightly above, that of the Australian capitals, at 36 per cent. Had the systems in the very largest US cities been removed, which are larger than Australian cities, the average cost recovery rate through the fare box would have been 32 per cent, similar to typical Australian outcomes. State and local government (municipal) contributions each provide a little over a quarter of the revenue required to cover operating costs in the US systems and a small federal operating contribution is received.

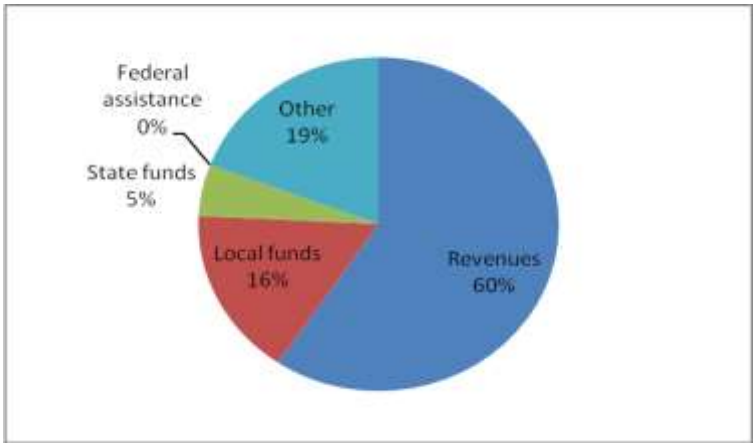
Figures 2 and 3 respectively show that Canadian transit systems in cities with populations exceeding 2 million generate revenues that cover about 60 per cent of direct operating expenses, or 44 per cent for systems in cities of between 400,001 and 2 million. The substantial 'other' component in Figure 2 is mainly revenues sourced from the local dedicated gasoline taxes and auto licence fees collected by TransLink (Vancouver) and AMT (Montreal). There is no Canadian federal assistance for operating costs, with local government (local funds, property charges being a source) being the major revenue source beyond the fare box. Provincial governments only contribute a relatively small share of operating costs (5 per cent in the largest city systems, on average, and 6 per cent in cities with between 400,001 and 2 million population.

Figure 1: Operating cost coverage for top 50 US transit agencies (2012)



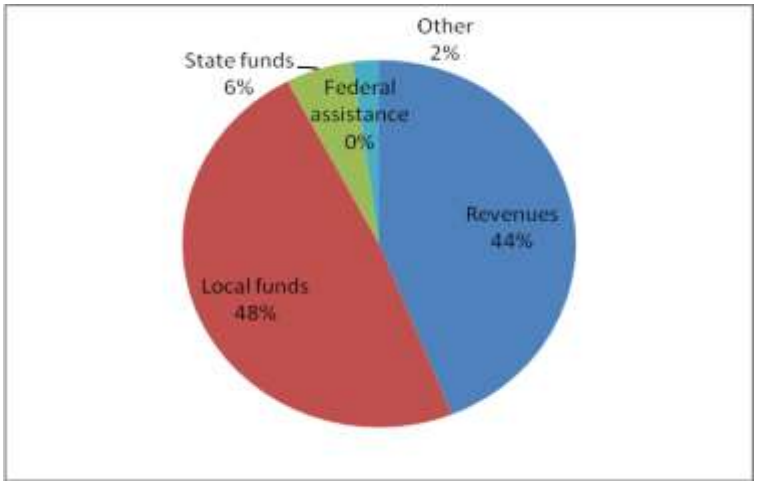
Source: US DOT (2013).

Figure 2: Operating cost coverage for Canadian PT systems in cities of over 2 million (2012)



Note: Contributions exclude Provincial and Municipal debt servicing contribution (~$C115K). Source: CUTA (2013).

Figure 3: Operating cost coverage for Canadian PT systems in cities of 400,001 to 2 million (2012)



Note: Contributions exclude Provincial and Municipal debt servicing contribution (~$C40K). Source: CUTA (2013).

Public transport capital spending in 2012: North American cities

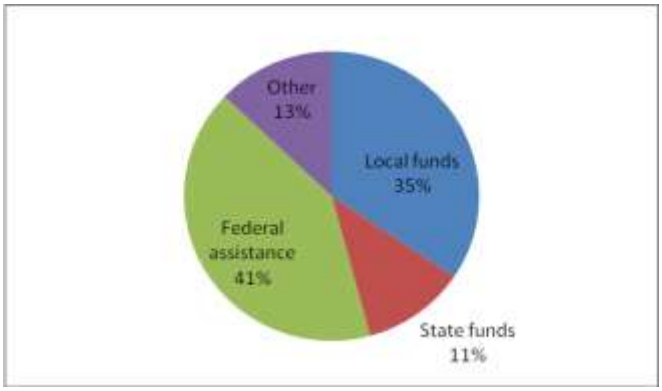
Capital spending for the largest 50 reporting US transit agencies is substantially sourced from the federal government (41 per cent, or $US5.6b in 2012) and from local government (35 per cent, or $US4.6b), as shown in Figure 4 for 2012. Local (municipal) sources provided just over a third of 2012 capital requirements for the 50 largest US systems ($US 4.6b). US state governments are relatively small contributors (at 11 per cent, or $US1.5b in 2012). Total capital provided in 2012 for the 50 largest reporting US transit systems was $US13.5b. The published data does not indicate how these amounts were funded by all levels of government involved.

Capital spending data for Canadian transit systems in 2012 is shown in Figures 5 and 6. Total capital spending in that year totalled $C2.25b by transit systems in cities of over 400,000 population. State (Provincial) governments provided the largest share of capital in systems of both sizes, at 38 per cent ($C508m) and 52 per cent ($C477m) respectively. Local municipal funds are also a major source of capital expenditure, at 31 per cent for the largest systems ($C409m) and 24 per cent for systems in cities of between 400,001 and 2 million ($C221m) in 2012.

The federal government is an important contributor of capital requirements for transit in Canada, providing almost a quarter of the capital funding requirement in 2012 for transit systems in cities with over 2 million population ($C306m) and over one-fifth (21 per cent, or $C192m) for systems in cities of between 400,001 and 2 million. The total 2012 federal government contribution for systems in cities of over 400,000 was almost $C500m, with small contributions also being made to systems in smaller cities (under 400,000 population).

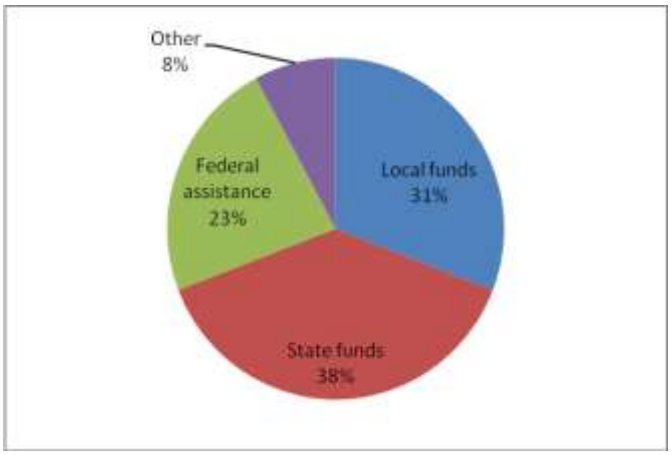
Both the Canadian and US federal governments are thus strongly supportive of transit. Each allocated roughly $1b to transit in 2012, per ~30 million population, and each looks to fuel tax (the gas tax) as a major funding source for this contribution. Beneficiary pays arguments support this funding source, as argued in section 2. The major difference between the US and Canadian approaches to federal transit funding is that the US approach essentially specifies the types of programs that will be supported by the federal government, allocating funds against these programs, whereas the Canadian approach depends largely on proposals put forward by those responsible for infrastructure, the Provinces/Territories and municipalities. The Australian federal government does not provide such systemic financial support for transit.

Figure 4: Capital cost funding sources for top 50 US transit agencies (2012)



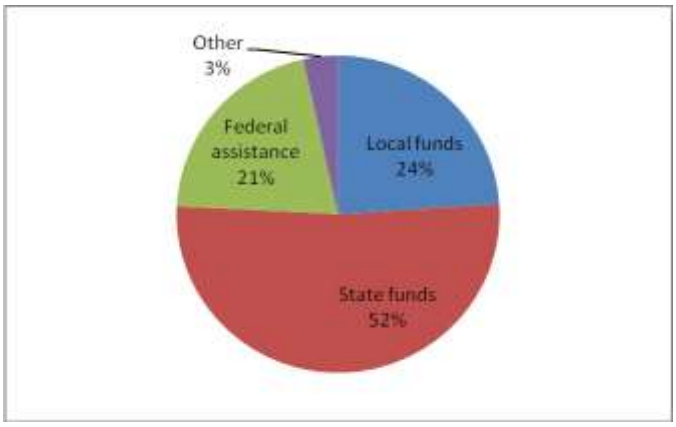
Source: US DOT (2013).

Figure 5: Capital cost funding for transit in Canadian cities of over 2 million (2012)



Source: CUTA (2013).

Figure 6: Capital cost funding for transit in Canadian cities of 400,001 to 2 million (2012)



Source: CUTA (2013).

4. Criteria for selecting (public) transport funding measures

The principle that *beneficiary pays* measures should generally be used for infrastructure and services funding before resort is made to government funding poses the question of whether there are other useful criteria that might help in the selection of public transport funding measures, from amongst available alternatives. Four sources (at least) have considered this question in recent times (NSTIFC 2009; Litman 2014; Metrolinx 2013; Aecom KPMG 2013). Drawing on these various sources, the following nine criteria are suggested, using mainly the language adopted by Litman (2014) and Metrolinx (2013):

1. revenue raising potential of the measure
2. predictability and stability of the revenue stream from the measure
3. equity – *horizontal equity*, which is concerned with treating similar people in a similar way, and *vertical equity*, which deals with the relative treatment of different socio-economic groups or groups that are distinguished on other grounds, such as particular personal capacities
4. travel behaviour impacts - concerned with the extent to which the revenue measure affects travel behaviour in strategically desired ways
5. strategic development objectives – how the funding measure impacts on, for example, the scale, type and location of development and how this aligns with strategic planning objectives, such as the achievement of more compact growth patterns
6. public acceptability – often a stumbling block and, therefore, critical for implementation
7. ease and flexibility of implementation - which includes governance considerations, such as whether new legislation might be required for implementation
8. accountability and transparency – key governance principles
9. efficiency of the measure – in terms of loss of economic activity per each $ increase in revenue from the measure. This criterion recognizes the 'deadweight' loss from taxes and charges and seeks to minimize that loss (Daley and Coates 2015).

These criteria are used in Section 5 to undertake a high level assessment of a range of possible public transport funding measures.

5. Individual public transport funding measures

Range of measures

Internationally there is a wide range of measures currently used, or under close examination, to fund public transport operations and/or infrastructure, in addition to direct government funding from general revenue sources. To a greater or lesser extent, these measures reflect beneficiary pays principles. The major measures in use, or under consideration, in countries such as the UK, US, Canada and/or Australia are:

- public transport fares
- miscellaneous PT service provider revenue streams - e.g., advertising; concession revenues. This is usually only a minor source of revenue (apart from in high density, large cities, such as Hong Kong and Tokyo, where they can be very substantial). Such revenue sources are not considered further in this paper
- fuel taxes
- road tolls - e.g., High Occupancy Toll (HOT) lanes and freeway or bridge tolls applied to fund adjacent PT services
- transport/road pricing - externality based charging, such as congestion charging, where (part of) the revenue might be used to support transit
- carbon taxes – sometimes used to part fund public transport
- employer taxes - such as the French 'versement' or the Portland (Oregon) employer payroll tax and tax on the net earnings from self-employment

- parking levies
- property taxes
- sales taxes
- developer charges
- various other forms of value capture.

There are other revenue tools that could also be used to generate funds for public transport, as discussed for example in Aecom KPMG (2013), but these generally measure up poorly against the criteria outlined in Section 4.

Fares

Public transport fares are a direct form of user pays charging for service. Section 3 pointed out that Australian capital cities and large Australian, US and Canadian cities typically recover only 30-60 per cent of operating costs from fares. In contrast, the London Underground is currently in the fortunate position that its cost-recovery rate from fares is around 100 per cent, which means that revenue from other beneficiary pays mechanisms can be kept for mainly capital purposes.

So long as road users are not required to meet the societal costs attributable to their travel choices, then it is arguable that public transport services should also not be expected to recover all their costs via user charges (distributional arguments remain as a rationale for some fare support, even when road users are charged their attributable external costs). A major problem with such 'second-best' pricing, however, is that subsidising public transport to compensate for the lack of an effective road pricing regime encourages too much travel by all modes. Road pricing reform should be accorded a much higher priority, which would provide the opportunity to improve cost-recovery levels on public transport, making due allowance for impacts on disadvantaged groups/individuals.

Fuel taxes/road pricing reform

Fuel tax ('gas tax') is recognised as a rather imperfect way of charging for the costs of road use, because of the weak alignment between fuel tax revenues and the costs of road use. Its administrative simplicity, however, is a real advantage. This revenue stream has become a major source of federal transit funding in Canada and the US, with two key arguments supporting this application, arguments which recognise fuel tax/excise as a charge for road use: first, the failure to properly price the external costs (e.g., congestion, air pollution, noise, etc) of road use, juxtaposed against the benefits of public transport in reducing these external costs; and, second, the benefits road users themselves derive from public transport operation, in terms of easier road conditions and the 'option (or insurance) value' that public transport often creates for road users (who value public transport because they may wish to use it at some point in future).

Canada provides a good example of the use of fuel taxes to fund public transport. The Canadian Federal Government's New Building Canada Plan includes 'Gas Tax Funding', to be passed through the Provinces to municipal authorities. This money is often used for transit. Canadian Provinces/Territories can also levy gas taxes, which can vary by region. In the Translink Vancouver operating area as at 1st July, 2012, for example, British Columbia added a 17c/L motor fuel tax, dedicated to Translink (the metropolitan transport agency), a Province-wide 6.75c/L tax dedicated to the British Columbia Transport Financing Authority, a Province-wide 1.75c/L tax that went to general revenue and a carbon tax of 6.67c/L (Ministry of Finance 2014).The total motor fuel tax was 25.5c/L, with the carbon tax additional. Some 25 per cent of Translink's revenue was from fuel tax in 2012 (~$C335m; Translink 2013a). Transit accounted for about 84 per cent of total Translink spending on roads, bridges and transit in that year, so the gas tax was clearly important for transit funding. In Canada, gas tax funding to support transit might come from the Federal Government (for funding capital) or from provincial governments (for capital and operating).

The usefulness of fuel tax as a means of charging for the costs associated with road use is declining over time, as vehicle fuel efficiency improves and the number of vehicles powered by means other than fossil fuels, in full or part, increases. Increasing global pressures to reduce GHG emissions will see this trend accelerate. Governmental shifts away from fuel taxation to more direct (satellite-based) road charging systems can be increasingly expected in coming years, building on current congestion pricing schemes in cities such as London and Stockholm and the longer standing Singapore charging scheme. Singapore will be the first jurisdiction to implement a satellite-based charging system for light and heavy road vehicles on a wide scale, in 2016, the Netherlands having gone close a few years ago.

Over time, charging that more accurately reflects the full (marginal) social costs of road use can be expected, charging at least taking account of vehicle distance travelled, as recommended for the US by the National Surface Transportation

Infrastructure Financing Commission (2009), but also, and preferably from an economic viewpoint, recognising the influence of vehicle mass and location on the social costs of road use. A distance, mass, location based charging system would represent a considerable advance on current congestion pricing schemes. As with fuel tax, part of the revenues thus raised may be available for supporting public transport.

Road tolls

By road tolls here we mean charges that are levied for travel on some particular roads or sections of roads (e.g., lanes), rather than more generic road pricing. For example, seven bridges in San Francisco have tolls levied and one has a congestion charge. Some freeways in the US have HOT lanes (high occupancy toll lanes), where single occupant vehicles (for example) can pay a toll for use of a lane that is otherwise restricted to high occupancy vehicles (that travel free). Metrolinx (2013) in Toronto proposed HOT lanes for improving the efficient allocation of scarce highway capacity on the '400' series roads in that city and to raise revenue that could be used to support transport system improvements, including transit improvements. However, the amounts likely to be raised by such measures are relatively small, relative to the costs of implementation.

In terms of tolling an existing congested (free) freeway to help fund transit improvements, a *beneficiary pays* argument was suggested in Section 2 to support this case when the existence of such a rail or bus service would reduce congestion levels on the freeway and improve the reliability of road travel times. Tolling of all traffic on an existing congested freeway would be a much bigger net revenue generator than HOT lanes but would be politically more difficult to implement, given likely community reaction to tolling a hitherto free link. Tolling of a current congested freeway, to help fund a major new road nearby which will ease that congestion, was also supported on beneficiary pays grounds in Section 2 (provided the new link stacks up on cost-benefit grounds).

An example of a jurisdiction that incorporates some charging for roads and then uses part of the revenue thus raised to support public transport is Oslo, where cordon-based congestion charging has been implemented. A significant share of this Oslo revenue stream (about 60 per cent according to ITF 2013) is allocated to public transport, for the purposes of helping to meet both operating and capital costs.

Carbon taxes

Land transport is a major source of greenhouse gas emissions, with road transport accounting for by far the major part of these land transport emissions. Some jurisdictions are looking to a price on carbon to help fund improvements to public transport. For example, California has set up a cap-and-trade market system for pricing carbon and transport fuels come in to the scheme in 2015. The California legislature agreed (June 2014) to spending 40 per cent of the cap-and-trade revenue on public transport, with 25 per cent going to high speed rail and 15 per cent to public transport (10 per cent for capital purposes, which cannot be spent on operations, and 5 per cent for operations, which can be used for capital), with 10 per cent for affordable housing and communities located close to jobs and public transport.[ii] The total sum involved in 2014-15 was expected to be $US870 million, growing rapidly to $US5 billion by 2015-16, such that the public transport share is substantial. The State will pick the projects to be supported from scheme revenue.

Employer taxes

The most well-known employer levy to help fund public transport is the French *versement transport*. Nearly 40 per cent of public transport operating revenues in the Ile-de-France region (greater Paris) comes from this source (ITF 2013), a dedicated transport tax levied on employers (based on gross salaries of employees in companies with nine or more employees). The *versement* is seen as a form of *beneficiary pays* charge, because of the high levels of accessibility provided in the Paris region by public transport. The levy rate varies, from 2.6 per cent in Paris down to 1.4 per cent in four poorer departments bordering Paris, and to 0.9 per cent in smaller urban areas. Such variability in the rate is useful from an equity perspective.

Portland Oregon covers about 25 per cent of its public transport operational expenditure from fares but relies primarily on a payroll tax (similar to the versement) to meet operating costs. Employers pay $US7.02 per $US1000 gross wages, the levy meeting 61 per cent of operating costs in 2011.

Parking levies

Parking levies are a government charge on parking spaces in defined areas, to discourage car use for travel to/from those areas and (usually more importantly) to raise revenue, which might be used (in whole or part) to help fund public transport. The charge can be argued to be one way, albeit indirect, of charging for congestion costs and other external costs caused by the vehicles that use the parking places that are subject to the charge (however, 'through traffic' avoids any charge). It is thus

a weak form of *polluter pays* charging. A number of Australian states, for example, levy parking charges and most use the revenue thus raised to help fund public transport. The fact that parking levies, once in existence, can be easily changed (given the political will) and have connections to both *polluter pays* and *beneficiary pays* principles are arguments supporting this measure for helping to fund improved public transport services.

Land/Property taxes

Land/property taxes are recognized as one of the most efficient ways for a government to raise revenue, because they do little to change incentives to work, save and invest (Daley and Coates 2015). They contain an element of long term value capture in their origins, insofar as the amount levied increases with, in particular, land value. Land/property taxes are a major revenue source for local government in Australia and North America, sometimes based only on charges on land value and sometimes on the improved capital value of land. With provision of public transport services being largely a municipal responsibility in North America, 'local funds' primarily from this source met between 16 per cent and 48 per cent of operating and capital costs in US and North American systems overall in 2012, as illustrated in Section 3.

MetroTransit in Halifax Nova Scotia, the transit agency of the Halifax Regional Municipality (HRM), uses an interesting approach to property taxation to support public transport operation, through its area rate taxation (Robar 2014). Two separate property levies are raised to help fund conventional transit:

1. a regional transportation rate of 5.1c/$C100 of residential assessment, which is for transit services that are more regional in nature, with an average household cost of $C106 a year. 97 per cent of HRM residences are covered by this charge
2. a local transit rate of 10.5c/$C100, with an average residential cost of $C220, paid by residential properties within a 1km walk of a local transit route.

The levies are shown separately from the General Rate on the householder's bill and, in total, are a little under a quarter of the size of the general rate charge for those paying both the regional and local levies. They have helped to align the cost of the service with the incidence of benefits from the service, while providing increased funding predictability, stability and transparency. Ratepayers can clearly see what they are paying for the transit services. This approach has many desirable features.

Sales taxes

The High Court has prevented Australia's states from imposing any form of sales tax (excise) on goods. However, this revenue measure is a significant source of funding for public transport in the US and Canada. Metrolinx (2013), for example, proposed that 65 per cent of the $C2b annual funding needed to implement its proposed *Big Move* initiatives should come from a Harmonised Sales Tax, by increasing this tax by one percentage point. In the US many areas use sales tax to help fund public transport. *Measure R,* passed in 2008 in Los Angeles, for example, is intended to help deliver a 30 year public transport improvement program in 10 years, with $US14b of transit projects underway. A 0.5 per cent sales tax will raise $US36b over 30 years, with 65 per cent to be used for transit capital and operations, 20 per cent for highway capital and 15 per cent for local government priorities. This was the third sales tax measure passed in LA for transit.

The main benefit of sales tax is its *revenue-raising potential*. Arguments that try to link sales tax to beneficiaries paying, however, are weak. There is little direct connection between paying sales tax and benefiting from transit.

Value capture

The connection between transport and land use is partly reflected in land prices, with accessibility an important linking component. When transport infrastructure/services improve accessibility, they will typically increase land values. Value capture mechanisms are, therefore, an important potential opportunity for funding such services and infrastructure, seeking to recover part of the value uplift attributable to the initiative in question from non-user beneficiaries (e.g., developers or landowners). There are a number of variants of value capture approaches, with variations mainly relating to:

- the timing/frequency of charging (e.g., a specific one-off payment or recurring annual payments at a lower rate) and
- the nature of the charge (e.g., determined by formula or subject to negotiation).

Table 1 illustrates a range of value capture mechanisms that may be relevant to public transport, initially categorized according to whether they are levied on developers or on land owners. Particular mechanisms may have different names in different jurisdictions.

Table 1: Examples of value capture mechanisms

Beneficiaries	**Measurement of benefit**	**Financial measure**
Landowners	Land value growth	Land value taxes or metropolitan improvement levy
	Property tax growth	Tax increment financing
	Assessed special benefits	Special assessments
Developers	Off-site development opportunities	Development impact fees
	Off-site access benefits	Negotiated exactions
	Development privileges	Joint development
	On-site development opportunities	Air rights

Source: Based on part of Centre for Transportation Studies (2009), Table 1.

Continuing low rate annual charges on land owners levied on a beneficiary pays basis and with a value capture rationale could be included within the category of broad land/property taxes, as considered above. Alternatively, they might be levied as specific (additional) land/property value based levies. A *metropolitan improvement levy* is an example of a specific purpose property tax, imposed at a low rate city-wide to help fund particular types of initiatives. For example, the Gold Coast City Council in Australia levies an annual transport improvement charge ($111 in 2013-14), which funds Council cabs, bus stops, bicycle and pedestrian pathways, rapid transport and improvements to local roads, as well as expanded bus services across the city.[iii] This has been included under 'value capture', rather than 'land/property taxes', because it has been explicitly implemented recognizing connection with particular initiatives that will generate local value, rather than being an omnibus local charge like most land/property taxes. The metropolitan levy approach is similar to the Halifax public transport rate charge approach outlined above.

Major new transit capital projects are increasingly looking to more substantial value capture as a key funding source. A well known recent example is the London Crossrail 1 project, where funding is basically 1/3 from central government (recognizing the national economic significance of the project), 1/3 from fare payers and 1/3 from business. The business contributions will come from a Business Rates Supplement (BRS), which will raise £4.1b, and from developer contributions, raising a further £1.1b (of which £0.3b is in the form of a new development tax called a Community Infrastructure Levy, or CIL). It has been suggested that Crossrail will increase the value of commercial buildings near stations by 10 per cent above already rising prices. Residential values near stations are expected to increase by 25 per cent in London and 20 per cent in the suburbs (Ware 2014).

Tax increment financing (TIF) is widely used in the US and is becoming more widespread in the UK. In essence, it allows a government to borrow against predicted growth in locally sourced (property based) revenues in a defined area, to help fund activities that will drive that growth. Bonds are usually issued to provide the necessary up-front finance for infrastructure/urban renewal initiatives, additional annual local tax (rate) revenues being used to fund interest and principal repayments. A key issue in relation to TIF as a possible financing/funding source is the extent to which the infrastructure programs involved lead to a *net increase* in development-related revenues to the sponsoring government, as distinct from simply diverting revenue from one area to another.

A recent innovative example of TIF application in the UK is the Enterprise Zone TIF associated with London's Battersea and Northern Line Extension, a project with a capital cost of an estimated £1 billion. The Greater London Authority will borrow to finance construction, with funding to repay the finance coming from the private sector through value capture. Additional business rates generated within a newly established Business Enterprise Zone, above an agreed baseline, will be the major funding source, directly connecting growth attributable to the Northern Line Extension with the funding to pay for it. Enterprise Zone income over a thirty year period is estimated at £1.71b. Additional funding will come from project related developer contributions of £266.4b raised by the London Boroughs of Wandsworth (£259.1m) and Lambeth (£7.3m), part coming from a CIL and part (£200m) from a commitment that was part of the planning consent for the redevelopment. Risk is being borne by the Greater London Authority. This example is likely to be much more widely adopted internationally in

coming years, demonstrating commitment to greater financial autonomy on the part of a major city (through the Mayor of London and GLA) and showing how this can be achieved through benefit-based funding (in this case value capture).

Special assessments (Table 1) impose formula-based charges on property close to a new facility (such as a new transport facility) that receive an identifiable benefit from the facility. This approach is widely used across the United States, typically for local infrastructure improvement projects. *Development impact fees* are one-off charges levied on new development, widely used to help recover associated costs of public infrastructure/services, growth-related public service costs, parks/open space and perhaps local public transport. These charges are usually determined by formula, related to a proportion of expected public service costs attributable to a level of new development. *Negotiated exactions* might cover similar types of costs to a development impact fee but are subject to negotiation, rather than being the outcome of a formulaic process. They may be in-kind contributions (e.g., of open space), instead of money.

An interesting example of value capture is provided by Portland Oregon, where in 2001 businesses decided, in effect, to tax themselves to develop a light rail project. They formed a Local Improvement District and decided to raise $US10m out of the $US60m project cost, agreeing to get the government to tax them to help pay for the project. The project has been very successful, driving $US5b worth of private development.

In a transport context, *joint development* refers to the development of a transport facility and adjacent private real estate, often based around a railway station where higher density development might accompany station re-development (e.g., transit oriented development). This might involve a partnership between a public land development agency or transport authority, and a private sector developer. There are a number of possible joint development models, with varying equity, risk allocation and revenue/cost treatments. However, such approaches are unlikely to generate sufficient funding to facilitate much investment/service development beyond those covered by the particular joint development arrangements (Aecom KPMG 2013).

Air rights. Major new transport projects, or urban development projects, may add value to the space above (or below) a transport facility. Air rights agreements establish the right to develop above (or below) a facility, in exchange for a financial contribution or future additional property and/or income taxes (depending on jurisdictional income raising opportunities). Revenue from such an initiative may be used for a range of public purposes, such as place making, but is most likely to be retained within the development site.

Conclusions on public transport funding measures

Table 2 presents THE BIC's broad assessment (by category) of various measures against the assessment criteria for urban public transport funding: others may reach different conclusions. Public acceptability is shown as a question mark for all measures, relevant assessments needing to reflect attitudes in particular jurisdictions. However, several sources suggest that the public is more likely to accept increased taxes/charges for improved public transport services if there is a clear line of sight between the tax/charge and its use.

The measures assessed in Table 2 generally fall in to four types:

1. broad measures that are good at raising revenue, with positive *beneficiary pays* characteristics, that should be technically easy to implement, do not raise major equity concerns and are relatively transparent (e.g., property taxes; employer levies; metropolitan improvement levy). These measures have a lot going for them as ways of funding improved public transport. On tax efficiency grounds, the land/property charge measures are superior to employer levies (Daley and Coates 2015)
2. measures that mainly target road users (*polluter pays/user pays*) and, over time, have the potential to raise substantial sums because there are large numbers of road users and the external costs of urban road use are typically high (e.g., HOT lanes; fuel taxes; carbon taxes; road tolls; road pricing reform). Equity concerns will be significant, indicating the need for programs to deal with these concerns. Implementation costs for some measures (e.g., road pricing reform) are likely to be high but the prospective long term benefits are substantial
3. measures that are purpose specific and can raise substantial sums for major place-based initiatives, which will primarily be major initiatives like metros, light rail transit and bus rapid transit. Equity is unlikely to be a major issue, because of opportunities for targeting and the focus on capturing part of value increases, and implementation can usually draw on successful examples (e.g., special assessments, TIF and developer charges)
4. measures that have some revenue raising potential but issues for reasons such as equity and/or undesirable impacts on travel choices (e.g., increasing PT fares). Raising additional revenue from this source is best aligned with road

pricing reform and with improved public transport services, including niche services that can command higher fares. Equity issues require attention.

Table 2: Indicative assessment of funding measures

Measure	Assessment criteria								
	Net revenue raising potential*	Stability and predictability	Equity (horizontal/vertical)***	Travel behaviour impacts	Strategic development impacts	Public acceptability	Ease of implementation	Accountability & transparency	Measure efficiency
Fare increases	L	H	M/L	-	Low		Yes	H	M
Fuel tax/road pricing	H	M	L/L	++	++		Yes/No	M-H	M
Road tolls	M	H	M/M	+	+		**	H	M
Carbon taxes	M	H	H/M	+	+		Yes	L	M
Employer taxes	H	H	H/H	Low	**		Yes	**	M
Parking levies	M-H	H	H/M	+	+	?	Yes	**	M
Property Taxes	H	H	H/M	Low	Low		Yes	**	H
Value capture									
Metro Imp. Levy	M-H	H	H/M	Low	Low		Yes	**	H
Tax Inc. Fin.	M	M	H/H	Low	+		**	M	H
Special Assess'ts	H	H	H/H	Low	+		**	H	H
Developer levies	L	H	H/M	Low	**		Yes	M	H

Notes: * Revenue raising potential, net of implementation and operational costs; ** Signifies that the impact will depend substantially on how the measure is shaped and implemented, which is true to a large part with all measures and all impact categories. *** H signifies little equity concern; and L signifies serious concerns.

6. Bundling

How might various measures, as discussed above, be bundled together to fund public transport services and service improvements? We discuss this question against the background of current road user charging arrangements, rather than our preferred medium term position of road user charges that reflect all the social costs road user impose on the wider community.

Application of the *beneficiary pays* principle says to look for possible net external benefits that might be attributable to the existence of public transport services and recognize these in fare setting, an approach that is followed by IPART in NSW (see, for example, IPART 2013) but without recognition of agglomeration benefits or social inclusion benefits.

Measures in category 1 above, which were described as 'broad measures that are good at raising revenue, with some positive beneficiary pays characteristics, that should be technically easy to implement, do not raise major equity concerns and are relatively transparent (e.g., property taxes; employer levies; metropolitan improvement levy)' are a good starting point. Tax efficiency arguments favour land/property based measures over employer levies. Well designed land/property taxes do little to change incentives to work, save and invest. For example, in an Australian setting, KPMG Econtech (2009) has estimated the average welfare loss from payroll taxes at over 20 per cent, with those from municipal rates (on land/property) at only a few per cent. Land as a tax base is marginally better than property in terms of welfare losses but both are considerably better than levies on employer payrolls. We therefore conclude that land, or property, should be the basis on

which government raises the funding to pay for net external benefits from public transport, with a low rate broad-based charge being most appropriate. The linkage between public transport services and land values is supportive of this approach.

Where funding of public transport capital improvements is being considered, land (and to a lesser extent property) again should figure prominently as a means of beneficiary pays funding, through developer charges and other value capture mechanisms, including project specific value capture for specific big projects, like CBD rail, light rail and Bus Rapid Transit, which can have substantial revenue raising potential. These are category 3 (of the four) revenue raising measures from Section 5. Placing the onus on land, rather than property, provides an incentive for more intensive land development, which is consistent with the idea of the compact city. The Colbert hissing principle might also support use of additional funding mechanisms (e.g., parking levies), to spread the burden more widely, but this runs the risk of reducing the welfare efficiency of the mechanisms that are used. User fees plus beneficiary pays for net external benefits, based on land/property, provides a solid base for funding urban public transport, supported by specific government funding for social inclusion benefits.

Over time, reformed road user charging (based on mass, distance and location and reflecting all the external costs of road use) should be pursued, which would support better resource allocation efficiency across the whole land transport sector.

The particular revenue streams that might be best suited to support public transport service provision and upgrading may accrue to the level of government with responsibility for service provision. This is a convenient outcome but will not always be the case. For example, fuel excise/gas tax revenues, land/property revenues and parking charge revenues are all candidate revenue streams but accrue to different levels of government. Any opportunity for the level of government with responsibility for public transport service delivery to draw on such multi- governmental revenue streams will usually require formal funding agreements between the respective governments, which are common practice.

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[i] For example, Australian superannuation funds have $A2 trillion under management, which can be used (inter alia) for infrastructure financing.

[ii] http://www.eenews.net/stories/1060001261

[iii] http://www.goldcoast.qld.gov.au/council/about-your-rate-notice-630.html. Viewed 2nd July 2014.