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Mode Choice for Non-Work Trips

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Abstract:

Travel demand modelling in Sydney using the conventional four-step approach, has to date concentrated on understanding and forecasting the demand for travel to work in the morning peak period. Both observation and analysis of data on travel patterns indicates that a significant and increasing proportion of travel is for non-work purposes, even in the morning peak. Using data collected in the 1991 Home Interview Survey for the Greater Sydney Metropolitan Region, this paper looks at home-based non-work trips for the Statistical Local Areas in the Sydney Region and examines the relationship between mode shares, trip lengths and number of trips with a range of socio-economic, land use and accessibility factors. Research in the US has suggested that non-work trips are influenced to a greater extent than work trips by local land use factors such as neighbourhood density, street patterns and mixture of land uses. Thus, as well as the standard socio-economic factors, this paper attempts, with the assistance of the Geographic Information System, to include these variables in the analysis. This exploration of the data is undertaken to identify possible variables for use in the estimation of a non-work mode choice model

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Introduction

The travel demand model used for forecasting in the Sydney Metropolitan Area, generally known as the Sydney Strategic Travel Model, is of the traditional four-step structure. The estimation of the model was based on the demand for travel to work and its outputs are trip tables for the morning peak period. The forecasts of travel are driven by employment, workforce and population projections. Trips for purposes other than going to work are assumed to follow the same pattern, and the mode choices to be driven by the same factors, as those for work trips.

Whilst trips to work may still make up the majority of the transport task in terms of vehicle kilometres travelled, travel data indicate that trips for non-work purposes represent a significant, and increasing proportion, of the number of trips both throughout the day, as well as in the morning peak. The implications for policy assessment of using a model based largely on work travel depends on the policy objective. The demand for cross-regional infrastructure may be driven by work travel, however the increasing number of trips for other purposes exacerbates local traffic congestion and contributes to the adverse environmental impacts of vehicle travel.

Data on personal travel in the Sydney Metropolitan area show that the mode share for non-work trips is even more strongly biased in favour of private vehicle use, with public transport being used for a much lesser proportion of these trips than for work travel. Thus if travel demand policies are to achieve an increase in public transport use, more understanding is needed of the factors which influence mode choice for trips for non-work purposes

If non-work trips are becoming increasingly important in the understanding and forecasting of travel demand, the assumption that non-work trip behaviour is determined by the same factors as work trip behaviour, has to be questioned. Using data from the 1991 Census of Population and Housing and the Home Interview Survey 1991 for Sydney, this paper explores some of the possible relationships between mode choice for home based non-work travel and a range of socio-economic and other land use variables.

An important and interesting avenue of research which may also provide some insight to this question, is the work by Cervero and others which has been exploring the relationship between urban form and mode choice. A number of conclusions have been drawn from the research in this area which has been carried out overseas. This paper attempts to determine if there is any evidence in the Sydney data which may indicate that these conclusions are relevant here.

The first part of this paper discusses the role of non-work trips in the overall travel task in Sydney. The second part considers some possible factors which may influence mode choice for non-work travel and the third part of the paper examines some data for Sydney to explore those relationships.

Home based non-work travel

Data used

The following analysis is based on data collected in the 1991 Home Interview Survey which was conducted by the then NSW Transport Study Group (now known as the Transport Data Centre). The survey collected data on all trips by all individuals in selected households in the Greater Sydney Metropolitan Region. A trip is defined as a movement between two points which is greater than 100 metres. Details collected include the time, location, purpose and mode used for each trip. A final sample size of approximately 12,000 households was achieved which represented a 1 per cent sample of the population of the study area. For this analysis data have been used only for the Sydney Statistical Division as shown in Figure 1.

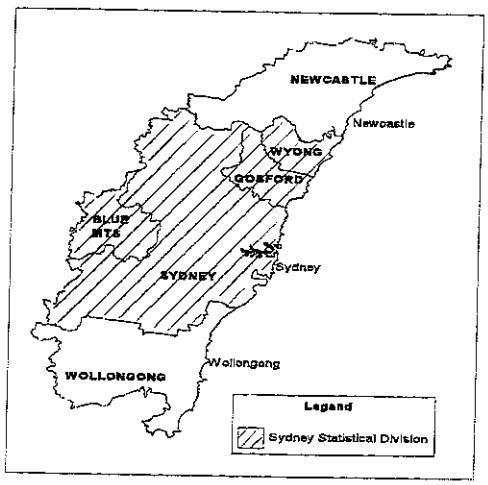

Figure 1 Greater Sydney Metropolitan Region

This analysis also only looked at home based trips, that is, trips that begin at the respondent's usual dwelling place. It therefore excluded trips made by that respondent from origins other than home, such as work place based trips or trips which follow on from other trips during the respondent's day, such multiple shopping, personal business or social/ recreation trips. This approach has been adopted as we want to explore factors which can be associated with the respondent's place of dwelling which may influence the mode choice made.

Socio-economic data are also used from the 1991 Census of Population and Housing at an aggregate level for the Statistical Local Areas (SLA) of the Sydney Statistical Division (SD) to explore the possibility of relationships between these variables and mode choice for non-work trips.

Purposes of non-work trips

Non-work trips are undertaken for a wide range of purposes. They are categorised into a few broad purposes which are generally shopping, personal business, education, serve passenger and social/recreation. Most of these, with perhaps the exception of serve passenger, are self explanatory. A serve passenger trip can be a trip by an adult taking someone else to another activity, such as a child to school or preschool, or another person

to the train station, or it could be a trip by a child who is accompanying an adult on an activity, such as shopping

The importance of non-work trips in our daily activities is illustrated in Figure 2 which shows the distribution of purposes for home based travel for the Sydney SD for an average weekday. Overall work and work related business trips account for 24 per cent of trips, with the remaining 76 per cent being non-work trips. As this analysis has used home based trips, some of those trips could be the first stage of the trip to work. For example serve passenger and shopping have been found to be important trip purposes carried out on the way to work, particularly by women. The fact that these purposes are carried out on the way to work, may have important implications for the mode choice made.

The distribution of trip purposes in Figure 2 is for an average weekday for trips at all times of the day. However, even when only the morning peak period is considered the distribution of purposes is not very dissimilar. Figure 3 shows that 64 per cent of trips in the morning peak (that is arriving between 6.30 am and 9.00 am) are for non-work purposes. Education and serve passenger trips are also important trip purposes at that time of the day.

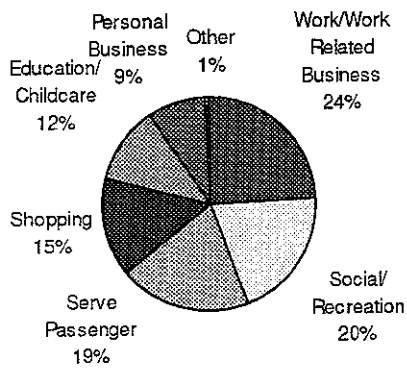

Figure 2 Proportion of trips from home by destination purpose by residents of Sydney SD, Average weekday

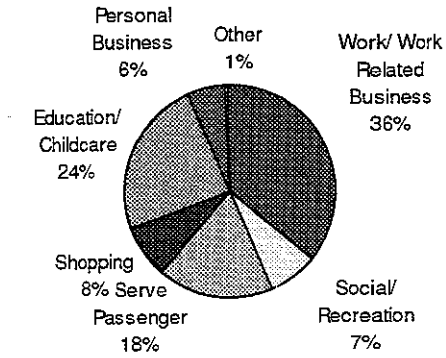

Figure 3 Proportion of trips from home by destination purpose 6:30am & 9:30am by residents of Sydney SD, Average Weekday

Modes used for non-work trips

Public transport is used for only 10 per cent of all trips in the Sydney SD on an average weekday with the majority of trips, 58 per cent, being made by private vehicle, either as a driver or a passenger. Private transport is the dominant priority mode used for all trip purposes as shown in Figure 4.

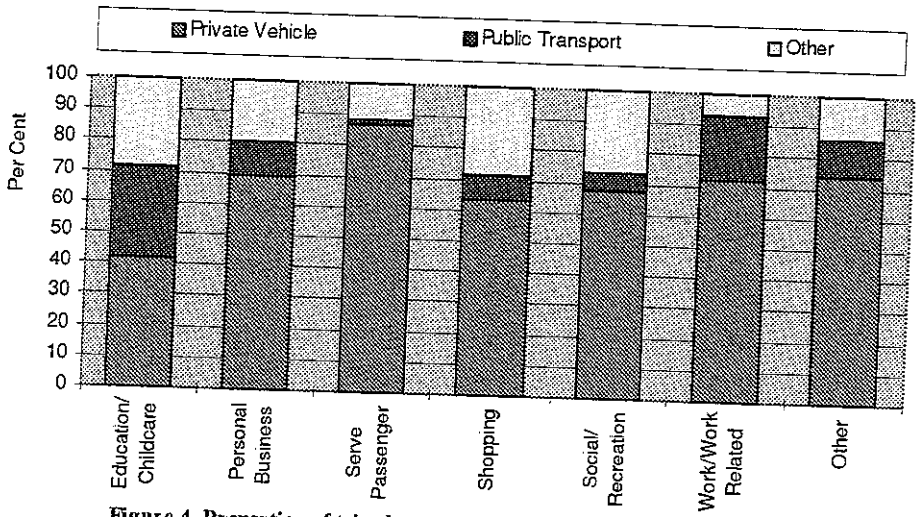

Figure 4 Proportion of trips by purpose and mode by residents of Sydney SD, Average weekday

The trip purpose with the highest public transport mode share is education, with nearly 30 per cent of education trips undertaken on public transport. It is also evident in Figure 4 that, with the exception of education trips, the mode share to public transport for non-work trips is less than that for work trips. Nearly 20 per cent of work trips are by public transport but, with the exception of education and return home trips, less than 10 per cent of non-work trips are by public transport. This undoubtedly reflects, in part, the convenience provided by the private car for trips for non-work trips such as shopping and to social and recreational activities. Another contributing factor is that public transport services are less frequent in the periods outside the peaks and on weekends when a lot of trips for these purposes are undertaken. The convenience of the private car, as well as the very dispersed nature of destinations for these types of trips, makes it difficult for public transport to increase its mode share.

As illustrated in Figure 4 the mode share differs for each non-work purpose. Thus it might be expected that the mode choice decision is different depending on the nature of the activity. However, for the rest of the analysis in this paper, non-work trips will be considered as one group to simplify the discussion.

Trip lengths of non-work trips

One characteristic of non-work trips which has been identified in the Home Interview Survey data for Sydney is that on average non-work trips are more localised than work trips. For the SLAs in the Sydney SD the average duration of non-work trips, on an average weekday, ranged from 14 to 25 minutes with an average of 18 minutes. This compared with the average duration of work trips which ranged from 19 to 45 minutes with an average of

33 minutes. (This excludes the Sydney Inner SLA where there are a small number of people who walk to work in the Sydney CBD.)

Who makes non-work trips?

The distribution of non-work and work trips by males and females is shown in Table 1 Appendix 1, which illustrates the fairly even spread between the sexes for non-work trips in total, but the disproportionally high level (68 per cent) of home based work trips which are made by males. As we have used home based trips for this analysis, work trips are not included if preceded by a non-work trip such as shopping or dropping off children or other passengers. This in part explains the lower proportion of home based work trips by women as they are more likely than males to undertake these activities on the way to work. Excluding social/ recreation, return home trips and childcare and education trips, which are predominantly by children, women undertake the majority (56 per cent) of other non-work trips. The choice of mode for non-work trips appears to be similar for males and females, with approximately 10 per cent of trips for both sexes being by public transport.

When looked at by age group (Table 2, Appendix 1) the distribution varies significantly depending on the particular activity. Childcare and education trips are, as expected, predominately made by the younger age groups, as are serve passenger trips. Other non-work trips are fairly evenly distributed across the adult age groups, although tapering off in the over 60 years group. The distribution of the choice of mode is interesting with the public transport share being around 11 per cent for all age groups with the exception of 40 to 59 year olds where it drops to around 5 per cent.

The distribution of non-work trips by income (Table 3, Appendix 1) predominantly reflects the income distribution in the population as the data have not been weighted to remove this effect. However the distribution of mode share within income groups is interesting in that it indicates a considerably higher use of public transport in the lower income groups which declines significantly as income rises.

The above analysis, indicates that in the estimation of mode choice models for non-work purposes it would be worthwhile to explore the significance of age, sex and income on those choices.

Factors which may influence mode choice for non-work trips

The Sydney Strategic Travel Model which is used for the forecasting of travel demand, is a traditional four step model with a binomial logit model used to determine the mode choice between public and private transport. This model is applied to work trips in the morning peak. The independent variables in this model are travel time and cost (generalised time), employment density as a proxy for parking availability, income per worker and number of vehicles per adult.

Travel for all purposes is derived by factoring the car and public transport trip tables which are produced after the mode choice step in the model to replicate the observed proportions of work to non-work trips in the survey data. There is no attempt to "model" the choice of non-work trips. It is indirectly assumed that non-work trips are determined by the same factors as work trips. There is no evidence to support this assumption and given the growing importance of non-work travel in travel demand this assumption needs to be questioned

It can reasonably be expected that time and cost also are important determinants of the mode choice for non-work trips and thus would be significant variables in any such mode choice model. However an interesting avenue of research has been exploring the impact of other factors such as neighbourhood design and other neighbourhood and household characteristics on mode choice and has found that some of these factors do have an influence on the choice of mode for non-work travel

New Urbanism

The possibility of a link between urban form and mode choice is proposed by a movement which has become known as the "New Urbanism movement". This movement "calls for a return to compact neighbourhoods with grid like street patterns, mixed land uses and pedestrian amenities so that they are more conducive to walking, bicycling and transit riding" (Cervero and Radisch 1996). A considerable body of research exists which has tested the claims that particular neighbourhood characteristics are associated with, or can indeed bring about, a higher mode share to transit and non-motorised modes.

Studies (Handy 1992, Cervero 1994, 1995, Cervero and Radisch 1996, Friedman et al 1994, Kitamura et al 1994, Frank and Pivo 1994) have tested the relationship between urban form and travel patterns in the San Francisco Bay area, most of which have demonstrated some relationship between these factors and mode choice. It is interesting to note that this relationship has been found to be more significant for non-work than for work trips. Cervero and Radisch (1996) which estimated a binomial logit model to predict the probability of using non-auto modes for non-work trips as a function of neighbourhood characteristics, concluded that "the type of neighbourhood was a stronger predictor of mode choice for non-work trips than for commute trips".

Handy (1996) discusses the methodologies, which include simulation studies, aggregate analysis, choice models and activity-based analysis, that have been used to explore the relationship between urban design and travel behaviour as proposed in the New Urbanism concept. It is proposed that there are two steps to making this research useful for policy makers. The first is to understand the general relationships that influence automobile choice and the second is to try and quantify those relationships so that they can be incorporated into transport models which can be used as tools by policy makers to influence transport choice.

In this paper an aggregate analysis approach has been adopted as a first stage of exploring possible relationships between mode choice and personal and neighbourhood characteristics. It is hoped that this will lead to further quantifiable analysis to estimate choice models for enhancement of the travel demand modelling process.

The evidence in Sydney

To examine the possibility of a relationship between mode choice for non-work trips and household and neighbourhood characteristics in Sydney, we have first looked at the locational pattern of public transport use, and then aggregate analysis has been used to consider the household and neighbourhood characteristics of those areas. It is recognised that this approach does not necessarily demonstrate that there is a causal relationship between those characteristics and mode choice, but it is considered as a first step to identifying variables which may be appropriate for further quantifiable analysis.

Locational patterns of mode use for work and non-work purposes

The data used in the earlier sections of this paper have been at the Sydney SD level. Some interesting patterns are revealed in the use of modes for work and non-work purposes when data at the Statistical Local Area (SLA) level are used. Figures 5 and 6 show the distribution of home based trips by public transport for work and non-work purposes. It is evident in Figure 5 that SLAs which have good access to public transport, both bus and rail, have between 10 and 40 per cent of home based trips made by public transport for the journey to work. By comparison, Figure 6 shows a generally much lower level of public transport use for non-work trips. The highest rate of public transport use for non-work trips is in those SLAs in the inner city areas which have between 10 and 20 per cent of non-work trips by public transport. In all other SLAs less than 10 per cent of home based non-work trips were by public transport.

Focussing on the SLAs which have the highest proportion of non-work trips by public transport, ie between 10 and 20 per cent, we can identify 17 SLAs which we will call "public transport SLAs " and the remaining 28 SLAs which we will call "non-public transport SLAs" For each of these SLAs the averages for a selection of variables identified in overseas research as having some influence on the mode choice decision, are shown in Table 1, Appendix 2 for "public transport SLAs" and Table 2, Appendix 2 for "non-public transport SLAs" These are summarised into an average for the "public transport SLAs" and the "non-public transport SLAs" in Table 1. The variables are explained in the notes to the table.

Table 1 shows that the "public transport SLAs", which have the higher public transport mode share for non-work purposes, also on average have a lower average trip rate for non-work trips per person than the SLAs which are more car dependent. These "public transport SLAs", which are shown in Figure 6 to be in the inner areas of the city, have a much higher population density and a high ratio of medium density to low density dwellings. They also

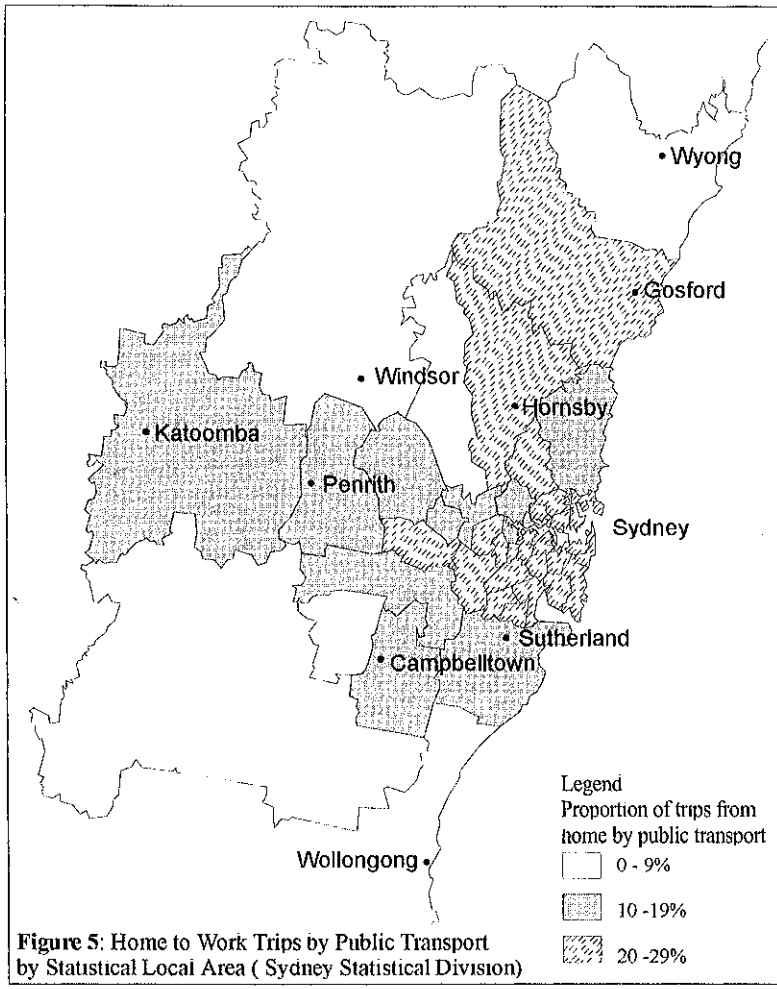

Figure 5: Home to Work Trips by Public Transport by Statistical Local Area (Sydney Statistical Division)

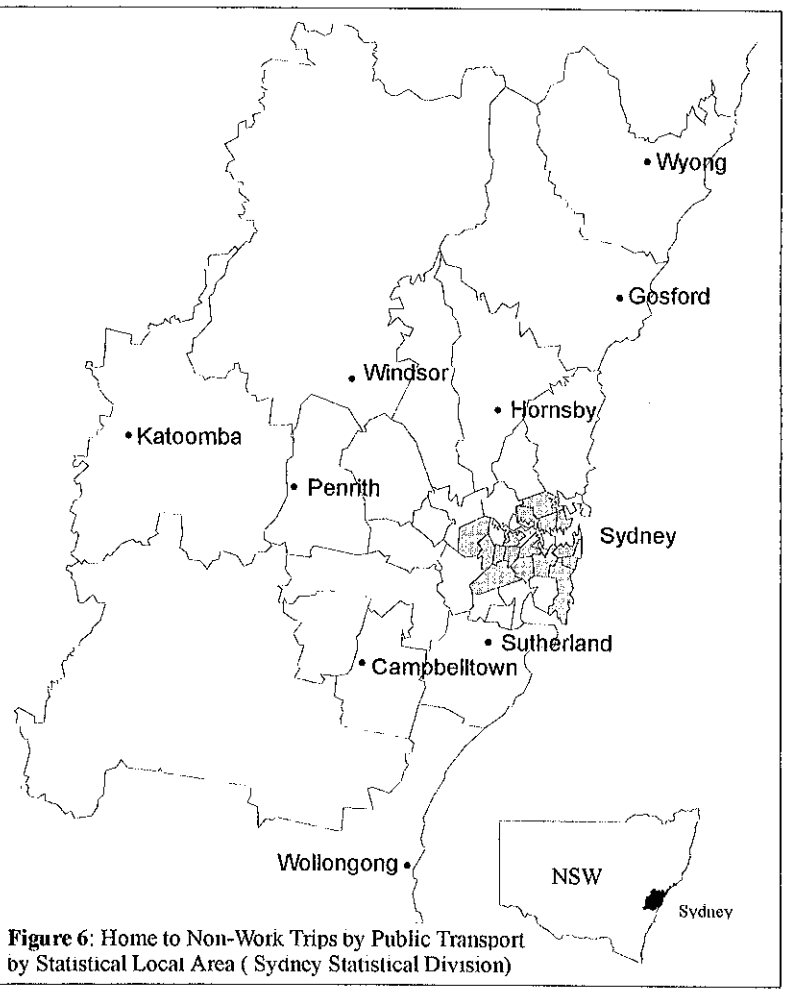

Figure 6: Home to Non-Work Trips by Public Transport by Statistical Local Area (Sydney Statistical Division)

show a lower car ownership rate with an average number of vehicles per household of 1.05 compared with 1.41 for "non-public transport SLAs".

A number of other variables have also been created to represent neighbourhood characteristics as identified in overseas research has having an influence on mode choice. These include a workforce to employment ratio which is used as a proxy for mixed land uses and a street pattern index to represent neighbourhood design. These are discussed in more detail below.

Table 1 Summary table of Statistical Local Area averages

SLA	PT mode split	Trip rate	Pop density	W/E ratio	Dwelling ratio	Vehs per hh	Hh income	Pop 1.5km rail	Street pattern index
PT SLAs	>10%	2.60	34.19	1.23	1.52	1.05	$42446	53%	0.9
Other SLAs	<10%	2.79	2.17	1.52	0.23	1.41	$40895	33%	0.6

Notes

Mode split to PT:	Proportion of non-work trips by public transport on an average weekday (Source: 1991 Home Interview Survey)
Trip rate:	The average number of non-work trips made per person on an average weekday (Source: 1991 Home Interview Survey)
Pop density:	Population per hectare (Source: 1991 Census of Population and Housing)
W/E ratio:	Compares the level of population resident in an SLA who are in the workforce in relation to the level of employment (Source: 1991 Census of Population and Housing)
Dwelling ratio:	The ratio of separate dwellings to other forms of medium density dwellings (Source: 1991 Census of Population and Housing)
Vehs per hh:	Average number of vehicles per household (Source: 1991 Census of Population and Housing)
Hh income:	Average income in 1991 dollars (Source: 1991 Census of Population and Housing)
Pop 1.5km rail:	Proportion of population within 1.5km of rail station (Source: 1991 Census/TDC GIS)
Street pattern index:	Proportion of SLA with traditional street pattern (Source: TDC GIS)

The workforce to employment ratio: This has been used as a proxy for commercial development, or employment attractors, in the SLA. The New Urbanism movement maintains that public transport use is increased in areas which have mixed land uses. As data were not readily available on the proportion of land zoned commercial relative to residential zoning, the relative workforce and employment levels have been used to give an indication of the level of mixed land uses and the employment opportunities within an SLA. Those SLAs which have a lower workforce to employment ratio have a lower level of resident workforce in relation to the level of employment opportunities in the SLA. It is therefore assumed that they have more employment activities and therefore more mixed land uses than the "non public transport", or more predominantly residential, SLAs. This appears to be associated with a high propensity of use of public transport for non-work trips as well as work trips

Street patterns: The New Urbanism concept maintains that the street pattern of a neighbourhood influences the mode choices made by residents. Two distinctly different patterns have been identified. The first, labelled as "traditional neighbourhoods" have a grid street patterns with four way intersections, which is generally termed a "connected street network". This pattern is more generally found in older neighbourhoods and is considered to be more conducive to public transport service provision and for encouraging non-motorised transport, particularly walking. The second distinctive street pattern identified is "conventional suburban development" which has a non-connected network characterised by a large number of culs-de-sacs and T-intersections. This is the pattern found in more recent suburban developments, particularly on the urban fringe.

Several studies including Cervero and Radisch (1996) and Friedman et al (1994), have established a difference in mode choice between traditional and conventional neighbourhood street patterns, with the traditional neighbourhoods having a higher level of public transport and non-motorised mode trips. Most of the studies exploring this link between street pattern and mode choice have done so using a case study approach to compare two neighbourhoods typical of each pattern.

In this paper we have taken a more aggregate approach and used the GIS to identify the dominant street pattern of each SLA to compare with the other characteristics of that SLA as shown in Table 1. Using the road network database for Sydney the GIS identified the number of intersections, T-sections and, by determining the number of vertices, calculated the length of straight road. The proportions of each of these in each travel zone were calculated so that a travel zone could be identified as "traditional" or "conventional". The number of each type of travel zone in each SLA was determined and an index derived to indicate the predominance of each street pattern in the SLA. It can be seen in Table 1 that the "public transport SLAs" also predominantly have a "traditional neighbourhood" street pattern.

Average household income: This has been included as there is evidence from research overseas that higher public transport use is associated with lower income levels. This is also supported at the personal level in the analysis of the Home Interview Survey data from Sydney as discussed in an earlier section of this paper. However, at the SLA level average household income in Sydney is more closely related to land values influenced by desirable location so that in the inner areas there are a number of high income suburbs due to the influence of the harbour location on residential property values. Although these suburbs have a relatively high proportion of trips undertaken on public transport, car ownership rates are much more in line with those for the "non public transport SLAs". The high car ownership rates found with relatively low income levels in the outer, or non public transport SLAs in Sydney, indicates that car ownership is not necessarily driven by income but by the need to provide private accessibility due to the lack, or poor level, of public transport services.

Access to public transport: To those familiar with the city of Sydney and its public transport system, it is apparent in Figures 5 and 6 that the areas with the highest proportion of public transport use are those areas which have the highest accessibility to public transport, both

rail and bus. Using the ARC/INFO Geographical Information System (GIS) package and the data from the 1991 Census, the proportion of the population within 1.5 kilometres of a railway station was calculated for each of the SLAs in the Sydney SD. On average the 17 identified "public transport SLAs" had 53 per cent of the population within walking distance of a railway station compared with 31 per cent for the "non-public transport SLAs".

Only including accessibility to railway stations considerably understates the accessibility of public transport in the "public transport SLAs" as they also had a high proportion of their population who could access ferry services and are known to have a high level of bus services. Unfortunately the data to determine the degree of accessibility to bus services for an SLA are not as yet readily available in a form which can be analysed in the TDC's GIS. Under the NSW Passenger Transport Act 1991, standards are set to achieve the target of 90 per cent of the population within 800 metres of a bus route. This is generally accepted to have been achieved. However accessibility also depends on the level of service provided on a route and that data have not been captured in the GIS to undertake this analysis

In the mode choice model the main independent variables are travel time and cost, or generalised time. Increased accessibility resulting in lower travel times and costs will favour public transport choice. Car travel becomes more attractive when public transport travel times are longer, particularly if this is the result of long access times and/or the need to change mode which carries a high cost penalty. This is generally the experience with using public transport in those SLAs which we have categorised as "non-public transport".

In summary, Table 1 demonstrates that those SLAs which have a higher use of public transport also display characteristics identified by the New Urbanism movement as being encouraging of public transport use. What cannot be determined from this analysis is the degree of explanatory power of any of these variables in a mode choice model. Further analysis is required to quantify these relationships.

Conclusion

The data presented in this paper have highlighted the importance of non-work trips in urban travel patterns. Some of the characteristics of those trips have been analysed to assist in the understanding of how they may differ from work trip patterns. A range of factors, including household and neighbourhood characteristics have been examined to determine the likelihood of a relationship with public transport choice.

In line with the findings of other research in this area this aggregate analysis for Sydney, has demonstrated a relationship between urban form and public transport use and trip frequency, suggesting the possibility of the potential for land use variables to be used in the prediction of mode choice, and ultimately for formulating effective land use policies for reducing car dependency.

While it is likely that time and cost of travel will be important determinants in the mode choice for non-work trips, as they are for work trips, this analysis would suggest that there are other factors at play in determining that choice which warrant further investigation. If policies are to be formulated which are to effectively encourage greater public transport use a suite of mode choice models needs to be estimated for a range of trip purposes which identify the role of policy sensitive variables in those choices.

Acknowledgements

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Appendix 1

Table 1 **Proportion of trips by destination purpose and sex, residents of Sydney Statistical Division on an average weekday** (Source: 1991 Home Interview Survey)

Purpose	Male	Female	Total
Childcare	53.71%	46.29%	100.00%
Education	51.34%	48.66%	100.00%
Home	50.93%	49.07%	100.00%
Personal Business	46.65%	53.35%	100.00%
Serve Passenger	43.33%	56.67%	100.00%
Shopping	42.91%	57.09%	100.00%
Social/Recreation	49.57%	50.43%	100.00%
Unknown	52.92%	47.08%	100.00%
Non-Work	**48.18%**	**51.82%**	**100.00%**
Work/Work Related	**67.75%**	**32.25%**	**100.00%**
Non-work mode share			
Private Vehicle	66.96%	66.50%	
Public Transport	9.44%	9.85%	
Other	23.60%	23.66%	

Table 2 **Proportion of trips by destination purpose and age group, residents of Sydney Statistical Division on an average weekday** (Source: 1991 Home Interview Survey)

Purpose	< 20 years	20 - 39 years	40 - 59 years	60+ years	Total
Childcare	100.00%	0.00%	0.00%	0.00%	100.00%
Education	89.82%	7.74%	1.92%	0.52%	100.00%
Home	29.67%	26.62%	28.68%	15.03%	100.00%
Personal Business	12.47%	28.32%	32.39%	26.83%	100.00%
Serve Passenger	42.18%	21.89%	27.61%	8.33%	100.00%
Shopping	12.02%	29.39%	31.87%	26.72%	100.00%
Social/Recreation	32.51%	27.38%	22.32%	17.80%	100.00%
Unknown	35.05%	23.63%	25.11%	16.22%	100.00%
Non-Work	**31.84%**	**25.39%**	**26.62%**	**16.15%**	**100.00%**
Work/Work Related	**5.54%**	**38.86%**	**48.77%**	**6.83%**	**100.00%**
Non-Work Mode Share					
Private Vehicle	60.22%	65.84%	77.02%	61.43%	
Public Transport	11.05%	11.04%	5.80%	11.05%	
Other	28.73%	23.12%	17.18%	27.52%	

Table 3 **Proportion of trips by destination purpose and annual personal income, residents of Sydney Statistical Division on an average weekday** (Source: 1991 Home Interview Survey)

Purpose	$0-12000	$12001-35000	$35001-90000	$90000+	Unknown	Total
Childcare	0.00%	0.00%	0.00%	0.00%	100.00%	100.00%
Education	25.27%	4.59%	0.71%	0.00%	69.43%	100.00%
Home	28.60%	37.08%	12.12%	0.91%	21.29%	100.00%
Personal Business	39.63%	39.47%	14.11%	0.84%	5.95%	100.00%
Serve Passenger	25.28%	28.40%	7.85%	0.47%	38.00%	100.00%
Shopping	40.17%	40.58%	12.90%	0.73%	5.63%	100.00%
Social/Recreation	33.28%	33.84%	10.91%	0.76%	21.22%	100.00%
Unknown	27.73%	37.75%	10.29%	0.37%	23.87%	100.00%
Non-Work	**31.01%**	**34.02%**	**10.87%**	**0.73%**	**23.38%**	**100.00%**
Work/Work Related	**6.37%**	**61.74%**	**29.67%**	**2.22%**	**0.00%**	**100.00%**
Non-Work Mode Share						
Private Vehicle	59.78%	73.34%	76.32%	76.95%	61.51%	
Public Transport	12.80%	7.73%	5.95%	3.27%	10.18%	
Other	27.42%	18.93%	17.72%	19.78%	28.31%	

Appendix 2

Table 1 Public transport Statistical Local Areas *

SLA	PT mode split	Trip rate	Pop density	W/E ratio	Dwelling ratio	Vehs per hh	Hh income	Pop 1.5km rail	Street pattern index
Ashfield	10.0%	2.48	48.65	1.76	1.43	1.01	$38 677	87%	1.0
Auburn	10.3%	2 42	14.67	0 49	0 37	1 08	$33 182	80%	1 0
Burwood	13 3%	2 47	39.60	1.07	0.64	1.13	$39.597	81%	1.0
Canterbury	12 8%	2.63	38 46	2 06	0 67	1 13	$33 838	96%	0 9
Drummoyne	10 1%	2 55	36 57	2.14	0.75	1.29	$44 090	3%	1 0
Lane Cove	15 3%	2 47	27 49	1 04	0 83	1 30	$52 115	34%	1 0
Leichhardt	14.2%	2 77	46 83	1.33	1.75	0.99	$43 786	0%	0 8
Marrickville	13 3%	2 74	48.23	1 35	1.61	0 93	$36 980	100%	0 9
Mosman	14.6%	2 23	29 46	1 83	1.41	1 23	$58 621	0%	0 9
Nth Sydney	12.6%	2.78	46.60	0 58	5 67	1.00	$53 298	66%	0.9
Randwick	12.6%	2 84	31.52	1.88	1.83	1.05	$39 387	4%	1.0
Sth Sydney	19 3%	2 64	43.76	0.40	19.17	0.62	$34 509	74%	1.0
Strathfield	10 7%	2.24	18 29	0 69	0.37	1 31	$44 942	56%	0 9
Sydney (R)	15 3%	2.67	23 39	0.07	600.33	0.63	$40.868	100%	1.0
Waverley	12 2%	2.93	64.65	2 19	3.94	0 95	$41,086	30%	1.0
Willoughby	10 4%	2.54	22 84	0 60	0 53	1.30	$52 549	51%	0 8
Woollahra	13.3%	2.73	40.31	1.44	2.99	1.14	$57,414	47%	0.8

* Mode share to public transport greater than 10% for non-work trips (see Figure 6)

Source: See Table 1 in text

Table 2 Non-public transport Statistical Local Areas *

SLA	PT mode split	Trip rate	Pop density	W/E ratio	Dwelling ratio	Vehs per hh	Hh income	Pop 1 5km rail	Street pattern index
Bankstown	6.9%	2 87	19.78	1 04	0.14	1.37	$36,466	61%	0.7
Baulk. Hills	6 9%	2 85	2.84	1 92	0 04	1 91	$55.321	3%	0 3
Blacktown	6 5%	2 86	8 82	1.70	0 09	1.35	$37 712	38%	0 4
Blue Mts	9 9%	2 91	0.48	2.33	0 05	1 33	$36 524	39%	0 0
Botany	8 7%	2.72	12.92	0.42	1 09	1 03	$33 906	1%	0 8
Camden	4 9%	2 65	1 11	1 49	0 05	1 71	$42 457	0%	0 2
Campbelltown	6 5%	2 92	4.42	2 13	0 24	1 35	$38 883	33%	0 3
Concord	8 5%	2 90	19.25	0 85	0 18	1 35	$41,419	69%	1.0
Fairfield	8 4%	2 71	17.29	1 56	0 23	1 33	$35 713	25%	0 5
Gosford	9 1%	2 93	1 26	1 51	0 15	1 27	$32,953	12%	0 2
Hawkesbury	7 5%	2 48	0.19	1 62	0 09	1 64	$39.101	7%	0 4
Holroyd	6 0%	2 80	19.71	1 24	0 23	1 35	$36 826	49%	0 7
Hornsby	7 2%	2 80	2.50	1 83	0 18	1 57	$49,582	41%	0 4
Hunter's Hill	6 3%	2 70	20 93	1 53	0 39	1 44	$53 995	1%	1 0
Hurstville	7 1%	2 90	25 74	1 51	0 31	1 33	$39 747	80%	0 9
Kogarah	8 9%	2 77	24 08	1 86	0 45	1 35	$43 056	65%	1 0
Ku-ring-gai	8 6%	3 10	11.62	1 99	0 11	1 71	$63 632	47%	0 6
Liverpool	7 3%	3 01	3.22	1 09	0 27	1 34	$35 638	17%	0 2
Manly	9 6%	2 80	24 34	1 82	1 38	1 16	$47 223	0%	0 8
Parramatta	9 5%	2 71	21 60	0 75	0 40	1 27	$38 452	68%	0 8
Penrith	5 4%	2 85	3 70	1 78	0 11	1 46	$39 727	17%	0 3
Rockdale	8 5%	2 62	27 92	1 95	0 68	1 18	$36,228	67%	1 0
Ryde	9 1%	2 76	22 14	1 04	0 56	1 31	$42 351	36%	0 7
Sutherland	4 5%	2 90	5 02	2 15	0 23	1 58	$45,726	41%	0 4
Sydney (I)	0 0%	2 00	11.27	0 02	36.92	0 48	$37 689	100%	1 0
Warringah	5 2%	3 03	6 57	1 75	0 35	1 52	$46 830	0%	0 4
Wollondilly	8 2%	2 60	0 12	2 02	0 03	1 71	$39 064	11%	0 4
Wyong	4.4%	2.93	1.22	1.53	0.13	1.27	$27,619	6%	1.0

* Mode share to public transport less than 10% for non-work trips (see Figure 6)

Sources: See notes to Table 1 in text

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