Number 145
September 1992

# USING THE REVENUES FROM CONGESTION PRICING: A SOUTHERN CALIFORNIA CASE STUDY

*by*

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## EXECUTIVE SUMMARY

Congestion pricing has many goals and benefits, but one thing is clear: its success depends on wise use of the revenues. The economic theory behind the concept relies on these revenues to help compensate for the payments required of highway users. Practical and ethical considerations similarly dictate that those who would otherwise be harmed by the fees receive tangible benefits from the revenues.

This paper investigates the possibilities for designing a package of congestion prices and revenue uses that can attract wide support. The suggested approach returns two-thirds of the revenues to travelers through travel allowances and tax reductions, and uses the rest to improve transportation throughout the area, including affected business centers. By replacing regressive sales and fuel taxes, this approach offsets the tendency of the prices alone to have a regressive distributional impact. By lowering taxes, funding new highways, improving transit, and upgrading streets and pedestrian facilities in business centers, the package provides inducements for support from several key interest groups.

The specific proposal is quantified for a scenario, previously developed by the Environmental Defense Fund and the Regional Institute of Southern California, in which congestion pricing is applied throughout the Los Angeles region. With peak-period prices averaging 15 cents per vehicle-mile in congested regions, revenues in the Los Angeles scenario would be about $3 billion annually after collection costs. The suggested allocation includes $700 million, funneled through employers, to provide a travel allowance of $10 per month for every employee in the region, regardless of mode of travel to work. It also funds a reduction of 5 cents per gallon in the fuel tax, replaces half the dedicated sales-tax surcharge now in place in four counties in the region, and rebates $460 million in local property-tax revenues now going to subsidize highways. Nearly $1 billion annually is left over to fund transportation improvements.

Illustrative calculations of the effects on various individuals suggest that the combination of travel-time savings, travel allowance, and tax reductions are sufficient to compensate most commuters. The net benefits are especially large to high-income auto drivers, carpoolers, and users of public transit regardless of income. When the value of newly funded transportation facilities and services is added in, even low-income “captive” drivers are likely to be better off.

## I. INTRODUCTION

Congestion pricing is widely recognized to be politically difficult because it adds a price to something previously free. Theory suggests, however, that enough revenue can be generated to more than offset the losses to individual travelers. If this theory applies, it ought to be possible to design a package of congestion charges and revenue uses that looks attractive to most people. Surveys confirm that support for the concept is much higher when it is presented as a complete financial package with explicit proposals for using revenues.[1]

The ability to design such a package, then, is both a test of the applicability of the economic theory and a challenge to those who wish to implement the concept. The details of the design will largely determine the policy's political feasibility, its fairness, and even the nature of the resulting transportation system.

This paper considers some principles that could guide a revenue-allocation scheme for a comprehensive program of congestion pricing that covers the entire Los Angeles region using area pricing or facility pricing or both. In particular, the paper investigates the possibilities for making the entire package appeal to the narrow self-interest of most residents. It accomplishes this by considering how various categories of people and institutions are affected by congestion pricing, and suggesting measures that would tend to offset those effects that are negative. It also considers measures that would appeal to influential interest groups in order to attract their political support. It then attempts to estimate roughly the magnitudes of revenues and expenditures that might typically be involved, to see what a feasible package could look like.

The exercise appears to show that there is room within a realistic scenario to spread benefits widely, so as to more than fully offset the costs to a majority of residents. Furthermore, these benefits can be made visible and understandable to ordinary citizens and leaders of major interest groups. The key to these results is the large magnitude of the congestion fees collected.

Demonstrating that such a package is feasible does not necessarily mean it is the one most likely to achieve political acceptability—to make that deduction would require accepting a theory of politics based entirely on self-interest. One need not endorse such a theory, however, to recognize its merit as a useful benchmark. If there is an institutionally feasible package of revenue uses that makes congestion pricing look attractive to individuals' self-interest, then there is a greater likelihood of finding a package that can attract support in a real political environment.

This paper considers the case of publicly owned highways that have already been paid for or whose financing is being undertaken through normal channels. An alternative scenario, not considered here, would be a new road financed through dedicated tolls levied on users. Differentiating the toll by place and time of day is an effective way to increase revenue, especially if the highway competes with a parallel free route subject to peak-period congestion.[2] This potential of congestion pricing has been recognized in planning for two of the privately proposed highways in Southern California,[3] but is seldom recognized for roads in the public sector.

Another scenario not considered here would be to commercialize a major portion of the road system: that is, to turn it over to a public or private authority that is required to be largely self-financing. There is reason to believe that in the long run efficient user charges, including congestion pricing, would enable such an authority to break even on the urban portion of its network.[4] Moving to such a system would require major changes in taxation and cost accounting, as well as a procedure to account for the value of roads already built, and therefore cannot be easily addressed in the context of this paper.

## II. DIRECT IMPACTS OF CONGESTION PRICING

We now turn to the distributional impacts of congestion pricing. We can distinguish three categories of people who are most directly affected:[5]

- Existing solo drivers on highways to be priced;
- Existing carpool or bus users on highways to be priced; and
- Existing users of highways not to be priced.

### *A. Existing Solo Drivers on Highways To Be Priced*

People driving alone on congested highways during peak hours will face much higher user fees, coupled with a dramatic improvement in service level. Because it takes only a modest reduction in use to greatly improve travel times, the efficient level of fees will accomplish that reduction and no more. Therefore, the majority of such users will pay the fee and continue to drive. Others will switch to alternative modes, times, routes, or destinations, or will forego the trips altogether.

Users with very high values of time will find that the service improvements more than offset the fees, so they will benefit. The rest, especially those for whom the alternatives to driving during peak hours are particularly unattractive, will experience losses. An exception might be some who find that alternative modes such as carpool or bus become so much faster, due to less congestion, that they are happier using those modes after the policy change than they are driving alone now. (This can happen whether or not carpools are exempted from the fee, since carpooling allows the fee to be divided among two or more people.)

### *B. Existing Carpool or Bus Users on Highways To Be Priced*

People now using high-occupancy modes subjected to highway congestion will mostly benefit. They receive the full benefit of improved travel time, but with a more modest cost increase per passenger. An exception might be two people with low values of time sharing a carpool, if carpools are charged at the same rate as other vehicles.

*C. Existing Users of Highways Not To Be Priced*

Highways outside the scope of the pricing policy, but close enough to be alternative routes, will experience some increase in traffic. This traffic will adversely affect their present users. The effect should small, because any highway which would suffer major congestion due to diverted traffic should instead be included in the pricing plan.

## III. INTEREST GROUPS

To realistically assess political feasibility, we need to consider not only individuals, but groups likely to be identified in any public debate over congestion pricing. These include:

- Traveling public;
- State and local officials;
- Public transit and taxicab industries;
- Trucking organizations;
- Business sector;
- Environmentalists and slow-growth advocates; and
- Low-tax advocates.

*A. Traveling Public*

People who use the transportation system extensively, especially automobile drivers, can be expected to express some common interests that will shape any political debate over congestion pricing. If galvanized on a transportation issue, these people can be a very large voting bloc, as exemplified by the large membership of the American Automobile Association. Their interests include reducing congestion, improving service on mass transit, and keeping taxes and user charges low.

*B. State and Local Officials*

Political, administrative, and technical officials must reconcile the public's demand for services, including transportation, with strong resistance to taxes. Many of these officials have career interests in constructing public works, whether or not efficient. State and local officials have a strong interest in finding ways to finance transportation projects and other services.

*C. Public Transit and Taxicab Industries*

State and local officials in agencies supplying mass transit services are joined by transit unions in seeking increased levels of transit funding. Taxicab operators want to ensure a stable operating environment, continued demand for their services, and regulatory authority to pass on any increases in their costs.

*D.Trucking Organizations*

While more active at state and national than local levels, these organizations are dedicated to better highways, full access to trucks, and financing mechanisms that do not target heavy vehicles. They are vehement in opposition to restrictions on truck movements, for which congestion pricing can substitute.

*E. Business Sector*

Local businesses share an interest in good public services, including both freight and passenger transportation, to support their activities. Some depend crucially on reliable timing of deliveries, and hence care a great deal about the inefficiencies of congestion; but they seek solutions to it that maintain their flexibility. They also share an interest in low business taxes. Beyond that, their interests can be quite divergent, ranging from a desire to increase downtown property values to a desire to promote new outlying development. Developers are very active in transportation issues in California, often playing an important role in shaping public opinion on transportation proposals.

*F. Environmentalists and Slow-Growth Advocates*

Successful lobbying groups have formed around issues of environmental degradation due to highways and their associated development. Concerns include scenic values, air pollution, noise, water runoff, and loss of wildlife. Typically these groups oppose most proposals to expand the highway system, although they are often willing to compromise on highways that are smaller and less environmentally damaging.

*G. Low-Tax Advocates*

A number of disparate organizations have successfully united to oppose tax increases, including past versions of the dedicated sales-tax surcharges now in place in Los Angeles County and three adjacent counties. Some of these groups are amenable to higher user fees, while others oppose all government charges. Some are interested in privatizing highways. All favor reducing taxes.

## IV. SOME GUIDING PRINCIPLES FOR USING REVENUES

Because congestion pricing is designed to reduce congestion, the higher user charges faced by peak-period highway travelers are accompanied by reduced travel times. This means that only a portion of the revenues need be used to offset the higher charges in order to fully compensate travelers in the aggregate. Because it is impossible to precisely target those who are most adversely affected, it is desirable to more than fully compensate the majority. Even so, the revenues are so large that there should be some money left over to promote general social goals and to garner political support.

This section outlines some measures designed to achieve the objectives of offsetting negative impacts, promoting social goals, and garnering political support from interest groups. The strategy is to fund enough programs with different distributions of impacts so that nearly everyone affected will find at least some offsetting benefits, and a majority will perceive the entire package as an improvement.

Furthermore, each component of the program has a rationale in terms of transportation funding. This has two advantages. First, it facilitates an understanding of the entire package as a transportation measure. Second, it limits the ability of interest groups or political opportunists to see the program as a gigantic revenue windfall to be appropriated for own favorite purposes.

*A. A Simple Tripartite Division of Revenues*

Any revenue-allocation scheme is more understandable to the public if part of a simple overarching strategy that appeals to common sense. This paper proposes one that keeps nearly all the money in the transportation sector, yet through several quite different mechanisms. The proposal is to allocate one-third of the revenues to each of the following categories:

- (i) monetary reimbursement to travelers as a group;
- (ii) substitution for general taxes now used to pay for transportation services; and
- (iii) new transportation services.

This is a rather conservative strategy compared to some that have been suggested. Phil Goodwin proposes a revenue allocation of one-third to highway improvements, one-third to transit, and one-third to either general tax relief or increased general expenditures.[6] However, spending two-thirds of the money on new projects would significantly expand the scope of government and thereby unnecessarily identify congestion pricing with one side of a divisive ideological debate. Furthermore, such a large increase in transportation funding might not be justified, especially since congestion pricing, as a demand-management tool, can substitute for some otherwise needed expansions of highway capacity.

It is argued by some that the only politically salient case for congestion pricing is to fund new highways.[7] Category (iii) can include some explicitly designated and well publicized highway improvements to help meet desires for such expenditures. Nevertheless, this paper does not incorporate this motivation as a dominant part of the proposed scheme because, once again, there is no guarantee that sound investment policy would involve that much new money. (This argument applies even more strongly to the suggestion made by the Bay Area Economic Forum that revenues from each corridor be targeted to highway improvements in that corridor.[8]) Tying congestion pricing to the financing of a particular highway may make more sense as part of a small-scale demonstration project, such as suggested by Robert Poole for the San Joaquin Hills corridor in Orange County,[9] than as part of the area-wide implementation envisioned here.

Others might argue the opposite extreme: that the system should be revenue neutral, with no increased expenditures. While such a position is defensible and has the virtue of simplicity, many voters will be more convinced by the ability to fund tangible transportation improvements than by the logic of pricing to allocate scarce capacity.[10] These voters may view a revenue-neutral program as just replacing one set of tax revenues by another.

The scheme proposed here follows a principle advocated by Dallas Burtraw for compensating losers from decisions in environmental policy.[11] Burtraw suggests that linked "compensation," in which losses are offset by measures that directly alleviate the harm done, is viewed by most people as fairer and more understandable than monetary transfers. In our case, the biggest loss *is* a monetary transfer, so the offsetting transfers in categories (i) and (ii) can be understood as linked compensation. For those who avoid the fee by switching to less convenient alternatives, the expenditures in category (iii) offer the possibility to directly redress their losses by improving their trip through better transit service or better pedestrian and cycling facilities.

Burtraw's argument, and indeed the whole rationale for category (iii), presumes that the new services will actually be used by people whose travel is affected by the plan. This highlights an important proviso in any compensation scheme: providing gold-plated services that appeal to planners rather than users will not make the package palatable.

*B. Specific Measures*

Listed below are seven specific measures that meet the goals outlined here. They are categorized according to the tripartite scheme just suggested. They are chosen to ensure that benefits are widespread, can be made visible through credible publicity, and reach the major categories of people who bear the burdens of the congestion charges.

**(i) Reimbursements to Travelers:**

<u>(1) Fund a program of employee commuting allowances.</u> This measure would encourage employers to establish a general commuting allowance to offset some of the extra commuting expense incurred by their workers. The allowance would be a fixed amount per month for each employee, regardless of mode or time of travel; this way it will not undermine the incentives that are the main purpose of the congestion charges.

Travel allowances have also been advocated as substitutes for the common practice of providing free employee parking. If desired, the two goals could be coupled in a single program. As has been noted in the literature on parking, one impediment to travel allowances is their taxability under present U.S. tax law.

The great advantage of using congestion-pricing revenues to fund travel allowances is that it puts money directly back in the hands of commuters, while giving them the flexibility to avoid some or all of the higher fees by shifting modes, routes, or times of day if they can do so conveniently. Furthermore, employers are given a public-relations tool that can help them avoid employee dissatisfaction arising from higher commuting costs. Because the allowance is a fixed amount per employee, it benefits all working people equally and thereby offsets the regressive tendencies in the congestion charges themselves.

(2) Reduce road user taxes. Another direct way to offset the new user charges is to reduce taxes assessed on highway users. The primary candidates are motor-vehicle license fees and fuel taxes. This measure offsets the impact on those people who actually pay the congestion fees, and more generally benefits highway users.

License fees in California are based largely upon the value of the vehicle and are thereby deductible in part from federal income tax. Thus if they were rebated or reduced, federal tax liabilities would rise accordingly, so some of the benefit would not accrue to local residents and businesses. Therefore, instead of reducing license fees, it may be preferable instead to lower the fuel tax in the region covered by congestion pricing. Although this might seem at odds with the goal of reducing automobile use, the fuel tax is actually a poor surrogate for road use, and is increasingly becoming undermined by improvements to fuel efficiency and introduction of alternative fuels. To the extent that these changes are considered desirable components of environmental or energy policy, there are better tax instruments available in the form of emission charges,[12] taxes on crude petroleum, and taxes on the carbon content of fuels.[13]

**(ii) Reduced general taxes:**

(3) Replace all or part of any dedicated sales-tax surcharge that applies in the region. Since congestion fees adversely affect many users of the transportation system, it is logical that they be applied to transportation programs broadly. One way to do so is to substitute them for the portion of the sales tax that in Los Angeles and neighboring counties has been added as a surcharge, dedicated to transportation financing.

While the logic of this measure is in support of transportation, its benefits accrue in proportion to taxable sales. It is therefore progressive because it substitutes for a regressive tax. It also addresses a primary goal of low-tax advocates. A disadvantage, however, is that many people campaigned vigorously for the surcharges and may be reluctant to see them repealed.

(4) Rebate a portion of property taxes. Even aside from the dedicated sales tax, a substantial portion

of funding for highway construction and maintenance is derived from local general revenues. In 1989, $1,010 million of the $3,156 million spent by local governments for highways in California was derived from property-tax and other general revenues of local governments.[14] Only $127 million of this was explicitly from property-tax revenues, but all of it can be regarded as absorbing local-government tax revenues for which property taxes are the primary source.

A property tax rebate therefore would serve to reduce the hidden subsidy to automobile use, while reducing yet another tax. It would also offset losses in property value that would otherwise occur to some landowners as some of the burdens of the peak-period charges are shifted.

The property tax has the practical advantage that it is easy to identify the people who pay it. A rebate rather than a reduction would make the connection between the congestion fees and this offsetting benefit more salient.

This measure would be valued by homeowners, other land owners including businesses, and low-tax advocates.

**(iii) New transportation services:**

(5) Fund new highway capacity. As noted earlier, this is arguably the single most persuasive policy to the public at large, since it meets a widespread desire and has an easily perceived link to highway fees.

This measure would please the traveling public, the highway industry, and developers and landowners served by the new capacity. It would probably not be viewed favorably by environmentalists, but there is a redeeming feature for them also: by applying congestion pricing to any new facility, its capacity can be less than it otherwise would be while still providing a better level of service. Hence where highway proposals already have strong support, congestion pricing provides a demand-management tool that permits a smaller and less intrusive facility.

(6) Fund improvements to public transit. This can be viewed both as “linked compensation” to people who switch to public transit because of the fees, and a provision to meet a general social goal. To some extent it is also a practical necessity, because the increased transit patronage will require increased service. The measure should appeal to environmentalists, public officials, transit unions, and those concerned with the poor.

Congestion fees provide incentives to use any alternative to solo driving, including carpool, public transit, walking, and bicycling. There are legitimate uses of funds to facilitate all these modes of travel. Examples include carpool matching services, increased transit frequency, more pleasant pedestrian walkways, and safer bicycle paths. However, it is important that the expenditures be tied to some reasonable prospect of actual use. The value of the whole program would be undermined if substantial revenues were diverted to projects that are very costly relative to their value to users. In particular, congestion pricing will be doomed if it is viewed simply as a “cash cow” for projects that would otherwise be rejected as cost-ineffective.

Generally, high-occupancy-vehicle (HOV) lanes should not be included among such improvements. A successful congestion-pricing program would reduce congestion to levels for which the advantage of special lanes would be minimal. In fact, one of the side benefits of congestion pricing is that existing HOV lanes could be converted to general use, thereby increasing the overall carrying capacity of the highways and simplifying law enforcement.

<u>(7) Fund improved transportation-related facilities and services in business centers.</u> Businesses in areas served by congested highways, especially downtown and inner-city areas included in area-wide pricing, rightly fear that some customers and suppliers will shun them if access is made more expensive. One way to prevent this outcome is to provide other facilities and services which are valuable to those businesses. By limiting them to transportation-related services, we maintain the exclusive transportation focus of the entire package. Examples include street repair and cleaning, lighting, pedestrian walkways and other amenities, street landscaping, shelters at transit stops, bus pullouts for easier loading, and ride-sharing coordination. Such services are often in drastic undersupply due to cities' fiscal conditions. The measure would work most effectively if business groups in each locality chose the projects to be funded.

It should be noted that fears of lost business due to parking and traffic restrictions have often proved to be unfounded; the improved traffic flow and ease of pedestrian travel resulting from auto restraint can make the area more rather than less attractive, even without these additional measures. Nevertheless, targeting a modest portion of revenues to inner-city business areas should help maintain their ability to adapt to the significant change represented by congestion pricing. It should also strengthen adjacent residential neighborhoods by upgrading the physical environment in their proximity.

This measure should appeal to businesses, to public officials who are hard pressed to provide needed services, and to inner-city residents seeking better prospects for local business.

## V. CASE STUDY: SOUTHERN CALIFORNIA

To determine whether the money raised by congestion pricing would be sufficient to fund a variety of programs at significant levels, a specific package for using the revenues is outlined, one that might be generated from a comprehensive system of congestion fees on all congested freeways and arterials in the five-county Los Angeles region. All figures refer to 1990 conditions.

The starting point is the scenario carefully constructed and analyzed in a study jointly sponsored by the Environmental Defense Fund (EDF) and the Regional Institute of Southern California, in which peak-period charges averaging 15 cents per vehicle-mile are applied to those highways now subject to heavy congestion.[15] The study estimates that in fiscal year 1990-91, about 97 billion vehicle-miles of travel (VMT) took place on the region's highways, of which 28 billion were under seriously congested conditions.[16] This paper refers to travel at those times and places as "peak VMT."

The charges are estimated to reduce total VMT by 5 percent, or 4.8 billion per year.[17] They would shift some additional VMT, which is assumed to be half the above amount or 2.4 billion, from congested to uncongested times and places. This implies a 26 percent reduction in peak VMT, from 28 billion to 20.8 billion. Annual revenues would therefore be 20.8 billion times 15 cents, or **$3,120 million**.

From these, we must subtract collection costs. Estimates for the electronic pricing system tested in Hong Kong indicate a cost of 6.6 cents per trip (in 1990 U.S. prices),[18] which is far lower than manual collection costs for conventional toll booths. The smart-card system studied for Holland was projected to cost about twice as much per transaction,[19] but the much higher volume of travel in the Los Angeles region should lower the cost per transaction for either system. The existing automatic toll collection system in New Orleans costs about $.04 per trip.[20] With these precedents in mind, the collection cost per 10-mile trip is estimated to be 6.6 cents, or 0.66 cents per vehicle-mile. This implies an aggregate collection cost of **$137 million**, or 4.4 percent of revenues.

Our estimate of available net revenue is therefore **$2,983 million**. The proposed package of uses for this revenue follows approximately the three-way division mentioned above. It is summarized in Table 1.

<u>(1) Fund a program of $10/month employee commuting allowances.</u> Data from the California Economic Development Department suggest a total of 5.8 million employees in the five-county area. Annual cost: **$696 million**.

<u>(2) Reduce fuel taxes by 5 cents per gallon.</u> In 1990, Californians consumed 15,126 million gallons of taxable fuel.[21] It is assumed that 62 percent of this derives from the Los Angeles region, that being the region's fraction of VMT in 1991.[22] Annual cost: **$349 million**.

<u>(3) Replace half of the dedicated sales-tax surcharge.</u> Four of the five counties in the Los Angeles region have a dedicated sales tax for transportation purposes. The rate is 0.5 percent in Orange, Riverside, and San Bernardino Counties, and 1.0 percent in Los Angeles County. From data provided by the California State Board of Equalization, it appears that annual

**Table 1**

**A Package of Congestion-Pricing Revenue Uses for the Los Angeles Region**

| | **Program** | **Annual Amount ($millions)** |
|---|---|---|
| **(i) Reimbursements to Travelers:** | | |
| (1) | Employee commuting allowance ($10/mo.) | 696 |
| (2) | Fuel tax reduction (5 cents/gal.) | 349 |
| **(ii) General Tax Reductions:** | | |
| (3) | Sales tax reduction (1/2 of transportation surcharge) | 525 |
| (4) | Property tax rebate (eliminate local highway subsidy) | 464 |
| **(iii) New Services Including Transportation** | | |
| (5) | Highway improvements | 315 |
| (6) | Transit improvements | 312 |
| (7) | Business services in impacted centers | 322 |
| TOTAL (Net revenue) | | 2,983 |
| Collection costs | | 137 |
| TOTAL (Gross revenue) | | 3,120 |

revenues at these rates amount to approximately $1,050 million.[23] Reducing these rates by half would thereby require **$525 million**.

(4) Rebate property taxes in an amount equal to all property-tax and general-fund revenues presently used by local governments for highways. In 1989, local governments in California allocated $127 million of property-tax revenues and $883 million of general-fund revenues to highways.[24] Assuming that the Los Angeles region accounts for 46 percent of this, in proportion to its VMT, total elimination of this subsidy would cost **$464 million**.

(5) Fund new highway projects by adding 30 percent to funds raised by the present dedicated sales tax. Since not all the sales-tax proceeds are used for highways, this amounts to more than a 30 percent increase in highway spending from this source. This would provide a significant boost to the region's ability to tackle the extensive backlog of highway projects considered essential by the county transportation commissions. Funding required is 30 percent of $1,051 million, or **$315 million**.

(6) Fund increased transit services at 130 percent of the amount needed to absorb the expected diversion from peak highways. Suppose half the 4.8 billion VMT reduction is diverted to transit, average trip length is 10 miles, and new transit service to accommodate the diversion requiresa subsidy of $1.00 per trip. (This is less than a typical subsidy for new transit service, but seems appropriate given that much of the new ridership would be on corridors already well served by transit.) The cost to serve diverted passengers is then $240 million. This increased service, besides accommodating the additional passengers, improves the convenience of the mass transit system to everyone by increasing frequency and/or route coverage. An additional 30 percent would provide considerable scope for still further improvement. **Total funding: $312 million.**

(7) Fund improved transportation-related services in impacted business centers. This would be a discretionary program, possibly with a formula distribution among employment centers, designed to alleviate adverse effects on businesses and thereby ensure that the policy would not aggravate urban blight. Specific items should be determined by affected businesses. The amount is chosen to exhaust the remainder of the revenues. Total: **$322 million**.

## VI. EFFECTS ON SOME PROTOTYPICAL RESIDENTS

In order to gain understanding of how residents in various circumstances might be affected by the proposed package of congestion pricing and revenue uses, Table 2 presents the implications for selected people of the package just outlined for the Los Angeles region. These calculations adopt very simple assumptions and consider only the direct impacts, ignoring any shifting of fee payments, tax burdens, or time benefits. Such shifting would surely occur since ease of travel interacts with many markets including those for labor, land, and retail goods. Hence the calculations to be described should be viewed not as measures of the true changes in people's

economic situations, but rather as an indication of the extent to which the direct, immediate impacts of the various provisions would tend to cancel each other. The situations chosen are illustrations, not necessarily averages of classes of people.

The first three columns of the table show three commuters who “stay and pay”: that is, solo drivers who continue to drive alone after the pricing is in place. These are the people one would expect to be most disadvantaged by the program. The first has a roughly average value of time of $6.05 per hour;[25] whereas the second and third (“high income” and “low income”) have higher and lower values, respectively, intended to represent people at the 80th and 20th percentiles of the income distribution.[26] Column (4) is an average-income commuter who finds it worthwhile to switch to carpool in order to cut the congestion fee in half, incurring thereby the equivalent of a 15-minute penalty in travel time. Columns (5) and (6) represent an average-income carpooler and a low-income transit user, respectively, who do not change mode as a result of the scheme.

*A. Assumptions*

Key assumptions for each case are given in the first panel of the table. Each commuter has a one-way trip that includes 10 miles on congested roads; this is increased to 15 miles for the person who initially carpools, in keeping with the known tendency of carpooling to occur more frequently on longer trips. The congestion fee of $0.15 per mile applies to carpools also, but for them it is assumed to be shared equally by two travelers. Average speed on congested roads is assumed to rise from 20 to 30 miles per hour due to the introduction of pricing, while the transit user's one-way trip falls from 30 to 25 minutes.

Each commuter, except the transit user, is assumed to own an automobile. The average-income solo commuter (column 1) drives 10,000 miles per year including nonwork trips, for an annual fuel consumption (at 25 miles per gallon) of 400 gallons. Savings in fuel consumption due to less congestion are not considered. The high-income worker travels 20 percent more than this, the low-income worker 15 percent less; in addition, being a carpooler reduces annual fuel consumption by 20 percent.

The average sales-tax liability per household for the present surcharge is computed as 80 percent of total surcharge revenues divided by the 4.9 million households in the region in 1990, on the assumption that 20 percent of sales-tax revenues are derived from business rather than household purchases. The high-income commuter is assumed to spend 20 percent more than this average, and the low-income commuter 20 percent less. Similarly, property-tax revenues rebated to the “average” household are computed as the aggregate rebate times 60 percent, divided by 4.9 million households; this is on the assumption that 40 percent of property taxes are paid on business rather than residential property. The high-income worker is assumed to receive a 70 percent higher rebate and the low-income worker a 35 percent lower one, representing differing property assessments in line with their differing incomes. The transit user is assumed to be a renter, receiving no rebate. The calculations exclude any indirect benefits arising from reduced taxes on businesses and landlords, even though these may be passed through to consumers and renters.

Quantification of the benefits to individuals from new transportation services (category iii) is more speculative because it would depend on these individuals' usage patterns. As a starting point, the average expenditure per household on each category was computed, given 4.9 million households in the area. Each worker who commutes by car is then assumed to receive benefits equal to this average for highway expenditures (category 5) and one-half the average for transit expenditures (category 6), on the assumption that these workers and their families use transit less frequently than average. The transit commuter receives no benefits from the new highway expenditures, and benefits equal to twice the average per-household expenditure on new transit service. In addition, every commuter receives benefits equal to half the per-household expenditure on business-center improvements (category 7), on the assumption that some of those benefits accrue to local residents, business owners, and customers rather than to commuters.

*B. Results*

The results shown in the table for “net time and money benefits” include the fee payments, the value of time savings, and the monetary benefits arising from the first four of the revenue uses outlined earlier. Hence they take into account the immediate impact of the travel allowance and tax reductions, but not the value of expenditures on highways, transit service, and business services.

These results indicate that for the continuing driver of average income, the time and monetary benefits alone are enough to offset the fee payments. This comes about because her travel allowance and tax reductions more than offset the difference between her payments ($750 per year) and her valuation of the time savings ($504 per year). For the high-income driver, the continuing carpooler, and the transit user (who has no fee payments), these time and monetary benefits far exceed the fee payments. The reason high-income solo drivers benefit so much is not because they pay less or receive substantially more rebated taxes, but because they value their time savings more. The long-distance carpooler receives a large time savings and divides the fee among two commuters, so comes out a clear winner;  so does the transit user, who pays no fee but receives some time savings and substantial allowance and tax rebates.

The low-income driver places less value on the time savings, and so is not fully compensated. However, if he is able to switch a two-person carpool, he cuts his congestion fee in half and thereby comes out almost even on a time-plus-money basis, even after taking into account the assumed carpooling inconvenience.

When the value of new transportation services funded by the program is taken into account (“other benefits” in Table 2), all the commuters shown come out ahead. Even the low-income captive driver receives enough benefits from the $949 million expenditures on highway, transit, and business centers to more than overcome the net loss from the combination of congestion fees, time savings, travel allowance, and tax reductions. In practice, many low-income drivers would probably find ways to further reduce their fee payments by coming to work early, taking more roundabout routes, or sharing rides on an occasional basis. In addition, they would share indirectly in a number of benefits not quantified in the table:  for example, lower sales- and property-tax payments by businesses would be partly passed through to their customers, and the transit improvements and physical improvements to business centers would stimulate upgrading of some residential neighborhoods.

It is easy to misinterpret the large value that high-income people place on time savings as indicating that the program as a whole is regressive. Actually, high-income commuters would shoulder a disproportionate share of its monetary costs because they are more likely to continue to drive alone despite the fees. Some commentators have assumed that the poor who are “forced off the roads” are the most aggrieved group, but in fact it is those without such flexibility who benefit the least or suffer the most. Those who can shift to other modes, times of day, or locations avoid the full adverse impact of the fees, while still reaping the full benefits funded through the program. This is reflected in a comparison of columns (3) and (4). And as column (6) shows, those low-income commuters who already take transit are clear winners.

Obviously, less favorable cases could be constructed, and someone will be made worse off no matter how the program (or any public policy, for that matter) is designed. For example, a low- or average-income person with a long one-way commute on congested highways and no feasible alternative would suffer. In the longer run, the congestion fee gives such people a very powerful incentive to alter their situations to avoid such heavy charges. They may do this by changing residences, changing jobs, or negotiating new work hours that permit off-peak travel.

## VII. CONCLUSION

The scheme proposed here is, of course, one of an infinite variety that are possible. My goal has been to combine a theoretical insight—that there is more than enough revenue to fully compensate all losses—with some practical considerations of institutions, politics, and perceptions. The scheme weighs heavily on the side of viewing the revenues from congestion pricing as a substitute for other revenue sources rather than a gigantic windfall for expanded government programs;  yet it still provides for substantial new services, which can help attract support from diverse interests provided the services are chosen to serve real needs. Needless to say, the balance among various components can and should be adjusted to fit the desires of the people whose lives will be affected.

## ACKNOWLEDGEMENTS

Paper prepared for the Reason Foundation Research and Education Project, “Introducing Congestion Pricing.” Financial support from the Reason Foundation is gratefully acknowledged, as is the generous provision of visiting research facilities by Boston College. I am grateful to Michael Cameron, Genevieve Giuliano, Robert Poole, Philip Viton, and Clifford Winston for helpful discussions and comments on earlier drafts.

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22. Data from the California Department of Transportation.

23. "Revenues Distributed to Special Districts from Transactions and Use Tax, 1990-91." The Orange County tax and half of the Los Angeles County tax went into effect on the same date, near the end of fiscal year 1990-91. Because revenues distributions of the two halves of the Los Angeles County tax are reported separately, the fraction of a full year's revenues for the newly enacted taxes that were distributed during 1990-91 could be measured at .071; the same ratio is assumed to apply to Orange County.

24. U.S. Federal Highway Administration, *Highway Statistics 1990*, Table LGF-21 (p. 106).

25. Small 1992, op. cit., 43-45. This summarizes information measuring the value commuters place on their travel time. He concludes that the best supported value is 50 percent of the wage rate. Average hourly earnings for private nonagricultural production and nonsupervisory workers in the Los Angeles region is approximately $11.00 per hour, obtained by taking the average for the three metropolitan areas comprising most of the Los Angeles region (Los Angeles—Long Beach, Riverside—San Bernardino, and Anaheim—Santa Ana). Data are from U.S. Bureau of Labor Statistics, *Employment and Earnings*, vol. 37, no. 7 (July 1990): hourly earnings by locality are from Table C-8, p. 108, and employment (used as the weights to average the three metropolitan areas) are from Table B-8, p. 62. Comparable data for managerial, professional, and supervisory employees are not available, so I have added 10 percent for an estimated overall average wage rate of $12.10 per hour.

26. Wages of 170 percent and 65 percent of the median wage are assumed for these two percentiles, based on the

approximate relative incomes for those percentiles measured in a 1989 survey of Los Angeles-area commuters. (The survey is described in David Brownstone and Thomas F. Golob, “The Effectiveness of Ridesharing Incentives: Discrete-Choice Models of Commuting in Southern California,” *Regional Science and Urban Economics*, vol. 22, no. 1 March 1992, 5-24. The income distribution is not reported there, but was instead calculated directly from data supplied by the authors.) Value of time is assumed to be 40 and 60 percent of the wage rate for the higher- and lower-income worker, respectively; this attempts to approximate the findings from a number of studies showing that value of time rises less than proportionally with income: see MVA Consultancy, Institute for Transport Studies of the University of Leeds, and Transport Studies Unit of the University of Oxford, *The Value of Travel Time Savings: A Report of Research Undertaken for the Department of Transport*, Newbury, England: Policy Journals, 1987, 133-135, 150, 152.