Travel time savings, transport infrastructure and path dependence, the case of Melbourne, Australia

John Odgers and Nicholas Low[1]

Introduction

In this paper we argue that investment in transport infrastructure in developed eonomies cannot be justified by an appeal to economic benefit arising from travel time saved. We examine the case of the City Link freeway expansion in Melbourne, Australia. We argue that transport infrastructure policy can best be explained as 'path dependent'. Infrastructure policy, for decades heavily dominated by expenditure on roads at the expense of every other form of transport, is a policy setting that is 'locked in' by its capacity to deliver increased power and influence to the state apparatus that produces it.

Travel time saving

In a recent book David Metz, former chief scientist of the UK Department of Transport, discusses the monetized time savings conventionally used to justify public expenditure on infrastructure, and particularly on road programs. He cites data from the UK National Travel Survey to show that average per capita travel time in Britain remained more or less constant between 1970 and 2005, a period which saw enormous investment in new and improved roads. He observes that he was surprised to find no analysis in the research literature that measured whether a particular road investment had actually achieved the travel time savings claimed for it. He 'drew a blank', he says, from his search (Metz, 2008, p. 30).

Recent work in Australia seeks to fill the gap identified by Metz by evaluating the claims made for a major motorway expansion carried out in Melbourne between 1996 and 2000. City Link is a 22 kilometre roadway expanding and linking existing motorways by means of a new section of elevated motorway, a bridge and two tunnels (Lay and Daly, 2002). City Link was built under a Concession Deed granted to a consortium of companies (Transurban comprised of Transfield Engineering and Obayashi) to design, build, finance, operate, levy tolls and maintain the roadway for 34 years until 14 June 2034. It will then transfer to public ownership. The project was designed on the BOOT model: Build-Own-Operate-Transfer.

The project had multiple objectives:

- Reducing the congestion caused by existing freeways terminating on the fringes of the city and feeding heavy traffic flows into the central area..
- Reducing traffic intruding into residential areas surrounding the CBD harmful to the community's social and economic wellbeing..
- To reduce the through traffic flowing into and through the inner city.
- Diverting freight trucks travelling through the CBD which were contributing to congestion and a deteriorated environment.

The new motorways also served to link the massive new Docklands residential and commercial development to the road system, and to serve interstate truck traffic to and from the Port of Melbourne and Melbourne's Tullamarine Airport. No doubt these are significant economic objectives within a certain paradigm of a road based, car dependent city, with long haul freight transport carried by road rather than rail. However a significant hurdle that the City Link project had to pass was the test of a benefit-cost ratio (BCR) greater than one: the economic benefits from the road had to be greater than the cost of building the road.

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In research carried out for the OMEGA project into the decision making process for Mega Urban Transport Projects (MUTPs), key decision-makers for the City Link project at both political and administrative levels were interviewed (public and private sector actors). A stronior g finding from the interviews was that a positive BCR was an important part of the justification of the project even though the analysis was conducted after the decision to go ahead with construction. The BCR test was not the sole justification for the project, but it was a factor that had to be demonstrated to be satisfactory. Time savings claimed for the project provided the only quantitative economic justification, and they are still relied on to calculate benefit when BCA analyses are conducted.

The Benefit Cost Ratio calculation for Melbourne's motorways

Melbourne's urban road network is extensive and still being expanded (Figure 1). Its major elements are managed for the Victorian government by the Roads Corporation of Victoria (VicRoads), a consolidated agency with the responsibility for planning the metropolitan road system, devising new road projects and regulating traffic (see Low and Astle, 2009)

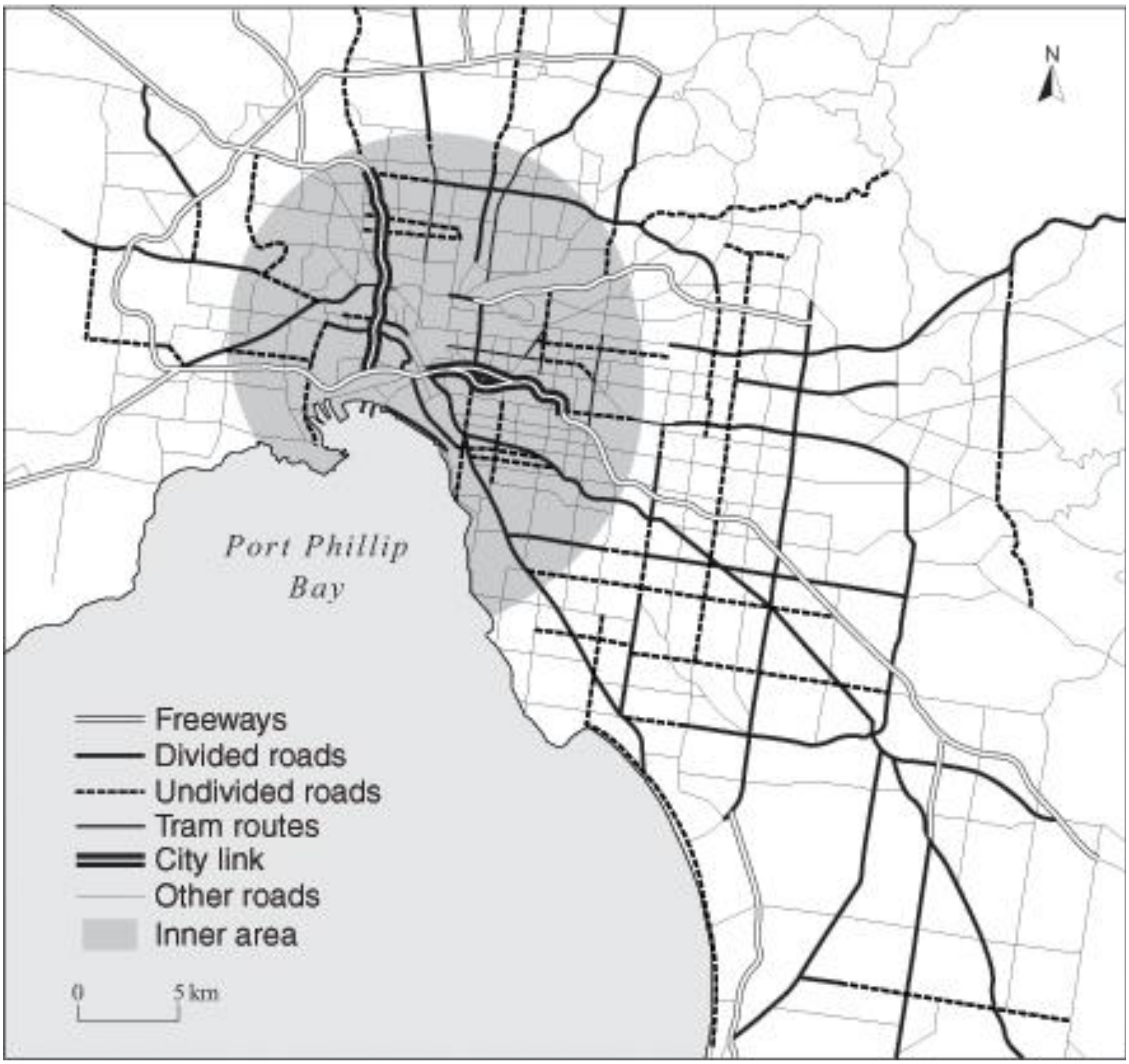

Figure 1 Melbourne's Major Urban Road Network (Source: VicRoads, 2008, Traffic System Performance Monitoring 2006-07, p. 11)

Unlike some American cities, Melbourne has had a history of ambivalence towards the construction of urban motorways, retaining an extensive suburban railway system and what is claimed to be the world's largest tram/light rail system in terms of length of track. Some radial freeways were constructed in the 1950s and '60s. But a plan to convert the metropolis to a full scale American style urban transport system by building a grid of motorways at approximately one kilometre intervals was defeated in 1973 when, following intense public pressure, the Premier of Victoria cancelled the proposed inner urban motorway extensions (Lay, 2003, p. 202). Lay comments: 'in hindsight, the plan was unacceptable in terms of cost (it would have meant a trebling of the then-current expenditure rate on freeways), its effect on the environment and the urban form, and its general inappropriateness for a city like Melbourne that already had a good arterial road system'(ibid. p.200).

Some relatively small scale links between sections of motorway were constructed in the 1970s, and construction of an outer ring road began in 1989, with work on its first section – the Western Ring Road – being completed in 1999. This section cost a total of AU$631 million, AU$555 million of which was provided by the Federal government (current dollars, VicRoads, undated). Propelled by the growing popularity of the concept of public-private partnership, momentum also began to develop around the need to link two of the radial motorways by-passing the CBD to the West and South (Lay, 2003, p. 207). In 1994 the State Government of Victoria released a strategy, *Linking Melbourne*, (State Government of Victoria,1994) whose key recommendation was a major expansion of Melbourne's freeway system by substantial traffic capacity additions to the earlier generation radial motorways: the Tullamarine Freeway (to the North) and the South Eastern Freeway, and by 'developing freeway standard links between the South Eastern arterial, the West Gate freeway (and bridge across the Yarra River) and the Tullamarine Freeway (Transurban City Link Limited, 1996, p. 13)'. Collectively this new freeway-linking project was named City Link.

The economic impact study of City Link prepared for the Melbourne City Link Authority by The Allen Consulting Group Pty Ltd (hereafter abbreviated to ACG) and Cox (1996) is particularly important because it provides the most transparent analysis available of the projected costs and benefits of the whole planned metropolitan motorway system that was subsequently developed between 1996 and 2006. The analytical approach used by ACG and Cox (1996) to estimate socio-economic benefit and costs is typical of the method used to evaluate road building projects in Australia up to the present time.

The benefit-cost analysis for the future motorway expansion was developed in the early 1990s. The Victorian government commissioned two separate road network traffic models for the whole of Melbourne's major road networks: one by VicRoads, the other by the transport consultant Veitch Lister. The objective of both network models was to compute the future traffic volumes under two contrasting circumstances: namely (i) the *Base Case* in which no change to the major road network occurs within a specified time horizon, and (ii) the *Project Case* in which new road projects are funded, constructed and opened for use.

The results of both of these road network traffic studies are shown in Table 1. The simple average projected savings in daily vehicle hours was 318,000 (Veitch Lister) and 379,000 (VicRoads).

Outcome type	**Veitch Lister**	**VicRoads**
Change in vehicle kilometres of travel if project case were implemented	140,000 kms per day	35,000 kms per day
Vehicle hours travel (VHT) per day	19,276,000	19,302,000
Change in vehicle hours of travel per day (*Base Case* compared with *Project Case)*	- 318,000	-379,000
Average travel speed urban network whole day (*Base Case* compared with *Project*	44.9 kms per hour	43.8 kms per hour

Case)		
Change in average travel speed (*Base Case* compared with *Project Case)*	1.1 km per hour	1.0 km per hour

Table 1: Comparison between *Project Case* forecast outcomes and *Base Case* for year 2001 (Source: ACG and Cox, 1995, Table 2.6, p. 19)

The Victorian government subsequently commissioned two economic studies of the potential benefits and costs of the construction and operation of City Link. Both were conducted by consultants: ACG and John B. Cox. In both these cost-benefit studies, five types of economic savings were proposed and valued: travel time savings, reduced vehicle operating costs, accident cost savings, fleet mix savings, and off-road benefits. Of these five types of savings, travel time savings are by far the largest, representing 63% of the total forecast future value of all benefits accruing over the 36 years ending June 2031 (ACG and Cox, 1996: table 2.5, p. 14. Note that the assumed concession period was slightly different at that time from that of the actual Concession Deed). The stated assumption is that such travel time benefits will be 'gained from the freer and faster flow of traffic in Melbourne' should City Link be constructed and subsequently used (ACG and Cox, 1996: 9). In particular the claim was made that City Link 'will have a dramatic effect on the efficiency of travel movements within the central core of Melbourne' (ACG and Cox, 1995: 4).

The 1996 benefit-cost study of City Link presents a comparative forecast drawn on the modeling by Veitch Lister Pty Ltd for use by the Melbourne City Link Authority (MCLA) in evaluating the project tenders for City Link (ACG and Cox, 1995: 17). It is presented here as Table 2. It is important to note that the projections set down in Table 2 were made on the basis that Transurban had actually been awarded the BOOT tender and that, 'a number of other projects are deemed to have been completed by 2011 (e.g. the Scoresby Freeway – now East Link, the F2 freeway south of the Monash Freeway, and the Mornington Peninsula Freeway'. ACG and Cox, 1996: p. 2). That is all we have been able to glean on the assumptions the consultants made about the future of the road system on which their calculations were based. East Link and the Mornington Peninsula Freeway and sections of the F2 have been completed.

Road type	**Vehicle type**	*Base Case* (000s daily vehicle hours DVH)	*Project Case* (000s daily vehicle hours DVH)	Change *Project Case* over *Base Case* (000s daily vehicle hours)
Freeways	Private	229,000	236,000	7,000
	Commercial	97,000	95,000	-2,000
	Total Freeway DVH	326,000	331	5
Arterial	Private	1348	1320	-28
	Commercial	453	446	-7
	Total arterial DVH	1801	1766	-35
	Grand total DVH	**2127**	**2097**	**-30**

Table 2: Projected daily vehicle hour time savings from City Link: year 2011 (Source: ACG & Cox 1996, Table 2.1, p. 11 Estimates by Veitch Lister Pty Ltd for MCLA)

Table 2 indicates that the construction of City Link was projected to reduce total daily vehicle hours (DVH) on Melbourne's urban road network by 30,000 hours per day (around 1.4%), compared with the *Base Case* if the freeway system were not expanded.

The value of three variables must be determined before daily vehicle hours (DVH) can be computed:

(i) number of trips per day (T)
(ii) average distance per trip in kilometres (D); and
(iii) average speed per hour (kms/ hr). (S)

The product of variables (i) and (ii) equals vehicle kilometres travelled (VKT). VKT divided by speed per hour (S) = DVH

These variables are now considered:

Number of trips per day

The projected number of trips per day on freeways or arterial roads is not explicitly stated. As noted in Table 2 ACG and Cox (1996) contend that the total number of vehicular trips taken on Melbourne's freeways would increase by around 1.5%, presumably due to reduced freeway congestion resulting from a significant expansion of total freeway carrying capacity and a corresponding increase in the attractiveness of freeway travel to Melbourne's motorists. The reduction in total daily vehicle hours travelled on Melbourne's arterial roads of just under 2% detailed in Table 2 is presumably the result of both the growth of trips per day on Melbourne's expanded freeways that in turn would reduce the number of trips per day on the arterial roads and thus enable faster average travel speeds overall. The only explicit comment offered in the 1996 benefit-cost analysis of City Link was that annual growth in traffic volume is assumed to be 2 % per year (ACG and Cox, 1996:13).

Average distance per trip

The second variable determining daily vehicle hours is average distance per trip. Again, no specific data on this variable were disclosed in benefit-cost studies. One is entitled to assume, however, that the expansion of Melbourne's freeway system that, *ceteris paribus*, the City Link project would provide would result in a reduction in distance per trip for motorists who moved from travelling on arterial roads to travelling on the expanded freeway network, since freeways are generally more direct in route than arterial roads.

Average speed per trip

As noted, the third variable needed to compute daily vehicle hours is average speed per trip. The achievement of this projected total reduction in travel times across Melbourne's road network was claimed to result directly from a corresponding projected increase in average speed, especially within inner Melbourne: 'Most of the travel time savings (74 per cent) are located in an 8 kms x 8 kms grid close to the CBD even though this area has only 7 per cent of the total travel in the metropolitan area. The average travel speed in this inner city area would rise significantly from 29.7 km / hr to 36.1 km/hr compared to a minor increase of 0.3 km/hr outside of this grid' (ACG and Cox, 1995: 19).

The valuation of travel time savings

Travel time savings have to be given a dollar value in order to reduce time to a common unit that can be entered into a monetized benefit-cost analysis. ACG and Cox (1996) argued for the use of a composite hourly rate of $19.15. This composite rate derives from the addition of two thirds of an hourly rate of $21.50 for the value of time saved in inner Melbourne, and one third of an hourly rate of $14.42 for time saved elsewhere. This valuation was based on analysis by Thorensen, Thorensen and Taylor (as cited in ACG and Cox, 1995: 20). The justification for the use of a considerably higher dollar value than that used by other analysts for travel time saved was that the bulk of the (projected time) 'savings are located in the inner Melbourne urban area where there is more commercial travel, and which should lead to a significantly higher value of time than for an average vehicle distribution around Melbourne (ACG and Cox, 1995: 21)'.

Annual average time savings
Two other metrics are needed in order to compute annual travel time savings. Without reference to supporting justification, the assumption was made that 330 days per year was appropriate in order to 'aggregate annual values' (ACG, 1995: 21). The final metric required is the average annual rate of growth of travel time savings over the economic life of City Link. Again without supporting justification it was asserted that 'time benefits grow at 4.25 per cent per year' (ACG, 1996: 13).

The resultant projected annual dollar values of time benefits computed (see ACG 2006 Table 2.5, p. 14) have been converted into equivalent daily vehicle hours saved by applying the following formula.

$DVH_s = 1000*(\$b/ \$t_s /n)$
where:
DVH_s = Implicit daily vehicle hours saved ('000 hrs)
$\$b$ = projected value of travel time savings (million $)
$\$t_s$ = hourly value of travel time saved
n = number of days/ year savings achieved.

Table 3 presents the forecast by ACG & Cox (1996) of DVH that would be saved per year from 1997-08 to 2011-12. It is surprising however that time savings were projected for the years 1997-98 through to 1999-2000 given that City Link's construction would not be complete until the middle part of the year 2000. The consequent disruption of traffic flows especially on the Tullamarine freeway was specifically noted: 'Since mid 1996, construction works on City Link, coupled with the staged opening of the Western Ring road, (in June 1997) in particular were negatively affecting travel speed trends on the Tullamarine freeway' (Vic Roads, 2001).

Year	DVH saved ('000 hrs)	Value of time savings ($ millions)
1997-98	1.9	11.8
1998-99	1.9	11.8
1999-2000	9.4	59.1
2000-01	18.7	118.1
2001-02	19.5	123.2
2002-03	20.3	128.4
2003-04	21.2	133.8
2004-05	22.1	139.5
2005-06	23.0	145.4
2006-07	24.0	151.6
2007-08	25.0	158.1
2008-09	26.1	164.8
2009-10	27.2	171.8
2010-11	28.3	179.1
2011-12	29.5	186.7

Table 3: Annual forecast DVH saved via City Link project: 1997-8 to 2011-12 (Source: based on Allen Consulting Group and Cox 2006 Table 2.5, p. 14.)

Comparison and analysis of projected performance against actual performance

Table 4 presents the main projections that underpinned the quantification of the value of the annual travel time savings presented in Table 3, and a comparison with actual published results over the years 1994-5 to 2006-7

Expected			Actual
Variable	Year	Specific value projected	Actual value reported [6]
1. Average travel speed inner Melbourne; all roads whole of day (km /hr)[1]	2001	36.1	33.8
2. Average travel speed across urban road network (km/ hr) [2]	2001	44.3	42.6 (2000-01)
3. Total daily vehicle hours of travel on the urban road network (000 hrs) [3]	2001	1929.8	1991.8 (1999-00) 2087.2 (2000-01)
4. Total daily vehicle hours of travel on the urban road network (000 hrs) [4]	2011	2097.0	2157.2 (2006-7)
5. Melbourne's freeways total daily vehicle hours (000s)[4]	2011	331.0	244.7 (2006-07)
6. Melbourne's arterial roads total daily vehicle hours (000s)[4]	2011	1766.0	1866.8 (2006-07)
7. Freeway travel's share of total vehicle kms of across the urban network [4]	2001	(i) 17.3% (ii) 20.3%	21.9%
8. Total cumulative change in daily vehicle hours (DVH) [5]	1997-8 to 2006-07	-162	328.7

Table 4 Basic propositions supporting projected City Link travel time savings

Sources:

1. ACG and Cox, 1995, p. 19.
2. VicRoads as cited in ACG and Cox, 1995, p. 19. Note 44.3 is simple average of 43.8 km projected by Veitch Lister and 42.8 kms projected by VicRoads.

3. VicRoads as cited in ACG and Cox, 1995, p. 19. Note 1927.6 is simple average of 1959.4 projected by Veitch Lister and 1930.2 projected by VicRoads
4. Veitch Lister as cited in ACG and Cox, 1996, p. 11. 17.3% projected by Veitch Lister; 20.3% projected by VicRoads.
5. ACG and Cox (1996)
6. All actual results obtained from VicRoads (2009) Annual Traffic System Performance Monitoring; longitudinal data from 1994/5 to 2006/7 provided to author by Vic Roads April 2009..

As shown in Table 4 there was a negative change of 2.3 kms / hour (or 6.4%) between the projected and the actual average travel speeds on all roads in inner Melbourne in 2001. However, analysing traffic patterns on a whole day basis in major metropolitan centres like Melbourne obscures the variable nature of hourly road usage across a typical weekday. Figure 2 shows clearly this time-of-day road use variability. It highlights the clearly bi-modal nature of 'traffic distribution' in Melbourne for both freeways and for arterial roads. On Melbourne's freeways morning traffic volumes spike sharply from around 5 am to about 7.30 am. After that, traffic volumes drop until around 11 am and then rise gradually until about 2.30 pm. The afternoon peak commences around 3.30 pm and ends around 6.30 pm. As noted in Figure 2, traffic volumes per fifteen minute intervals fall very sharply after that. The other notable feature depicted in Figure 2 is that the morning peak for freeways both starts and finishes earlier than that for arterial roads.

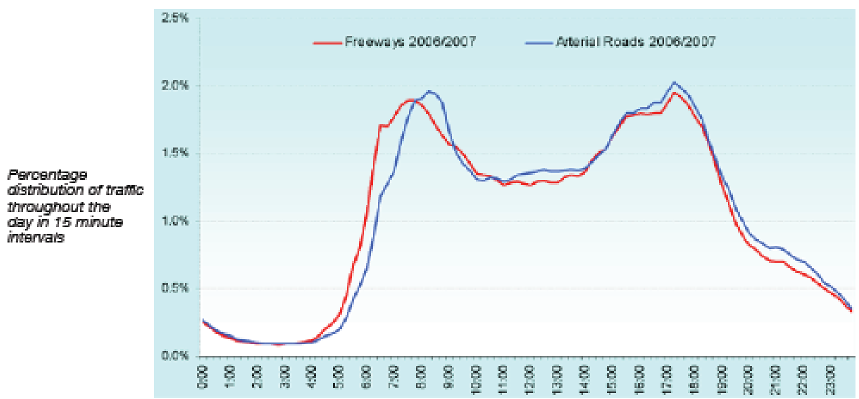

Figure 2: Variability of road usage over a 24 hour cycle: Typical week day (Source: VicRoads (2008): Traffic System Performance Monitoring 2006-07, p. 12)

The average speeds for the freeways during both the morning and the evening peaks in the inner Melbourne region over the year 1994-95 to 2006-07 have increased: from 46.8 km /hr to 58. 8 km/ hour for the morning peak and from 67.8 km/ hour to 73.5 km/ hour for the afternoon peak (Vic Roads, 2009). However, for the period 2001-02 to 2006-07, the average freeway speed per hour in the inner Melbourne region has dropped markedly, both in the morning peak (from 67. 4 km/ hr to 58.8 km/ hr) and in the evening peak (from 80.2 km/ hr to 73.5 km /hr). Given the fact that City Link was fully operational in the second half of 2000-01, and the very substantial economic investment that it represents, one must be concerned about this quite substantial drop in average speed per hour on the busiest usage periods of the day. The average speeds on Melbourne's freeways for the entire urban network also dropped in the years following the fully completed City Link's opening.

One possible explanation for this overall reduction in average speed on Melbourne's freeways is that the morning peak period is now 30 minutes longer than in 2001/02 and the afternoon peak is up to 30 minutes longer (Vic Roads, 2007). Another plausible explanation is that freeway travel in the evenings as a proportion of the whole day is lower than for arterial roads (Vic Roads 2006). In other words the bulk of the increased total freeway VKT is occurring at times when the freeway's capacity to absorb extra traffic (whilst allowing vehicles to maintain higher average speeds) is at its lowest.

The average speeds on Melbourne's inner arterial roads during both the morning and the afternoon peak periods have also fallen over the period 1994-5 to 2006-7. For instance the average speed in the morning peak on inner Melbourne's divided arterials fell from 34.3 kms per hour in 1994-5 to 29.5 kms per hour in 2006-07 (Vic Roads, 2009). The same trend applies in the evening peak that has experienced a fall in average speed per hour from 34.9 kms to 30.9 kms over the same period. Admittedly the year by year pattern is volatile with some years seeing an increase (1996-7 and 2002-03 the most notable). A similar reduction in average speeds in both the morning and evening peaks is observable for inner Melbourne's undivided arterial roads.

In summary, average travel speeds in inner Melbourne after the opening of City Link have reduced in both the morning and evening peaks. Even more concerning is the fact that average speeds across the whole day for both freeways and all types of arterial roads in the inner Melbourne region have all similarly dropped over the years 2001-02 to 2006-07. Figure 3 shows the average speed per kilometre for inner urban arterial roads over the years 1994-5 to 2006-7 plotted against total VKT on these roads.

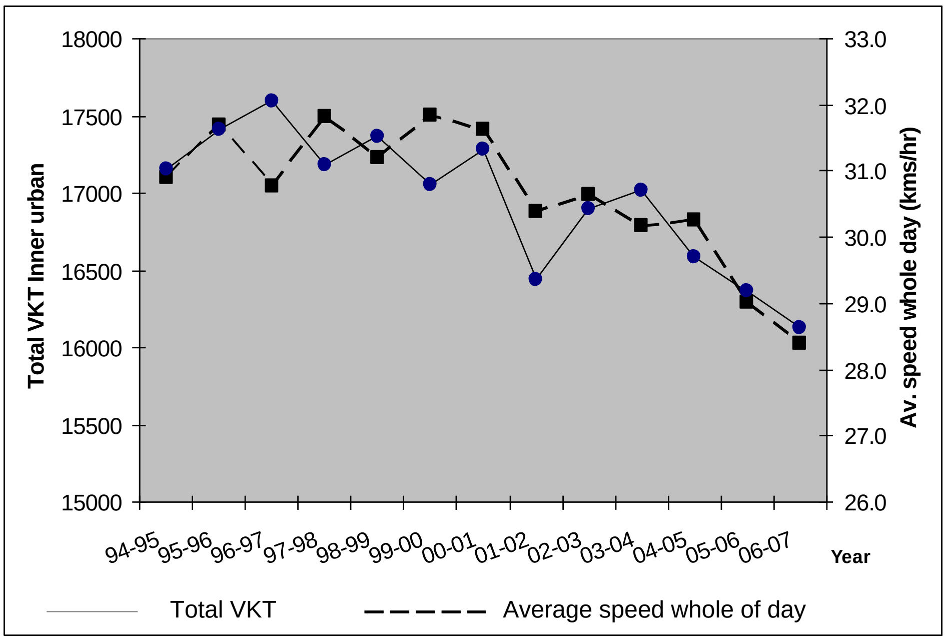

Figure 3. Melbourne's inner arterials: Total VKT and simple average speed all day

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Given the observed negative relationship between projected and actual speeds in both the inner Melbourne area, and in the urban road network overall, urban network travel time savings would be possible only if the actual percentage traffic volume using Melbourne's inner roads fell during the relevant time period and at the same time the average speed on Melbourne's outer roads increased. As just noted, the average speeds have not increased. Between 1994-95 and 2006-07, the percentage of total vehicle kilometres travelled (VKT) in the urban Melbourne road network represented by inner Melbourne traffic has actually fallen from 27.5% (1994-95) to 23.9% (2006-07). This decline has been a gradual and relatively steady one. Moreover the average speed achieved on Melbourne's outer urban roads for the whole day has also declined from around 44.1 kms per hour in 1995 to 40.8 kms per hour in 2006-7, as illustrated in Figure 4.

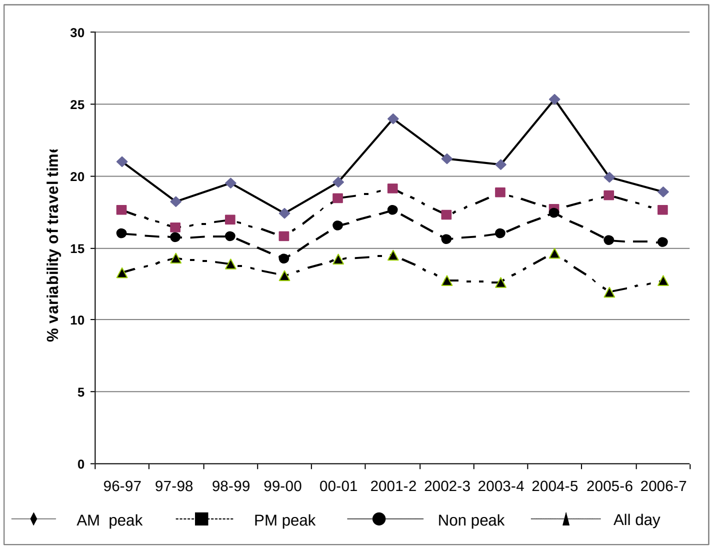

Figure 4 Melbourne's outer arterials: Total VKT and simple average speed all day

The last comparison (presented in Table 5) is between the projected amount of travel time saved — as measured by reduced daily vehicle hours — through the introduction of additional freeway capacity in Melbourne and the actual annual increment to daily vehicle hours recorded and reported by Vic Roads.

Year	Estimated total DVH metropolitan Melbourne network ('000 hours)	Annual change in total DVH ('000 hours)	Imputed *Project Case* DVH -*Base Case* DVH ('000 hours)	Annual difference between Actual DVH and imputed improvement following City Link
1996-97	1808.2			
1997-98	1869.2	61.0	-1.9	62.9
1998-99	1874.4	5.2	-1.9	7.1
1999-2000	1927.0	52.6	-9.4	62.0
2000-01	1991.8	64.8	-18.7	83.5
2001-02	2087.2	95.4	-19.5	114.9
2002-03	2069.4	-17.8	-20.3	2.5
2003-04	2085.1	15.7	-21.2	36.9
2004-05	2166.2	81.1	-22.1	103.2
2005-06	2136.9	-29.3	-23.0	-6.3
2006-07	2157.2	20.3	-24.0	44.3

Total		349.0	-162.0	511

Table 5 Comparison of actual and projected changes in daily vehicle hours Melbourne urban road network 1997-8 to 2006-07

The non-appearance in reality of the travel time savings that were projected and used to justify the economic benefits alleged to result from City Link is expressed in Table 5. The Net Present Value (in 1993 dollars) of time savings projected for City Link over thirty six years was AU$1.4851 billion (ACG and Cox, 1996). Of this total amount, $528.1 million were projected to be saved during the years 1997-8 to 2006-07. With the same discount rate of 8% the NPV of the extra travel time in daily vehicle hours equivalents over the years 1997-98 to 2006-07 shown in Table 5 is -AU$349.4 million (in 1993 dollars). Given this net cost (dis-saving) to the Victorian community, computations reveal that in order for the total projected travel time savings NPV of AU$1.485 billion to be achieved, the NPV of travel time savings on Melbourne's' urban road network from 2007-08 to 2030-31 inclusive would have to amount to AU$1.834.4 billion, as opposed to the projected NPV of AU$957.1 million.

Given the actual shortfall in travel time savings already noted, future travel time savings would have to increase in value by more than 64% per year faster than they were forecast to grow post-2011 by ACG and Cox (1996). As noted earlier, time savings were forecast by ACG and Cox (1996) to grow by 4.5 per year. They would need to grow year-on-year consistently at almost double this rate for the total NPV of time savings to be achieved. Based on the above analysis of actual urban network performance such an outcome seems highly unlikely.

Doubts about travel time saving from infrastructure

The evidence adduced above supports the Zahavi-Marchetti thesis of stability in the average travel time budget (Zahavi and Talvitie, 1980; Marchettit, 1994). Congestion costs are of course not zero, but they have been greatly overstated. The favoured solution of building additional roads to cater for increasing motorized travel demand is seriously flawed. Supply influences demand. Building infrastructure for private vehicles is a subsidy to private vehicle traffic and encourages its growth. The subsidy diverts funds from alternatives, notably public transport infrastructure. It encourages longer journeys and more dispersed urban development. It is not a cure for traffic congestion.

Admittedly, a mis-specification of the economic value of the new roads does not mean that there is no economic value. But in Melbourne that value comes from increased access and mobility within the context of an ever sprawling city; a type of urban development that investment in transport infrastructure (in Australia overwhelmingly in roads) assists in creating and maintaining.

Metz (2008) does not propose that investment in road building is without value. He posits that 'the economic benefit of long-lived investment has been wrongly specified. The bulk of the economic benefit of road schemes and other transport infrastructure investment is associated with making possible additional access to preferred destinations' (ibid. p. 31). However he concludes:

> One important message to take from this chapter concerns the choices that are made possible by increasing mobility. Such choices increase rapidly with increasing speed of travel – roughly with the square of the speed. On the other hand, the value of each additional destination that we might chooseis less than the previously available possibility – diminishing marginal utility, as it is described by economists. What this means is that our need for choice is not open-ended. It can be met by a finite transport system. Indeed, for most of us living in developed economies, it may well be that the mobility we already have is sufficient meet our day to day needs (Metz, 2008, p. 42).

It may be argued that without the motorway expansions (including City Link) there would have been even greater traffic congestion in the urban system. But there are other ways of relieving traffic congestion than by building motorways, and more efficiently too. The motorway solution creates demand in addition to that generated by population and economic growth as people adjust the locations of their journey origins and destinations to reflect the availability of infrastructure, so that the average time spent in travel tends to increase over time as demand catches up with increased supply.

In Melbourne time spent in travel increased. This increase in the travel time budget was demonstrated in a study conducted for Victoria's Department of Transport by Melbourne University economist Duncan Ironmonger (Ironmonger, 2008). Between 1996 and 2006 people travelled more and further. Average time spent in travel in Melbourne increased between 1996 and 2006 from 7.4 hours per week to 8.0 hours per week (an increase of 8.2%). Time spent in travel by car increased from 5.5 to 5.9 hours per week (an increase of 7.3%). Trip distances increased from an average of 6.09 kms per trip in 1996 to 6.65 kms (an increase of 9.2%) in 2006.

What accounts for this increase? The major change was that women were travelling more and further. Between 1996 and 2006 men increased their travel time on average a little from 8.6 to 8.7 hours per week (1.1%). But women's average travel time increased from 7.4 to 8.6 hours per week (16.2%). Time spent in travel by car increased from 6.5 to 6.6 (1.5%) hours per week for men and from 5.4 to 6.1 hours per week (13%) for women. Women also increased the time they spent travelling by public transport: from 0.75 hours per week in 1996 to 0.85 hours per week in 2006 (13%). So there is no evidence here that women are averse to public transport. By contrast men reduced their travel time on public transport from 0.75 to 0.71 hours per week (-0.5%) Ironmonger's study shows that although travel time for other purposes increased for both men and women, women's travel time for paid work showed the largest growth. Women's travel time for paid work grew 21.25% (from 1.6 hours per week in 1996 to 1.94 hours per week in 2006). Men's travel time for paid work actually declined by 5.4%, from an average of 3.29 to 3.11 hours per week. More women are joining the paid workforce and consequently travelling more. Surely they are entitled to do so. But, also, everyone is travelling further.

Project path dependence

The 'normal' view of transport policy is that it responds to rational calculation and consumer – or voter demand. An alternative perspective is that transport policy is 'path dependent' (see Low, Gleeson and Rush, 2003; Low, 2005; Low and Astle 2009).

Simply stated, the theory of path dependence posits that the production of commodities does not follow the rational logic of the market in which supply is entirely led by demand. Rather, chance events play a role in deciding which kinds of product are taken up and become dominant in the market. And once established there are incentives within real production systems to keep producing the same kind of product. Similarly within politics, the production of policies and institutions does not entirely follow the democratic logic of response to the public demand, but rather chance events determine which policies and institutions become dominant. And there are incentives within real political systems to maintain established policy settings.

The theory stems from the path-breaking work of economists Brain Arthur (1994) and Paul Krugman (1991), political economist (and Nobel laureate) Douglass North (1990), and political scientists Paul Pierson (2004) and Jakob Torfing (2001) among others. . Arthur challenged the central premise of modern economics that equilibrium is a normal state in economic systems because of the law of diminishing returns: increasing investment in the same product will produce ever decreasing profits. Arthur proposed that in some production processes there are incentives to keep producing the same product line thus giving '*increasing* returns'. North, Pierson and others have applied this concept to politics. Pierson (2000, p. 257) shows how the theory of path dependence can be applied to understanding political behaviour. He discusses four interconnected characteristics of politics 'that make this realm of social life conducive to increasing returns processes'. They are: 1. The central role of collective action, 2. The high density of institutions, 3. The potential for using political authority to enhance asymmetries of power, and 4. The intrinsic complexity and opacity of political systems.

These four characteristics of politics are all present in the design and production of transport systems. Transport systems are complex socio-technical artifacts. They result from a mixture of individual and collective (governmental) behaviour. Transport systems are intimately connected with land use patterns and processes of urban development. The production of infrastructure is typically an institutional activity – if by institution we mean 'the formal or informal procedures, routines, norms and conventions embedded in the organizational structure of the polity or political economy' (Hall and Taylor, 1996: 938). And the politics of transport is the subject of complex and far from transparent political dynamics (Vigar, 2002; Dudley and Richardson, 2000).

Take one example: the politics of 'congestion'. Though there is an obvious reality about traffic congestion which makes people angry and impatient, the term 'congestion' when it is used by transport advocates, functions as a trope. A trope is a figure of speech 'in rhetoric' (Macquarie Dictionary). When used by transport advocates 'congestion' is used to direct attention to an undesirable quality. In using the term 'congestion' the users mean us to think that the phenomenon to which it refers is unhealthy.

The term is derived from bodily ills such as congestion of the heart or lungs. As Cresswell (2008, p. 131) notes, 'When, for instance, we understand that the discovery of blood circulation by William Harvey in the seventeenth century led to city planners associating circulation with health and moral order, we can better understand the urban development of cities such as Paris or Washington D.C.'. Figure 5 is a detail from advertisements promoting the City Link motorway enlargements and extensions in Melbourne, Australia, in the 1990s. The link between bodily health and traffic circulation is here unpleasantly explicit. We might think that this is just a bit of metaphorical fun, but the trope of congestion and its opposite pole 'healthy' circulation has a deceptive and manipulative side.

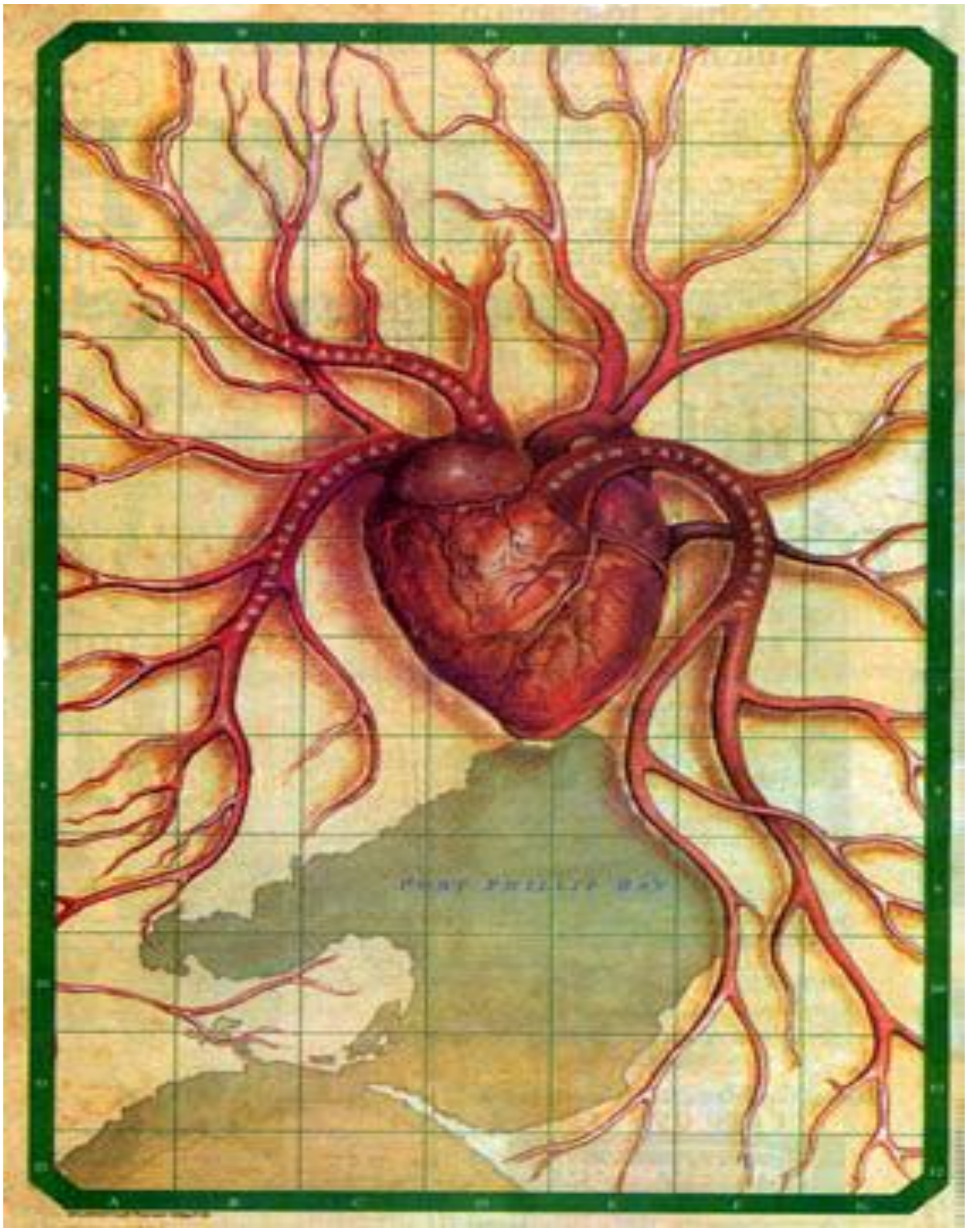

Figure 5. Detail from an advertisement promoting the value of City Link in the 1990s: The slogan: 'You will feel better for a triple by-pass'.

Congestion can be costed in monetary terms, and the public can be made to pay for it through a congestion tax or road pricing. Taxes of this kind have been successfully introduced in Singapore, London, and (road pricing) in Melbourne. Far more commonly, however, the cost of congestion is used as an argument for building more transport infrastructure – usually roads. In recent speeches the Minister of Transport of Australia said:

- 'Every minute spent in a traffic jam is a minute lost with your children, and a substantial loss to the national economy … the Bureau of Infrastructure, Transport and Regional Economics has estimated that urban congestion alone will cost nearly AU$20 billion by 2020 if we persist with current (Anthony Albanese, Minister for Infrastructure, Australia, 2008a)

- ‘Traffic congestion in our cities is costing us time, it’s costing us money, and it’s costing us our way of life. According to the Committee for Economic Development of Australia, infrastructure bottlenecks are estimated to total approximately AU$25 billion’.
  (Anthony Albanese, Minister for Infrastructure, Australia 2008b)

The only point of road pricing is to raise money to build infrastructure to relieve congestion. Otherwise, rationing road space by price merely privileges those who can afford to pay for it. Congestion itself is self-limiting, and as Metz points out can be useful in protecting urban areas beyond the bottlenecks from becoming overloaded with traffic. It is interesting that Vancouver, Canada, is one of the few cities in which the amount of time people spend in travel has actually dropped, yet Vancouver during this period embraced congestion and refused to build motorways.

The particular way the costs of congestion are established is by summing the rather tiny individual parcels of time which a particular piece of infrastructure is alleged to ‘save’. By allocating money amount per unit of time, these summations can be made to add up to very large amounts of money. The claim can then be made that the cost to the economy of building the infrastructure is justified by the saving to the economy in time saved. There is a whole industry of consultants and academics devoted to pricing time accurately. However it is not difficult to show, though as Metz (2008, p. 30) observes it very rarely is shown, that building new infrastructure does not eventuate in time saved in travel (see Odgers, 2009). If new infrastructure allows higher speed of travel, then the time saved is spent in extending the distance travelled. The proposition of Zahavi and Marchetti that average travel time over long periods in many cultures remains constant just happens to be empirically true (See Table 3.1). Thus Metz (2008, p. 41) says, ‘Travel time saving has the quality of a myth – a traditional story accepted as a factual. Travel time saving is what economists term a “stylized fact”, a pretend fact so to speak, as opposed to a real empirical fact’. Increased speed and distance travelled leads to induced traffic which in turn increases congestion.

Unfortunately the pretend fact of travel time saving is used to justify the expenditure of prodigious amounts of money on roads and high speed intercity railways that could be spent for other purposes: for public hospitals, for example, or schools, or even on improving existing urban public transport infrastructure. Expenditure on transport infrastructure in most cities of the rich part of the world is path dependently fixed and there is no economic justification for any more of it,

There has been an interesting response to the original paper by John Odgers (2009) following its publication on the GAMUT (Australasian Centre for Governance and Management of Urban Transport). Dr Max Lay dismissed the paper as ‘not important’ yet the points he makes are supportive of a critical approach to the rationality of transport planning. In order not to risk distorting Lay’s response we cite his first four points just as they were written:

> 1. A) I disagree with the view that this is an important paper. In my view it misses key marks, as I will try to illustrate below. B) However, my basic thesis is that what should happen in transport and what has usually happened with Melbourne's road system is that the system is developed within a strategic and policy framework, with individual components being tested against economic and social criteria. In many cases, these criteria are best seen as filters eliminating bad projects and as prioritising tools for good projects. It is wrong to see community transport investment as primarily an economic activity.
> 2. It has been common in the past for many authors to note drops in travel times over time, particularly in papers about increasing congestion. Often such authors have then used the observation to argue for more investment in transport (particularly in roads, I will admit). [I have found most of those papers to be very debatable, for reasons not relevant to this discussion.] The Odgers paper certainly draws different and relatively unique conclusions from such previous observations.
> 3. New transport investments do induce new traffic. Usually, models account for this - the main exception was the extraordinary omission of induced traffic from British models in the second half of the last century

4. Transport is a derived demand and that demand will increase as economies increase and as populations grow. Over time we need more schools, more hospitals and more transport, or the existing facilities become over-used. Often market mechanisms respond to this increase in demand, but transport infrastructure is largely supplied by governments who do not respond to markets with nearly the same speed.

Thus Lay, a distinguished Australian commentator on transport policy in general and the City Link road project in particular, confirms the reality of induced traffic. He appears to agree that the failure of consultants' projections of travel time savings to meet their targets merely gives rise to demands by roads lobbyists for more roads. It seems then that the argument of the road lobby goes like this:' if building roads saves travel time then roads should be built. If building roads **does not** save travel time – then more roads should be built. Lay attests to the political nature of transport planning. Rarely are members of the roads lobby so frank in their assessment of the way in which transport policy is actually conducted. (Lay makes a number of detailed criticisms of the Odgers paper which can be accessed on the GAMUT website).

We should be clear about what this means. It means that decisions on infrastructure projects are made by sovereign fiat, not rationality: basically what the policy makers think is good, not what falls out of rational calculation. Rationalization follows decision. The role of BCA is to legitimate decisions not to guide them.

What Lay does not provide is any hint that transport policy could be different from the path it is set on in Australia. Cities do not have to be car-dependent (Newman and Kenworthy). Other ways of meeting the need for mobility are possible, as the experience of the Australian city of Perth demonstrates (Stone, 2009; Nielsen et al, 2005). Even more so the cities of Vancouver and Toronto in Canada (Mees, 2000), Zürich in Switzerland, Curitiba in Brazil), Bogota in Colombia, Freiburg in Germany.

A pertinent solution to the demand for mobility is a combination of high quality networked public transport (Nielsen et al., 2005) within a strictly limited metropolitan area, growing only very slowly at the periphery. It is well known that rapid public transport systems can move people much more efficiently than private vehicle systems without concomitant congestion. Building up urban densities of employment close to public transport reduces the need for people to fall back on car use for intra-urban journeys. We agree with Crozet (2009, p. 38) when he says that public policies should focus on accessibility instead of trying to increase the average speed of urban trips:

> Public policies cannot continue trying to maintain car access to always larger areas. In coordination with the policies developing public transit already implemented in the urban city centres, public policies should rather try to improve public transport accessibility between the city centre and its surroundings. This maintains in the city centre the concomitant presence of employment, business and inhabitants, while avoiding a spatial, time and social gap with the surroundings… '.

In Melbourne this solution is available; it is even publicly advocated in some government policies. But so far it is far from being implemented.

Conclusion

In this paper we inquired whether the travel time savings from the City Link project in metropolitan Melbourne had in fact eventuated. The evidence showed that not only were the time savings not achieved, but the reverse occurred. The findings support the Zahavi-Marchetti hypothesis that in the long run travel time remains more or less constant. The increased flow of women into the workforce has added to the overall time spent in travel. The failure to check the rationale supporting policy is a serious error. The repeated and knowing use of a claim without foundation is a lie.

If there is to be an argument for investment in road infrastructure based on claims of economic benefit then a new method of making such evaluations is required. The unfortunate truth appears to be that infrastructure projects are politically driven and have little to do with rational calculation. They are built because political leaders decide that they shall be built. It was argued that transport policy in Australia is probably path dependent and tends to foreclose a range of alternative options which should be always under consideration. All new infrastructure, whether rail or road based, must be evaluated on equal terms.

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