Commonwealth Grants Commission 2020 Review

Supplementary Transport Submission

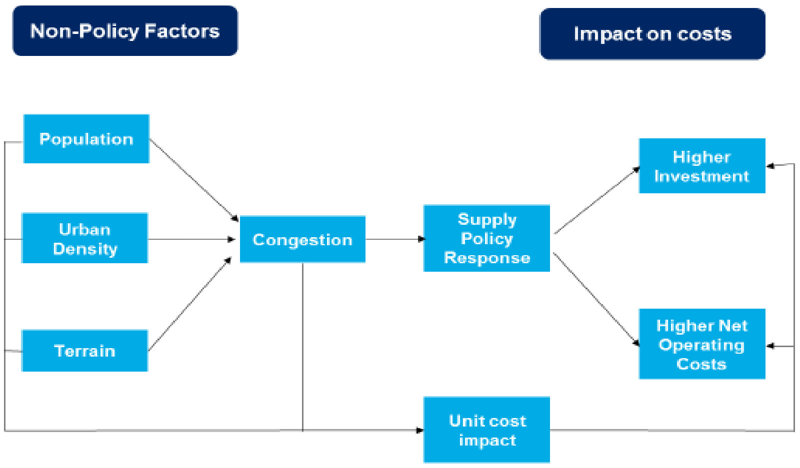
NSW Treasury

12 December 2018

Overview

1. In our main submission to the 2020 Review NSW Treasury proposed a framework for determining non-policy factors for assessing underlying transport expenditure needs to be funded by government (see Figure 1). In our submission, we stressed the importance of population, population density and terrain in driving levels of congestion and the resulting need to provide public transport to facilitate the efficient operation of a modern city.

Figure 1: Conceptual Framework for Urban Public Transport



2. We welcome the strong support of our position contained within the modelling undertaken by Jacobs and Synergies Economic Consulting in its Stage 2 report to the Commonwealth Grants Commission (CGC).[1] The modelling undertaken by Jacobs clearly shows that population density (as well as total urban population) is a significant determinate of net public transport expenditure. The modelling also indicates that transport needs in large urban centres have been significantly under estimated through the CGC processes in the past.

3. In reviewing the Stage 2 Jacobs Report, we have identified several areas in which further investigation could improve the explanatory power and policy neutrality of the proposed urban public transport model. In particular, we believe the Jacobs model may be improved to reflect:

    - The impact of terrain barriers on public transport demand
    - Urban population distribution and its impact on the measurement of ‘mean land slope’
    - The absence of significant economies of scale in the provision of bus services.

---

[1] Jacobs, Urban Transport Consultancy Stage 2 to the Commonwealth Grants Commission, 25 October 2018.

Measuring the impact of urban terrain barriers

4. The Jacobs Stage 2 model uses ‘mean land slope’ to measure the impact of terrain or topography on the net cost of providing urban public transport. While we support the use of ‘mean land slope’ within the Jacobs model, we believe it does not capture the full impact of topography on the net cost of public transport provision. In particular, ‘mean land slope’ does not reflect the impact of terrain barriers, such as rivers and waterways, on increasing congestion, and therefore the demand for public transport.

5. While ‘distance to work’ may partially capture the impact of terrain barriers, it fails to capture the congestion impacts caused by these barriers which act to limit transport access options across the urban setting.[2] As we have argued, limiting congestion is the key driver for government expenditure on urban public transport.

6. We believe more fully capturing the congestion impact of harbours and rivers on the demand for public transport could be achieved within a respecified Jacobs model by the following changes:

   - Include the ratio of ‘travel time to and from a place of paid employment’[3] to ‘distance to work’. We note that while most cities (including Sydney and Melbourne) have similar travel distances, there is a significant variation in average travel times.

   - The inclusion of a dummy variable where ferries are part of the transport mix. We note the significance of the dummy variable for ferries in Model 4 of the Jacobs Stage 2 report.

Better measuring ‘mean land slope’

7. The Stage 2 Jacobs model includes ‘mean land slope’ as a variable to capture costs associated with topography. While NSW accepts this variable is associated with differing public transport costs, we believe ‘population-weighted mean land slope’ would better reflect cost pressures on public transport operators by capturing the interaction between land slope and where people live. We note that, for similar reasons, the preferred Jacobs model uses population-weighted density as a preferred explanatory variable.

---

[2] To illustrate this, consider two identical cities, and then add a barrier dividing City B into 2 halves requiring the provision of bridges and tunnels. For a given transport task, City B will be more congested due to longer travel distances and the funnelling effect of the bridges and tunnels.

[3] This variable is available at a SUA level from the Household, Income and Labour Dynamics in Australia Survey, Melbourne Institute, University of Melbourne.

More accurately reflecting urban transport economies of scale

8. Jacobs includes train and bus passenger numbers within its net expenditure transport model in a log form. In doing this, Jacobs implicitly assumes that there are economies of scale in the delivery of public transport services, whereby the marginal effect on net costs declines with passenger numbers.

9. NSW Treasury agrees that economies of scale are likely to exist at some level in the provision of passenger train services given the fixed costs associated with rollingstock, track and depots. However, it should be recognised that the cost function for train services involves a series of discrete upward steps associated with expansions in infrastructure and services followed by declining unit costs as passenger numbers increase.

10. In the case of buses, our experience – in conjunction with empirical evidence - suggests economies of scale are weaker and/or possibly non-existent beyond a certain minimum size.[4] Purchasing buses and expanding and/or establishing depots requires significantly less capital than for rail. Hence beyond a certain minimum size, bus operating costs are likely to be more strongly linked to passenger volumes.

11. In support of this view, we note that while the train passenger variable is highly significant in the linear-log model (ie Model 1b – the preferred model), this is not the case for the bus passenger variable. However, in the linear model (ie Model 1a), actual bus passenger numbers are highly significant.

12. Consequently, Jacobs should test a model that combines the most promising elements of Models 1a and 1b. Specifically, Jacobs should test a model with a log train passenger variable (ie implicitly assuming economies of scale for trains) and a linear bus passenger variable (ie implicitly assuming no economies of scale for buses).

Policy neutrality

13. A number of jurisdictions have asserted that the net cost of public transport is higher in per capita terms in large cities as a direct result of a policy choice to operate heavy rail systems and/or operate at lower cost recovery levels.

14. As pointed out in our main submission, replacing trains with buses in large metropolitan areas is simply not feasible given the levels of congestion that would inevitably arise. A fundamental tenant of the CGC's analysis is to reflect 'what states do'. Jurisdictions determine the transport mode mix that best suits their needs. This will differ over time and across cities as circumstances evolve. We make no comment on whether other jurisdictions have chosen the most efficient form of public transport to meet their individual needs. The modelling approach

---

[4] https://www.sciencedirect.com/science/article/pii/S0965856408000797

applied by Jacobs results in the needs of each jurisdiction being assessed on an average policy basis, as is the case for all other assessments by the CGC.

15. With respect to the assertion that NSW chooses to adopt a low cost recovery ratio, we put forward the following data drawn from What States Do – Transport CGC Staff Research Paper (see Table 1).

Table 1: Estimated cost recovery rates for urban passenger transport, 2011-12 (a)

	NSW	Vic	Qld	WA	SA	Tas	ACT	NT
Cost recovery (%)	25	28	24	23	21	22	17	10

(a) Figures calculated as total State costs (including depreciation) divided by farebox revenue.

Source: BITRE, Urban public transport: updated trends, September 2014, pages 10 to 12. Found in What States Do – Transport CGC Staff Research Paper, CGC 2016-011-S, p. 36.

16. Some jurisdictions have also argued that the pattern of settlement within urban areas, and in particular urban density, is a function of government policy and that this influence on public transport costs should not be compensated through GST relativities. NSW Treasury strongly rejects this partial analysis for a number of reasons:

- Sydney has a number of geographic boundaries which severely limit the availability of greenfield residential land. These constraints involve both topography as well as long standing areas set aside as national parks and cannot be considered now as policy choices. These constraints force a high degree of urban growth to be accommodated through increasing urban density.

- All governments adopt policies that attempt to minimise the infrastructure and service delivery cost of urban growth. In some jurisdictions, the outcome of this may be to keep expanding the geographic footprint of the urban area while in others, the least cost solution is urban infill. Urban development levies in Sydney reflect the higher underlying infrastructure costs associated with expanding Sydney's urban footprint.[5]

---

[5] Special Infrastructure Contributions (SIC) are levied by the NSW Government on new developments to fund key infrastructure that is required to support growing communities. SICs allow priority infrastructure to be funded and delivered at the same time development is occurring, ensuring new and growing communities have access to the infrastructure and services they need in a timely manner. Typically these rates are higher in Greenfield development sites than for infill developments, reflecting the higher cost of infrastructure delivery. For example, proposed SICs are currently on exhibition in Wilton and St Leonards/Crows Nest.

- The rate per new dwelling in Wilton (a Greenfield development area) is $59,274.
- The rate per new dwelling in St Leonards/Crows Nest (urban infill) is $15,100.

- Revisiting historical policy choices made, and thus hypothesising an alternative cost structure of a city, is fraught with difficulties and we believe ultimately pointless. For example, we would challenge any modeller to estimate the impacts on both net urban public transport costs and the pattern of development in Sydney had the decision not been made to remove trams more than 60 years ago. Even if modelling was successful, the analysis would not reflect 'what states do'.

- Reducing the urban density of a city for so-called policy choices would require an adjustment to other variables within the Jacobs urban transport model. In particular, lower urban densities would logically flow through to higher average trip lengths and potentially other explanatory variables in the model.

- Finally, higher levels of urban density inevitably result in higher land values. If the CGC considers urban density as policy affected, internal consistency requires that the CGC also discount its current land revenue and stamp duty assessments for this policy influence. Such a discount would see a significant redistribution of GST revenues.

Further work being undertaken by NSW

17. NSW Treasury commissioned Veitch Lister Consulting (VLC) to assist with the CGC's assessment methodology for transport. VLC's modelling and methodological approach has been guided by two objectives. First, to provide quantitative evidence to support the conceptual framework advanced in the NSW submission. Second, to independently verify the key findings in the Jacobs report.

18. Unlike the work by Jacobs, VLC is attempting to separately model determinants of net public transport expenditures using microdata for up to five capital cities. By adopting a distinct modelling approach with different assumptions and data, we hope to provide greater confidence in the key findings of the Jacobs model.

19. VLC's work will consider three primary determinants of net expenditures: service productivity, total supply, and demand. Initial work has focused on the productivity of public transport services, specifically average bus speeds. Preliminary results suggest average bus speeds are negatively affected by population density and possibly geographical barriers. Further work will model the effect of non-policy factors on the supply of and demand for public transport.