

## **DRAFT Technical Background Document on the Impacts of Parking Pricing Based on a Review of the Empirical Literature**

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### **Study Selection**

There are relatively few academic studies that examine the impacts on vehicle miles traveled (VMT) of parking pricing. However, much of what has been done is directly applicable to the conditions that exist in the major urbanized regions of California. Examples include Deakin et al. (1996) and Shoup (1994, 1997, 2005). These studies differ in both methodology and scope. Deakin et al. used outputs of the Short-range Transportation Evaluation Program (STEP) travel demand model to examine regional VMT impacts of parking pricing. Shoup (1997) used case studies of individual workplaces to examine the impacts of site-specific parking policies on employee VMT. Including both approaches gives the reader a better picture of the potential VMT impacts from policies of varying scope.

In addition to these studies, our review included documents that examined multiple parking pricing studies. Among these were Chapter 13 of the Transit Cooperative Research Program (TCRP) Report 95: *Parking Pricing and Fees* (2005) and Rodier's (2008) review of parking pricing models. These two documents include the California studies mentioned above, as well as other U.S. and international examples. From the studies cited in these documents, the most relevant were examined individually. Those that were both relevant and methodologically sound were included in the review. These included Dueker et al. (1998), which also used outputs of the STEP model to evaluate regional parking pricing impacts in California and Seattle. The European PROPOLIS modeling study, cited by Rodier, was included as well, because it is one of a very small number that examine the regional VMT impacts of parking pricing. PROPOLIS also used a comprehensive travel demand and land use model to examine policy impacts over various time periods.

The final set of studies that were included in this review were those that were concerned with elasticities of demand for parking spaces. Shoup's (1994) study of U.S. and Canadian cities was useful because it examined parking behavior in Los Angeles. Historical background on parking demand elasticities was taken from studies reviewed in TCRP 95, including Kulash's 1974 study of San Francisco and Gillen (1977). Kelly and Clinch (2009) was included because it is one of the few recent studies of parking demand elasticity that examines actual (revealed) behavior in a commercial shopping district. They used revealed preference data obtained from parking records to calculate elasticity of demand for parking space in Dublin and controlled for income changes during the study period. Henscher and King (2001), which used stated preference methods and a nested logit model, was also included because it illustrates the potential impact on commercial district parking demand. Kulash (1974) estimated elasticities for parking space demand using historical data, controlling for income and parking growth trends.

### **Effect Size, Methodology and Applicability Issues**

Of the studies presented in the review, those that examine regional VMT impacts are likely to be the most useful for regional planners and policy makers. These also show a moderate

impact on regional VMT is possible through parking pricing alone. The range of reductions given is relatively narrow - between 1 and 3 percent depending on price level. Of the 16 studies examined by Rodier (2008), the mean VMT reduction was 2.2 percent for both the 10- and 20-year time frames. Rodier states that the California studies included in her review showed greater reductions than the mean, but still in a range between 2 and 3 percent.

The other studies in this review of parking pricing are presented to provide background on the effect of parking policy on local conditions. These are informative, but possibly less useful for the purpose of reducing regional greenhouse gas emissions. Shoup's studies of workplace parking illustrate that large impacts can be achieved at the individual level through parking cash-outs. How this translates to VMT reductions at the household level is less clear, however.

The remaining studies, which relate to parking space demand elasticity, show that significant variability exists depending on a number of factors. These include user mix (for example, commuting versus shopping), the availability of alternative modes of transportation, and the supply of on-street or commercial parking spaces. Although the studies reviewed here and in other reports indicate an average elasticity of -0.3, careful consideration must be given to local conditions to gauge actual impacts on localized parking behavior.

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## **Acknowledgments**

This document was produced through an interagency agreement with the California Air Resources Board with additional funding provided by the University of California Institute of Transportation Studies MultiCampus Research Program on Sustainable Transportation and the William and Flora Hewlett Foundation.

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