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Parking Strategies to Attract Auto Users to Public Transportation

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INTRODUCTION

Increasing public transit ridership has emerged as a primary goal of policy makers seeking to comply with legislation such as the Clean Air Act Amendments of 1990 and the Intermodal Surface Transportation Efficiency Act of 1991. There are a number of policies that researchers and decision-makers are presently examining for their potential to divert automobile drivers to transit. This report assesses the implementation of various parking strategies as a means of increasing transit patronage for the work trip.

A key connection between parking and transit ridership lies in the *supply and price of parking*. Where parking is scarce—typically in high-density areas—prices are normally charged and transit ridership levels are relatively high. Where parking is ample—typically in low-density areas—there is usually no charge for parking. Consequently, commuters have little incentive not to drive and thus transit ridership levels are low. In fact, about 90 percent of all customer and employee parking in the U.S. is free *(1)* and, not surprisingly, 87 percent of worktrips and 91 percent of *all* trips are made by automobile *(2)*.

Despite this apparently simple connection between parking and transit ridership, there are complex factors at play in metropolitan areas that caution against a blanket recommendation of an across-the-board increase in parking prices as a means of increasing transit ridership. This paper considers the issues surrounding the relationship between parking and transit ridership and provides recommendations for policy-makers who seek to include parking strategies as part of an overall transportation policy aimed at reducing automobile travel.

METHODOLOGY

The Eight Parking Strategies

Eight parking strategies are assessed along five dimensions. The strategies are divided into two categories: price based and nonprice based. The price-based strategies include three parking pricing approaches:

- Increasing the Price of Parking, Based on a Tax on Revenues

- Increasing the Price of Parking, Based on a Tax on Parking Spaces
- Cashing-Out Employer-Provided Parking

1985 travel data from the Portland, Oregon, region was used to estimate the impact of different parking strategies on mode share. The Portland destination- and mode-choice models for home-based work purposes were reestimated to incorporate parking costs explicitly. These analytical techniques did not allow for precise estimates of specific parking pricing strategies, because of the inability of the models to separate parking price from other travel price effects. A chief factor contributing to this inability is the use of zonal average parking prices—the zonal averages are strongly influenced by the large number of zero and missing prices resulting from the fact that so many commuters do not pay for parking. This research relied on a number of alternative definitions of cost and distance variables with different values in an attempt to find the best model that could include a separate parking cost variable. These methodological drawbacks indicate that while the results of the Portland destination- and mode-choice model suggest tendencies, they should be interpreted with caution.

This paper also discusses two other price-based strategies, although their modal effects were not modeled:

- Expanding Meters and Accompanying Residential Permit Programs
- Parking Impact Fees

Finally, three nonprice-based strategies, whose effects also were not modeled, are included in the discussion:

- Changes in Zoning Ordinances to Restrict Parking Supply
- Shared Parking
- Transportation Demand Management approaches, consisting of
    - satellite parking-shuttle lots
    - preferential parking for carpoolers
    - transit incentive programs

Five Dimensions of Assessment

The parking strategies were assessed across the following five dimensions:

- **effectiveness**, in terms of increasing regionwide transit worktrip share, as estimated by the destination- and mode-choice modeling mentioned above
- **scope**, in terms of targeting peak-hour drivers (*temporal scope*), specific types of driver or trip (*functional scope*), and specific geographic areas (*spatial scope*)
- **political feasibility**, in terms of stakeholders made worse or better off; the extent to which revenues might be used to finance mechanisms for compensating those made worse off; and the extent to which the strategy results in both short- and long-term unintended negative consequences, such as spillover parking or decentralization
- **economic efficiency**, in terms of correcting failures in the overall transportation market and in terms of avoiding the creation of additional inefficiencies or negative externalities (such as inadequate parking supply)
- **ease of administration and implementation**, in terms of cost; technological requirements; and necessary reform or creation of new procedures, agencies, institutions, and legislation

The strategies were assessed using a qualitative assessment ratings, such as "high," "moderate", and "low." Where quantitative modeling underlay the assessment, the qualitative ratings were based on the quantitative findings (for example, with respect to strategies' effectiveness in increasing worktrip transit share). Otherwise, the ratings are derived from a review of the literature and from five case studies conducted to provide illustrations of some of the strategies that policy-makers are currently implementing throughout the U.S.:

1. a study of parking policy and travel behavior in twenty metropolitan areas and their central cities, based on surveys of parking officials *(3)*and on data from the 1990 Nationwide Personal Transportation Survey *(2)* and the Federal Urban Mass Transportation Administration *(4)*
2. a study of parking policy in eleven "edge cities," based on surveys of parking officials in those areas
3. a case study of parking policy in Portland, Oregon, which has been implementing a wide range of parking strategies for over two decades, based on interviews with key informants and on archival records *(5)*

4. a case study of parking policy in Midtown Atlanta, a new development occurring outside of the downtown area, in which zoning codes do not require developers to provide any parking *(6)*
5. a study of transportation demand management and parking procedures at several universities and hospitals, based on interviews with key informants

ASSESSMENT OF PRICE-BASED PARKING STRATEGIES

This section provides an assessment of five price-based parking strategies. The next section presents the assessment of the three nonprice-based parking strategies. Table 1 provides a summary of these two sections.

Increasing the Price of Parking, Based on a Tax on Revenues

One way to stimulate pricing of parking is to tax the revenues that parking providers generate. The economic rationale for this tax is to impose on motorists the social cost of driving, in addition to the private cost. This strategy would target providers who presently realize revenues, i.e., those in the central business district (CBD) and other high-density areas. Parking providers located in the suburbs and other low-density areas do not charge for parking and hence do not realize revenues.

This type of parking tax is estimated to have a moderate effect on increasing transit ridership. A 20-percent tax on revenues is estimated to result in a 7-percent increase in transit share for home-based worktrips regionwide, although the effects of this strategy would vary according to whether the price increase is occurring in an area with high transit service or in an area with low transit service. The effects would also vary, of course, depending on the size of the tax.

Scope

The temporal scope of this strategy is broad, since it is not aimed specifically at peak-hour drivers. This strategy would affect only those drivers who currently pay to park, making the functional scope fairly narrow. Its spatial scope is also fairly narrow because the strategy would apply only to those denser locations where parking is already priced.

Political Feasibility

This strategy is expected to have moderate political feasibility. In general, travelers would benefit from a decrease in travel and parking congestion resulting from a moderate increase in transit share. Those made worse off include auto users who cannot afford the price increase, e.g., low-income people who drive to and park in the CBD; and employers, retailers, and service providers located in the CBD, who might protest additional constraints on parking.

Depending on the level of the tax, policy makers could use the revenues from this strategy to compensate those made worse off if the administrative costs associated with identifying and compensating those individuals and groups did not outweigh the benefits of doing so.

Because CBD firms and commuters would be at a disadvantage relative to the suburbs—where this strategy would not apply—this approach could stimulate decentralization over the long term, despite the relatively superior transit service in the CBD. Another problem is that there would almost certainly be spillover parking into unmetered on-street spaces.

Efficiency

Because this strategy is likely to result in spillover parking—as well as in long-term differential impacts between the CBD and the suburbs—this tax has low to moderate economic efficiency. This strategy's economic efficiency could be further compromised if the tax is set too low or too high. If set too high, it would cause a shift from single-occupancy vehicle (SOV) travel in the short term but encourage decentralization in the long term. If the tax is set too low, the modal impact would be slight and the only impact would be the resulting revenues.

Implementation Issues and Ease of Administration

Half of the cities included in the survey of parking policy in twenty central cities impose a tax on parking revenues, and in about half of these, the tax is just an application

of the regular sales tax. The tax on parking revenues appears to be primarily for revenue generation and is largely unrelated to transportation policy in general. Indeed, cities are not currently taxing parking revenues at a rate high enough to stimulate the pricing of parking or cause a mode shift.

The ease of administration of this strategy is moderate to high. While little new technology would be needed, the approach does require that a monetary transaction occur, so mechanisms need to be in place for handling that transaction. Some new agencies and procedures may be necessary, as well, for levying, collecting, and enforcing compliance with the tax.

Increasing the Price of Parking, Based on a Tax on Parking Spaces

Another way of stimulating parking pricing is by taxing actual parking spaces, rather than revenues. Such an approach would affect all parking, not just that in high-density areas where parking is presently priced.

Effectiveness

In the CBD, where there are few opportunities for spillover parking, parking providers are likely to pass a large percentage of the tax on to drivers; the effect on increasing transit share should be high—a $1 tax per space is estimated to result in a 22-percent increase in transit share for the home-based worktrip regionwide. In the central city and suburban business districts, where there are more opportunities for spillover parking, providers will probably pass less of the tax on to drivers; the effect on transit would be relatively low, particularly if the available transit service is not of very high quality. In business districts outside of the CBD, travelers may be more inclined to switch to carpooling rather than transit.

Scope

This strategy is broader in its aim than the tax on parking revenues. Although it might affect a larger percentage of peak-hour drivers, it is not aimed specifically at that

group. Instead, it would impact *all* drivers who park in the CBD or other central city or suburban business districts. This strategy thus has a broad temporal, functional, and spatial scope.

Political Feasibility

This strategy is expected to have low political feasibility. Those whom this strategy makes worse or better off are similar to those whom the tax on parking revenues would affect, except on a broader basis: they would include all travelers to central city and suburban business districts as well as to the CBD, where the parking providers could pass the tax on to drivers. The impact would also be more extensive, and, thus, this strategy would be more effective in reducing SOV share and increasing transit share. Therefore, while this strategy would make those who benefit from reductions in congestion would much better off than under the previous strategy, it would make those who cannot afford the price increase much worse off. In addition, the differential effect resulting from variations in density would impact drivers parking in high-density areas more strongly than those in low-density areas. The primary negative impact would be on parking providers in low-density areas, who are unable to pass the tax on to motorists and who therefore have to absorb it.

Like the tax on parking revenues, this strategy may stimulate decentralization over the long term, as CBD employees and firms might find suburban locations more attractive, though this effect may be offset if firms have to absorb a larger proportion of the tax in such areas. Another drawback to this approach is that it would result in spillover parking onto unmetered on-street spaces.

Efficiency

This strategy is broad in scope, would result in the additional externality of spillover parking, and is likely to stimulate decentralization over the long term. Thus, its economic efficiency is low. If the tax is too high in magnitude, the resulting SOV

reduction could compromise efficiency by creating more distortions than it would correct. If the tax is too low, it would have little modal effect.

Implementation Issues and Ease of Administration

The case studies also illustrate potential problems with a tax on parking spaces. None of the twenty surveyed cities levies a per-space tax. There are two possible explanations for this. One is that, unlike a tax on parking revenues, a tax on parking spaces would not be part of an existing sales tax; thus, this strategy would require a new tax. Implementation impediments might also arise because of the differences in incidence between the central city and the suburbs: parking providers may be more likely to pass a tax on off-street spaces on to drivers in the high-density CBD but may be more likely to absorb the tax in the low-density suburbs.

The ease of administration of this strategy is low. This tax would require new legislation; existing legislation authorizing a sales tax would not be adequate, because this tax would not be based on a monetary transaction. Implementation of this tax would also require new agencies and procedures for counting spaces and levying, collecting, and enforcing compliance.

Cashing-Out Employer-Provided Parking

Cashing-out employer-provided parking is a strategy whereby employers would give their employees the cash equivalent of any parking benefit provided, and employees could then either spend that cash toward paying for the parking (rather than continuing to receive it free) or spend it toward any other purpose, including transit. Current legislation limits cashing-out to employers who lease parking, because it is easier to impute a cash value to that parking than to parking that the employer owns. The cash-out amount is also limited only to those employees to whom employers presently offer parking, not to *all* employees.

Effectiveness

Some studies have estimated very optimistic effects on transit as a result of cashing-out strategies. These studies, however, have focused on the estimated impacts for a given site, such as an individual employer *(7)*. The simulations conducted for this paper estimated effects on worktrip transit ridership for the entire Portland metropolitan area. The results suggest that a 9-percent increase in regional transit ridership for the home-based worktrip would result from a $3-per-day cash-out applied in the CBD and near-CBD and a $1-per-day cash-out applied in regional activity centers.

Scope

Cashing-out targets only peak-hour drivers; thus, the temporal scope is narrow. If cashing-out is limited to leased parking, the functional scope is also narrow, because this strategy is aimed specifically at commuters who park in leased spaces. The spatial scope is moderate to narrow, because the strategy would apply to all individual employment sites within a region, although only whose where employers lease parking. If cashing-out is *not* limited to leased parking, its functional and spatial scopes would be broader.

Political Feasibility

Cashing-out has moderate political feasibility. The fact that most proposals for cashing out focus on parking that the employer leases and that most leased parking is in the CBD—where market rates are also their highest—has some impact on which groups this strategy makes worse or better off. All employees to whom employers offer the cash-out option would be better off because they would have a choice they did not have before.

Those who would benefit from the slight reduction in congestion are also among those whom cashing-out makes better off, even if they are not among those who have the cash-out option. Assuming that this strategy would apply only to leased, and therefore CBD parking, these beneficiaries would include travelers to the CBD whose time is highly valued, transit interests, and local officials concerned with improved access to the CBD. Because of better transit service in the CBD, cashing-out may encourage centralization

over the long run, and local officials and CBD retailers may benefit from this centralization. Employers who have to cash-out employees to whom they previously offered free parking but who did not use it (e.g., transit users) constitute the primary group made worse off; the administrative costs associated with cashing-out may also be disadvantageous to employers, as would the effect of increasing salaries to compensate employees for the loss of the tax exemption.

No revenues would result from cashing-out with which to offset the negative impacts to those whom cashing-out would make worse off; cashing-out is, in fact, designed to be revenue neutral.

Efficiency

Cashing-out is more efficient than the previous two strategies. It is more narrow in scope, although it still affects only a small percentage of all commuters. Although some spillover parking may result, cashing-out is designed to generate few other negative externalities. Its economic efficiency is thus moderate.

Implementation Issues and Ease of Administration

Although currently in place on a limited demonstration basis in the Los Angeles region, none of the cities surveyed for this research has implemented cashing-out. However, a parking advisory committee in Portland identified current federal tax legislation as the primary impediment to cashing-out, because under a cash-out program, employees who choose the previously tax-free parking option would now be taxed on the value of the parking *(8)*. In addition, as of 1996, employers may deduct $165 per month per employee parking benefit, but only $65 per month per employee transit or ridesharing benefit. These problems result in negligible incentives for commuters to switch from SOV commuting to another mode.

This strategy is expected to have a moderate ease of administration. While little new technology or institutional change would be required, employers would have to take on the task of administering the cash-out program.

Expanding Meters and Accompanying Residential Permit Programs

This strategy would extend meters outside of the CBD, to other business districts within the central city and suburbs. It would also involve instituting residential permit programs in areas surrounding the metered locations to ward off spillover parking from metered spaces into nonmetered residential zones. Residents would pay a small annual fee to purchase a sticker for their automobile, and visitors may park in the zone for a limited amount of time, such as two hours. Others are not allowed to park in the permit zone.

Effectiveness

This strategy was not modeled and its effects were not quantified. However, it is expected to result in a low to moderate effect on transit ridership, with the greatest impact being in areas with high-quality transit service. This strategy is best suited to areas experiencing problems with spillover parking, such as locations close to downtown or other places where off-street parking is priced.

Scope

In areas where spillover parking is a particular problem, on-street meters and permit programs target all-day parkers, and thus the temporal scope is broad (peak-hour drivers are not singled out). Overall, however, the approach is aimed at employees, so the functional scope is narrower. The spatial scope of this strategy is also narrow, as it is applied in specific districts and neighborhoods.

Political Feasibility

This strategy has moderate political feasibility. Those made better off by this strategy include travelers on shopping or personal business trips, who are more likely to find on-street spaces not filled by employee parking. Neighborhood residents also benefit by not having to compete with employees for on-street spaces. Some residents, however, may object to the annual fee, although it is usually small, and to the short time period for

visitors. Transit interests would benefit from the modest increases in ridership, as would local officials concerned about improving access to the CBD.

Although retailers and service providers may benefit from a greater number of customers due to turnover of metered on-street spaces—and particularly higher income customers, who are more likely to pay to park—business owners tend to be the most vociferous opponents of permit and meter programs. Despite proponents' assurances that firms would not suffer financial losses and that in fact business conditions might even improve, most businesses oppose any measures that would restrict their customers' access. Others who object to these programs are long-term parkers, particularly employees, who attempt to spill over from nearby priced parking; other opponents are those who continue to park and pay, even though they find the fees a financial hardship.

Where parking is in high demand (e.g., in high-density activity centers), significant revenues can result with which to compensate those whom this strategy makes worse off. Policy-makers could use these revenues as Donald Shoup suggests, that is, to create "benefit districts," where the city funnels revenues back into the district in the form of benefits such as improved landscaping and lighting, bicycle and pedestrian amenities, and improved transit *(9)*.

Efficiency

This strategy has moderate to high efficiency, depending on where officials implement it. If they implement meters and permits in high-density areas with excess demand for parking, the programs will be more efficient than if implemented in low-density locations with excess parking supply. The fact that this strategy expressly addresses the externality of spillover parking also enhances its efficiency. If officials set meter and permit rates to inefficiently high (or low) levels, however, efficiency may be compromised.

Implementation Issues and Ease of Administration

The survey of parking policy in twenty central cities reveals that parking meters are employed outside of the CBD in most, but not all, of the cities. In most of the cities, residential permit programs complement on-street metering outside of the CBD. However, in five of the cities where most of the meters are located *outside* of the CBD, no residential permit program is in place, suggesting that spillover problems are either not serious or remain unaddressed. On the other hand, it may be that the primary purpose of the metering program is revenue generation rather than control of parking supply or stimulation of pricing.

As with parking taxes, a program of extended parking meters and residential permits is part of an overall transportation policy in only a few cities. Portland is an example of a city that is endeavoring to tie parking policy to an overall transportation policy. Portland has been trying to extend meters and permits into the Lloyd District, a commercial and retail area just across the Willamette River from the CBD. A district task force has proposed a package that includes parking meters for on-street parking and permit programs for nearby residential neighborhoods. Area businesses have indicated their willingness to support the package only if it also includes certain transit improvements such as extension of the city's "Fareless Square" (presently confined to the CBD) and more direct bus service. The city has approved the plan, but due to a lack of political support, has not yet implemented it.

There are other districts in Portland whose plans also include recommendations for extending meter and permit zones. The political process involved with implementing these measures in all of these districts is proving to be complex. In the six years since the plans were first initiated, no additional meters or residential permit zones have yet been implemented. Businesses are reluctant to support extension of metering without significant—and expensive—transit improvements; meanwhile, in Portland, as in many cities, the legal process for implementing residential permit programs is very involved.

The ease of administration of this strategy is low to moderate. Not only are extensive surveys required, but both residential permit and on-street metering programs require monitoring and enforcement. Although fees and fines can contribute to city revenues, they require that mechanisms be in place for collection and dissemination.

Parking Impact Fees

Parking impact fees are a subset of road impact fees; that is, in some situations the number of parking spaces that a new development provides may be taken as a proxy for the impact that development will have on the transportation system. Authorities would impose a one-time fee on developers, which is meant to cover the costs the parking creates for the transportation system as a whole. Impact fees might provide an incentive for developers to provide only the amount of parking actually needed.

Effectiveness

The researchers expect that the full effect of impact fees would not be apparent in the short term and is thus difficult to estimate. The effect would probably be very low in the short term and somewhat greater in the long term. In any case, impact fees would affect areas of new development only.

Scope

Impact fees would have a broad temporal scope because they would not specifically target peak-hour drivers. Their functional scope is more narrow because they would affect only a small percentage of drivers or trip types. Because they would be aimed specifically at parking in areas of new development, their spatial scope is also fairly narrow.

Political Feasibility

The political feasibility of parking impact fees is moderate to high, as "making development pay its own way" is currently a popular notion among policy-makers and the public. Those whom this strategy would make better off are those individuals in and users

of already-developed areas, who would benefit from increasing the cost of new development. This would include slow-growth advocates, as well as the authority collecting the revenues. Those made worse off would include owners of newly developed land, who would have to absorb the fee if they could not pass it on in the form of higher prices. Users of newly developed areas would be worse off, as well, if the developers and businesses passed the impact fee on in the form of a high parking fees or higher prices for goods and services.

Although this strategy would yield revenues to the authority imposing the impact fee, in general, states may not use an impact fee for any purpose other than "to meet the service needs directly attributable to the project bearing its cost" *(10)*. In addition, impact fee revenues "must be segregated until used and must be expended in timely fashion (generally, within five or six years) for the purposes originally designated." These restrictions, known in judicial terms as "rational nexus," have been applied by the courts of most states. The implication is that there may be strict limitations on how and when the revenues from impact fees may be spent. It may not be possible to divert these revenues to mechanisms, such as transit improvements, for compensating those negatively impacted by the fees. This issue could possibly detract from the political acceptability of parking impact fees, if that acceptability hinges on using revenues for compensatory purposes.

Over the long term, impact fees may stimulate more compact development in areas of new growth; compact development is one common response in areas with restricted parking supply, which, although desirable to many environmentalists and slow-growth advocates, might in turn have the unintended consequence of increased congestion. As with many other strategies, impact fees may also engender spillover parking.

Efficiency

Parking impact fees are likely to have low to moderate efficiency. Such fees are a very indirect means of influencing modal behavior. In addition, if the fees result in inadequate parking supply, they may engender spillover parking. However, insofar as

existing parking supply standards might be too high, parking impact fees would stimulate a more efficient supply of parking.

Implementation Issues and Ease of Administration

While none of the case studies revealed any examples of parking impact fees, existing instances of road impact fees provide illustrations of the implementation challenges involved with parking impact fees, particularly with respect to the "rational nexus" limitations discussed above.

The ease of administration of parking impact fees is moderate. Some institutional and legal change would probably be required for the implementation and collection of the fee. The fact that the fee is a one-time-only charge lessens any potential administrative difficulty. Ease of administration would be significantly compromised if legislative changes were necessary to modify the rational nexus provisions that limit the use of revenues resulting from impact fees.

ASSESSMENT OF NONPRICE-BASED PARKING STRATEGIES

This section addresses three nonprice-based parking strategies, which, along with those strategies discussed above, are summarized in Table 1.

Changes in Zoning Ordinances to Restrict Parking Supply

This study evaluates three types of modifications to zoning ordinances: decreasing minimum parking requirements, imposing maximum parking requirements, and issuing conditional-use permits.

Because ordinances typically base minimum parking requirements on the amount of parking that would be required during times of peak use—during holiday shopping season, for example, at a mall—they often result in excess supply during nonpeak periods. Zoning ordinances often contain minimum parking requirements to ensure adequate parking supply and to discourage spillover parking during peak periods, but result in excess supply the rest of the time *(11)*. Thus, one way to modify zoning ordinances is to

decrease these minimums to bring them closer to typical nonpeak needs. Another approach is for zoning codes to impose parking maximums, which would cap the amount of parking developers may provide. Alternatively, municipalities may grant conditional-use permits allowing a developer to provide an amount of parking that is below the minimum stated in the zoning code. Frequently, in such scenarios, cities require developers to furnish support for alternative transport modes or pay money into a city "in-lieu fund" in exchange for being allowed to provide below the minimum. Cities also implement in-lieu funds when the provision of on-site off-street parking is not feasible. In these cases, the in-lieu funds are typically used to subsidize municipal lots or structures, as well as alternative transportation modes.

Effectiveness

Effects on transit share would vary greatly according to local conditions and would differ in the intermediate and long term. These strategies are all estimated to have very low effects in the short term, with only slightly higher in the long term.

Scope

Changes in zoning ordinances would not specifically target peak-hour drivers; hence, the temporal scope is quite broad. Their functional scope is more narrow, because these strategies would impact only a small percentage of drivers and trip types. Finally, because these change would be confined to areas of new growth, their spatial scope would also be fairly narrow.

Political Feasibility

These approaches are expected to have moderate to high political feasibility. In general, developers benefit from reduced costs associated with providing less parking. Those whom such strategies might make worse off include travelers, if the new parking supply turns out to be too low, as well as firms that might suffer business losses as a result of inadequate parking supply.

Of the three strategies in this category, only conditional-use permits would generate revenues, and, although these could be used to support alternative transport modes, it would be difficult to identify and compensate directly any individuals or groups made worse off.

Like parking impact fees, changes in zoning ordinances would affect areas of new development only. This fact restricts these strategies to the suburbs and other areas of new growth and may thus be perceived as punitive in those areas. In addition, where they are in effect, they may stimulate slightly more compact development. If either minimums or maximums end up resulting in inadequate supply, spillover may result.

Efficiency

Changes in zoning ordinances are likely to have low to moderate economic efficiency for the same reasons as parking impact fees: although the temporal scope is generally broad, existing inefficiencies due to oversupply of parking may be corrected. If the changes result in an inefficient *under*supply of parking, however, economic efficiency is not improved.

Implementation Issues and Ease of Administration

The case study of parking policy in Midtown Atlanta is an example of reducing minimum parking requirements in an area with good rail transit service *(6)*. The Special Interest Districts (SPIDs) in Midtown Atlanta have no parking minimums. When all parking facilities are included in an assessment of parking ratios that have developed inside SPIDs since 1980—including surface lots not connected with buildings—the parking ratios inside the SPIDs are lower than those outside. The Atlanta case suggests, however, that a parking policy that focuses on just one element—minimums—may not guarantee that there will be changes in travel and parking behavior. By themselves, minimums—which allow flexibility in choosing the number of spaces to be provided—do not necessarily result in lower parking ratios. The relatively low ratios inside the Atlanta SPIDs may be the result of unique factors, such as the widespread availability of very low-

priced parking on vacant land outside the SPIDs. In addition, to enhance political acceptability, policy-makers need to ensure that reductions in parking supply are accompanied by significant transit service improvements.

The ease of administration of these changes in zoning ordinances is moderate. Both maximums and minimums must be enforced, and so it is up to the municipality to monitor developments to make sure the standards are met. Where conditional-use permits are involved, it is also up to the municipality to monitor the developments to make sure that the minimum number of spaces has not been exceeded *and* that the agreed-upon alternative transportation programs are being provided. Ensuring compliance is easiest if the developer agrees to pay a fee rather than to provide the alternatives.

Shared Parking

The City of Portland's zoning regulations define shared parking as the "joint use of required parking spaces . . . where two or more uses on the same or separate sites are able to share the same parking spaces because their demands occur at different times" *(12)*. Typical examples of land uses that can share parking because of different peaking characteristics are a church and an office building, a dinner restaurant and an office building, a movie theater and a shopping center, a school and a recreational event.

Effectiveness

Shared parking facilities would have no direct impact on transit ridership. Shared parking may indirectly facilitate transit because the strategy would promote more compact and denser developments, as establishments "cluster" around their shared parking facilities. The higher densities would likely benefit transit. In addition, to the extent that a third party (e.g., a parking operator) provides the shared parking and prices it at market levels, this strategy would have a low to medium effect on SOV reduction.

Scope

Shared parking has a fairly broad temporal and functional scope in that it does not target peak-hour drivers or specific types of trips and travelers. Like parking impact fees and changes in zoning ordinances, however, the spatial scope would be more narrow.

Political Feasibility

The political feasibility of shared parking is moderate to high. Developers and firms can benefit from shared parking because they save on monetary outlays in providing exclusive parking spaces. In some cases, firms might benefit from increased traffic as a result of the shared spaces. For example, commuters parking in a dinner restaurant lot might stop to have dinner after work before heading home. Those whom shared parking makes worse off include the developers, who have to pay the additional costs associated with the shared-parking analysis required by most municipalities. Drivers might also be made worse off if shared parking supply is inadequate. Shared parking might also harm some firms if the strategy results in a parking shortage that makes them less competitive with other firms.

The revenues that result from shared parking come from the additional fees paid by developers; city officials use these fees to finance the review process. There are probably not enough excess revenues to be funneled into compensating the few whom this strategy might negatively impact.

Shared parking may restrict parking supply and may thus facilitate compact development; it may also fuel centralization of activities. Spillover parking onto unmetered on-street spaces may also follow, if shared parking results in inadequate parking of off-street supply.

Efficiency

Shared parking, like parking impact fees and changes in zoning ordinances, may stimulate a more efficient supply of parking, thus enhancing economic efficiency. On the other hand, the strategy is broad in temporal and functional scope and may result in

spillover parking if supply proves inadequate. As stated above, if shared parking were to be provided by a third party and priced at market levels, this may mitigate inefficiencies due to free or below-market pricing. Thus, shared parking has a moderate efficiency rating.

Implementation Issues and Ease of Administration

There are several institutional barriers to shared parking within the current regulatory environment, and thus, the ease of administration for implementing shared parking under current conditions is rated as low to moderate.

The Portland city code, for instance, requires developers to submit a multitude of documentation to the Bureau of Planning as part of the building permit application or land review process for shared parking. It also requires an analysis showing that the peak parking times of the uses occur at different times and that the parking area will be large enough for the anticipated demands of all uses. Aside from the burden of paying for this analysis, there are other barriers. One is the land review process, which can attach conditions (such as shared parking) to a current development proposal, but cannot attach conditions to existing adjacent land uses—that is, it cannot require adjacent developments to participate in the shared parking arrangement.

Transportation Demand Management

The transportation demand management (TDM) policies that this report considers are satellite parking-shuttle lots, preferential parking for carpoolers, and transit-incentive programs. These are typically implemented by large employers or transportation management associations (TMAs). TMAs are private enterprises, most commonly found outside of central cities, which charge employers and firms a fee to provide a variety of transportation-related services, such as shuttles, child care, carpool matching, and bicycle amenities.

A satellite parking-shuttle lot approach would involve an employer or TMA furnishing an off-site parking lot and transportation to and from the lot to the main destination. This strategy differs, however, from the more formal park-and-ride lot that is typically located at a large distance from the traveler's destination and is operated in conjunction with the regional transit provider.

Preferential parking for carpoolers involves employers converting a fairly large number of preferentially located SOV parking spaces to preferentially priced carpool spaces.

Transit incentive programs are implemented by major employers and are typically part of a larger transportation policy either at the institution or within the region. For example, an employer might stimulate transit use by not only subsidizing transit passes in part or in full for employees, but by giving transit commuters a "parking allowance," enabling them to park free for a limited number of days per month.

These TDM approaches are included in this research not only because of their merit as parking strategies but because such alternatives are necessary for compensating those whom pricing approaches might make worse off. In other words, travelers priced away from SOV use will need a viable alternative, and a TDM approach such as transit incentives can provide that.

Effectiveness

Of the three TDM strategies, satellite parking-shuttle lots would probably have the lowest impact on SOV and transit share, as they would not encourage mode shift. Rather, they are more of a mechanism for managing on-site parking supply and demand. Preferential parking for carpoolers is likely to have a low to moderate impact on SOV use, depending on how high the price for SOV spaces becomes. It is not likely to have any positive impact on transit share, however, as there is no incentive for travelers to choose transit over carpooling under this strategy. Transit-incentive programs are likely to have a somewhat higher impact on reducing SOV share *and* on increasing transit share, as well.

A combination of all three approaches may result in a moderate mode shift overall, although this shift is likely to be confined to the origin and destination of those commuting to the institutions where the strategies are implemented.

Scope

These three strategies are all aimed at peak-hour travelers. Thus, their temporal and functional scopes are narrow, while their functional scope is broad to moderate. Because these strategies would be applied in specific geographic locations, their spatial scope is narrow as well.

Political Feasibility

The overall political feasibility of TDM strategies is high. A primary beneficiary from satellite parking-shuttle programs is the establishment or employer that cannot afford to add more parking spaces on-site. Others negatively impacted would include users of the satellite facility, if they considered on-site parking to be more convenient. If the cost of providing the facilities is more than the cost of expanding on-site parking, this strategy might negatively impact employers as well.

Those who would be made better off by a strategy of preferential parking for carpoolers include those who already commute by carpool and SOV or transit commuters who are willing to convert to carpool commuting. All peak-hour commuters would also benefit from a moderate decrease in congestion. Those made worse off, on the other hand, would include those SOV commuters who are unwilling or unable to convert to carpool, while at the same time unwilling or unable to pay the premium prices for SOV spaces.

Beneficiaries from a transit-incentive program would, of course, include transit riders. But because of moderately high reductions in SOV travel that can result from such a strategy, all peak-hour commuters would benefit from moderate decreases in congestion. The parking allowance element of this strategy—which allows transit users to park on

occasion—can result in a shortage of parking, thus negatively impacting all drivers to the location.

The only one of these strategies capable of generating excess revenues is preferential parking for carpoolers, which would involve increasing the price of SOV parking. It may be possible to use some of these revenues to compensate those made worse off by the strategy, such as low-income drivers who are unable to carpool.

Efficiency

These strategies are fairly targeted in scope in the locations where they are implemented; that is, they are directed toward the peak-hour commuter. This contributes to economic efficiency, although the overall percentage of all commuters affected may not be very great. Long-term impacts on urban structure, if any, are minimal. Short-term problems, such as spillover parking, may result, but not to the extent expected by some of the other strategies. Thus, these strategies have moderate to high efficiency; this may be compromised, however, if high subsidies are required to support the programs.

Implementation Issues and Ease of Administration

There are several examples of situations in which institutions or other entities employ TDM strategies that include parking programs such as satellite parking and preferential parking for carpoolers. The study of parking policy in the eleven edge cities provides examples of transportation demand management. In order to meet growing transportation needs or state mandates, an increasing number of transportation management associations (TMAs) are taking root in edge cities and other noncentral locations. A good example is Warner Center, in the Los Angeles region. Warner Center includes about 15 million square feet of development, mostly retail and office, with about 40,000 employees. Its TMA is the Warner Center Transportation Management Organization (TMO), which provides a wide variety of services, including a midday shuttle, child care, computerized carpool matching, vanpool incentives, transit and rail pass distribution, commuter shuttles, a guaranteed ride home program, and a bicycle club.

Parking maximums set a cap on parking supply, although supply is still adequate enough to allow for free parking for 40 of the 45 largest employers. Despite the nearly ubiquitous free parking, SOV commuting within Warner Center has fallen from a high of 85 percent in 1987 to a low of 70 percent in 1994; this decline may be attributed in large part to the transportation demand management programs.

Another example of transportation demand management is that found at universities, as revealed by the study of parking procedures at universities and hospitals. The University of Washington, for example, implemented a transportation management program in 1991 to serve its 50,000 employees and students. The central feature of the program is the U-PASS, a highly discounted transit pass offered to those holding university identification cards. The program involves increased transit service, shuttle service, free carpool parking for holders of the U-PASS, vanpools, ridematching, bicycle amenities, and reimbursed ride home for transit riders.

Prior to the program's inception at the University of Washington, transit share was 21 percent, carpooling 10 percent, and SOV 33 percent. Walking, bicycling, and other modes made up the remaining 36 percent. With the program in place, transit share has risen to 33 percent and carpooling to 11 percent, while SOV has dropped to 23 percent. The remaining modes are capturing 33 percent.

The ease of administration for these strategies varies. Satellite parking-shuttle lots are very expensive to implement. Employers or independent operators typically lease the facilities, and the cost of leasing is highest for facilities in or near the CBD. These facilities also work best if shuttle service is both very frequent and fairly fast and if operators provide security at the lots. Operators will have to sustain large deficits, rely on generous subsidies, or pass some or all of the cost on to the commuters. If an employer is operating the shuttle, insurance costs must be added to the operating expenses. Employers might also want to bar junior employees from on-site spots and require them to use the remote lots. Such differentiation incurs additional administrative costs in

implementation and monitoring. The employer's losses in operating such a facility are offset only insofar as the costs of providing additional on-site parking would be higher. The ease of administration of this strategy is low.

Preferential parking for carpoolers has a moderate ease of administration. For preferential parking to be effective in diverting meaningful numbers of drivers to transit or carpool, the carpool spaces have to be significantly better in terms of location, security, price, and other amenities (e.g., located in a covered structure) than the remaining SOV spaces, which drivers must therefore consider to be highly undesirable in comparison.

Transit incentives have a moderate ease of administration. Employers need to identify a means for distributing free or discounted transit passes. They also need to determine how to manage the parking allowance, if they choose to provide it.

Table 1: Assessment of Individual Parking Strategies
See Chapter Introduction for an explanation of ratings.

Strategy	Effectiveness	Scope	Political Feasibility	Efficiency	Ease of Administration
increasing the price of parking, based on a tax on revenues	moderate	*temporal*: broad *functional*: moderate-narrow *spatial*: moderate-narrow	moderate	low to moderate	moderate to high
increasing the price of parking, based on a tax on parking spaces	high in CBD with good transit service; lowest in suburban business districts or where transit service is low	*temporal*: broad *functional*: broad *spatial*: broad	low	low	low
cashing-out employer provided parking	moderate	*temporal*: narrow *functional*: narrow *spatial*: narrow	moderate	moderate	moderate
expanding meters and accompanying residential permit programs	low to moderate	*temporal*: broad *functional*: moderate-narrow *spatial*: narrow	moderate	moderate to high	low to moderate
parking impact fees	very low in short term; somewhat greater in long term	*temporal*: broad *functional*: narrow *spatial*: narrow	moderate to high	low to moderate	moderate

Table 6: Assessment of Individual Parking Strategies (Cont'd)
See Chapter Introduction for an explanation of ratings.

Strategy	Effectiveness	Scope	Political Feasibility	Efficiency	Ease of Administration
changes in zoning ordinances to restrict parking supply: • **decreased minimums** • **parking maximums** • **conditional-use permits**	very low in short term; somewhat greater in long term	*temporal*: broad *functional*: moderate-narrow *spatial*: narrow	moderate to high	low to moderate	moderate
shared parking	low	*temporal*: broad *functional*: broad *spatial*: moderate-narrow	moderate to high	moderate	low to moderate
satellite parking-shuttle lots	low	*temporal*: narrow *functional*: narrow *spatial*: narrow	high	moderate to high, unless high subsidies are required	low
preferential parking for carpoolers	low to moderate	*temporal*: narrow *functional*: narrow *spatial*: narrow	high	moderate to high, unless high subsidies are required	moderate
transit-incentive programs	moderate	*temporal*: narrow *functional*: narrow *spatial*: narrow	high	moderate to high, unless high subsidies are required	moderate

CONCLUSIONS

Table 1 summarizes the assessment of the strategies discussed in this chapter. With the exception of the increase in the price of parking, based on spaces, all of the parking strategies considered here have a moderate to high degree of political feasibility. Most also are moderately easy to implement. Only those that are employer-specific, such as cashing-out and the TDM strategies, are well targeted to peak-hour travelers; the others, as presented here, are perhaps too broad to recommend their implementation.

Overall, the best strategies in terms of political feasibility are parking impact fees, changing zoning ordinances, shared parking, and TDM approaches such as satellite parking-shuttle lots. The strategy with the highest level of effectiveness in changing mode share—increasing the price of parking, based on a tax on spaces—is also the least politically feasible.

No single strategy is both effective in terms of increasing transit ridership and without difficulties in terms of scope, political feasibility, efficiency, and administration. Rather, policy-makers should implement *combinations* of parking strategies. Table 2 identifies six possible combinations and the components thereof.

Table 2: Combination Packages by Policy Goal and Component Strategies

Policy Goal / Strategy	encourage transit ridership through explicit parking pricing in areas of congested peak-hour travel and parking	encourage transit ridership by workers who park free in employer-leased parking	encourage transit ridership by employees and users of special generators: high-density employers with limited parking supply	address parking problems and decrease SOV use in suburban activity center or other noncentral area of growth	encourage transit ridership through explicit parking pricing in non-CBD commercial areas with parking problems	address parking problems in high-density housing areas susceptible to spillover parking from nearby commercial areas
increasing parking price by tax on revenues	++	0	+ (see ** below)	0	0	0
cashing-out employer-provided parking	+	++	+	NA	0	NA
expanding on-street meters	+	C	C	+	++	+
expanding residential permit programs	+	C	C	C	C	++
parking impact fees on new development of parking	C	C	0	++	NA	NA
changes in zoning ordinances to restrict parking supply	C	C	0	++	NA	NA
shared parking	C	C	0	++	++	NA
transportation demand management	C	+	++	+	+	NA
Compensatory Mechanisms						
cash-out subsidy	+	+	+ (see ** below)	NA	0	NA
financing of transportation demand management	++	+	++ (see ** below)	++	0	NA
enhanced transit service	++	+	++ (see ** below)	0	++	+
improvements/amenities in infrastructure or transportation system	+	0	0 (see ** below)	0	++	++
reduction of other taxes	+	0	NA	0	0	0
Combination Name	**Parking Market**	**Cashing Out**	**Special Generator**	**New Growth**	**Benefit District**	**Residential District**

** special generators may increase the price of parking through internal measures, in which case the revenues may be used to finance company-sponsored compensatory mechanisms

++ essential component + important component 0 neutral component C complementary component NA not applicable

These combinations should include several crucial elements:

- combinations should take a "package" approach, so that revenue-producing strategies can be included to finance compensatory mechanisms for enhancing the political feasibility of the strategies
- transit improvements should be an important component of each package, to provide a necessary alternative for drivers whom parking strategies divert from auto travel
- each combination should be targeted toward a specific geographic area and a specific parking problem or set of problems; this is because a combination of strategies targeted toward the CBD, for example, is not necessarily appropriate for an area of new growth in the suburbs
- just as no one single strategy is universally effective, neither is any one particular package of strategies in combination universally appropriate; thus, a variety of combinations should be implemented as appropriate throughout a region
- groups of combination packages should work to offset spillover parking, strong decentralizing trends or other unintended negative consequences from individual strategies or other combinations
- combination packages should be implemented on a regionwide basis, with a variety of combination s as appropriate for a given area or given situation

This last point reflects one important final conclusion of this research: regardless of which parking strategies are chosen and implemented as part of a combination approach, policy-makers need to consider parking as a regional issue and part of a larger, comprehensive and coordinated transportation policy.

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