

Exploring travel and parking impacts of the Melbourne CBD parking levy

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Abstract

Parking pricing schemes have been implemented in many cities across the world as an efficient means of managing car travel demand. In addition to providing a revenue stream to governments, parking pricing schemes can encourage economic development through increased traffic turnover, and manage travel demand by encouraging car drivers to switch to more sustainable travel modes. Previous research into parking pricing suggests an elasticity of -0.3 with respect to car travel demand, with a 75% diversion rate to public transport.

In January 2006, the Victorian Government introduced a levy on public and private car parking spaces within the Melbourne CBD and adjacent inner city areas. This paper explores the trends in travel behaviour before and after the introduction of the levy by analysing Census and travel activity survey data. Results of the analysis demonstrate that the number of trips to the levy area has remained relatively stable over the last decade, while the number of car trips has declined. However, the results also indicate that the parking levy is contributing only marginally to this reduction in car trips and the corresponding increase in public transport trips. It is hypothesised that one of the main reasons for the levy's minor impact is that only a limited number of drivers are required to pay the levy personally.

1 Introduction

Parking pricing schemes have been implemented in many cities across the world as an efficient means of managing car travel demand (Albert & Mahalel 2006). Such schemes are often preferred to more direct road pricing initiatives as restrictive and priced parking already exists in many centres, reducing the potential political impacts of implementation (Verhoef, Nijkamp & Rietveld 1995). In Australia, area wide parking pricing schemes have operated in the business districts of Sydney, North Sydney and Perth since the 1990s (Brown, G et al. 1999; Hidas & Cuthbert 1998) and in other suburban business districts of Sydney since 2000 (Enoch 2001). In Melbourne, a levy of \$AU400 per annum on long-stay parking spaces was introduced in January 2006, rising to \$AU800 per annum in January 2007. The primary aim of the levy (as stated in the Explanatory Memorandum of the *Congestion Levy Bill 2005*) was to reduce traffic congestion in Melbourne's inner city and encourage the use of public transport by commuters. A secondary aim of the levy was to create more parking options for shoppers and visitors through the increased availability of short-stay parking spaces, which were not subject to the levy. Although revenue was not an express aim of the levy, its introduction raised almost \$AU38 million in 2007 (State Revenue Office 2007), at least some of which was used to fund transport improvements (Melbourne City Council 2006b).

The purpose of this paper is to explore the trends in travel behaviour to the Melbourne central business district (CBD) before and after the introduction of the parking levy, based on an analysis of existing data sources. The paper begins with a brief literature review of the travel impacts of parking pricing schemes. Section 3 defines the geography of the levy area. Section

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4 outlines the methodology for analysing Census data and travel activity surveys that have been collected over the last 15 years and Section 5 describes the main findings of this analysis. The paper then draws some preliminary conclusions about the impact of the levy and suggests possible areas for further research.

2 Literature Review

Many studies have considered the impact that parking charges have on the decision to drive (see e.g. Pickrell & Shoup 1980; Willson & Shoup 1990). Where parking charges have been implemented at a local level (e.g. a place of employment), these charges often have a more significant impact on car travel demand than other travel demand initiatives. For example, a study of 26 employer-based travel demand management programs in the United States (Higgins 1990) found that five of the seven schemes which recorded a reduction in solo driving of between 12% and 40% included parking pricing strategies. By contrast, of the remaining 19 schemes that recorded a reduction in solo trips of less than 12%, only one had introduced parking charges.

Where area wide parking pricing schemes have been implemented, they are usually introduced with a package of other improvements, e.g. an upgrade to public transport services or infrastructure (Vaca & Kuzmyak 2005). This makes it difficult to determine the effect of the parking charge independently of other policies. Moreover, as the quality of the alternatives and the degree to which they have been upgraded vary from city to city, results from schemes are not necessarily transferable (Marsden 2006). This problem is compounded by the fact that US studies into the impact of parking pricing schemes have tended to focus on the reduction in parking demand for single occupant vehicles (Vaca & Kuzmyak 2005), whereas the European studies have tended to focus on the reduction in car travel demand (Halcrow Fox 1995).

Despite these qualifications, an assessment of six literature reviews into the effect of large scale parking pricing policies on car travel demand (Table 1) suggests typical short-run elasticities ranging between -0.10 and -0.60, with an average of -0.30. It is to be noted that these values primarily apply to CBD commuter trips (Vaca & Kuzmyak 2005), with limited information on non-CBD commuter trips, and even less information on non-commuter trips.

Table 1 - Parking elasticities for car travel demand

Country	Elasticity	Market Segment	Comments	Source
USA	-0.29 to -0.43		Typical range of elasticity estimates based on before-and-after studies, cross-sectional analyses and behavioural choice modelling	Kulash (1974b)
USA/Canada	-0.24 to -0.36		Typical range of elasticity estimates	Pickrell & Shoup (1980)
USA/Canada	-0.10 to -0.68	Solo driving	Evidence showed that ending employer-paid parking reduced the number of solo drivers by between 19% and 81% and reduced the number of cars driven to work by between 15% and 38%	Willson & Shoup (1990)
Australia	-0.20 to -0.40		Typical range for parking price elasticities	Chambers & Ker (1990)
Europe	-0.10 to -0.30			Halcrow Fox (1995)
Various	-0.10 to -0.60			Vaca & Kuzmyak (2005)

Only a limited number of studies have attempted to quantify the effects of parking charges on public transport travel demand. Results of studies varied and suggest that results are not necessarily transferable between cities. A study by Brown (1972) into car-bus and car-rail choice commuters in Vancouver yielded an estimated log-arc price elasticity of demand of -0.32 (Feeney 1989), while a study of bus demand with respect to parking across various US cities calculated elasticity values of between -0.13 and -0.19 (Kocur, Hyman & Aunet 1982). Elasticities similar to those recorded for US cities have been reported in European studies (Halcrow Fox 1995), where it was suggested that a diversion rate to public transport of between 50% and 75% (equivalent to an elasticity of -0.05 to -0.23) could be expected in central areas where public transport is likely to offer a viable alternative.

3 Overview of the levy area

The levy covers an area of 14.6 km² in central Melbourne, encompassing Melbourne’s major commercial, retail and entertainment precincts. The map below shows the area of the levy in relation to municipal and statistical boundaries (Figure 1). Even the smallest statistical area that is used in the Census to describe work destinations (the ‘destination zone’) cannot be aggregated to match the levy’s boundaries. Accordingly, analysis of the Census data was based on the ‘approximated levy area’. The approximated levy area is located wholly within the City of Melbourne’s municipal boundary, and covers 92% of the total leviable area that falls within that boundary.

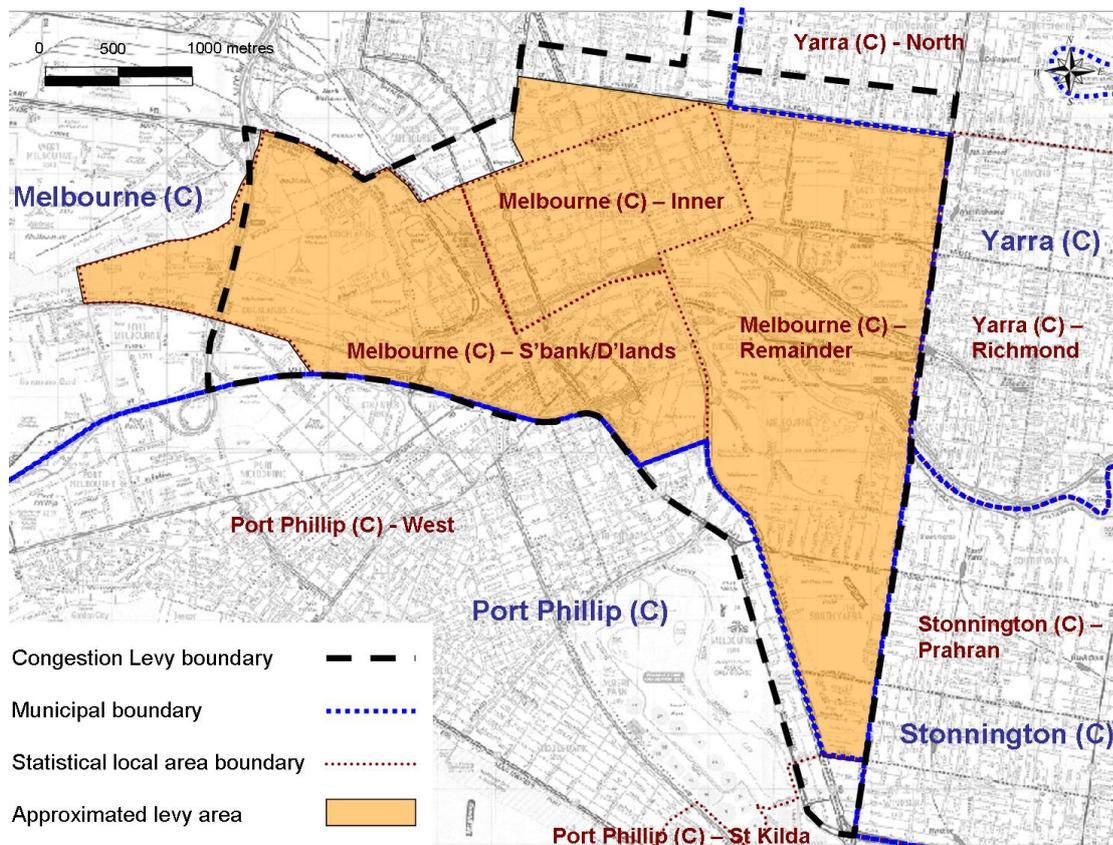


Figure 1 - Congestion Levy area – Municipal and Statistical boundaries

Source: Melways 2007

4 Methodology

A range of existing data sets were used to provide a baseline measure of travel behaviour from well before the introduction of the levy through to 2008. The data include the Australian Bureau of Statistics (ABS) *Census of Population and Housing* (Census) (ABS 1996; ABS 2001; ABS 2006), the Victorian Activity and Travel Survey (VATS) (Transport Research Centre 1994-1999), and the Victorian Integrated Survey of Travel and Activity (VISTA) (Department of Transport 2007-08). VATS and VISTA used a self completion questionnaire to seek travel and activity details from all members of selected households on one pre-specified travel day. VATS only sampled households within the Melbourne Statistical Division, whereas VISTA also sampled households from regional centres outside Melbourne. To ensure compatibility between the data sets, only trips made by occupants of households in the Melbourne Statistical Division sample were considered in the VISTA analysis.

The initial analysis focussed on travel demand trends to the levy area based on trip purpose. Using the VATS trip database, the total number of trips entering the levy area on an average weekday was identified. The results were disaggregated according to the four most significant trip purposes (work, social, shopping and pick-up/drop-off). A subset of these trips was selected to identify only those trips made by car. The recent release of the VISTA trip database enabled changes in travel to the levy area to be considered.

The second part of the analysis focussed on travel demand trends for work trips only. Not only was the parking levy targeted at commuters, but it was clear from the analysis of total travel demand that this market had the largest potential exposure to the levy. Using Census journey to work data, the number of work trips made to the approximated levy area was determined, and disaggregated according to the mode of travel. VATS journey to work trip numbers were not analysed as the corresponding VISTA survey data was not available.

The third part of the analysis focussed on the off-street parking market within central Melbourne. The results from the initial travel demand analysis were further disaggregated to identify only those car trips that terminated in an off-street car park. By comparing off-street parking demand with the results for total car travel demand, it was possible to highlight the importance of off-street parking within central Melbourne. The VISTA database also allows for the number of car trips to the levy area to be disaggregated according to the time of entry, duration of stay, and method of payment (where applicable). These parameters were aggregated to approximate the number of weekday car trips that are potentially affected by the congestion levy.

5 Results

5.1 Analysis of travel demand by trip purpose

Figure 2 shows the average number of weekday trips entering the levy area (for all times of the day), disaggregated according to the primary trip purpose. Between 1994 and 1999, an average of 794,200 trips were made to a destination within the levy area each weekday. The most common purpose for travel to the levy area was work (45%). Other significant trip purposes included social (13%), shopping (12%), and picking-up or dropping off other people or goods (8%). Post-levy data shows that the number of trips to the levy area in 2007-08 was relatively similar to that recorded a decade earlier. However, the composition of these trips

displayed changes that were statistically significant at the 95% confidence level. The proportion of work related trips (53%) and social trips (16%) made to the levy area both showed statistically significant increases from the 1990s to 2007, while the proportion of shopping trips (7%) and pick-up and drop-off trips (5%) showed statistically significant declines over the same period.

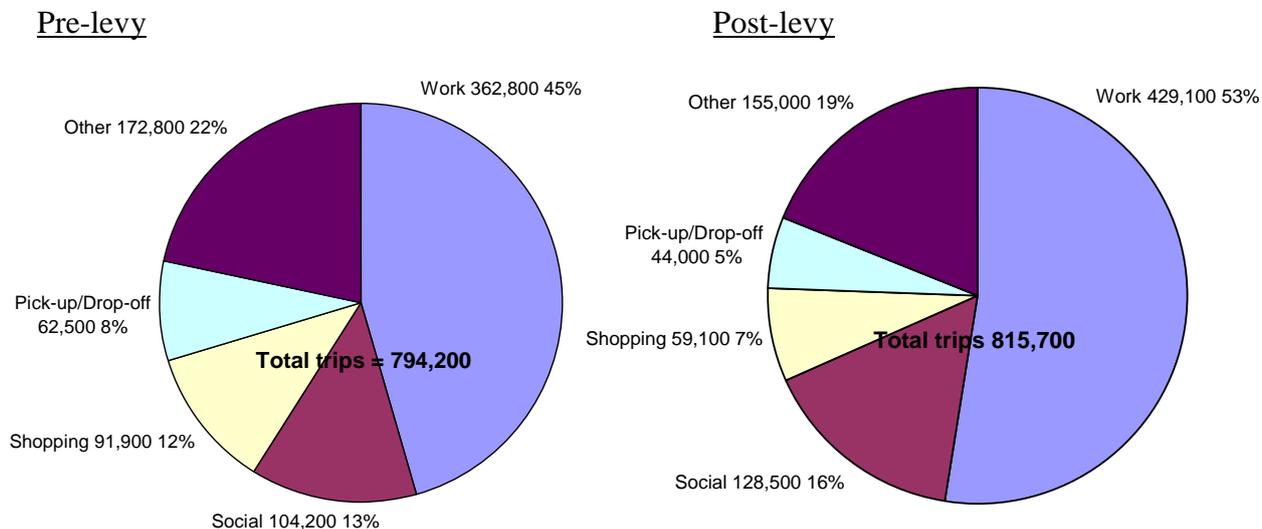


Figure 2 - Average number of weekday trips entering levy area (by trip purpose)

Source: VATS 1994-1999: Maximum sampling error (to 95% confidence level) = $\pm 1.4\%$;

VISTA 2007-08: Maximum sampling error (to 95% confidence level) = $\pm 2.5\%$

Travel demand to the levy area can also be analysed according to the travel mode. Figure 3 shows the average number of weekday trips to the levy area where the trip was made by car (either as driver or as passenger). Again, these trips have been disaggregated according to the primary trip purpose. Compared to Figure 2, the proportion of trips made for shopping or social purposes has fallen, while the proportion of trips made for the purpose of picking-up or dropping-off people or goods has increased. A review of the data suggests that many of these shopping and social trips are supplementary to another trip being made to the levy area on the day of travel and are made on foot, regardless of the mode of travel used to make the initial trip into the levy area.

Between the 1990s and 2007-08, the total number of car trips to the levy area fell from 276,200 to 247,100. While car trips made for a work purpose continue to comprise approximately half of all car trips to the levy area, the total number of car trips made for work purposes fell from 140,200 to 126,500. The decline in the number of total car trips and car trips made for work purposes are both statistically significant at the 95% confidence level. Of the four most frequent trip purposes identified in VATS, only trips for social purposes have not experienced a decline over the last decade.

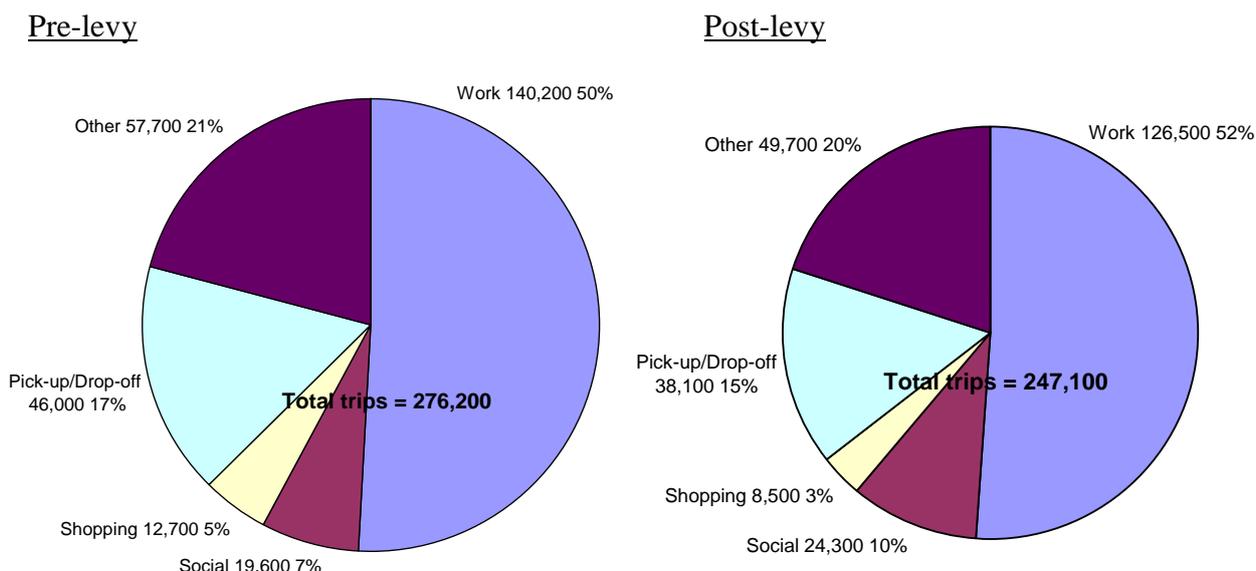


Figure 3 - Average number of weekday car trips to levy area (by trip purpose)

Source: VATS 1994-1999: Maximum sampling error (to 95% confidence level) = $\pm 2.4\%$;

VISTA 2007-2008: Maximum sampling error (to 95% confidence level) = $\pm 4.7\%$

5.2 Analysis of travel demand (work trips only)

From the foregoing discussion, it is clear that work trips remain the largest single component of trips to the levy area. Table 2 shows that over the decade 1996 to 2006, both the number and proportion of car (as driver) work trips to the levy area, while the number of public transport work trips to the levy area increased by 40%. The total number of Census journey to work trips, and the number of Census journey to work trips made by car – as driver, are far less than the number of work-related trips presented in Figure 2 and Figure 3 respectively. These differences can be attributed to a number of factors. Firstly, as explained in Section 3, the statistical areas used in the Census do not match the levy boundary and account for only 92% of the levy area that falls within the City of Melbourne’s municipal boundary. Similarly, the Census figures do not include any trips made to those parts of the Yarra and Port Phillip local government areas that fall within the levy boundary. Secondly, Figure 2 and Figure 3 used the VATS and VISTA trip databases, not the journey to work databases. The trip databases record all trips that terminate in a work destination. Thus, if a respondent made multiple work-related trips within the levy area within the same day, all of these trips would be included in the analysis. By contrast, the Census only records one work trip per person per day. Restricting the analysis only to the VATS journey to work database for trips to the approximated levy area reveals that in 1996, approximately 187,000 journey to work trips were made to the approximated levy area each weekday, compared to the Census value of 166,107. While sampling error is likely to account for some of the remaining discrepancy, other possible explanations for numerical differences include the exclusion of work trips made to second or third jobs, undercounting of the Census population (ABS 2006), and the form of the Census question itself; the 1996 Census required respondents to provide the employer’s workplace address, which may not have reflected where trips were actually being made.

Table 2 - Weekday JTW trips to approximated levy area⁴ (ABS 1996; ABS 2001; ABS 2006)

Mode	Census (1996)		Census (2001)		Census (2006)	
	No.	%	No.	%	No.	%
Car - as driver	68,637	41.3%	64,046	34.1%	58,789	29.5%
Public Transport	78,988	47.6%	97,923	52.1%	110,615	55.4%
All others	18,482	11.1%	25,917	13.8%	30,211	15.1%
TOTAL	166,107	100.0%	187,886	100.0%	199,615	100.0%

5.3 Parking trips to the levy area

The congestion levy focuses only on off-street parking. Figure 4 show the average number of weekday trips to the levy area, where the vehicle is parked off-street. Based on total trip numbers of approximately 800,000 per day (Refer section 5.1), less than one-sixth of all trips to the levy area require off-street parking. However, the limited availability of on-street parking within the levy area means that, in the period 1994-1999, 45% of car trips made to the levy area terminated in an off-street car park. VISTA (2007-08) recorded 50% of car trips made to the levy area terminating in an off-street car park.

Compared to Figure 3, both the number and proportion of trips made for the purposes of picking-up or dropping-off a person or goods have been significantly reduced. A review of the survey data demonstrates that most of these trips end with the vehicle either parked on street or not parked at all. Accordingly, of the total number of trips made to the levy area by car where the car is parked off-street, almost three-quarters are made for work purposes.

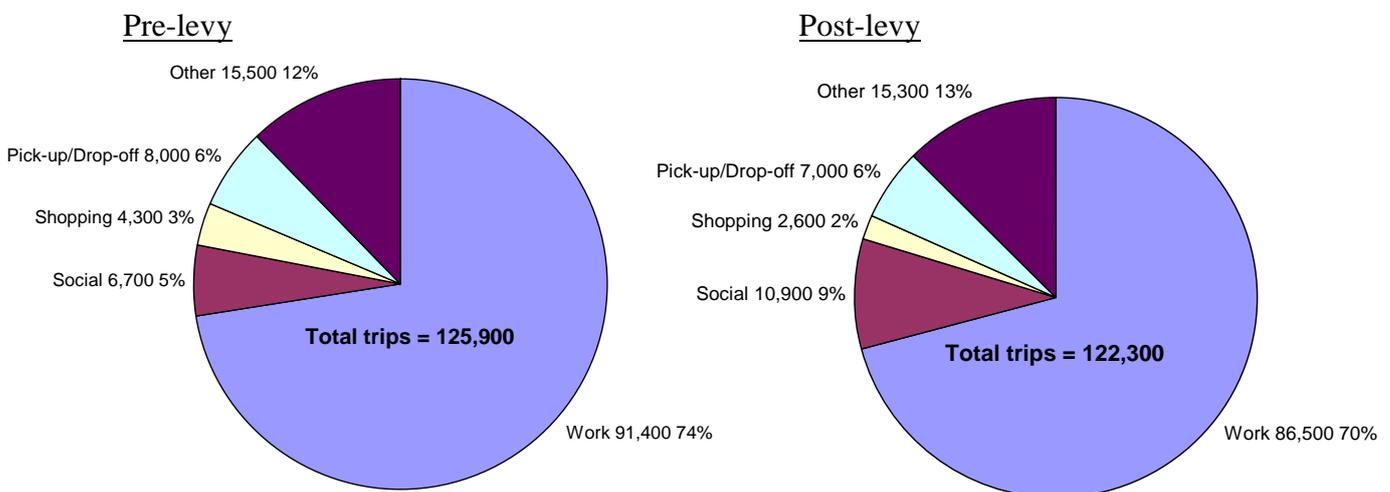


Figure 4 - Average number of weekday car trips to levy area, where car is parked off-street

Source: VATS 1994-1999: Maximum sampling error (to 95% confidence level) = ± 3.6%;
 VISTA 2007-08: Maximum sampling error (to 95% confidence level) = ± 6.7%

Both the total number of trips and the total number of work trips that terminate in an off-street car park within the levy area trended downwards between the 1990s and 2007-08, although this change has not been statistically significant. The only statistically significant (to a 95%

⁴ Excludes workers who worked from home, or did not go to work, on the day of the 1996 Census (6 August).

confidence level) change that has been recorded over the last decade within this market segment is the number of trips made for a social purpose.

The VISTA database also allows for the number of car trips to the levy area to be disaggregated according to the time of entry, duration of stay, and method of payment. These parameters can be combined to approximate the number of weekday car trips that are potentially affected by the congestion levy (Figure 5), using the following assumptions:

- (a) where no parking fee is paid, this represents parking in a private car park (i.e. where the car park typically is owned/leased to the organisation on those premises for use by employees);
- (b) where the parking fee is paid by the employer, this represents parking in a public car park which has been leased to an organisation for long-term parking;
- (c) where the parking is paid for by the user (or other person), and the car is parked for at least 4 hours commencing prior to 9:30am, this represents parking at commercial parking facilities; and
- (d) all other user-paid commercial parking

These criteria broadly represent the conditions under which the parking levy will be charged.

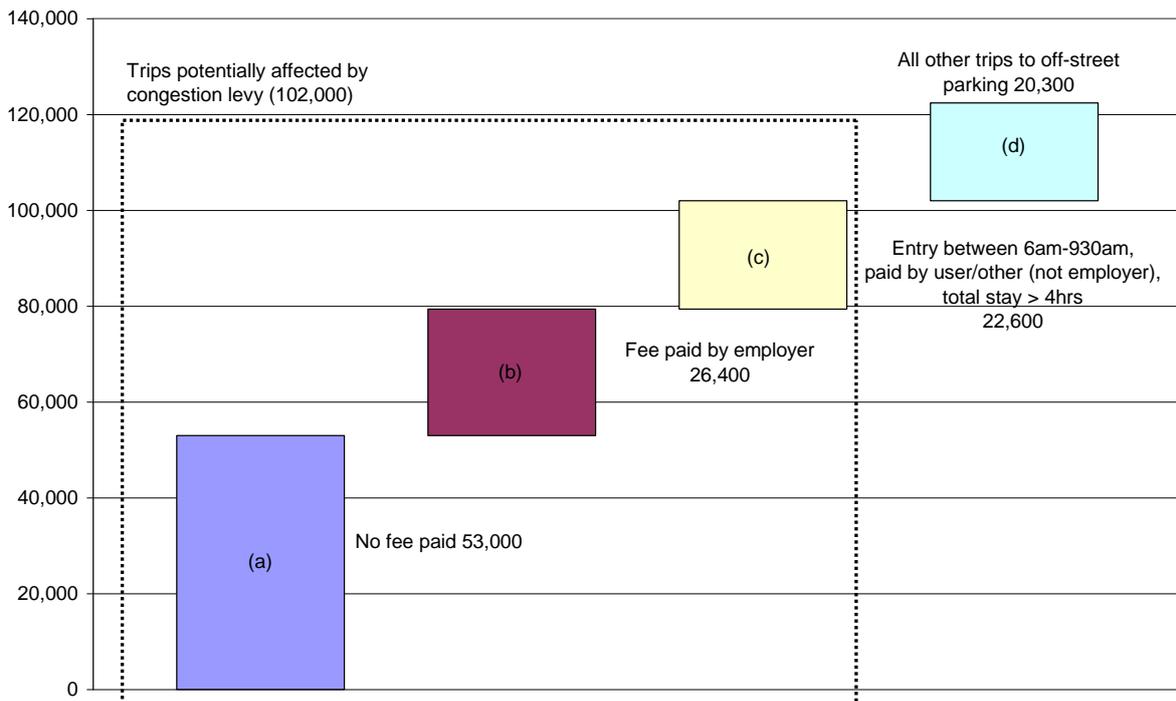


Figure 5 - Weekday trips to off-street parking areas in the levy area

Source: VISTA 2007-08; Sampling error (at 95% level of confidence) varies from ± 5,400 for ‘No fee paid’ to ± 3,400 for ‘All other trips’.

The total trip numbers (122,300) equal the total number of trips identified in Figure 4 and include all off-street parking trips, whether as car driver or car passenger. Of these, 102,000 are potentially affected by the congestion levy, the majority of which (88%) are car driver trips. Critically, almost 80,000 (or 78%) of these trips terminate in a parking space for which neither the car driver nor passenger are responsible for paying the parking charge.

6 Discussion

The parking levy introduced in central Melbourne in 2006 had two key aims: reduction of congestion by encouraging commuters to switch to public transport, and creation of more parking options for shoppers and visitors.

Prior to the introduction of the levy in 2006, the City of Melbourne conducted a survey of long-stay parking costs at commercial off-street parking facilities. Results showed an average cost of \$AU11 per day (Melbourne City Council 2006b). The parking levy charge of \$AU800 equates to \$AU3.20 per weekday, or a 30% increase in the cost of parking. Based on previous short-run elasticity estimates of -0.3, the parking levy should have generated a 9% reduction in car travel demand if the charge was fully passed on. However, a parking fee is only paid on 22,600 trips, suggesting a total traffic reduction of 2,200 car trips. This represents 61% of the estimated 3,600 car trips that are no longer being made to an off-street car park, but only 8% of the total reduction in car trips to the levy area.

Table 3 - Summary of car trips to levy area (VATS 1994-1999; VISTA 2007-08)

Measure	Source	Pre-levy	Post-levy	Change	
				No.	%
Number of user-paid, long-stay , weekday car trips to levy area, where car is parked off street	Estimate	24,800	22,600	-2,200	-9%
Number of weekday car trips to levy area, where car is parked off street	VATS/VISTA	125,900	122,300	-3,600	-2.9%
Number of weekday car trips to levy area	VATS/VISTA	276,200	247,100	-29,100	-10.5%*

* significant at 95%

Previous studies have also suggested a 50%-75% diversion rate to public transport for those trips no longer being made by car. On this basis approximately 1,400 additional trips would be made by public transport as a result of the levy, with half of those trips occurring in 2006 when the levy was \$AU400. Between 1996 and 2006, the number of public transport journey to work trips increased by 31,600. Assuming all diverted trips were work trips, the parking levy would then be responsible for approximately 2% of the increase.

Table 4 - Summary of public transport trips to levy area (ABS 1996; ABS 2006)

Measure	Source	Pre-levy	Post-levy	Change	
				No.	%
Number of off-street, user-paid weekday car trips to levy area diverted to public transport in 2006	Estimate	-	-	700	-
Number of JTW public transport trips to levy area	Census	78,988	110,615	31,627	40.0%

The results in Table 3 and Table 4 suggest that other factors are likely to be having a greater impact on car travel demand to the city than the parking levy. A market segmentation study commissioned by the Department of Infrastructure in 2006 (LEK 2006) found that, in addition to the cost of parking, rising fuel prices, health and fitness concerns, the lack of adequate parking supply, vehicle operating costs, environmental issues, improvements to public transport service provision, increasing road congestion and demographic changes all played a part in the decision to reduce one's car usage. The study found that more than half of all

participants nominated the rise of fuel prices as a reason for reducing their car use. The cost of parking was the second most common response, although only 15% of study participants stated it as a motivating factor. Given the multiple answer format of the question, this proportion of respondents tends to support the derived estimate of an 8% reduction in car trips attributable to the levy. Concerns over parking supply rated as the fourth most commonly stated response. These responses are interesting given that, in the CBD alone, the number of commercial and private non-residential car parking increased by almost 6,000 in the last ten years (Melbourne City Council 2006a), while total trip numbers remained static (VATS 1994-1999; VISTA 2007-08). While the composition of these additional parking spaces are not known, the raw data suggests that finding a car parking space in CBD should be easier now than it was a decade ago.

The parking levy specifically targeted long-stay car parking spaces so as to avoid discouraging shoppers and visitors to the city. The analysis undertaken in this paper shows that shopping and social trips to the city (both by car and in total) has remained relatively stable over the last decade. Significantly, the number of weekday shopping or social trips to the levy area that terminate in an off-street car park has increased. This has occurred in the context of a slight downward trend in the number of vehicles parking off-street within the city, and a more significant reduction in the overall number of car trips to the levy area. Although the development of areas such as Southbank and Docklands is likely to have increased the attractiveness of the city as a destination, the analysis suggests that, at the very least, the parking levy is not detracting shoppers and visitors from driving into the city.

Table 5 - Summary of shopping and social trips (VATS 1994-1999; VISTA 2007-08)

Measure	Source	Pre-levy	Post-levy	Change	
				No.	%
Number of weekday shopping or social car trips to levy area, where car is parked off street	VATS/VISTA	11,000	13,500	2,500	22.7%**
Number of weekday car trips to levy area, where car is parked off street	VATS/VISTA	125,900	122,300	-3,600	-2.9%
Number of weekday shopping or social car trips to levy area	VATS/VISTA	32,300	32,800	500	1.6%
Number of weekday car trips to levy area	VATS/VISTA	276,200	247,100	-29,100	-10.5%*
Number of weekday shopping or social trips to levy area (all modes)	VATS/VISTA	196,100	187,600	-8,500	-4.3%
Number of weekday trips to levy area (all modes)	VATS/VISTA	794,200	815,700	21,500	2.7%

** significant at 80%, * significant at 95%

7 Conclusion

In January 2006, the Victorian Government introduced a levy on public and private car parking spaces within the Melbourne CBD and adjacent inner city areas. The levy was introduced to reduce traffic congestion by encouraging commuters to switch to public transport for travel into the city, and to create more parking options for shoppers and visitors.

The levy also generates revenue of approximately \$AU40 million per annum, at least some of which is used to fund transport improvements.

This paper analysed data from the Census and two household travel surveys to explore the travel and parking changes that have occurred within central Melbourne over the last decade. The results show that the number of trips made to the levy area remained relatively stable, but there was a decrease (both proportionally and numerically) in the number of cars entering this area. However, shopping and social car trips that terminated in off-street car parks actually increased over the same period. Closer analysis of the results suggested that the levy is having only a minor impact on the recent reduction in car trips to central Melbourne.

This paper specifically focussed on the travel behaviour change that could be directly attributable to the levy (due to increased travel costs). A further component of the recorded travel change could be indirectly attributable to the levy, through the transport improvements that the levy has funded. Additional research is required to understand the extent of these improvements, and the likely travel behavioural response to these changes.

One of the main reasons for the levy's relatively small impact is that the driver does not typically pay for the cost of parking. As economic conditions change, and as labour contracts are renegotiated, there may be increased opportunities to place the burden of the parking levy on to drivers. Further and continued research is required to determine the extent to which the onus of levy payment is shifted to employees, and to understand more generally how parking providers are passing on the levy to car park users. Analyses of other parking tax regimes suggest that levying parking owners and operators may not be the most appropriate policy response (Kulash 1974a).

8 References

- ABS 2006, *Catalogue 2901.0 - Census Dictionary*, Canberra.
- Albert, G & Mahalel, D 2006, 'Congestion tolls and parking fees: A comparison of the potential effect on travel behaviour', *Transport Policy* vol. 13, pp 496-502.
- Brown, G 1972, 'Analysis of user preferences for system characteristics to cause a modal shift', *Highway Research Record* vol. 417, pp 25-36.
- Brown, G, McKellar, RD, Johnstone, P & Igglesden, D 1999, 'Perth's Parking Policy: Managing as an Element of the Urban Transport System', *Proceedings of the 23rd Australasian Transport Research Forum*, Australasian Transport Research Board, Perth, pp. 365-78.
- Chambers, L & Ker, I 1990, 'Parking: Why, Where and How', paper presented at the *2nd Australian Parking Convention*, Adelaide, 30 September - 4 October 1990.
- Department of Transport 2007-08, *Victorian Integrated Study of Travel and Activity*, Melbourne.
- Enoch, MP 2001, 'Workplace parking charges Down Under', *Traffic Engineering and Control* November 2001, pp 357-60.
- Feeney, B 1989, 'A review of the impact of parking policy measures on travel demand', *Transportation Planning and Technology* vol. 13, pp. 229-44.
- Halcrow Fox 1995, *Research into Pricing and Financing of Urban Transport - Final Report*, report to the European Commission, London.
- Hidas, P & Cuthbert, M 1998, 'Parking Policy as a TDM measure in CBD areas', *Proceedings of the 22nd Australasian Transport Research Forum*, Australian Transport Research Board, Sydney, pp. 739-54.
- Higgins, TJ 1990, 'Demand management in suburban settings: Effectiveness and policy considerations', *Transportation* vol. 17, pp. 93-116.
- Kocur, G, Hyman, W & Aunet, B 1982, 'Wisconsin Work Mode-Choice Models based on Functional Measurement and Disaggregate Behavioural Data', *Transportation Research Record* vol. 895, p 24-32,
- Kulash, D 1974a, *Parking Taxes as Roadway Prices: A Case Study of the San Francisco experience*, The Urban Institute, Washington DC.
- Kulash, D 1974b, *Parking Taxes for Congestion Relief: A Survey of Related Experience*, The Urban Institute, Washington DC.
- LEK 2006, *Market Segmentation Study*, report to the Department of Infrastructure, Melbourne.

Marsden, G 2006, 'The evidence base for parking policies - a review', *Transport Policy* vol. 13, no. 6, pp. 447-57.

Melbourne City Council 2006a, *Census of Land Use and Employment*, Melbourne.

Melbourne City Council 2006b, *Planning Committee Report: Monitoring report on the long-stay car parking levy*, Melbourne City Council, Melbourne.

Pickrell, D & Shoup, DC 1980, 'Employer subsidised parking and work trip mode choice', *Transport Research Record* vol. 786, pp 12-7.

State Revenue Office 2007, *Review of the Administration of the Congestion Levy - Final Report*, State Revenue Office, Melbourne.

Transport Research Centre 1994-1999, *Victorian Activity and Travel Survey*, Melbourne.

Vaca, E & Kuzmyak, JR 2005, *Traveler Response to Transportation System Changes (TCRP Report 95): Chapter 13 - Parking Pricing and Fees*, Transportation Research Board, Washington DC.

Verhoef, E, Nijkamp, P & Rietveld, P 1995, 'The economics of regulatory parking policies: the (im)possibilities of parking policies in traffic regulation', *Transportation Research A* vol. 29, no. 2, pp. 141-56.

Willson, RW & Shoup, DC 1990, 'Parking subsidies and travel choices: assessing the evidence', *Transportation* vol. 17, no. 2, 141-57.