

DISCUSSION PAPER

PARKING TAXES: OPTIONS FOR TORONTO

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TORONTO PARKING AUTHORITY

SUMMARY

Traditional approaches to taxing parking were reviewed. These include sales taxes, transaction taxes and space taxes. Two additional variations were considered; expanding the scope of the on-street charging program to areas without turnover requirements, and special treatments for low emission vehicles.

The measures were assessed in relation to their ability to achieve 5 policy objectives:

- Revenue generation;
- Congestion reduction;
- Reduction in greenhouse gas emissions;
- Ease of implementation and transparency of application; and
- Tax fairness.

With the exception of special treatments for hybrid vehicles, all of the tax measures were assessed to have high revenue generating potential. None of the measures considered had an appreciable impact on congestion or emissions. **The per space tax on a city-wide basis was the fairest and easiest to implement and would be the preferred approach should taxes be pursued.** All of the other parking tax options would have significant negative effects. Taxes limited to specific areas, either sales taxes or space taxes, would tend to encourage rather than curb de-concentration of economic activity.

Some other non-parking tax measures were assessed. These included vehicle registration fees, tolling and congestion charging. These measures were also judged to have high revenue generating potential but little impact on congestion (other than some local impacts) or greenhouse gas emissions. **Due to the ease of implementation, a vehicle registration fee was judged to be the best of these non-parking tax options.**

Waiving of parking or other fees for hybrid vehicles could generate some positive benefits with respect to Greenhouse gas emissions but would have negative revenue and congestion impacts.

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DISCUSSION PAPER

Parking Taxes: Options for Toronto

BACKGROUND

The use of taxes on parking has recently been suggested as one component in achieving the City's traffic, transit and environmental objectives. The concept is discussed in both the Mayor's recent "Change is in the Air" framework document which examines means towards an 'Environmentally Sustainable Future', and from a revenue perspective in the recent report by Henson Consulting on behalf of the City entitled "Assessment of Potential New Tax Measures Under the City of Toronto Act, 2006".

The idea of taxing parking is not new. It originally received attention during the first oil shock of 1993 as a means of reducing fuel consumption. At the time, it was additionally considered as a means of reducing toxic gas emissions that arise as a by-product of combustion of petrol. There are a number of publicly available reports detailing the variety of parking taxes available and the history of where they have been applied. Rather than reproducing the material in this report, a copy of one such report has been included as Appendix 'A'. The report in Appendix 'A' does a reasonable job of describing the types of tax approaches available and provides examples of where they have been applied. However, the report does not include a discussion of a recent set of parking tax initiatives which have arisen. These are the use of differential tax or fee treatments provided to high emission and low emission vehicles. Due to the recent development of these types of programs, and their different revenue impacts, these are discussed in a separate section of this report.

PURPOSE

As noted, reports describing the various measures are widely available. However, there is little information available which assesses the impacts of the various measures in achieving various policy objectives. Therefore, this review will assess the likely impact of various tax approaches against identified public policy objectives. The three traditional approaches will be considered first. These are:

1. Ad valorem taxes (sales taxes)
2. transaction taxes
3. area/space taxes

It is noted that Mr. Littman in his report (Appendix 'A') does not distinguish between the first and second class of taxes and also identifies a **fourth class of "taxes" in his paper which consist of an expansion of on-street paid parking regulation (meters or permits) to a wider area (that is, to areas which currently provide free parking)**. The distinction between a percentage tax and a flat transaction tax regardless of the fee is an important one from a policy impact perspective so they have been presented as separate measures in the following analysis. **With respect to the metering of currently uncharged spaces as Mr. Littman suggests, this would fundamentally redefine the purpose of on-street parking charges. Currently, meter spaces exist to allocate scarce resources through a market device. The extension of the fees to non-demand areas would provide for separate policy objectives of allocating scarce resources and discouraging overall use of parking. As these spaces are by definition, solely under the jurisdiction of the municipality, this measure would be considered a usage fee rather than a tax.**

Policy Objectives

The three policy objectives which a parking tax is traditionally utilized to achieve are:

1. **Revenue Generation.** A wide range of revenue impacts can be achieved through the design and application of a parking tax. These relate not just to how much revenue (and net revenue) can be generated but also as to how wide or narrow a range of persons pay the taxes. For example, a sales tax on commercial parking is relatively narrowly focused as only a small number of parking transactions (those that charge a fee) would attract the tax. It is estimated that somewhere between five and ten percent of non-residential parking transaction within the City of Toronto attract a fee. Further, it is likely that these fee attracting activities are not evenly distributed among vehicle operators. That is, some persons, due to geographic or personal circumstances, are more likely to require the use of paid parking for non-discretionary trips than others (e.g. medical trips, persons living in central city neighbourhoods). Therefore, even though these persons may generate fewer overall vkm they are likely to pay a higher portion of the ad valorem tax. On the other hand, a widely focused tax, such as the space tax in effect for the GVRD is, by definition, bundled into the price of goods and services in many situations such as shopping malls. It is then passed through to all consumers equally regardless of their access mode and a person walking and a person arriving by automobile would pay the tax equally. Most of these measures could have a wide range of revenue generating capabilities depending on the tax level selected.
2. **Reducing traffic congestion.** This could be a general reduction in overall automobile use (vehicle kilometres (vkm) travelled) or could be a targeted reduction by spatial area or by specific times of day;
3. **Reducing tailpipe emissions of CO₂.** Previously, beginning in the early 1970s government regulations have been utilized to require vehicle manufacturers to reduce noxious tailpipe emissions to levels acceptable to Health Canada and these measures will no doubt continue to be pursued.

Traditionally, carbon dioxide emissions have not been regulated as they were not considered toxic. However, due to climate change concerns, there is now a reduction in CO₂ emissions being sought. Carbon dioxide is the largest of the anthropogenic greenhouse gases and tailpipe emissions contain only negligible components of the other GHG. CO₂ is a by product of the combustion of fossil fuels and the amount of CO₂ emitted is linearly related to the amount of fossil fuel burned. (There is a slight difference between petrol at 2.31 kg of carbon per litre and diesel at 2.68 kg of carbon per litre). As a result, reducing tailpipe emissions of GHG is equivalent to reducing the amount of fuel burned (assuming on board sequestering is not available). Because of the non local nature of GHG impacts, it is sometimes suggested that both tailpipe emissions and source emissions (i.e. electrical generation) in electric or fuel cell cars be considered in assessing overall emission impacts. This approach has not been considered in this assessment as the reduction of source emissions is largely a provincial matter and is being directly addressed by the Province through their climate change initiatives. This assessment only considers tailpipe emissions.

In addition to these three direct policy objectives above, there are two related considerations which any adopted policy should be assessed against.

4. **Transparency and Ease of Administration.** Whatever tax mechanism is implemented, it will need to be administered and enforced. In addition, the tax should be transparent to users and taxpayers so that they are able to observe and assess the form of its application. The simpler the tax measure, the easier it will be to administer it and adjudicate disputes. In addition, the tax measure should minimize the amount of tax avoidance and the market distortions which it engenders.
5. **Tax Equity.** Taxes should treat persons in equal circumstances equally.

Assessment of Tax Alternatives

The various parking tax alternatives are assessed against these five objectives in general terms. The assessment utilizes estimates of the various input parameters such as number of transaction and area utilized for parking. This initial assessment is necessarily based on fairly rough estimates of the various input parameters. However, due to the relative insensitivity of the various policy objectives to relatively small ($\pm 20\%$) values of the input parameter, the assessments are fairly accurate representations of the actual level of desired policy objectives which will be obtained. However, the results, while sufficiently accurate for planning purposes, would be subject to verification and refinement through any implementation process.

TAX MEASURE 1 – AD VALOREM (SALES) TAX

This is a sales tax similar to a PST or GST.

A. Revenue Implications

The revenue implications are investigated in relation to the existing parking inventory in Toronto.

The Toronto Parking Authority operates:

- 20,500 off-street spaces which generate about \$60,000,000 in revenue annually (\$68,000,000 inclusive of GST & PST).
- 18,000 on-street spaces which generate about \$36,000,000 in revenue annually (\$41,000,000 inclusive of GST & PST).
- 14,500 off-street spaces on behalf of the Toronto Transit Commission (\$3,000,000 annually).

Other parking spaces in the City of Toronto for which a daily or monthly fee applies (rough estimates):

- 100,000 in commercial facilities - \$200 – 300 million annually
- 20,000 operated by Universities - \$15,000,000 annually
- 20,000 operated by hospitals - \$65,000,000 annually
- 20,000 other destination based (e.g. Woodbine race track, CNE, Ontario Place, Toronto Zoo) - \$30,000,000 annually

Revenue estimates for various tax levels for the various categories are indicated below:

		5% TAX (\$000,000)		10% TAX (\$000,000)		15% TAX (\$000,000)	
		No displacement	2.5% disp.	ND	5% disp.	ND	7.5% disp.
TPA	Off-street	3.0	1.5	6.0	3.0	9.0	4.5
TPA	On-street	1.8	0.9	3.6	1.8	5.4	2.7
TTC		0.15	0.075	0.3	0.15	0.45	0.225
Commercial		10.0	9.75	20.0	19.0	30.0	27.75
University/hospital							
Other		5.5	5.36	11.0	10.72	16.5	16.09
TOTAL		20.45	17.59	40.90	35.18	61.35	52.77

The Table considers the revenue impacts of the tax under two assumptions. Firstly, that it causes no displacement of activity, and secondly under the assumption that it displaces a portion of activity equivalent to half of its rate of application. This treats parking activity as relatively inelastic with respect to price which is widely assumed to be true. The displaced activity will consist of persons forgoing previously undertaken trips, trip ends being displaced to non-taxed locations, mode shifting and trip shortening.

Because all of the money generated by the TPA and the TTC is already municipal money for use in municipal purposes, the displacement cost is fully counted, including both lost parking fees and taxes for these sectors. The opposite is true for commercial and other non-municipal operators where the loss due to displacement is borne almost entirely by the operator and only a small proportion of the displacement loss accrues to the City. This table indicates that a 15% tax would generate between \$51 million and \$61 million for the City annually. Even a relatively high rate of 15% is not expected to displace a significant amount of parking activity. From a revenue perspective, it would serve the City to exempt municipal operations.

The choice of tax rates of 5%, 10% or 15% for purposes of this example was within the range of existing sales tax rates in Canada although higher rates apply in some U.S. jurisdictions. It would also be possible to enact a higher or even a crippling tax rate which would result in dramatic decreases in usage at the facilities subject to the tax and ultimately to the closure of many of these facilities. Due to the many unknowns associated with this option, including the likely catastrophic loss of the City's commercial tax base, it has not been analyzed. It is not known how high such a rate would need to be to seriously displace traffic as it would be subject to adjustment in operator behaviour. The effects on congestion and GHG gas reductions resulting from the crippling tax approach would be difficult to estimate in detail due to the likely large impact of second order effects. However, it is certain that it would have little impact on a regional basis due to displacement effects.

B. Congestion Effects

Given that the portion of total non-residential parking operations subject to the tax will be, at most, 20%, (this is a difficult figure to calculate accurately) and less than 10% of these operations are going to be suppressed even at the 15% tax level and that not all

trips are in private automobiles, and that not all private automobile trips have parking activities associated with them, the maximum amount of congestion reduction is below 1% on a city-wide basis. This reduction will have no noticeable impact on congestion. Of course there may be localized impacts in areas where a high proportion of private automobile trips are subject to the tax. For example, assuming there was an area where:

- 50% of private auto trips are subject to parking taxes;
- 80% of vehicles are private autos; and
- The tax has a 7.5% suppression effect.

The tax would suppress just fewer than 5% of trips which would create some local congestion improvement, although this would be quite marginal.

In addition, some of the previous trips with taxable trip ends will become non-taxable trips due to displacement to non-taxed locations (legal or illegal) or to becoming drop-off trips. Therefore, the overall impact will be less than the 5% indicated. In addition, some trips will substitute destinations outside of the taxed area and may create increases in localized congestion in other areas. By making more dense areas with good transit service more expensive and less attractive, trip ends will be relocated to less dense areas. **This tax, in the absence of other initiatives, encourages the decentralization of trip ends.**

C. Greenhouse Gas Effects

As per B above, due to the extremely modest trip reduction (<1%) effects associated with the ad valorem tax, it will have virtually no effect on GHG emission, and depending on the extent it causes relocation of trip ends to more distant locales or a substitution of drop-off trips, it could cause increases in GHG emissions. A localized application would have even more modest impacts.

D. Transparency and Ease of Implementation

This tax can be made transparent to customers through regulations requiring the posting of rates and the indication of the tax on sales receipts. The City of San Francisco has experienced difficulties in administering their parking tax due to a lack of sales receipt data and unaudited cash parking activities by operators. A substantial audit branch may need to be established to ensure compliance. A simple mechanism may be to piggyback the tax onto PST or GST rules and their compliance infrastructure. This option would need to be explored with the province. A significant amount of parking revenue at the smaller and/or transitional lots may be expected to go unreported.

E. Equity

The tax will not treat all trips causing congestion or generating GHG equally. As these are the two underlying public policy objectives to the parking tax program, this approach would be quite inequitable.

TAX MEASURE 2 – SET FEE PER TRANSACTION

A. Revenue

An alternative to a percentage tax on the parking fee would levy a fixed fee per parking transaction of some amount on each parking transaction. If this approach were utilized the results indicated below could be expected. For the purposes of this analysis, it has been assumed that the tax would only apply to paid parking locations. While it is theoretically possible to apply the tax to all transactions whether there is a fee associated with the activities or not, logistically this would require a very large cumbersome administrative and auditing framework. For the purposes of this analysis, a \$2.00 per transaction fee has been assumed¹. (\$1.00 per transaction on-street).

Using the same basic data as the ad valorem example but converting to transactions it is estimated that:

- TPA has 14,000,000 off-street transactions annually
- TPA has 25,000,000 on-street transactions annually
- Other commercial operators have 38,000,000 off-street transactions annually
- Universities, hospitals and special venues have 15,000,000 transactions annually.

Therefore have revenues of:

	(\$000,000) No Displacement	Displacement Effect (\$000,000) 10%	Displacement Effect (\$000,000) 20%
TPA Off-street	28.0	19.2	10.3
TPA On-street	25.0	18.9	12.8
Commercial	76.0	68.4	60.8
Other	30.0	27.0	24.0
Total	159.0	133.5	107.9

¹ In Chicago they apply a graduated fee per transaction approach. As this is effectively a modified percent tax, this approach has not been considered.

A characteristic of the fee per transaction proposal is that it applies a variable percent rate to the transaction. That is, if the underlying transaction is \$3.00 then the \$2.00 surcharge represents a 66% tax, while if the underlying fee was \$15.00 then the tax is at a rate of 13%. The possibly undesirable side effects of this are discussed below. The displacement effect of the tax (i.e. the displacement of trips and parking activities to non-taxed location which would have otherwise occurred in taxed locations in the absence of the tax; for example, a person currently parking in Bloor Street West Village, in light of an additional \$2.00 charge on a \$1.50 parking fee may choose to travel to the Stockyards Bay box retail area where no parking charges apply) will be proportionate to the underlying fee and therefore will disproportionately affect persons in areas with lower fees and persons staying for shorter periods (that is, the effective percent tax to these people will be higher). **Therefore this fee would disproportionately affect neighbourhood retail areas and shorter stay trips. While this may achieve congestion and Greenhouse objectives, it conflicts with other City policy objectives. These shorter stay trips in lower density retail areas are parking operations which traditionally have not been considered to be good candidates for substituting transit for private automobile as a mode.** A large proportion of these trips are linked trips. A tax on these activities could have a significant negative impact on the financial viability of neighbourhood retail areas and subsequent reductions in commercial property tax revenues to the City.

B. Congestion

Many of the same considerations set out under the ad valorem tax would apply to the transaction tax consideration. That is, as it affects only a tiny percentage of the actual vehicular traffic and will not, in most cases, have a dissuasive effect, it will have limited impact. It will have a somewhat different impact in that it will have a more pronounced impact on short stay trips and somewhat less of an impact on long stay trips. **As long stay trips tend to occur disproportionately during AM and PM peak periods, and short stay trips tend to occur outside of these traditional peaks, it would actually be less effective in addressing localized congestion in the commercial core than the percent sales tax.**

C. GHG Emissions

Similar to the ad valorem tax, this tax is expected to have a minimal impact on GHG emissions due to its limited impact on travel. As in the case for ad valorem, it may serve to increase GHG emissions depending on the induced travel behaviour of the displaced trips.

D. Transparency and Ease of Implementation

The transparency level would be high. Similar to Tax Measure 1, the implementation of this program would require a regulatory and auditing framework be established.

E. Tax Equity

This measure would be inequitable in a similar fashion to Tax Measure 1 in treating two trips generating the same undesirable congestion and emission side effects differently. Due to the variable percent tax resulting from this approach, it would introduce an additional level of inequality in that for example a paid one hour trip to a \$1.00 per hour location would attract a higher tax level than a paid one hour trip to a \$2.00 location. This is likely to have a disproportionately chilling effect on areas of the city with lower activity levels. It is possible that currently charged parking could convert to free parking as a result of this taxation (as occurred with the commercial concentration tax) to avoid taxation, thereby increasing congestion and GHG emissions.

TAX MEASURE 3 - AREA TAX OR PER SPACE TAX

A. Revenue

An area tax refers to a per area annual fee to any area utilized for parking. The GVRD recently implemented their annual fee of \$0.78 per m² which is expected to generate about \$20,000,000 annually. A parking space, including driveways averages about 32m² so that the tax amounts to an annual fee of about \$25 per space per year. The GVRD tax applies to all non-residential parking spaces with few exemptions. The most significant exemption is park and ride facilities. The tax rate and annual revenue indicate that there are about 25,000,000 m² devoted to non-exempt parking in the GVRD. The GVRD population is about 85% of the population of Toronto. On a pro rated basis, this would suggest a taxable parking area of about 29,000,000 m² under the same exemption assumptions for the City of Toronto.

Taxable areas for various groups of parking operators are indicated in the following table (on-street parking is exempted):

	Spaces	Area (000 m ²)	Tax @0.78 (\$000)
Toronto Parking Authority	20,000	640	499
Other Commercial	100,000	3,200	2,496
Other Charged*	60,000	1920	1,498
Non-Charged	725,000	23.240	18,127
Total	905,000	29,000	22,620

* Note: Universities and hospitals may be exempted facilities. This would need to be verified

In total, the tax (at the GVRD Rate) would generate about \$22.6 million annually. In Toronto about \$0.5 million of the total would be remitable by the TPA. The majority, \$18,127,000 would be incurred at spaces which are presently provided free of charge. Rather than a widely applied tax, the City report prepared by Henson Consulting, "Assessment of Potential New Tax Measures", assumes a tax would be applied only in the central area and would apply to, after exemption from ? universities, etc., it estimates the tax would apply to about 75,000 spaces or about 9% of the estimated total non-residential spaces in the city. Using the widely reported rate of \$100 per space annual fee, this would generate about \$7.5 million annually for the City. This would be a much

lower revenue return than were a lower tax (\$25 per space) applied to all non-residential spaces in the city ($\pm 900,000$). In addition, due to the low coverage rate of the tax (9% of spaces) and likely displacement effects it would be either ineffective or detrimental in achieving congestion and GHG objectives.

B. Congestion Reduction

It is difficult to determine how the imposition of this tax would lessen congestion. It is not expected to be passed through in parking fees by the vast majority of parking operators as at least 80% of spaces are not subject to charges. In addition, it is probably too modest a fee in most cases to adversely affect the supply of spaces in a meaningful way. Given that it translates (at the GVRD rate) into a daily charge of less than \$0.10 per space, it may result in the closure of a few parking spaces which are in any event never utilized. Given its modest level at one tenth of the previous Commercial Concentration Tax (CCT) in effect in Toronto from 1990 to 1993, it is unlikely to cause significant changes in behaviour by parking operators. No congestion relief is expected.

C. GHG Emissions

Given that the tax on commercial parking operators will generally not result in space closures or fee increases, and given that 90% of non-residential spaces will remain uncharged, there is not likely to be any change in behaviour on the part of vehicle operators. No reduction in GHG emissions are expected under this tax program.

D. Transparency and Ease of Implementation

This measure would have a low level of transparency to the user as there would be no appreciation of the tax by the actual user of the parking space. The tax may be the easiest to implement and monitor.

E. Tax Equity

This tax would be somewhat equitable as a portion of it would be borne by all persons owning and operating motor vehicles in the city (presuming they utilized non-residential parking spaces). There would be a low level of equity in the sense that a space accommodating a high turnover level (and therefore generating more vkm and GHG) would be taxed at the same level as a space which may be utilized only infrequently.

TAX MEASURE 4 - EXPANSION OF ON-STREET PARKING CHARGES

The current pay and display parking program could be expanded to all on-street spaces within a certain geographical areas, or all on-street spaces in the entire city.

A. Revenue

It is difficult to assess this measure without more certainty as to what is intended. That is, for example, would residential streets be included. The number of spaces included could be in excess of 100,000 should large portions of the city be included. Assuming a ratio of one parking machine per 10 spaces, there would be 1000 parking machines required for every 10,000 spaces in the program. It is possible but not certain that the spaces could be operated on a net break-even revenue basis considering the collection of voluntary revenue and fine collections. A considerable expansion of both the Toronto Parking Authority and the Toronto Police Service Parking Enforcement Unit would be required to operate the program.

B. Congestion

Assuming the program did not provide for any exemption (i.e. residential streets), and parking fees were at a reasonable level, there would likely be some suppression of activity by vehicle operators. It is difficult to estimate the level of vkm reduction without additional data collection and analysis. Practically speaking it would be difficult to distinguish residential and non-residential users. As on-street parking probably accounts for a very low proportion of total parking activities in large parts of the city, and in many cases off-street alternatives are available, the amount of vkm displaced is expected to be low.

C. GHG Emissions

A reduction in GHG of an equal magnitude with the congestion relief would be anticipated. There may be a displacement of trips outside the charging area (if it is area specific) or outside the city which would lessen the net GHG benefit.

A simpler approach which would largely achieve the same objectives would be to define desired streets as No Parking or No Stopping areas.

D. Transparency and Ease of Implementation

This implementation would be practically easy but extremely expensive as it would be an extension of the current on-street parking program. There would need to be a large expansion of operating and enforcement personnel.

E. Tax Equity

Depending on the rules and rates in effect, this program could be operated in a way that delivered equal treatment to all users. That is, as each parking operation is charged a fee consistent with the area intensity all customers are treated fairly.

SUMMARY AND ASSESSMENT OF TAX MEASURES AND IMPACTS

The parking tax measures are assessed against the policy objectives in the following Table.

	<i>Tax Measure</i>	Revenue <i>(\$M Annual)</i>	Congestion Impacts		GHG	Transparency Ease of Implementation	Equity
			<i>General</i>	<i>Local</i>			
1	Ad Valorem	30 – 50	None	Minimal	None	Low	Low
2	Transaction Tax	80	None	Minimal	None	Low	Low
3	Area Charge	29	None	None	None	Moderate	Moderate
4	Eliminate Free Parking	--	Some	Some	Some	Low	High

Minimal = less than 5%

Some = unknown but likely greater than 5% and less than 25%

The taxes under consideration will have virtually no impact on congestion or the emission of Greenhouse Gases except where a wide expansion of the on-street charging zone is considered. They could redirect a significant amount of money to the City from either private or public parking operators (Measures 1 and 2) or private land owners (3). Measure 4 is extremely demanding from an implementation perspective and would be expensive to administer. The area charge (measure 3) could result in positive congestion and Greenhouse impacts were the fee set at a higher level, although may cause difficulties to the commercial businesses in the city. At the lower level, it has the advantage of being the easiest to implement and having at least a modest level of tax equity. It provides the best combination of positive outcomes.

VEHICLE SPECIFIC TAXES AND FEES

A number of jurisdictions are proposing or have enacted tax treatments relating to hybrid or other low emission vehicles. With specific respect to parking treatments the following programs have been enacted.

1. Discount monthly parking permits at City locations (Baltimore)
2. Free parking at meters (many jurisdictions including Los Angeles)
3. Free pre-paid parking cards for on-street parking (Austin, Texas)
4. Discounted residential on-street permits (Richmond, England)

No examples of cities discounting hourly or daily rates at city facilities based on vehicle emissions were found. The most common parking treatment for low-emission (GHG at point) vehicles is free on-street parking. There were no studies located which assessed the impacts of these programs but the general impression from the literature is that a very low number of vehicles currently qualify or are taking advantage of the program. It is likely that such a program may encourage some motorists to acquire hybrid vehicles if they are regular consumers of municipal parking. This would be especially true if the program were extended to municipal off-street facilities (as it is in Los Angeles) as it could provide substantial relief (up to \$5000) annually of parking charges. For example: persons currently purchasing monthly parking permits at the TPA garage at Queen Street and Victoria pay monthly parking fees of \$3300 annually. Assuming these vehicles also consume other on off-street municipal parking of \$100 per month, the total avoided fees would be about \$4500 annually. This would offset the increased capital cost associated with a hybrid vehicle versus another vehicle choice. However, it would also provide an incentive to switch from another transport mode (e.g. public transit) and could encourage more automobile use. This is particularly true for those persons who are now being assessed a taxable benefit for their employer provided parking.

Assessed against the five criteria defined.

A. Revenue

The provision of free parking to a certain class of vehicles will reduce the overall amount of revenue collected. The reduction would depend on the classes excluded in the program. The revenue loss would increase over time as additional vehicles qualified for inclusions.

B. Congestion

The implementation of this measure would likely lead to increased congestion as it would create an incentive for persons currently travelling by other modes or limiting their vehicle trips to increase their use of their qualifying vehicles by reducing one travel disincentive.

C. GHG Emissions

This measure would result in GHG emission reductions if the amount of reduced fuel consumption associated with vehicle substitution was larger than the amount of induced driving generated. As a maximum of 20% of vehicle trips have a paid parking component, the overall substitution would likely be relatively small and the GHG effects would be minimal in either the positive or negative direction. However, if a wider package of incentives were provided for hybrid vehicles, and then are widely adopted, substantial GHG emission reductions could be obtained.

D. Transparency and Ease of Implementation

Once an acceptable vehicle class is identified as being the target beneficiary of the program, most of the measures would be relatively easy to implement. The exception would be variable parking rates (as opposed to free parking) at on-street metered locations. The program would be difficult to implement at off-street parking facilities due to revenue controlled limitations. The provision of free parking to hybrid vehicles at on-street locations would result in some of the difficulties arising or currently exist with respect to the provision of free on-street parking to persons with disabilities.

E. Tax Equity

As there is a wide range of possible programs the treatment could vary widely. Overall vehicle owners would be treated fairly within a class. The fairness would be limited to treatment with respect to emission not congestion.

MODE SHIFTING

In addition to the five policy objectives considered (revenue, congestion, GHG emissions, ease of implementation and tax equity), there is some suggestion that an objective of the policy is to increase the use of other modes, particularly public transit, in preference to the current use of personal automobiles. This is really a variation on the congestion objective and most of the previous discussions on that issue would apply. Generally speaking, none of the tax measures under consideration would have a significant impact on mode choice. Where good transit alternatives exist, they are already achieving extremely high mode shares by North American standards. It would likely require tax policies much more punitive than those under consideration to affect major mode shifts. These punitive approaches would have other less desirable impacts.

If there was a specific desire to create a mode shift tax policy to affect this shift, the policy would likely have the following characteristics:

- a. it would need to be substantial financially in either a punitive way, a permissive way or both;
- b. it should be financially punitive in areas with existing low transit mode shares as this is where substantial gains are achievable. For example: in the city's outer wards only about 10% of work trips in the AM peak are by transit, whereas in the denser commercial areas the transit share is already over 60%, and the drive alone share is below 20%; and
- c. it should encourage higher activity levels in already dense areas as these areas can be served by transit more effectively than low density areas. Most new trips to higher density areas will be by transit.

The parking tax policy which would best achieve the three objectives set out is to tax parking in areas of low density which currently have relatively low transit service levels. Conversely, parking in already dense areas with good transit levels should not be taxed as this would tend to lower activity levels and force activity to areas with low transit mode shares. This will cause an immediate increase in carpooling and, to a lesser extent, a shift to public transit. This may seem counter intuitive.

ALTERNATE POLICIES TO ACHIEVE THE THREE OBJECTIVES

The analysis of the parking tax alternatives in this paper suggests that parking taxes are poor candidates to achieve two of the three direct objectives and have implementation and fairness issues associated with them. This section considers policies which would achieve the itemized objectives. The following policy approaches should be considered:

1. **Vehicle Registration Fees.** There are about 1,300,000 vehicles registered in the City of Toronto. An annual registration fee of \$80 would generate just over \$100,000,000 but would likely have a minimal impact on vkm. This would be equivalent to or greater than the revenues associated with any of the five parking tax approaches. This initiative could be achieved relatively easily by utilizing the existing provincial registration system.
2. **Fuel Taxes.** It is estimated that 2 to 3 billion litres of fuel are purchased in Toronto annually. A \$0.02 per litre charge would generate \$50,000,000 annually. This may not substantially reduce vkm as it would not significantly deter fuel consumption (which is inelastic), and would cause a shift to more fuel efficient vehicles (over time). However, it should reduce fuel consumption and therefore GHG emissions somewhat over time. The fuel tax is regressive in the same way as any sales tax.
3. **Traditional Road Tolls.** Tolls at selected points e.g. inbound on the QEW and on the Don Valley at the Toronto border could generate \$130 million annually according to the recent study by the Toronto Waterfront Revitalization Corporation. There seems to be little expectation of a displacement of vehicular traffic by the TWRC and consequently no impact on congestion or GHG.

-
4. **Congestion Charge Zone (e.g. London).** The revenue would depend critically on the location of the zone to be controlled. Assuming a downtown core zone, as many as 200,000 unique vehicle trips per day may cross the zone boundary. There would of course be some displacement of trips due to persons avoiding the screen line. Congestion would undoubtedly be decreased within the screen line area. London experienced reductions of up to 30%. Some increases in congestion outside the screen line could be expected.

 5. **Vehicle Tracking and Metering.** The most direct and effective way to control vehicle kilometres traveled and fuel consumption is to track vehicle movements directly and toll vkm based on real time. The technology needed to do this would be very expensive and would raise privacy concerns. This would not seem to be a feasible approach at the present time.

Assessment of Alternatives to Parking Tax

The following Table assesses the available parking tax alternatives with respect to the identified objectives.

	Revenue (\$000,000)	Congestion		GHG Reduction	Transparency Ease of Implementation	Equity
		<i>Global</i>	<i>Local</i>			
Vehicle Registration	100	N.I.	N.I.	N.I.	High	Good
Fuel Taxes	50*	Minimal	Minimal	Some	High	Moderate
Point Tolls	130	Minimal	Minimal	Minimal	Moderate	Poor
Congestion Zone	300*	Minimal	Some	Minimal	Low	Poor
Vehicle Tracking/ Metering	300*	Good	Good	Good	Low	Good

*can be set at any desired level.

N.I. = No Impact

Minimal = less than 5%

Some = unknown but likely between 5% and 25%

The toll levels or the fuel surcharge can be set at any desired level. The congestion charge, tolls and metering rates can be varied by time of day, etc. therefore, they can be adjusted to achieve any combination of vehicle displacement and revenue is desired. For all practical purpose vehicle, tracking and metering is not a viable alternative at present. Fuel taxes and vehicle registration fees seem to have the best combination of benefits although they have no impact (at the level considered) on the relief of congestion and GHG reduction.

CONCLUSIONS

This paper provided an initial review of the variety of parking tax options available to try to achieve reductions in traffic congestion and Greenhouse Gas emissions from mobile sources. A variety of non-parking transportation fee initiatives was also briefly considered. The most significant conclusion is that none of the parking tax measures provides any appreciable reduction in either congestion or Greenhouse gas emissions due to the insensitivity of travel demand and mode choice at the tax levels being considered. They will, however, generate substantial amounts of revenue. Some of the non-parking measures may offer more effective measures to reduce congestion and GHG emissions although the impact of any measure, at the level it is likely to be applied, is minimal.

APPENDIX 'A'

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Parking Taxes

Evaluating Options and Impacts

by

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May 29, 2006



Abstract

This paper describes and evaluates various types of parking taxes. *Commercial parking taxes* are a special tax on parking rental transactions. *Per-space parking levies* are a special property tax applied to parking facilities. Commercial parking taxes discourage the pricing of parking and concentrate impacts in a few areas. Per space levies distribute cost burdens more broadly, encourage property owners to manage parking supply more efficiently, and reduce sprawl. Although per-space levies are more challenging to implement they tend to support more strategic planning objectives.

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Introduction

Many experts advocate various types of transportation pricing reforms, including cost-based fees and taxes for the use of roads and parking facilities (“Market Reforms,” VTPI, 2005). Such reforms can provide *double dividends* by raising revenues and helping to achieve other planning objectives such as reducing traffic congestion, air pollution and sprawl.

Vehicle parking is particularly appropriate for reform (Shoup, 2005). Current parking planning practices tend to favor generous parking supply and minimal parking prices, which have unintended and undesirable consequences: they increase development costs, reduce housing affordability, cause dispersed land use patterns (commonly called *sprawl*), and increase automobile travel which exacerbates various problems including traffic congestion, roadway costs, crashes and pollution emissions. As a result, many professional organizations and planners recommend parking planning and management reforms (Litman, 2006a).

One such reform is to tax parking activities and facilities. Parking taxes can raise funds and help achieve various planning objectives, including more compact development and increased use of alternative modes (Feitelson and Rotem, 2004). Because excessive parking supply has so many negative impacts such taxes can provide significant benefits, particularly in growing urban areas where problems are greatest.

There are also practical reasons to tax parking. Such taxes are an appropriate source of revenue for local governments and public entities such as port districts and business improvement associations; they impose costs on property owners and motorists in specific areas and so can be considered a fair way to finance local transport services.

This paper evaluates various types of parking taxes and their impacts with regard to various planning objectives, including *parking supply* (how much parking is provided in an area), *parking prices* (whether users are charged directly for parking, and the price structure used), *travel patterns* (the amount of vehicle traffic generated and use of alternative modes) and *equity impacts* (how costs are distributed). It provides examples and guidelines for implementing such taxes.

Types of Parking Taxes

This section describes various types of parking taxes.

Commercial Parking Taxes

Many jurisdictions impose a special sales tax on commercial parking transactions, called an *ad valorem tax*.

Implementation

Implementation requires commercial parking operator to maintain reliable records of revenues or transactions. Some commercial parking operators may underreport their revenues to reduce their tax payments. To address this problem the city of San Francisco now mandates that operators use specific revenue control systems that provide a receipt to users and securely record transactions for auditing (City of San Francisco, 2001). This has increased revenues and reduces auditing labor costs. Businesses that collect parking fees as an ancillary service (such as hotels and hospitals) may need to specially track such transactions for tax purposes, but this is generally easy using modern accounting systems.

Impacts

This tax tends to reduce the supply of priced (user paid) parking. It may reduce total parking supply in areas where a significant portion of parking is provided by commercial operators, and by making free parking more financially attractive to users it may encourage more parking to be unpriced. For example, without a tax a free parking space may be worth \$1,000 in pre-tax wages to an employee (what the employee would need to earn in pre-tax wages to pay for the parking directly), but with a 20% tax it becomes worth more than \$1,200. As a result, employers will find that free parking becomes an even more valuable employee benefit. Similarly, this type of tax increases the value of building space with parking included rather than rented separately, so developers are likely to increase the amount of parking bundled with building rents.

Such a tax applies primarily in downtowns and other major urban centers, where more parking is priced, and not in suburbs where most parking is provided free. As a result, it makes urban centers relatively less competitive compared with suburban locations where parking is unpriced. In this way, commercial parking taxes can increase total parking subsidies and sprawl, contradicting other planning objectives.

Examples

- The City of San Francisco imposes a 25% tax on all commercial off-street, non-residential parking transactions (“any rent or charge required to be paid by the user or occupant of a parking space”). Revenues are divided between the city’s general revenue, public transportation and senior citizen funds.
- The City of Pittsburgh imposes a 31% parking tax (increased to 50% in 2005), the highest rate in the U.S. Parking operators indicated that they had been able to pass the majority of the tax onto the users, but had absorbed some of the tax themselves.

Parking Taxes: Evaluating Options and Impacts

- The City of Miami imposes a 20% tax on all commercial, non-residential, off-street parking. The Miami Downtown Development Authority found no decline in business activity or increase in vacancies due to this tax (Berk & Associates, 2002). Commercial parking operators indicated that the surcharge had a significant negative impact on operating income and that they had had to absorb most of the tax, except in the wealthiest business districts, apparently due to the high supply of parking in downtown Miami.
- The City of Los Angeles imposes a tax of 10.6% on fee-based parking, excluding on-street and residential parking. The tax was introduced in 1990, and was fully passed on to users (parking operators did not absorb any of the tax). The tax was felt to have negligible impact on driving habits. The tax generates approximately US\$58 million, flowing into general revenues (Berk & Associates, 2002).
- The City of Chicago imposes a flat tax (rather than a percentage tax) on daily, weekly and monthly parking, as summarized below. It contributes to general revenues.

Chicago Parking Tax Rate

Hourly	Weekly	Monthly
If fees are \$2 - \$5 Tax is \$0.75	If fees are \$10 - \$25 Tax is \$3.75	If fees are \$50 - \$100 Tax is \$15.00
If fees are over \$5 Tax is \$2.00	If fees are over \$25 Tax is \$10.00	If fees are over \$100 Tax is \$40.00

- New York City imposes a tax of 18.5% on commercial parking and 10.5% on residential parking in Manhattan.

Table 1 summarizes examples of commercial parking taxes in U.S. cities, indicating that they range from 6-31% of revenues.

Table 1 Parking Taxes In Various Cities (Various Sources)

City	Parking Tax
Bainbridge Island, Washington	12% of revenues on both public and private parking facilities.
Bremerton, Washington	6% of commercial operator revenues.
Burien and SeaTac, Washington	\$1.00 per parking transaction. Exemptions for people with disabilities, government vehicles and carpools.
Baltimore, Maryland	\$14 flat fee on monthly parking transactions, 11% on daily and weekly parking.
Cleveland, Ohio	8% tax to fund a new football stadium.
Detroit, Michigan	30% tax on airport commercial parking.
Los Angeles, California	10% of parking revenues.
Miami, Florida	27.8% of revenues.
New York	18.5%, or 10.5% for Manhattan residents.
Oakland, California	10% of revenues.
New Orleans, Louisiana	12% of revenues.
Pittsburgh, Pennsylvania	31% of revenues.
Santa Monica, California	10% of revenues.

This table summarizes examples of commercial parking taxes in U.S. cities.

Per Space or Area Levies

Some jurisdictions apply special taxes (called a *levy*) on parking facilities, based either on the number of spaces or their surface area. Such taxes can be structured to support specific planning objectives, such as applying a levy only on *unpriced parking*, to encourage property owners to price parking.

Implementation

A parking levy is similar to a general property tax but applies specifically to parking facilities. It can be a flat fee per space or based on the facility's surface area. It requires parking space inventory, which can be incorporated into general property tax records.

Impacts on Parking Supply and Pricing

By increasing the annual cost of each parking space, per space taxes can help reduce total parking supply and encourage parking pricing. For example, a parking levy may cause a 5-10% reduction in total parking supply and a similar size increase in the portion of parking that is priced. Supply reductions primarily affect infrequently-used spaces, particularly if property operators are allowed and encouraged to reduce parking supply.

Examples

Examples of this type of tax are described below.

Australian Experience

Three Australian cities have special levies on non-residential urban parking, intended to encourage use of alternative modes and fund transport facilities and services:

- In Sydney, a *Parking Space Levy* of AU\$800 annual per stall is currently applied to parking in the central business district (CBD), and AU\$400 per stall at other business districts. The levy applies to all privately owned, non-residential, off-street parking. It is prorated for parking facilities that are only used occasionally, such as church parking lots; property owners must maintain daily records indicating how often such space is used. The levy raises more than AU\$40 million annually, which is dedicated to transportation projects and cannot be used for operating expenses.
- In Perth, parking suppliers within the CBD and surrounding area must pay a *Parking Licence Fee*, which has different rates for short-term and long-term use facilities (DPI, 2002). Owners only pay for the number of parking spaces that are actually in use, and may shift a space from one category to another (from "in use" to "out of use") and pay a prorated amount if appropriate for part of a year. When first introduced in 1999, the levy was AU\$70 per space, and by 2006 had risen to AU\$169 for short-stay parking and AU\$195 for commuter-orientated parking. Businesses with five parking stalls or less are exempted from the charge. The levy raises about AU\$9 million annually.
- In Melbourne, a *Long Stay Car Park Levy* will be charged to designated long-stay and permanently leased parking spaces in CBD commercial car parks. The levy is intended to encourage car park owners to convert long-stay spaces into short-stay spaces, creating more parking options for shoppers and visitors. Planners estimate that the levy will apply to about 48,000 of 70,000 total CBC off-street parking spaces.

Perth and Sydney have similar tax collection procedures. The state government's revenue collection agency sends a parking license application to all non-residential property owners within the designated area. Property owners are required to return the completed application indicating all parking spaces on their property, including land used for motor vehicle parking even if parking spaces are not marked out. In Sydney, for example, where an unmarked area is used for parking, the number of spaces is determined by dividing the total area, by 25.2 square meters, which takes into account parking spaces and access lanes. Owners are sent an annual assessment based on this application. In Perth, the parking license holder is responsible for ensuring that the number of vehicles parked anywhere within the boundary of their property is within the number licensed. The licensing and payment of the levy for on-street parking is the responsibility of local government which meets this requirement from the revenue generated from their on-street parking operations. Table 2 compares features of Sydney and Perth levies.

Table 2 Parking Levy Comparison (Enoch, 2001 and other sources)

	Sydney	Perth	Melbourne
Name	Parking Space Levy	Parking Licence Fee	Long Stay Car Park Levy
First Implemented	1992	1999	2006
Annual Levy	Central CBC: \$800 Other districts: \$400	Short stay: \$155 Long stay: \$180	\$400 annually in 2006 \$800 annually in 2007
Annual revenues generated	AU\$40 million	AU\$8.2 million	\$19 million first year \$39 million second year
Use of revenues	Transport facilities	Downtown transit	CBD transport
<i>Exceptions</i>			
On-street	Exempt	Not exempt	Exempt
Residential use	Exempt	Exempt	Exempt
Part-time facilities	Pro-rated by use	No reduction	Exempt
Publicly-owned facilities	Exempt	Not exempt	Exempt
Currently unused spaces	Not exempt	Exempt	Exempt
Small businesses (5 stalls or fewer)	Not exempt	Exempt	
Disabled persons parking	Exempt	Exempt	Exempt
Loading & taxi parking bays	Exempt	Exempt	Exempt
Public service vehicle spaces	Exempt	Exempt	Exempt
Service (e.g., repairs) spaces	Exempt	Exempt	Exempt
Car sales and service spaces	Exempt.	Exempt	Exempt

This table compares the per-space parking levies in Sydney, Perth and Melbourne Australia.

Perth officials consulted extensively with stakeholders prior to the levy's introduction. As a result, there was an approximately 98% compliance rate the first year. When first applied in 1999, there were about 58,000 stalls, of which about 4,000 were exempt on usage grounds and 2,000 because they are owned by small businesses. This was about 10% fewer than recorded in a 1998 survey, indicating that the levy reduced downtown parking supply. Most of the eliminated spaces were situated near the edge of the levy area and remote from the areas of high parking demand (Enoch, 2001). Some businesses decommissioned spaces to meet the five stalls or less exemption, and some long-stay parking was converted to short-stay use, increasing parking availability and turnover.

Vancouver, British Columbia

TransLink, the Vancouver, British Columbia regional transportation authority which builds and operates roads, transit facilities, bicycle facilities and other transport services, implemented a Parking Site Tax in 2006. The initial rate is \$1.02 annually per square meter of non-residential parking facility, typically \$25-\$40 per space. Assessment, collection and enforcement of the tax utilizes the existing property tax framework, operated by *BC Assessment*, a provincial agency. The agency used aerial photos, digital mapping, municipal records and site visits to develop an inventory of non-residential parking facilities in the region. Exemptions include:

- On-street parking.
- Most buildings exempt from general property taxes (schools, churches, synagogues, etc.).
- Parking facilities used for vehicle retail and rental business inventory storage, impounded vehicles, trailers of tractor-trailer units, vehicle servicing and fueling.
- Parking facilities owned by TransLink (including Park & Ride lots).
- Ferry loading queuing areas.
- Campgrounds.

Toronto Commercial Concentration Tax

During the early 1990s, the Ontario provincial government imposed a Commercial Concentration Tax (CCT) of \$1.00 per square foot per annum on commercial properties larger than 200,000 square feet in the Toronto area, to fund transit and road programs. Large-scale paid parking facilities were subject to this tax, although the tax was not specific to parking. Unexpectedly, some of the largest impacts were on suburban parking facilities where the fee was relatively large compared with paid parking revenues. As a result, suburban area municipal lots and transit Park & Ride lots abolished their parking fees to avoid paying the tax (IBI, 2000). The tax had no apparent impact on regional vehicle travel, since it caused a relatively small price increase in downtown areas, and had little or no impact in suburban areas where most parking is free, and in some cases resulted in the elimination of parking charges to avoid the tax. The tax was highly criticized because it generated revenues from Toronto businesses but used the revenues to fund projects in other parts of the province and was repealed after three years.

Parking As A Taxable Benefit

Many jurisdictions classify parking provided by employers to employees as a taxable benefit for income tax. Some jurisdictions, such as the U.S., tax parking subsidies over a certain value. However, this rule is often overlooked or the value of parking subsidies is significantly understated.

Employee Parking As A Taxable Benefit in Canada

Employee parking is a taxable benefit in Canada. However, Revenue Canada provides technical exemptions that allow most employees to avoid paying the tax, or pay a relatively low amount. These include an exemption if an employer would find it difficult to determine the value of the employees' parking spaces, and if several parking spaces are shared among employees, rather than each having an individually assigned space.

Employee Parking As A Taxable Benefit in Sweden

Commuter parking provided by employers is a taxable benefit in Sweden. Employers are required to report the market value of parking benefits on income tax forms. Employees who receive an assigned parking space are tax for every workday day, regardless of actual use. Employees offered a shared space are only taxed for the number of days that they actually use it. Specific rules apply if an employee must use their vehicle for work purposes. If a vehicle is used for work at least 160 days a year and at least 3000 kilometres its parking is tax exempt. If they drive between 60 and 160 days a year and at least 3000 kilometres, parking is only be taxed for the number of days that the vehicle is driven for commuting but not used for work purposes.

Worksite Parking Levies

Some European jurisdictions allow workplace parking levies to raise revenues and encourage commute alternatives. Implementation has been limited. Below are examples:

- Nottingham City is planning to implement a workplace-parking levy. The proposed levy will be £150 annually per space, with revenue to be used for transport improvements, with exemptions for disabled people, small businesses, emergency vehicles, and parking used by motorbikes, scooters and bicycles. Employers will be charged a license for the number of stalls subject to the levy.
- In 1999 the Irish Minister of Finance considered but did not implement a tax on free commuter parking at urban worksites, and is now considering applying a higher property tax rate on parking than other types of property (Enoch, 2001).
- A Dutch *Parking Policy Implementation Paper* promotes policies that tightly restrict parking in city centres and limit parking availability in other areas based on accessibility to public transport. Cities such as Amsterdam and Leiden have implemented city centre parking management programs, including taxes on long-term parking to discourage commuting by car. Short-term parking is exempt to accommodate shoppers and business trips, and keep city centre businesses competitive with suburban businesses.

Stormwater Fees

Stormwater fees are special charges applied to impervious surfaces (pavement and buildings) to fund stormwater management systems (drain systems, treatment facilities, etc.). Such fees range from about \$5 to \$20 per 1,000 square feet, or about \$1-7 annually per off-street parking space, as indicated in the table below.

Table 3 Annualized Stormwater Fees (PCW, 2002)

Jurisdiction	Fee	Per 1000 Sq. ft.	Per Space
Chaple Hill, NC	\$39 annual 2,000 sq. ft.	\$19.50	\$6.50
City of Oviedo Stormwater Utility, FL	\$4.00 per month per ERU	\$15.00	\$5.00
Columbia Country Stormwater Utility, GA	\$1.75 monthly per 2,000 sq. ft.	\$10.50	\$3.50
Kitsap County, WA	\$47.50 per 4,200 sq. ft.	\$11.30	\$4.00
Raleigh, NC	\$4 monthly per 2,260 sq. ft.	\$18.46	\$6.00
Spokane Country Stormwater Utility, WA	\$10 annual fee per ERU.	\$3.13	\$1.00
Wilmington, NC	\$4.75 monthly per 2,500 sq. ft.	\$22.80	\$7.50
Yakima, WA	\$50 annual per 3,600 sq. ft.	\$13.88	\$6.50

“Equivalent Run-off Unit” or ERU = 3,200 square foot impervious surface.

Pricing Public Parking

In most communities a significant portion of high value parking facilities are publicly owned, including on-street spaces, off-street public parking (such as downtown area parking lots and structures), and off-street parking serving public facilities such as schools, parks and government offices, and only a small portion of these spaces are priced, typically, on-street parking on major commercial streets during weekdays, and some public off-street facilities. Pricing of public-owned parking can be expanded as a way to manage parking demand, manage vehicle traffic, and generate revenue (Shoup, 2005). Although not technically a tax, it is equivalent to requiring and then taxing private parking facilities. Some examples are described below.

Seattle

The City of Seattle's program to replace coin-operated parking meters with modern wireless pay-stations increased revenue from about \$10 million in 2003 to about \$16 million in 2006. This resulted from increased payment compliance (the new system is easier to use because it allows credit and debit card payments), more priced spaces, and higher hourly rates. By the end of 2006 the city is projected to have 1,573 pay kiosks covering more than 11,000 parking spaces (a pay station typically serves six spaces). The capital cost was \$10.3 million to install the pay stations and remove 9,000 old meters. City officials are considering extending pricing to nights and weekends in some areas, which is easy with the new centrally-controlled system which can be programmed for varying hours at select locations. Enforcement is cheaper compared with free, time-limit parking because enforcement officers need only make a single pass, rather than chalking vehicles and returning two hours later to issue citations.

Old Pasadena Parking Revenue (Kolozsvari and Shoup, 2003)

To help address downtown parking problems the city of Pasadena, CA proposed pricing on-street spaces to increase turnover and improve customer parking availability. Most local merchants initially opposed the idea, so city officials agreed to dedicate all revenues to downtown improvements. In 1993 a Parking Meter Zone (PMZ) was established within which parking was priced and revenues invested. With this proviso, the merchants agreed to the proposal. They began to see parking meters as a way to fund projects and services that directly benefit their customers and businesses. Because parking was previously unpriced the city lost no revenue, and gained overtime fine revenue.

The city formed an advisory board of business and property owners to oversee parking policies and expenditure priorities. Connecting parking revenues directly to added public services and keeping it under local control helped the program succeed. Investments included new street furniture and trees, more policing, better street lighting, more street and sidewalk cleaning, pedestrian facility improvements, and marketing. To highlight these benefits each parking meter has a sticker that reads, *Your Meter Money Will Make A Difference: Signage, Lighting, Benches, Paving*. This created a "virtuous cycle" in which parking revenue funds improvements that attract more visitors, increases revenue, allowing further improvements, resulting in extensive downtown redevelopment. Parking is no longer a problem for customers, who can almost always find a convenient space. Local sales tax revenues have increased far faster than in other shopping districts with lower parking rates, and nearby malls that offer free customer parking.

Austin Parking Benefit District (www.ci.austin.tx.us/parkingdistrict/default.htm)

Many neighborhood experience parking spillover problems, including difficulty finding parking for residents and visitors, concerns that public service vehicles cannot pass two lanes of parked vehicles on the street, or that parking on the street reduces neighborhood attractiveness. These problems become an opportunity with the establishment of a Parking Benefit District (PBD) A PBD is created by metering the on-street parking (either with pay stations on the periphery of the neighborhood or with the traditional parking meters) and dedicating the revenue, less City expenses for maintenance and enforcement, towards improvements in the neighborhood that promote walking, cycling and transit use, such as sidewalks, curb ramps, and bicycle lanes. Charging for parking and promoting alternatives reduces parking in neighborhoods and helps fund neighborhood benefits. The PMD may be used in conjunction with a Residential Permit Parking program to ensure that parking is available for residents and their visitors.

Ashland, Oregon

Ashland is a small but rapidly growing city in central Oregon, famous for its Shakespeare Festival which attracts tens of thousands of visitors each year. The city's downtown is a major destination and activity center, particularly during the summer tourist season. Downtown business people were concerned that existing parking supply was at capacity but feared that pricing parking would have a negative effect on customer traffic. To address these concerns local planners examined the experience of five comparable cities that have recently implemented priced parking. Their research indicated that pricing did not adversely affect visitor demand or use, that it increased turnover, that it generates net revenue, and that newer multi-space meters work well.

Using this feedback and information, the planners developed a parking management plan. They divided the downtown into three major parking management zones, described as "Core," "Intermediate," and "Periphery." For each of these zones they developed overall guiding principles, parking management strategies, and an implementation plan with near-, mid- and long-term actions. The plan includes pricing of publicly-owned parking facilities to increase turn-over, shift employee parking to less convenient locations, encourage use of alternative modes, and provide funding to increase parking supply and support alternative modes. The plan describes under what circumstances and how parking will be priced. It applies the following principles when pricing publicly-owned off-street facilities:

- The short-term rate is equal to the hourly fee charged for on-street parking.
- Special evening rates to serve appropriate uses.
- Long-term, daily/monthly rates that reflect the objectives of each zone.
- Rates adjusted as needed to maintain optional utilization (i.e., 85% peak occupancy).
- Rates adjusted as needed to shift long-term parkers outside the Core zone.

Comparison of Impacts

A tax's impacts on parking supply, parking price and travel patterns depend on how it is structured and its magnitude. Below are factors that affect these impacts:

- A tax that only applies to priced parking tends to increase commercial parking prices and reduce the portion of parking provided by commercial operators, since it reduces profitability and increases the value to motorists of subsidized and bundled parking.
- A tax that applies to all parking facilities tends to reduce total parking supply if that is allowed, particularly if it is supported by other parking management strategies such as programs to encourage sharing of parking facilities and use of alternative modes.
- A tax that only applies to unpriced parking will tend to reduce parking supply and increase the portion of parking that is priced.
- A tax or fee that applies in a relatively small geographic area may shift some parking facilities and activities to other, lower-taxed areas.

Commercial parking tax impacts are concentrated in certain areas and types of trips. Because only a small portion of parking is priced, a commercial parking tax must collect far more revenue per space than a per-space levy to raise a given amount of revenue. For example, a commercial parking tax might need to collect \$300 per priced space while a per-space levy would only need to collect \$30 per space to raise \$5 million annually. Table 5 calculates the magnitude of the two taxes relative to various types of parking facility costs. A commercial parking tax is greatest for high-priced parking, which is usually located in major central business districts (CBDs). Per space levies tend to have the greatest impact in suburban areas where there are many lower-value parking spaces, some of which may be decommissioned or priced if their annual costs increase.

Table 5 Typical Parking Facility Financial Costs ("Parking Costs," Litman, 2004)

Type of Facility	Land Costs	Construction Costs	O & M Costs	Total Annual Cost	Commercial Parking Tax	Per Space Levy
	<i>Per Space</i>	<i>Per Space</i>	<i>Annual, Per Space</i>	<i>Annual, Per Space</i>	<i>20% of Revenues</i>	<i>\$30 Per Space</i>
Suburban, On-street	\$200	\$1,500	\$200	\$360	20%	8.3%
Suburban, Surface, Free Land	\$0	\$1,500	\$200	\$342	20%	8.8%
Suburban, Surface	\$455	\$1,500	\$200	\$384	20%	7.8%
Suburban, 2-Level Structure	\$227	\$6,000	\$300	\$888	20%	3.4%
Urban, On-Street	\$1,000	\$2,000	\$200	\$483	20%	6.2%
Urban, Surface	\$2,083	\$2,000	\$300	\$685	20%	4.4%
Urban, 3-Level Structure	\$694	\$8,000	\$400	\$1,221	20%	2.5%
Urban, Underground	\$0	\$20,000	\$400	\$2,288	20%	1.3%
CBC, On-Street	\$8,000	\$2,500	\$300	\$1,291	20%	2.3%
CBD, Surface	\$15,385	\$2,500	\$300	\$1,988	20%	1.5%
CBD, 4-Level Structure	\$3,846	\$10,000	\$400	\$1,707	20%	1.8%
CBD, Underground	\$0	\$22,000	\$500	\$2,388	20%	1.3%

This table illustrates parking taxes relative to various parking facility costs under various conditions. For more calculations see www.vtpi.org/parking.xls. CBD = Central Business District.

Commercial parking operators typically require a 10% or greater return on operations. They are unlikely to fully absorb a large parking tax; they would either pass it on to customers or close down a lot. To the degree that a tax is passed on to users, travelers can respond by paying the tax, changing modes (for example, from driving to cycling, ridesharing or public transit), destinations (for example, from city center to suburban mall), parking location (for example, using free parking outside the CBD and walking to their destination), or parking duration (remaining downtown for less time). Such impacts depend on the price sensitivity of the market, referred to as the *price elasticity*. Where demand is elastic, a price increase will cause consumers to use significantly less parking, forcing commercial parking operators to absorb more of the tax or reduce parking supply.

Many studies have estimated the elasticity of parking demand (“Transportation Elasticities,” VTPI, 2005). Elasticities typically range between -0.2 and -0.4 , indicating that a 10% increase in parking price reduces parking demand by 2-4%. Many factors can affect these impacts. Price elasticities tend to be greater for longer-term users such as commuters than for shorter-term users such as shoppers, and are greater for a particular location (for example, a particular lot) than an area (for example, if all parking lots in a downtown increase their prices), since some motorists respond to price differences by switching where they park. These elasticities indicate that a 20% commercial parking tax which is fully passed on to users will reduce parking demand in areas dominated by commercial parking by 4-8%, but a much smaller portion of total travel.

Reductions in parking supply and increases in the portion of parking that is priced are likely to be largest if these taxes are implemented in conjunction with other parking management strategies, such as reductions in minimum parking requirements and standardized parking pricing systems (Litman, 2006a). A per-space tax that only applies to unpriced parking could significantly increase the portion of parking that is priced, and so can be an effective parking pricing reform.

Equity can be evaluated in many different ways, reflecting different concerns and perspectives (“Equity Evaluation,” VTPI, 2005). From a *horizontal equity* perspective a parking tax can be considered most equity if it is broadly applied. From this perspective a per-space tax and more public parking pricing appear most equitable. Parking taxes and fees can be considered user fees, which are therefore most equitable if they reflect the external costs of parking facilities and motor vehicle use. From this perspective per-space taxes and pricing public parking appear most equitable, especially if such taxes and fees vary to reflect differences in costs, such as higher rates in denser urban areas.

From a *vertical equity* perspective a parking tax can be considered most equitable if the cost is borne mostly by higher income people. From this perspective a commercial parking tax may be considered most equitable, since such facilities are mostly used by higher-income motorists, except in some urban neighborhoods where relatively low-income people also pay for parking. Other equity issues may include the impacts on businesses resulting from changes in their costs and costs to their customers, and impacts on the commercial parking industry and its employees.

Table 4 summarizes differences between these tax and pricing options.

Table 4 Parking Tax Comparison

	Commercial Parking Tax	Per-Space or Area Levy	Price Public Parking
Description	Tax on commercial (user paid) parking transactions.	Tax on parking spaces, either per-space or based on area.	Charge for use of more public parking facilities.
Distribution of tax burden	Borne by commercial operators, motorists who use their services, and businesses in major commercial centers.	Borne by non-residential property owners. Because it applies to all parking facilities the burden is widely distributed.	Borne by motorists who use such facilities, and sometimes businesses in areas where parking is priced.
Implementation	Commercial operators pay based on their receipts. Some jurisdictions require operators to use certified revenue control systems that provide user receipts and transaction records.	Special property tax assessment. Requires an inventory of parking spaces, which is generally incorporated into the property tax assessment rolls.	Install and enforce parking payment systems, and expand when and where fees are charged.
Parking supply	Tends to reduce commercial parking and encourage free parking. May reduce total supply where a significant portion of parking is provided by commercial operators.	By increasing the cost of owning parking facilities this tax tends to reduce total parking supply, particularly parking spaces that receive minimal annual use.	By encouraging more efficient use of parking facilities allows supply to be reduced, or the need to expand supply avoided, if desired by public officials.
Parking prices	Increases prices of commercial parking, but reduces the portion of parking that is priced.	May increase the portion of parking spaces that are priced and encourage pricing that favors short-term use.	Increases the portion of parking that is priced. May involve increasing prices.
Parking management	Little impact.	By reducing parking supply encourages better parking management.	Represents a type of parking management.
Transport	By increasing parking prices tends to reduce some vehicle trips, but they may also shift travel from urban to suburban locations, and increase free parking, increasing vehicle use.	By reducing parking supply and increasing the portion of parking that is priced it tends to reduce vehicle use, particularly if implemented with improvements to other travel modes.	By increasing parking prices tends to reduce some vehicle trips, but they may also shift travel from priced to unpriced locations.
Land Use	Because it primarily applies in major commercial centers and gives suburbs a competitive advantage it encourages sprawl.	Because it applies to all parking and encourages reduced parking supply it encourages more compact development.	Depends on where pricing is applied. If widely applied may support land use planning objectives.
Equity	By imposing costs on a limited portion of motorists, tends to be horizontally inequitable, but may be progressive with respect to income.	By distributing costs broadly among property owners and motorists, tends to increase equity, particularly if considered a user fee.	By distributing costs more broadly among motorists, tends to increase equity, particularly if considered a user fee.

This table compares the two types of parking taxes.

Best Practices

Below are suggestions for structuring and implementing parking taxes to increase public acceptability and their ability to help achieve various planning objectives. For more information see Berk & Associates (2002); Shoup (2005) and Litman (2006a & b).

Below are best practices recommendations:

- The tax base should be broad and well defined. A broad tax base spreads the financial burden and does not give certain groups a competitive advantage. For example, it is most equitable to tax publicly owned as well as private parking facilities.
- Before imposing special parking taxes, local governments should increase their own parking prices to market rates. Commercial operators tend to be more accepting of a parking tax if governments are already maximizing income from other parking-related revenue sources, such as meters and enforcement of parking regulations.
- Taxes and fees should be structured to avoid undesirable land use, travel or economic impacts, such as increased sprawl or reduced downtown competitiveness.
- Parking tax reforms should be part of overall parking and mobility management programs and coordinated between jurisdictions in a region.
- Exemptions and discounts should be well defined and audited to insure they apply as intended.
- Stakeholders, such as commercial parking operators, should be consulted to insure that regulations, administrative procedures, and enforcement policies are efficient and fair.
- It possible, require parking suppliers to pass taxes on to motorists, rather than absorb it.
- Enforcement should be fair, friendly and effective.
- Taxes should be structured for efficient compliance and auditing. When implementing a commercial parking tax, operators should be required to use a ticketing system that provides receipts and creates secure transaction records suitable for auditing.
- Establish an evaluation program, with before-and-after analysis, to determine the taxes impacts on parking supply and pricing, economic activity, traffic, and spillover problems.

There are often debates over exemptions and discounts. *Functional* exemptions are justified on the grounds that collecting a tax is not worthwhile in particular circumstances. For example, Perth's levy exempts businesses with fewer than six parking spaces, which reduced administrative costs with only a small reduction in revenues. Some types of property owners and motorists want exemptions *equity* grounds, because their parking spaces are infrequently used (e.g. drive-in theaters), public service organizations (churches, schools, hospitals, etc.), and people with low incomes or disabilities. It is usually best to offer equity-based *discounts* rather than *exemptions* so everybody pays a share and has incentives to use parking efficiently. For example, drive-in theaters and churches can be charged a prorated levy based on the portion of days a space is occupied, tax exempt organizations can pay discounted levies, and people with disabilities might qualify for a discount or rebate for a portion of the parking taxes they pay.

Conclusions

Although few taxes are popular, some are better than others in terms of economic efficiency, consistency with strategic planning objectives, and equity. Properly implemented parking taxes can provide multiple benefits; they can help reduce traffic congestion, encourage more compact development, and support environmental objectives, in addition to raising revenue. If a jurisdiction must raise revenue, parking taxes are among the best options.

In general a *commercial parking tax* (a special tax on parking rental transactions) is relatively easy to implement but tends to contradict other planning objectives. It discourages pricing of parking, encourages sprawl, and its cost burden tends to be concentrated in a few areas, such as major commercial centers, campuses and hospitals.

A *per-space parking levy* (a special property tax applied to parking facilities) is more challenging to implement because it requires an inventory of qualifying parking facilities, but it encourages property owners to reduce parking supply (particularly seldom-used spaces) and manage their parking supply more efficiently, and it encourages pricing of parking. As a result, it encourages more compact, accessible, multi-modal land use patterns and reduces sprawl. Its cost burden is more evenly distributed.

Most jurisdictions own and operate many currently free parking spaces that could be priced. Charging for use of such parking is in many ways comparable to requiring private property owners to supply parking and taxing such facilities. Pricing public parking can be an effective way to manage vehicle traffic and parking demand, and raising revenue.

Such taxes and fees tend to provide the greatest benefit if they are:

- Applied as broadly as possible, to the widest geographic area and the most categories of parking facilities.
- Implemented as part of parking management programs that encourage more efficient use of parking facilities, allow parking supply to be reduced, and anticipate any spillover problems that might occur.
- Implemented as part of mobility management programs that encourage use of alternative modes.
- Implemented as part of smart growth policies that encourage more compact, mixed, multi-modal community development.
- Structured so users to pay them directly, as an incentive to reduce marginal vehicle ownership and use.
- Implemented in cooperation with property tax assessment agencies (to reduce implementation costs) and the business community (to reduce implementation problems).
- Used to fund local improvements.

References and Information Resources

ACTRO (2003), *Proposed ACT Parking Space Levy Discussion Paper for Consultation*, ACT Revenue Office (www.revenue.act.gov.au), available at (www.revenue.act.gov.au/docs/ACT%20Parking%20Space%20Levy%20Discussion%20Paper.pdf).

Berk & Associates (2002), *Seattle Parking Tax Analysis*, City of Seattle (www.seattle.gov/transportation/parking/parkingtax.htm).

CORDIS (2001), *Parking Policy Measures and their Effects on Mobility and the Economy*, COST 342, CORDIS (www.cordis.lu/cost-transport/src/cost-342.htm).

DfT (2002), *Road User Charging And Workplace Parking Levy Regulations*, Dept. for Transport, (www.dft.gov.uk/stellent/groups/dft_localtrans/documents/page/dft_localtrans_503967.hcsp).

DPC (2005), *City Car Parking Levy To Ease Congestion: Press Release*, Department of Premier and Cabinet, Victoria (www.dpc.vic.gov.au), April 22, 2005.

DPI (2002), *Licensed Parking in Perth: A Guide for Commercial Property Owners About Licensing Their Parking Bays*, Department of Planning and Infrastructure, Government of Western Australia (www.dpi.wa.gov.au).

Marcus Enoch (2001), *Workplace Parking Charges Down Under*, Traffic Engineering and Control (<http://eeru.open.ac.uk/staff/marcus/Workplace%20parking.PDF>), November 2001, pp. 357-360.

Marcus Enoch and Stephen Ison (2006), "Levying Charges On Private Parking: Lessons From Existing Practice," *World Transport Policy & Practice*, Vol. 12, No. 1 (<http://ecoplan.org/wtpp/general/vol-12-1.pdf>), pp. 5-14.

Eran Feitelson and Orit Rotem (2004), "The Case for Taxing Surface Parking," *Transportation Research Part D*, Volume 9, Issue 4 (www.elsevier.com/locate/trd), July, 2004, pp. 319-333.

Judith Gray (2004), "Policies for Rational Parking Development: Fee-In-Lieu Options," *The Parker*, Canadian Parking Association (www.canadianparking.ca), First Quarter 2004, pp. 10-14.

Heffron Transportation (2002), *Parking Management Study*, City of Seattle (www.seattle.gov/transportation/parking/parkingstudies.htm).

Daniel B. Hess (2001), *The Effects of Free Parking on Commuter Mode Choice: Evidence from Travel Diary Data*, UCLA.

Thomas Higgins (1992), "Parking Taxes: Effectiveness, Legality and Implementation, Some General Considerations," *Transportation*, Vol. 19, pp. 221-230.

IBI (2000), *Transit-Supportive Parking Policies: North American Experience and Model Policies for Municipalities*, Canadian Urban Transit Association (www.cutaactu.on.ca).

David A. Hensher and Jenny King (2001), "Parking Demand and Responsiveness to Supply, Price and Location in Sydney Central Business District," *Transportation Research A*, Vol. 35, No. 3 (www.elsevier.com/locate/tra), March 2001, pp. 177-196.

Parking Taxes: Evaluating Options and Impacts

Douglas Kolozsvari and Donald Shoup (2003), "Turning Small Change Into Big Changes," *Access 23*, University of California Transportation Center (www.uctc.net), Fall 2003, pp. 2-7; www.spsr.ucla.edu/up/webfiles/SmallChange.pdf.

J. Richard Kuzmyak, Rachel Weinberger, Richard H. Pratt and Herbert S. Levinson (2003), *Parking Management and Supply*, Chapter 18, Report 95, Transit Cooperative Research Program; Transportation Research Board (www.trb.org).

Todd Litman (2002), *Transportation Land Valuation*, VTPI (www.vtpi.org).

Todd Litman (2004), "Parking Costs," *Transportation Cost and Benefit Analysis: Techniques, Estimates and Implications*, Victoria Transport Policy Institute (www.vtpi.org/tca/tca0504.pdf).

Todd Litman (2006a), *Parking Management: Strategies, Evaluation and Planning*, Victoria Transport Policy Institute (www.vtpi.org/park_man.pdf).

Todd Litman (2006b), *Parking Management Best Practices*, Planners Press (www.planning.org).

Todd Litman (2006c), *Parking Management: Innovative Solutions To Vehicle Parking Problems*, Planetzen (www.planetizen.com/node/19149).

MRSC, *Downtown Parking Solutions*, Municipal Research and Service Center of Washington (www.mrsc.org/Subjects/Transpo/Tpark/transsolut.aspx).

Nottingham City (2003), *Workplace Parking Levy*, Nottingham City (www.nottinghamwpl.com).

NSW (2000), *Parking Space Levy Amendment Bill 2000*, Parliament New South Wales (www.parliament.nsw.gov.au).

OSR (2003), *Parking Space Levy*, Office of State Revenue, NSW Treasury (www.osr.nsw.gov.au).

Parking (2002), "On Again Off Again: A Parking Tax (Levy) For Brisbane," *Parking: Official Journal Of the Parking Association of Australia*, Issue 4 (www.parkingmag.com.au/articles/parkingtax.html).

Richard H. Pratt (1999), *Traveler Response to Transportation System Changes, Interim Handbook*, TCRP Web Document 12 (www4.nationalacademies.org/trb/crp.nsf/all+projects/tcrp+b-12), DOT-FH-11-9579.

D. H. Pickrell and D. C. Shoup (1980), "Employer Subsidised Parking And Work Trip Mode Choice," *Transportation Research Record*, Transportation Research Board (www.trb.org).

PCW (2002), *Some Existing Water District Funding Sources*, Legislative and Regulatory Issues Technical Advisory Committee, Project Clean Water (www.projectcleanwater.org).

SF, *San Francisco Commercial Parking Tax*, City of San Francisco (www.ci.sf.ca.us/tax/parking.htm).

Donald Shoup (2002), *Curb Parking: An Ideal Source of Public Revenue*, Lincoln Institute of Land Policy (www.lincolnst.edu), Presented at "Analysis of Land Markets and the Impact of Land Market Regulation," (Code CP02A01), July, 2002.

Parking Taxes: Evaluating Options and Impacts

Donald Shoup (2005), *The High Cost of Free Parking*, Planners Press (www.planning.org).

Donald Shoup (2006), *The Price of Parking On Great Streets*, Planetizen (www.planetizen.com/node/19150).

TNO (2001), *The Fiscal Taxation of the Company Parking Space: A Study of the Opportunities, Feasibility and Possible Effects*, Department of Traffic & Transport, TNO Inro (www.inro.tno.nl).

Transport 2000 (1998), *A Taxing Question: How A Parking Tax Might Work*, Transport 2000 (www.transport2000.org.uk), 1998.

TransLink (2006), *Parking Site Tax and How It Will Be Applied*, TransLink, Greater Vancouver Transportation Authority (www.translink.bc.ca/ParkingTax/default.asp).

TSU (2003), *Impacts of Road User Charging / Workplace Parking Levy on Social Inclusion / Exclusion: Gender, Ethnicity and Lifecycle Issues*, Transport Studies Unit, University of Oxford (www.tsu.ox.ac.uk/research/impacts.php).

Cy Ulberg, Graciela Etchart and Bethany Whitaker (1992), *TRAC: Local Option Commercial Parking Tax Analysis*, Research Project GC 8719, Task 30, Parking Tax Evaluation, Washington State Transportation Center (TRAC) (<http://ntl.bts.gov/DOCS/TRAC.html>).

USEPA (2006), *Parking Spaces / Community Places: Finding the Balance Through Smart Growth Solutions*, Development, Community, and Environment Division (DCED); U.S. Environmental Protection Agency (www.epa.gov/smartgrowth/parking.htm).

VTPI (2005), *Online TDM Encyclopedia*, Victoria Transport Policy Institute (www.vtppi.org).

T. Wang and J. Sharples (1999), *Workplace Parking Levy*, TRL 399, Transport Research Laboratory (www.trl.co.uk) for Chartered Institute of Transport and the Royal Town Planning Institute.