

DRAFT Policy Brief on the Impacts of Parking Pricing Based on a Review of the Empirical Literature

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Policy Description

Increasing existing parking prices, or charging for parking that is currently offered for free, has the potential to reduce vehicle travel (as measured by vehicle miles traveled (VMT)) and encourage mode switching by increasing the cost of private vehicle trips. As a result, it may also have the potential to reduce greenhouse gas emissions. Several parking pricing strategies exist, including:

- **Long/Short-Term Fee Differentials:** Charging different fees for short versus long-term parking can change turnover rate and user mix. For instance, implementing higher fees for long-term parking can help to discourage commuter parking and make more spaces available for shoppers and other short-term users. Such a policy has the potential to encourage car pooling and mode switching without hindering commercial activity.
- **On-street Fees and Resident Parking Permits:** These tools can be used to manage parking congestion and increase turnover to favor short-term parking. Resident parking permits can help to control spillover of commuter parking into residential areas, and can play an important parking demand management role in conjunction with workplace or commercial parking policies.
- **Workplace Parking Pricing:** Studies have found that approximately 95 percent of employees park at their workplace for free. Because free workplace parking is primarily the result of employer subsidies, programs have targeted these subsidies in an attempt to manage private vehicle travel demand. Other examples of workplace parking pricing include charges for single occupant vehicles and cash-out programs that offer employees cash in lieu of subsidized parking.

Impacts of Parking Pricing

Effect Size

While a number of studies have examined the effect of pricing policies on parking demand, relatively few have focused on the impact of parking pricing on VMT. Often, parking pricing is included as one component of a bundle of travel demand management (TDM) and infrastructure measures, making separate evaluation difficult. Travel demand management is the term for policies that are designed to affect the amount, time, or place that people travel.

Of the studies that examine VMT, most deal with impacts of workplace parking subsidy elimination at individual sites. In these cases, the literature indicates that parking pricing policies can produce moderate VMT reductions among employees who accept parking cash-outs. In an examination of the VMT impacts in California, Shoup (1997) found a 12 percent VMT reduction among individuals who accepted a parking subsidy cash-out.

Modeling of parking pricing has indicated a smaller impact on regional VMT. A study of four

California regions conducted by Deakin, et al. (1996) indicated regional VMT reductions of 2.3 to 2.9 percent were possible if solo commuters were charged \$3.00 per day for workplace parking. A similar study, using the same pricing level, estimated regional VMT reductions of 1.9 percent for Seattle (Dueker, et al., 1998). An analysis of 16 parking pricing studies by Rodier (2008), which included studies of six European cities and those noted above, yielded a median regional VMT reduction of 2.2 percent. In the U.S. studies, parking charges were evaluated at levels of \$1 and \$3 per day. The European studies used prices set at 20 percent and 60 percent of the value of commuters' travel time. Prices were evaluated in study year dollars.

In terms of demand for parking spaces, several studies (Kelly and Clinch, 2009; Gillen, 1977; Kulash, 1974) have indicated that every 10 percent increase in parking charge results in a 3 percent decrease in demand for parking spaces. However, Dueker, et al. (1998) estimated a decrease of 5.8 percent per 10 percent price increase for single occupant vehicle commuters in urban Portland, using a base parking charge of \$80 per month. When the base charge was \$20 per month, the demand for workplace parking places dropped 1.2 percent when parking prices increased 10 percent, illustrating the effect of the baseline parking charge level on demand for spaces. Shoup's (1994) study of parking subsidy effects found parking demand at workplaces in the California, Washington D.C., and Ottawa, Ontario fell an average of 1.5 percent for every 10 percent increase in parking prices.

Relating parking space demand to changes in VMT can be problematic, however, as drivers may attempt to avoid parking charges or select alternative destinations, especially for shopping trips. Parking policy may also lead to larger than expected changes in driver behavior, despite relatively small changes in parking space demand. For example, Shoup (1994) found employer subsidy eliminations led to an average decrease of 25 percent in solo commuter parking, despite a much smaller decrease in parking space demand. Studies have found that these effects, as well as long-term changes in residential and business location, can impact the effectiveness of parking pricing programs (Lautso, et al., 2004). Table 1 summarizes the effect sizes for the parking pricing studies presented here.

All of the studies presented in this brief were conducted in urbanized areas. Therefore the results may not be applicable outside of an urban context.

Table 1: Summary of Parking Price Studies

Study	Study Location	Study Year(s)	Results	
			Effect Type	Effect Size
Deakin et al. 1996	4 California regions	1991	Regional VMT Change	-1.0% for \$1/day charge -2.6% for \$3/day charge
Dueker et al. 1998	Seattle region	1990	Regional VMT Change	-1.9% for \$3/day charge
Lautso et al. 2004	7 European cities	2002	Regional VMT Change	-2.8% average for price increase= 60% of commute time cost
Shoup 1997	8 workplaces in Southern California	1993-95	Individual employee VMT Change	-12% for employees who chose parking cash-out
Shoup 1994	Ottawa, Canada, Washington D.C, 5 sites in LA	1986	Change in parking space demand for 1% price increase	-0.15% average
Kelly and Clinch 2009	Dublin, Ireland	2001	Change in parking space demand for 1% price increase	-0.29% average
Henscher and King 2001	Sydney, Australia	1998	Change in parking space demand for 1% price increase	-0.54% close-in CBD -1.01% elsewhere in CBD -0.48% on CBD fringe
Kulash 1974	San Francisco	1970-73	Change in parking space demand for 1% price increase	-0.3% average
Dueker et al. 1998	Portland	1990	Change in parking space demand for 1% price increase	-0.58% at \$80/mo base price -0.12% at \$20/mo base

Evidence Quality

The available evidence on the direct impact of parking pricing on VMT is relatively scarce. In addition, much of the evidence that does exist was obtained from studies that are now at least 15 years old. However, the results of various modeling exercises conducted for urban regions worldwide have yielded similar results. Likewise, evidence on the price effects on parking space demand has proved quite robust. Studies conducted in the U.S. and abroad indicate general agreement that every 10 percent increase in parking price produces a reduction of approximately 3 percent in the demand for parking spaces.

Caveats

Parking pricing measures are often implemented and modeled as part of a comprehensive package of travel demand management measures. Careful consideration must be given to

situations where alternatives to car commuting are lacking or where parking alternatives exist, as these conditions may lead to deviations from the results indicated here. For example, at locations where alternate parking was available, studies have found parking demand may decrease at rates equal to price increase. (Hensher and King, 2001; Vaca and Kuzmyak, 2005) At the regional level, consideration must also be given to the potential decentralizing effects of parking pricing on both residences and businesses, especially where differences in pricing policy exist between localities. In cases where parking prices are increased in one locality, households and businesses may choose to relocate to lower priced areas in the longer term.

Several studies have found that workplace parking pricing has the potential to significantly discourage single-occupant commuting trips, despite small sensitivity of parking demand to price increases (Shoup, 1997; Shoup, 1994). More information is needed, however, on the relationship between individual commuter VMT reduction and overall household VMT.

Greenhouse Gas Emissions

Although parking pricing is likely to impact greenhouse gas emissions in proportion to VMT reductions, our review found no academic literature that quantifies this impact directly. This is an area where further research is needed to determine how various parking pricing policies impact greenhouse emissions, both alone and in combination with other policies.

Co-Benefits

Potential co-benefits that could be realized through parking pricing include increased commercial activity and congestion relief. Commercial activity may be enhanced by using parking pricing strategies that free up space in business districts that would otherwise be taken by commuters. This may be accomplished through peak period surcharges or differential parking rates. In addition, decreasing demand for parking space through pricing may make more space available for development or preservation as open spaces.

To some extent, parking pricing may provide congestion relief by using pricing strategies that encourage parking around the outside of congested central business districts (CBDs). Where congestion is lowered within CBDs, local air pollution may be reduced as well. To be effective, alternatives must be available that will allow completion of trips into the CBD by non-car modes.

Examples

In 1992, California enacted a parking cash-out law. The law required employers in air quality non-attainment areas with more than 50 employees to offer a cash allowance in lieu of a parking space. The parking cash-out helps to reduce congestion and air pollution by reducing the number of employees who drive alone to work. Receiving cash in lieu of a parking subsidy encourages employees to take transit, carpool, walk, or bicycle to work. Shoup (1997) found that employees of businesses that offer cash-outs reduce their vehicle miles traveled by an average of 12 percent.

In 1980-81, Madison, Wisconsin instituted a parking pricing demonstration program whose purpose was to discourage private vehicle commuting and make more parking spaces

available for shopping and personal business. To accomplish this, a surcharge was applied to parking during the peak morning commute hours. The surcharge resulted in a 40 percent reduction in the number of spaces occupied in the peak period. A survey of those who changed their behavior during the program found that 18 percent of respondents used a different mode to travel downtown. More than half of these cited the surcharge as the reason for the change.

Suggested Further Reading

- Deakin, E., Harvey, G., Pozdena, R., and Yarema, G., 1996. *Transportation Pricing Strategies for California: An Assessment of Congestion, Emissions, Energy and Equity Impacts*. Final Report. Prepared for California Air Resources Board, Sacramento, CA.
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