The Role of Public Transport in Australian Cities

Introduction

Much is written locally about the importance of public transport in the metropolitan areas, not necessarily reflecting the facts.

In the cities, public transport carries a relatively high share of commuting and school/college educational trips (Figure 1), but only very small proportions (around 5%) of leisure journeys (shopping, recreation, social etc) are by public transport.

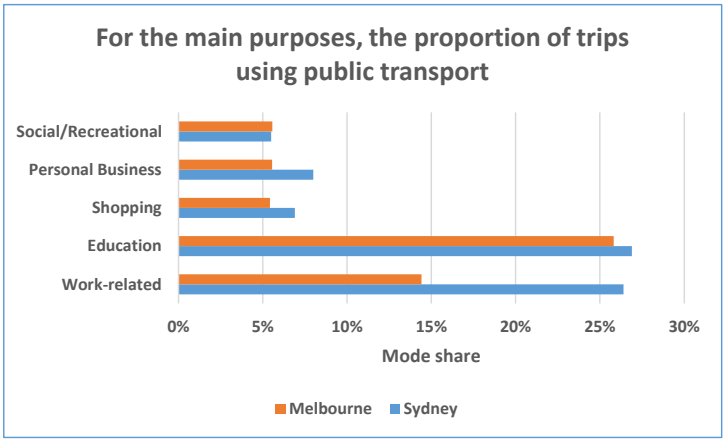

Figure 1

This note focuses on the journey to work for which reliable data is readily available from the national censuses[1]. This purpose is particularly important because of its impacts on peak period congestion on the roads and crowding on public transport, both of which lead to demands for further expensive infrastructure investment.

Commuting Trends in Australian Cities over the 20 Year Period 1991 to 2011 (source: Census)

Over the 20 year period 1991-2011, the five major Australian cities have increased in size (Figure 2)[2]. Brisbane and Perth have been the fastest growing cities over this period, such that employment in these cities increased by over 50%, while Sydney and Adelaide have been the most stable, their employment increasing by a little over 20%.

In 2011, Sydney public transport services carried 24% of commuter trips, the highest share of all the cities. At the other end of the scale only 10% of commuters used public transport in Adelaide and only 12.5% in Perth (Figure 3)[3]. The public transport share has increased between 1991 and 2011 in Melbourne, Brisbane and Perth. But it has remained stable in Sydney and declined in Adelaide.

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[1] In processing the data there is the possibility of inconsistencies between years in the definition of modes of transport and in the boundaries of the cities, and these are discussed in the appendix. So far as possible inconsistencies have been minimised, the city boundary being the SD (Statistical Division, 1991-2006) or GCCSA (Greater Capital City Statistical area, 2011).

[2] Current 2011 populations are Sydney 4.4m, Melbourne 4m, Brisbane 2.1m, Perth 1.7m and Adelaide 1.2m.

[3] For comparative purposes, recent data for Wellington and Auckland in New Zealand indicates public transport shares for commuting are 18% and 6% respectively.

Neither the low public transport shares in Perth and Adelaide, nor the lack of improvement in Adelaide and Sydney appear consistent with sustainability objectives.

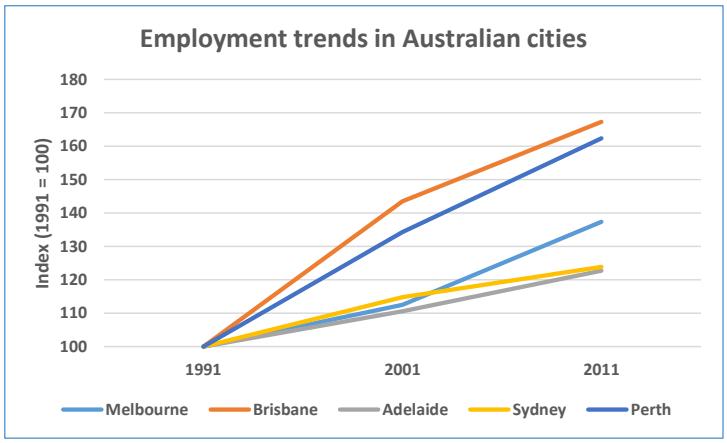

Figure 2

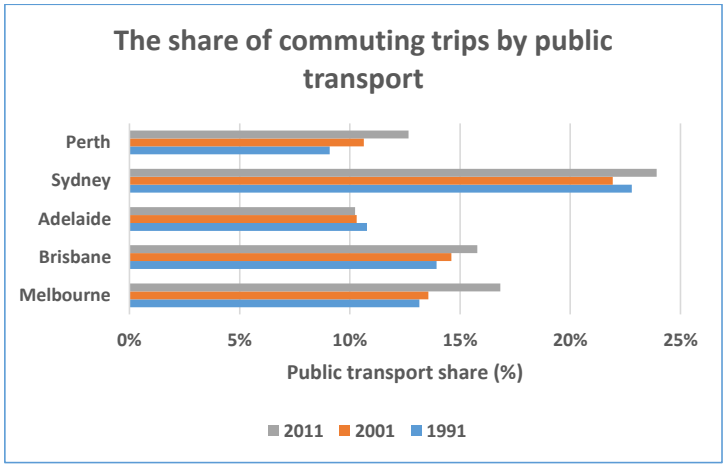

Figure 3

Together with the growth in the cities over the period, this has led to large increases in public transport patronage by commuters in Melbourne, Brisbane and Perth of 75%, 90% and 125% respectively (Figure 4).

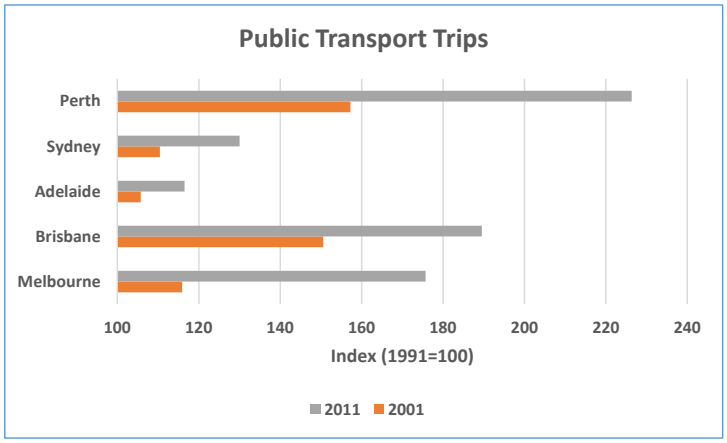

Figure 3

The shares of commuting trips across the transport modes in all five cities (Figure A1, Appendix A) reveal some common themes: despite the popularity of cycling, it makes little overall contribution to the journey to work, and the same applies to walking to work; travel to work as a car passenger has declined in all cities over the period and most people drive their car to work.

For all cities, the younger age groups (15-24 years old and 25-34 years old) make less use of the car (Figure 5). 15-24 year olds make more use of public transport and are more often car passengers than the older age groups. 25-34 year olds are more likely to use public transport than the older age groups (but have a similar likelihood of being a car passenger).

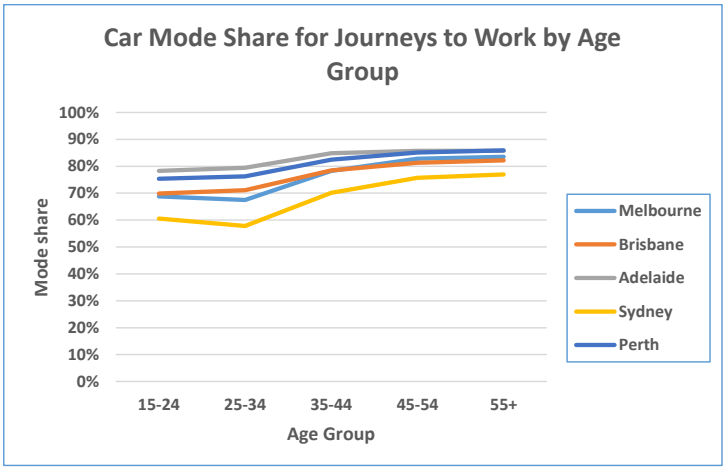

Figure 5

Consistently, the increase in public transport shares between 1991 and 2011 is highest for the 25-34 years age group (Figure A2, Appendix A). In Adelaide, all other age groups show a worsening public transport mode share over the period.

A paper by NSW Bureau of Statistics[4] discusses the changes in travel behaviour and licence-holding of young people and suggests reasons for the different changes in travel behaviour apparent in these age groups. These include the NSW Graduated Licence Scheme, urban consolidation and the economic and social constraints imposed by higher education levels[5].

Public transport principally serves radial commuting trips to the centres of the cities. In Melbourne (Figure 6), the public transport share of commuting trips to workplaces outside the city of Melbourne is just 6-7%, whereas it is currently 60% to the CBD. It is also apparent that over the ten year period shown, the public transport share for commuting to the city and inner suburbs has increased significantly, whereas for the rest of Melbourne it has scarcely changed.

Public transport shares to the centre of Sydney at 70% are higher than Melbourne but, as in Melbourne, public transport usage is low and stable to workplaces outside inner Sydney, at around 11% (Figure 7). The shares have been fairly stable over the past 20 years.

Melbourne and Sydney CBDs account for around 10% of city employment and this increases to 18% and 25% respectively if the inner areas immediately surrounding the CBDs are included (Figures 8 and 9).

[4] Tim Raimond and Frank Milthorpe, Why are young people travelling less? Trends in licence-holding and travel behaviour, ATRF 2010.

[5] In that the extended tertiary education period combined with the need to pay off HECS debt delays entry to the workforce and leads to a greater proportion of students living with parents and deferring car purchase.

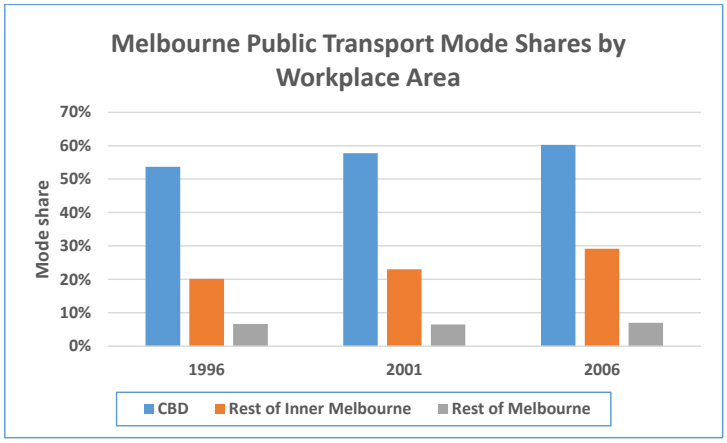

Figure 6

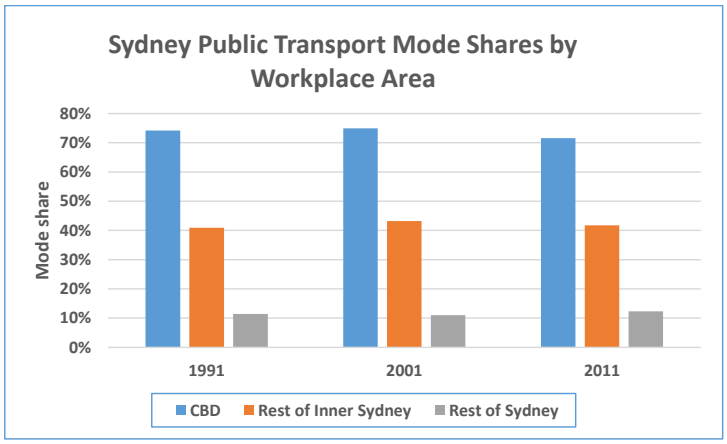

Figure 7

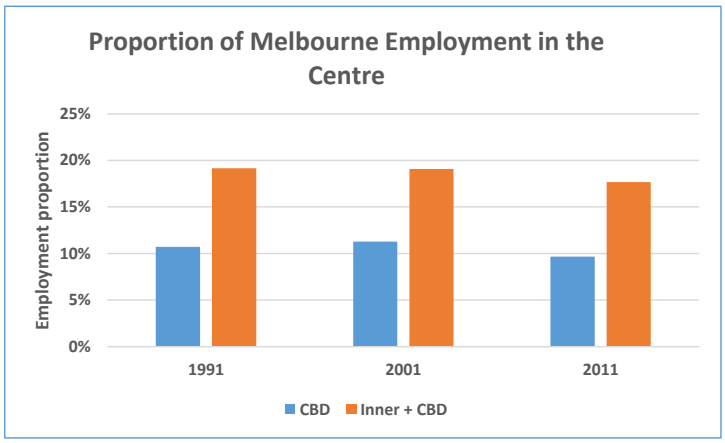

Figure 8

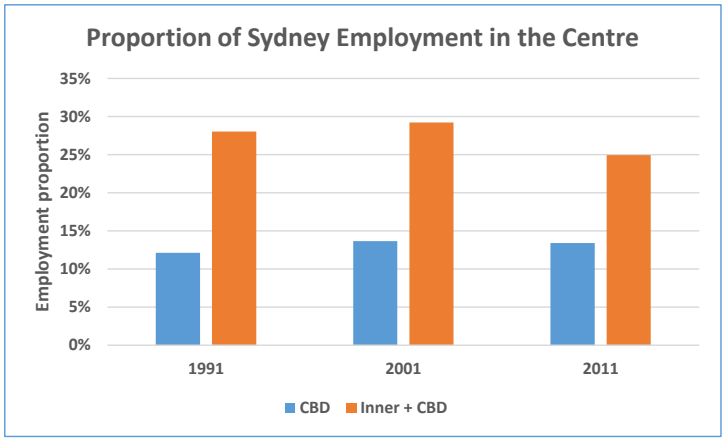

Figure 9

Commuting in London

The equivalent statistics for London provide a comparison with those for the Australian cities.

The public transport share of all journeys into central London in the morning peak is quoted as just under 90% (Figure 10). Congestion charging was introduced in 2003 and the increased public transport use after this date is apparent.

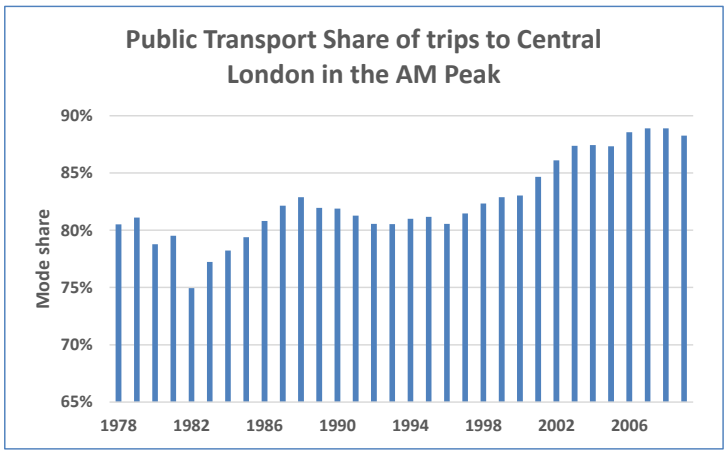

Figure 10

In direct comparison with the Australian cities (Figure 11), 80% of commuting trips to central London are by public transport, 50% to inner London and over 20% to the rest of London.

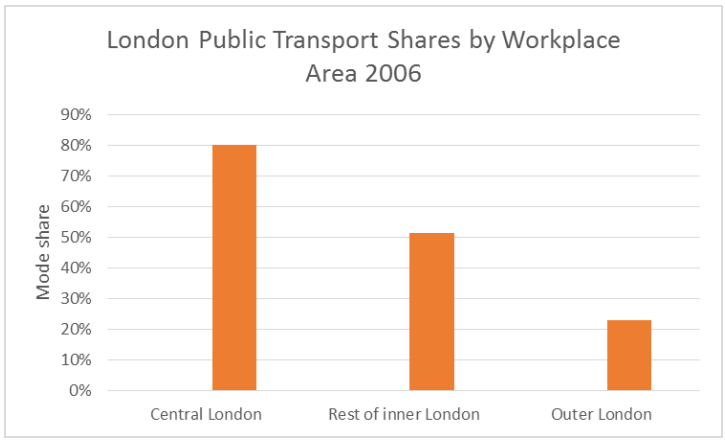

Figure 11

Overall, 49% of commuting trips in London were made by public transport in 2006 (Figure 12), a much higher proportion than any of the Australian cities.

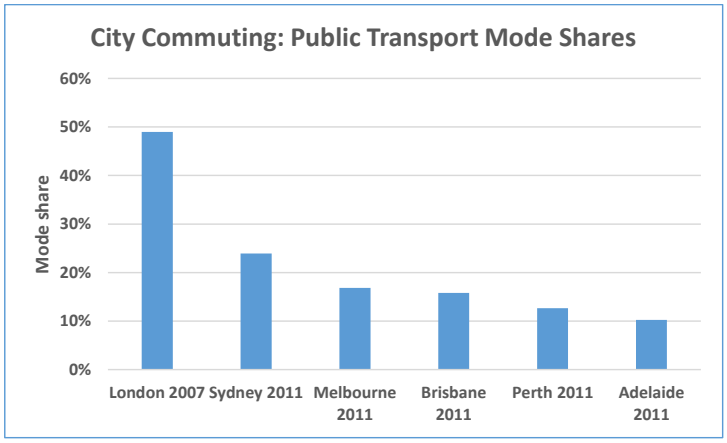

Figure 12

The Greater London Authority has defined the CAZ (Central Activities Zone) as central London, which accounts for 30% of London's employment. A quite generous definition of the rest of Inner London accounts for a further 30% of London's employment. This is compared in Figure 13 with Melbourne and Sydney. London has far higher proportions of employment in the public transport-accessible central and inner areas and higher public transport shares in each of these areas (Figure 14).

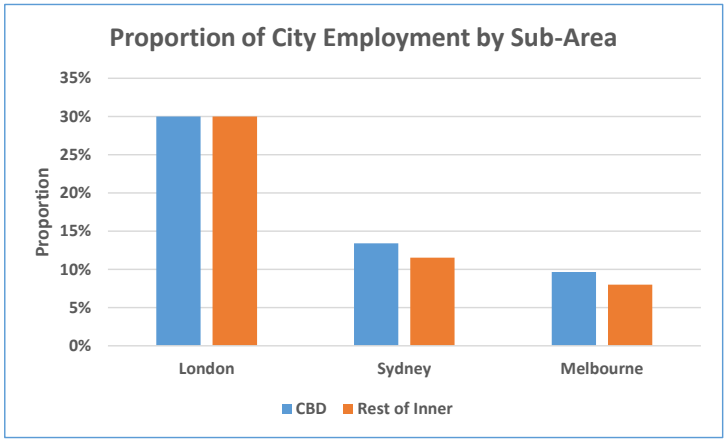

Figure 13

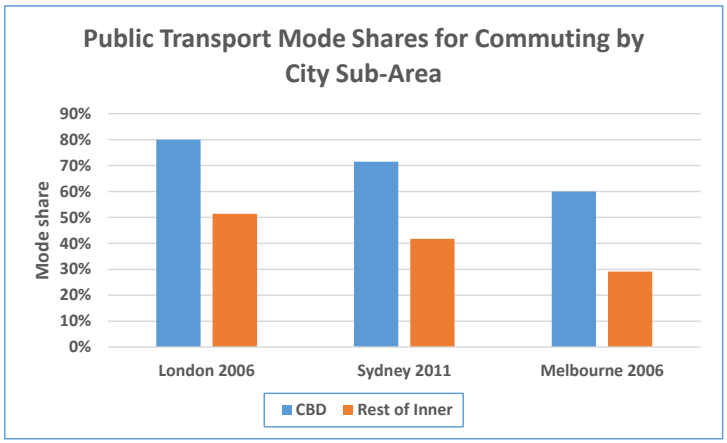

Figure 14

London has twice the population of Sydney and Melbourne (Table 1) and a very much higher urban density. This combined with the much greater concentration of employment in the central area gives central London approximately five times the employment of central Sydney and ten times the employment of central Melbourne. This far greater scale and concentration of activity enables the city to support a far more effective public transport system.

Table 1 Comparative City Statistics

Statistic	London	Sydney	Melbourne
Population (m)	8.2	4.4	4
Area (km^2)	1,575	12,368	9,990
Population Density (persons per km^2)	5,206	356 (1370)	400 (1660)
Red densities are probably a more reasonable estimate excluding undeveloped peripheral land.			

The Influence of Public Transport Infrastructure on Mode Shares

The first phase of the Manchester Metrolink was the subject of a comprehensive before-and-after study (quite unusual)[6]. The study used stated and revealed preference surveys, and counts of passengers and road vehicles to investigate the impact of Metrolink.

Metrolink was the first new street operating light rail system in the UK, which opened in 1992. It connected Altrincham in the south west of Manchester via the city centre to Bury in the north, with a spur to Piccadilly station (the Altrincham-Bury and Altrincham-Piccadilly services in Figure 15). Lines across the city centre were on-street, otherwise existing heavy rail lines formed the track.

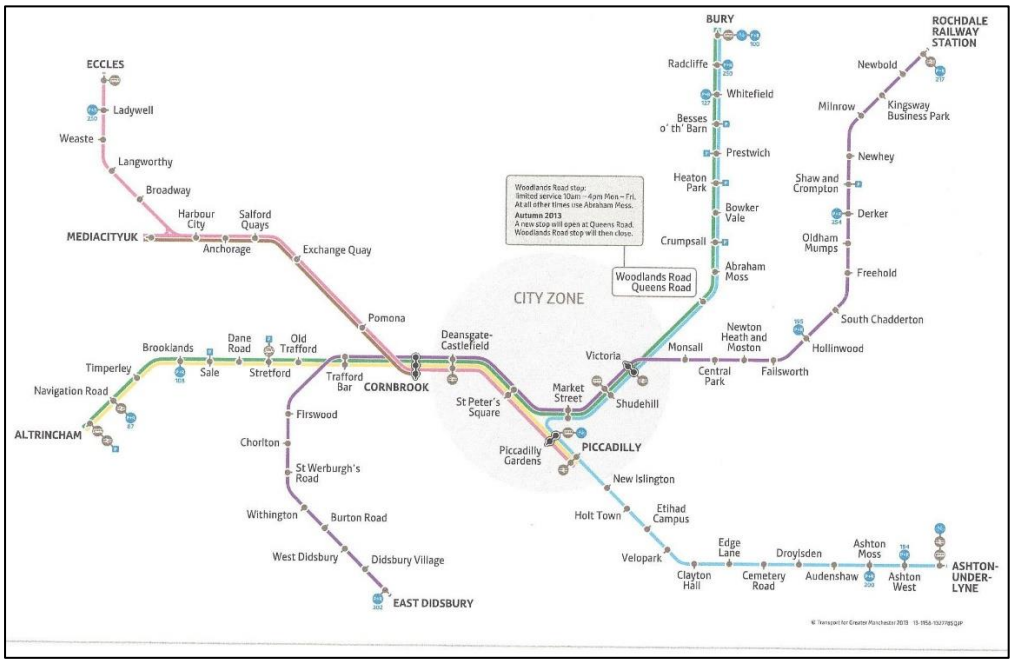

Figure 15

The sources of Metrolink patronage are summarised in Table 2. The vast majority of journeys are either diverted from existing public transport modes or induced. Between 10% and 18% of journeys are diverted from car, the proportion varying by location along the line.

Table 2 Sources of Metrolink patronage

Movement/Mode	Peak	Off-Peak
Bury Line		
Diversion from car	10-12%	15-18%

[6] Validation of the Demand Model for Manchester Metrolink, David Gane, Oscar Faber TPA, The Transport Economist, Vol 23 No 3, Autumn 1996.

Diversion from bus	27-31%	25-29%
Diversion from rail and induced trips	57-61%	55-59%
Total	100%	100%
Altrincham Line		
Diversion from car	15-20%	6-14%
Diversion from bus	14-30%	11-39%
Diversion from rail and induced trips	54-71%	54-74%
Total	100%	100%

The ranges in the estimates relate to measurements at different points along each corridor.

In Table 3 the impacts of the line on the highway network are summarised for selected main roads in the two corridors. Off-peak and outbound traffic reductions are generally small, less than 3.5%, while peak inbound traffic reductions in the Bury corridor are 2-8% and in the Altrincham corridor up to 10%.

Table 3 Impacts on the Road System

Movement/Mode	**AM Peak Hour Inbound**	**AM Peak Hour Outbound**	**Off-Peak**
Bury Line			
A665	2.5-8.5%	0.5-3.5%	1-2.5%
A56	1.5-3%	0.5-3.5%	1.5-2%
M66	3%	1.5%	1.5%
A576	3.5%	1.5%	3%
Altrincham Line			
A56	5.5%-10%	2-5%	<2%
A560	7.5%	2.5%	
A5103	3-6.5%	1-2.5%	

The ranges in the estimates relate to measurements at different points along each corridor. All ranges rounded to nearest 0.5%.

The total reduction in car traffic flows on a cordon around the central area of Manchester was estimated to be 1.9% in the peak and 0.7% in the off-peak.

The Konsult data base[7] states that in 1998 car accounted for 91% of passenger kilometres in Manchester metropolitan area and public transport the remaining 9%, of which Metrolink accounted for 1%, bus, the main public transport mode in Manchester, was 7% and other rail the remaining 1% (these statistics exclude walk and cycle). Thus car is overwhelmingly dominant.

The equivalent figures for Sydney and Melbourne are that public transport accounts for about 16% and 12% of passenger kilometres (on weekdays). The figure for London is approaching 50%[8].

Final Remarks

The role of public transport in Australian cities is quite specific and limited.

Public transport is mainly used for work and education travel but, in the smaller cities, the usage is in overall terms low.

Most public transport commuter journeys are to and from the city centres, as would be expected, and any increases in the public transport share over the past 20 years were for journeys to and from

[7] www.konsult.leeds.ac.uk

[8] London residents journeys wholly within London, 2009/10.

the central and inner areas of the cities[9]. For the outer city areas, the public transport share of commuter trips has been very low and stable.

The structure of Australian cities is a big influence.

Commuting to the city centres of Sydney and Melbourne is mainly by public transport and the mode shares bear comparison with London, although they are somewhat lower (80% for London, 60% and 70% for Melbourne and Sydney respectively).

The big difference between the cities is that most (approx. 60%) of London's employment is in the inner and central city areas, well-served by public transport, whereas most of the employment of Sydney and Melbourne is in the outer suburbs (75% and 82% respectively). Public transport use by commuters to workplaces in the outer suburbs is very low for the Australian cities (and for London).

It is very difficult to change the overall mode shares for cities.

The statistics show little use of public transport for journeys other than work and educational travel in all five cities. Even for commuting trips, public transport has a minor role for workplaces outside the city centres.

Over the past 20 years, in just two of the five cities has there been a significant increase in the public transport share of commuter trips (of more than a few percentage points).

As is evident from the comparisons with London, Australian cities have a much lower proportion of their workplaces in the city centres, for which public transport has a major role, and the urban densities are very much lower than London, undermining the performance of public transport (by reducing the population within the catchments of bus stops and stations).

As illustrated by the analysis of Manchester Metrolink, individual public transport projects, even those of substantial scale, can exert only a small influence on the overall city mode shares (simply because their area of impact is limited to the immediate catchment of the service and the size of the impact in that catchment is constrained by competition from other modes of transport).

[9] On the evidence of Melbourne and Sydney.

Appendix A

Figure A1

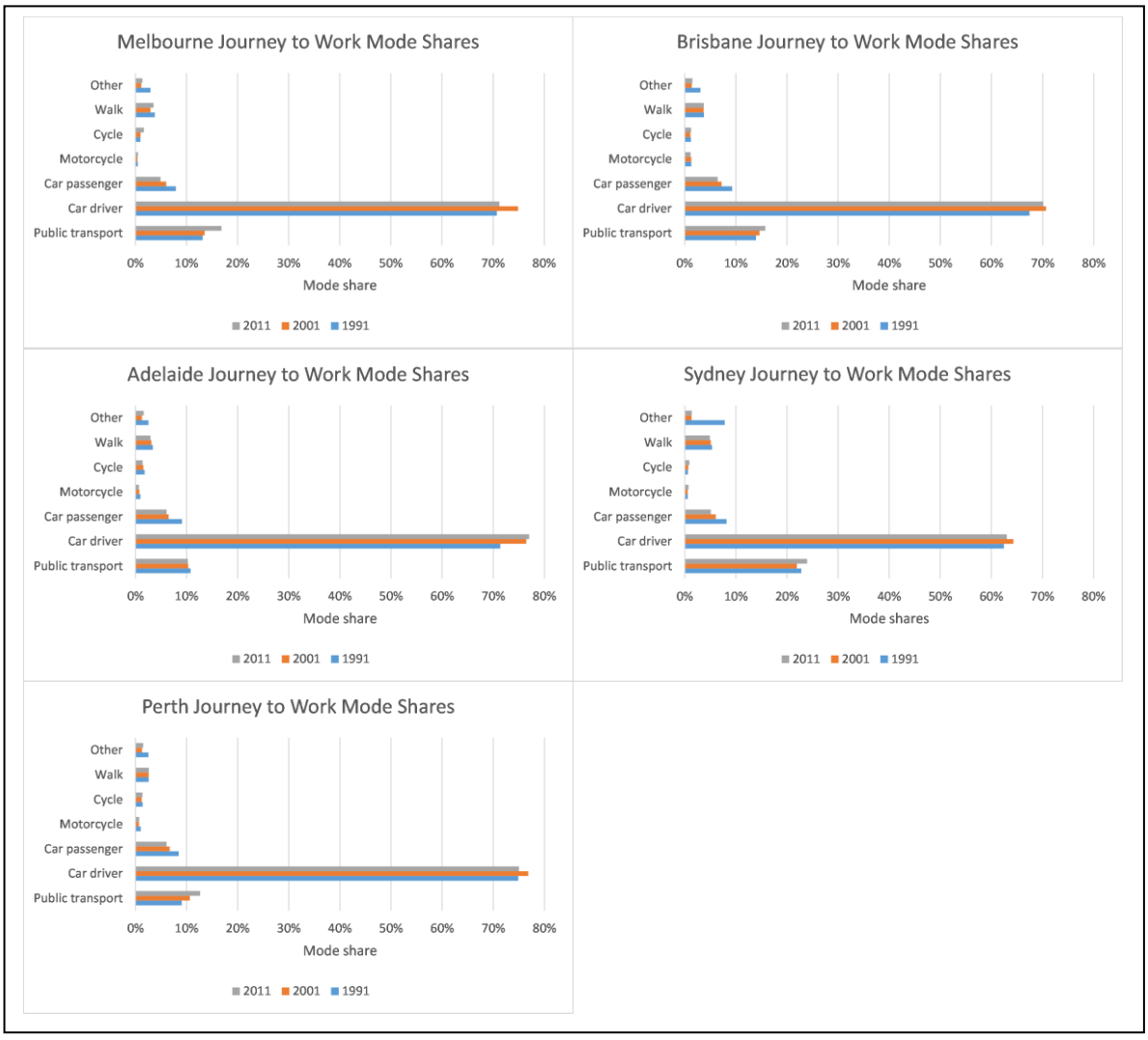

Figure A2


Sydney Public Transport Share by Age
Mode share
50%
40%
30%
20%
10%
0%
15-24
25-34
35-44
45-54
55+
Age group (years)
1991
2001
2011
Adelaide Public Transport Share by Age
Mode share
50%
40%
30%
20%
10%
0%
15-24
25-34
35-44
45-54
55+
Age group (years)
1991
2001
2011
Perth Public Transport Share by Age
Axis Title
50%
40%
30%
20%
10%
0%
15-24
25-34
35-44
45-54
55+
Age group (years)
1991
2001
2011
Brisbane Public Transport Share by Age
Mode share
50%
40%
30%
20%
10%
0%
15-24
25-34
35-44
45-54
55+
Age group (years)
1991
2001
2011
Melbourne Public Transport Mode Share by Age
Mode share
50%
40%
30%
20%
10%
0%
15-24
25-34
35-44
45-54
55+
Age group (years)
1991
2001
2011

Appendix B The Data

Sources

Census data: ABS. Metropolitan areas are SDs (1991-2006) and GCCSAs for 2011. There are significant differences in the areas covered between SD and GCCSA boundaries in some areas. A comparative analysis in 2006 showed that this had little effect on mode shares as these areas had small populations and were at the edge of the cities. Employment totals in 2011 have however been adjusted to reflect approximately the area differences.

Sydney Census Data and household travel survey data: Bureau of Transport Statistics, NSW Government as published on their website.

Melbourne VISTA household travel survey data as published on the Victorian Department of Transport website.

Melbourne area breakdowns: East West Needs Study, Transport Supply and Demand (Existing and Future), Sinclair Knight Merz – Maunsell (undated), published by Department of Transport, Planning and Local Infrastructure.

Transport for London: Travel in London and London Travel reports.

Definitions

Sydney breakdown: statistical subdivisions

- CBD: Sydney (C) Inner
- Rest of Inner Sydney: Sydney (C) – Inner, South, West, East and North Sydney (A)

Melbourne breakdown: as reported in relevant source.

Processing modes of transport: order of priority when more than one mode was used: public transport, car other.