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U.S. Department of Transportation
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A Framework for Formulating Equitable Road Pricing Programs at the State and Local Level

September 2005

HDR | HLB Decision Economics Inc.

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EXECUTIVE SUMMARY

Instituting tolls during busy times of day stands as one of the most talked about yet least used instrument in the toolkit of measures to combat urban congestion. By discouraging some trip making, and by encouraging some travelers to make shorter journeys, or to switch to less busy times of day, different routes, or transit, tolls make congested roads faster, more reliable and safer. A reason why tolls are nonetheless rare in the urban scene is their social cost or, more precisely, a lack of information about the disadvantages of road pricing for particular social groups and how such disadvantages might be lessened or alleviated. What is the nature of these social costs? How can they be quantified and what is their quantitative significance? What measures are available with which to mitigate or alleviate social costs? And by what mean can such measures be financed? This report examines these questions and provides a policy framework within which transportation authorities can formulate road pricing policies from the perspective of both congestion management and social objectives.

THE NATURE OF SOCIAL COSTS

People who gain from road pricing are those who value improved roadway performance more than the cost (the toll) of obtaining it: They pay the toll and obtain a net economic benefit, a better road, accordingly. People who lose out when roads are tolled during congested times of day fall into three broad groups:

Group 1: Those who make less use of the roads. They include:

1i: People who cut back the total number of journeys they make;

1ii: People who adopt new activity schedules they find less convenient

1iii: People who switch to transit or other modes of travel (like walking) that they prefer less than driving;

1iv: People who make shorter journeys on the tolled roads; and

1v: People who divert to auto routes they prefer less because they are more circuitous or inconvenient because of intersections and traffic lights; and

Group 2: Those who pay the toll, but not because they value the increased road performance by an equal or greater amount, but because they simply have no choice; and

Group 3: Those who experience increased congestion on roads to which people divert in order to avoid tolls

People can of course belong to more than one group or subgroup. Moreover, while social costs are compounded for low income people and other disadvantaged groups (such as people with disabilities and the elderly), the three groups of people that incur social costs are not confined to particular socio-economic categories. Even for people with average or above

average spending power, economic theory recognizes that being compelled, for whatever reason, by a previously nonexistent toll to travel less or make less preferred travel choices represents a loss of economic utility (value) to them. Since the marginal utility of money ("the meaning of a dollar") is greater for low income people than for others, losses in economic value due to tolls are proportionately greater for the poor. But, again, the social costs arising from road pricing are not confined to particular socio-economic or demographic groups.

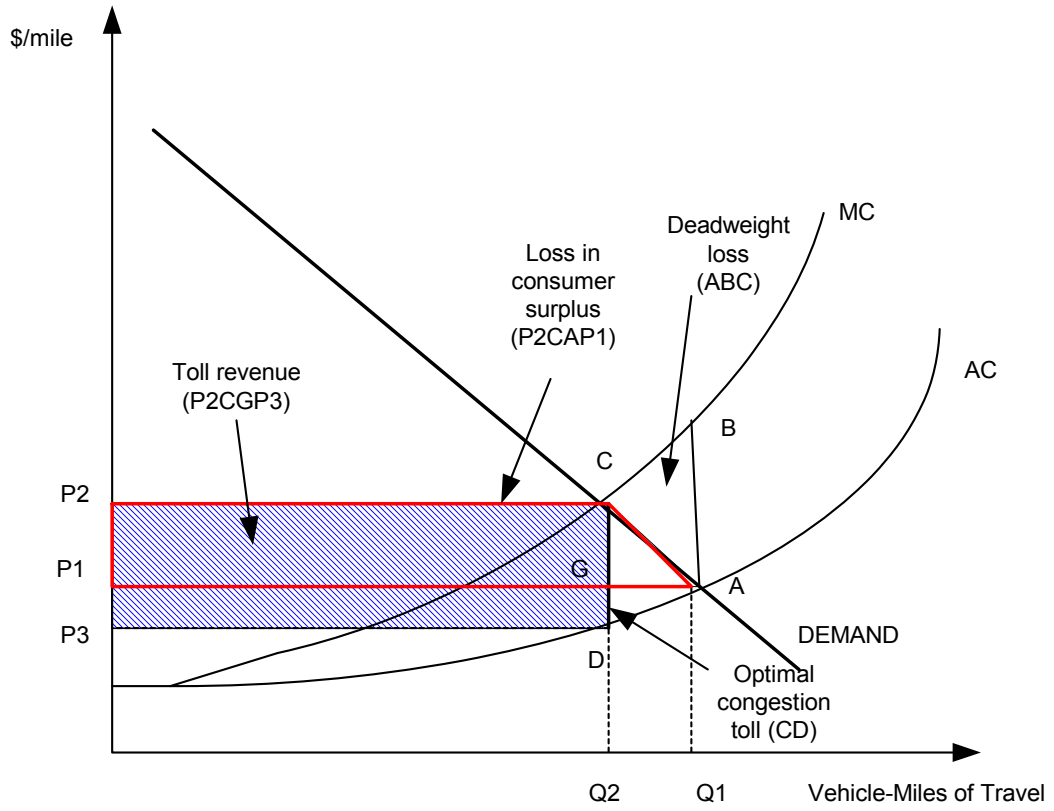
QUANTIFYING SOCIAL COSTS

The Economics of Congestion Pricing

The standard microeconomic theory of road pricing, shown diagrammatically in Summary Figure 1, helps reveal the means by which social costs may be identified and quantified. Everyone pays the private costs of auto travel, the gas, oil, insurance and depreciation expenses incurred in getting from one place to another by car. Economists call these expenses "internal" costs. Congestion prices are meant to reflect the "external costs" of using roads. External costs include the value of additional delay, incidents, accidents and pollution we impose on others when entering an already crowded traffic stream. An economic benefit arises from congestion tolls because people stop making trips that they do not value as highly as the full cost of the resources used up in their production, namely that sum of both private and external costs (the latter as reflected in the toll). Many such trips are made in the absence of congestion pricing, creating what economists call a "deadweight loss" for the economy. A deadweight loss is the amount by which the cost to the economy of producing a group of commodities (such as trips) exceeds the value their consumers attach to them. The economic value of the deadweight loss arising from the absence of congestion pricing, and subsequently eliminated by the imposition of tolls, is represented in Summary Figure 1 by area ABC. Eliminating this deadweight loss is how congestion pricing yields economic benefit.[1]

[1] Most people are used to thinking of the benefits of road pricing as the value of time, environmental and accident savings that arise for road users once the road becomes less crowded. Indeed, there is an exact equivalence between the net value of such savings (area P1GDP3 net of area CAG) and the deadweight loss. The amount that is netted off, area CAG, is the value of the trips lost by those who drop off the road due to tolls.

Summary Figure 1: Economic Analysis of Congestion Pricing



EQUIVALENCY BETWEEN (i) DEADWEIGHT LOSS, (ii) TRAVEL TIME SAVING MINUS LOSS IN CONSUMER SURPLUS TO USERS WHO DEPART, AND (iii) TOLL REVENUE MINUS LOSS IN CONSUMER SURPLUS TO ALL USERS

ABC = P1GDP3 - CAG = P2CDP3 - P2CAP1

where

ABC = Deadweight loss
P1GDP3 = Travel time savings to road users who stay on the road
CAG = loss in consumer surplus to road users who drop off
P2CDP3= Toll revenue
P2CAP1= loss in consumer surplus to all road users

Group 1 Costs: Costs to Those Who Use of Roads Less

The elimination of deadweight losses arises because some people respond to the toll by making less use of the congested road. These trips, Q1–Q2 in Summary Figure 1, had economic value to those who took them. This dollar value is revealed specifically in Summary Figure 1 by area CAG and represents the economic loss imposed on this category of consumers by the toll.

Although the microeconomic framework of Summary Figure 1 does not separate the aggregate losses represented in area CAG among the five substrata of people that make up this group

(see earlier), the costs do not fall proportionately on each. Losses are likely to be proportionately highest for those who cut back on the total number of journeys they make (Group 1i). In cutting back on trips people make sacrifices in the amount or kind of life activities they consume (work hours, shopping, social engagements, entertainment and other travel purposes). Those who cut back trips are also likely to make the kind of adaptations listed in Groups 1ii to 1v. It will be disproportionately low income people who make both fewer journeys and other choices less preferable to them, such as switching to transit and using longer, more circuitous auto routes.

Losses are probably smallest among those who make the same number of journeys and continue in the same life activities as before, but use less convenient auto routes by which to get to and from them (Group 1v). A fully enumerated social welfare function, unfortunately a theoretical construct only, would be needed to enumerate and rank the cost burdens definitively. Economic logic suggests, however, that the order in which the five substrata of Group 1 are listed in Summary Table 1 is a reasonable reflection of the descending burden of social cost.

Group 2 Costs: Costs to People who Pay the Toll Not Because they Value the Improved Roadway Performance by an Equal or Greater Amount But Because they Have no Choice

As indicated earlier, economic theory indicates that those who remain on the road following the imposition of a toll do so because they value the improvement in roadway performance more than the cost of the toll. There is in fact an aggregate loss in economic value to these consumers, but this loss is off-set by the additional benefits they derive in less delay and fewer accidents. The aggregate loss arises in the form of diminished "consumers' surplus," the difference between what they are willing to pay versus what they actually pay to use the road, namely area P_2CGP_1 in Summary Figure 1. The aggregate benefit (the value of time savings and other benefits to those remaining on the road) is represented by area O_1GDP_3. Even though theory predicts that aggregate benefits will exceed the loss of consumer surplus among those paying tolls, the outcome is not necessarily duplicated for all travelers. Some individuals might pay the toll because of limited options to cut back journeys, reschedule activities, or switch to alternative routes or travel modes, the result of rigid work schedules, a limited road network, poor transit or some combination thereof.

Thus some portion of area P_2CGP_1 represents the net value of Group 2 social cost, a fraction that will vary from corridor to corridor depending upon local circumstances.

Simulations reported by Mohring[2] for the Twin Cities find that road pricing on all congested roads would actually make the average road user worse off. He reports that while all travelers would benefit from faster trips, toll payments would exceed the value of these time savings for many. Only two groups in the Mohring study would gain from congestion pricing, namely high income auto travelers (those earning more than $80,000.00 annually in 2000 prices), and current mass transit users.

[2] Herbert Mohring, Congestion, (in) Essays in Transportation Economics and Policy; A Handbook in Honor of John R. Mayer, Jose Gomez-Ibanez, William B. Tye, and Clifford Winston, Eds. Brookings Institution, 1999

Group 3 Costs: Costs to People: Those who Experience Increased Congestion on Roads to Which People Divert in Order to Avoid Tolls

In applying congestion pricing to just part of a network, the diversion of traffic to the un-tolled portion can help alleviate social cost among those for whom tolls would exceed the value of improved roadway performance. Diversion to un-tolled roads, however, can lead to worsened delay for existing users of those roads. Economic rules of "constrained-optimality"[3] lead to discounted tolls so that diversion does not wipe out the overall benefits of road pricing. Even with constrained-optimal pricing in place, however, some diversion -- and thus some cost to existing users of un-tolled roads -- is probable.

ALLEVIATING SOCIAL COSTS AND FINANCING ALLEVIATION PROGRAM

Theory and analysis each indicate that toll revenues raised through congestion pricing would exceed the money value of the costs imposed on affected travellers.[4] Mohring's simulations for the Twin Cities indicate that tolls applied during the morning peak hour alone would generate $1.54 in revenue for each dollar of cost borne (lost consumers' surplus) borne by those who forgo trips and those who continue to travel despite the tolls. Since the cost of toll collection is between 10 percent and 20 percent of revenue, programs for redistributing revenue so as to make everyone better off should be possible.

Direct versus Indirect Policy Mechanisms for Alleviating Social Costs

Two general approaches, one direct and one indirect, exist under which to formulate cost alleviation programs. The two are not mutually exclusive in application, but they provide distinctly different ways of addressing social costs.

Direct Mechanisms. The direct approach entails monetary reimbursement for losses incurred. Though highly focused, monetary reimbursement programs under which tolls are effectively returned to those who pay them can destroy the incentive effects of pricing needed to generate the benefit of improved roadway improvement. There are two ways in which to blunt this deleterious effect. One is to focus reimbursement on an identifiably larger group to which toll road users belong, such as all households in the region, or all taxpayers. Returning average toll collections per toll-paying household to all households in a region could, however, require more cash than congestion tolls would provide. Alternatively, an aggregate fixed budget set equal to the amount by which tolls paid exceed value of time savings for those who lose due to tolls could be allocated among all households, or all taxpayers, in the region. While the appropriate size of such a budget would be developed from transportation models and involve substantial empirical uncertainty, the underlying logic would be understandable to the general public.

The second way in which to dampen the incentive-blunting effects of direct reimbursement is to target certain identifiable sub-groups of toll users. Candidate groups are those who meet a

[3] Such rules are known in the economics literature as "Ramsey Pricing."

[4] This is evident in Summary Figure 1.That tolls would eliminate the deadweight loss from unpriced congestion and lower the time costs of still-made trips guarantees that increased toll revenue would exceed consumer losses. For the formal proof of this proposition, see Mohring, ibid.

defined low income threshold, people with disabilities and the elderly. Some toll road authorities already grant exemptions to such groups.

Indirect Mechanisms. Indirect mechanisms seek to mitigate social costs by improving the quality of transportation alternatives available to those who reduce the use of tolled roads. Indirect mechanisms include:

- Earmarking toll revenues for transit investment;
- Earmarking toll revenues for roadway improvements;
- Establishing minimum quality standards for alternative free routes as a precondition to imposing tolls; and
- Programs to encourage firms to permit flexible working hours.

While indirect mechanisms cannot be targeted as precisely as direct reimbursement programs, earlier studies conclude that both are likely to needed in any given region adequately to address the social costs incurred by principal stakeholders.

A TEMPLATE FOR FORMULATING ROAD PRICING POLICY AT THE REGIONAL LEVEL

Employing all or most net toll revenues (gross toll revenues minus the costs of toll collection) for the purpose of alleviating social costs would fully compensate those who incur them. Depending upon the extent of a road network to which congestion tolls are applied, the sums potentially available for this purpose are significant. Mohring's analysis for Minneapolis-St. Paul anticipates gross revenues from peak hour tolls on all congested roads at $700 million (revalued from 1990 to 2002 dollars). An on-going study for the Office of the Secretary of the U.S. Department of Transportation indicates that a region the size of the Twin Cities (population 2.4 million in 2000) could see revenues of fully $850 million in the first year of the analysis period (2002), growing thereafter with inflation. To put these figures in context, total transit operating costs in 2002 in the Twin Cities was $212 million; and three years of planned highway investment there is estimated at $2 billion (about $667 million annually).

Whereas total revenues from tolls are sufficient to fully compensate social costs, there is no economic rule by which to ascertain the allocation best suited a given region. Three researchers, one in Britain and two in the United States, propose a particular split of toll revenues. In the U.S., Small[5] proposes an allocation of one-third in monetary reimbursement to trip makers; one-third to off-set general taxes presently used to fund transportation services; and one-third for new transportation services (transit, roads or both). In other words, just under 70 percent of toll revenues would go to some form of direct reimbursement and the balance to indirect mitigation through investment in roads and transit. Also in the United States, DeCorla-Souza[6] proposes a scheme wherein tolls would be exempted for designated

[5] K. A. Small, Using Revenues from Congestion Pricing, Transportation 19, 1992

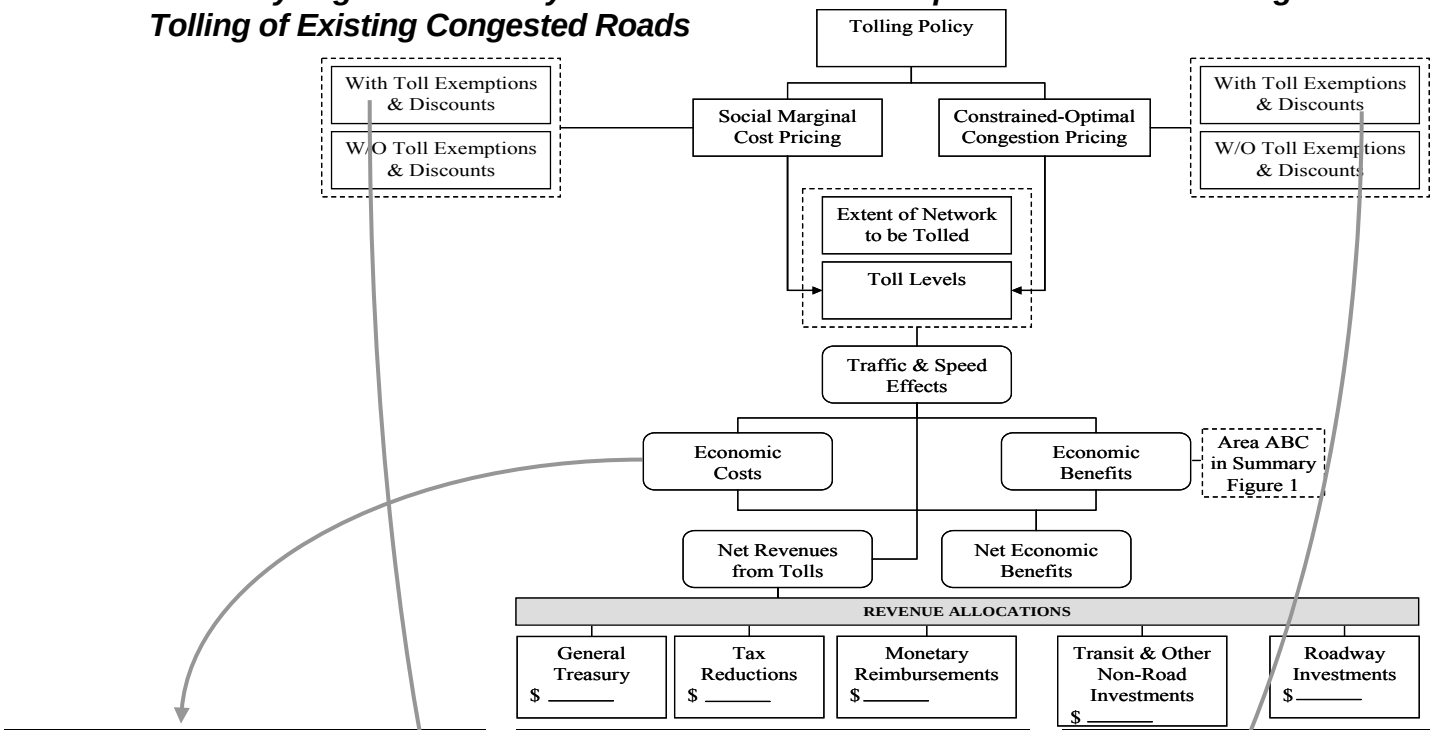
[6] P. Decorla-Souza, Clearing Existing Freeway Bottlenecks with Fast and Intertwined Regular Networks: Costs, Benefits and Revenues; Paper presented to the Transportation Research Board Annual Meeting, January, 2004

users groups (such as high-occupancy vehicles); some 70 percent of net toll revenues would be employed for roadway and transit capital improvements and a fifth of net revenue would go to cash reimbursements against tolls and transit fares incurred by low income travelers. In the British study, Goodwin[7] proposes a division of one-third in reductions in existing taxes; one-third in the construction of new roads, the improvement of existing ones or the improvement of roadway maintenance standards; and one-third to improve public transport services. In contrast to the Small approach, with Goodwin about 30 percent of toll revenues would go to direct reimbursement while fully two-thirds would be steered to indirect investment in mitigating social costs through improved roads and transit. Both Small and Goodwin, whose programs would each more than compensate most "losers," justify their approach as (i) easy for the public to understand and, (ii) a reasonable starting point to reach consensus.

Researchers such those whose work is reviewed above acknowledge, correctly, that each region considering a congestion tolling program for existing roads would need to engage the public in the search for a widespread consensus on how toll revenues would best be distributed. Accordingly, Summary Figure 2 provides a template within which comprehensive tolling and corresponding compensation mechanisms can be arrayed and quantified as a basis for community discussion, modification and consensus. The template calls for, and is amenable to specific quantification at each point, and specific project earmarking in relation to capital improvements to the extent that such earmarking is required in order to obtain consensus.

[7] P.B. Goodwin, The Rule of Three: A Possible Solution to the Political Problem of Competing Objectives for Road Pricing, Traffic Engineering and Control, 30, (10), 1989

Summary Figure 2: Policy and Consensus Development Process for Regional Tolling of Existing Congested Roads



Category of Social Cost	Social Costs	Direct Compensation		Indirect Mitigation
Group 1: Those who make less use of the roads. They include: **1i:** People who cut back the total number of journeys they make; **1ii:** People who adopt new activity schedules they find less convenient; **1iii:** People who switch to transit or other modes of travel (like walking) that they prefer less than driving; **1iv:** People who make shorter journeys on the tolled roads; and, **1v:** People who divert to auto routes they prefer less because they are more circuitous or inconvenient because of intersections and traffic lights	Area CGA, Summary Fig. 1	Toll Refunds/Credits/ Exemptions for Low Income and People with Disabilities Toll Exemptions & Discounts	Off-Set in of General Taxation	Public Program to Facilitate Flexible Work Schedules for Toll Road Users Specified Transit Improvements in Toll Road Corridors -
Group 2: Those who pay the toll, but not because they value the increased road performance by an equal or greater amount, but because they simply have no choice; and	Some fraction of P_2CGP_1	Toll Refunds/Credits/ Exemptions for Low Income and People with Disabilities		Specified Roadway Improvement Program - -
Group 3: Those who experience increased congestion on roads to which people divert in order to avoid tolls.	$Cost from MPO Model Analysis			Specified Quality Standards for Specified Routes -

1. INTRODUCTION

The projected economic benefits of road pricing (less delay, fewer accidents, cleaner air) sharply exceed the likely economic costs (electronic toll collection technology and reduced mobility for those compelled to make different travel arrangements due to tolls). Forecasts of significant revenues suggest that road pricing might offer a deep vein of funds for highway capacity in an era of dwindling yields from traditional funding sources, namely gas taxes.[8] Yet for many Americans, economic efficiency and highway finance constitute, at most, a subset of the relevant policy issues. For some, free access to roads, congested or not, is a birthright. Congestion certainly infuriates travellers, especially when it compels them to adjust when or how or whether to travel. But being obliged by a toll to make such adjustments can instil something more profound than frustration with daily life, breeding instead a sense of loss of rights and freedoms. Thus, framed as it is by matters of economic outcomes alone, the scope of road pricing policy debate is too narrow to facilitate the emergence of a policy consensus in most of the nation's major urbanized areas.

Indeed, some Americans view the idea of road pricing on existing roads as double-taxation – paying through tolls for that which has already been paid for with gas taxes. And notwithstanding the economic theory of road pricing – namely, that revenues from tolls constitute a signal to expand roadway capacity, such signals cannot systematically be acted upon because of environmental opposition to many highway projects. Although earmarking toll revenues instead to non-road purposes might not be economically efficient, some people believe that revenues should be available for alternatives to driving, such as transit, all the same.

Even in parts of the country where toll roads are common (Florida, New York) and the idea of tolls as a way of financing the *cost* of roadway construction long accepted, the notion that tolling existing roads can generate economic *benefit* is not intuitively obvious. That tolling would benefit society is especially hard to swallow when reduced congestion is seen to occur at the expense of less mobility and less freedom of choice for even a few. At the very least, some argue that mechanisms by which to avoid negative outcomes for those who can least afford to pay tolls should be part of a comprehensive road pricing policy framework. This too would extend beyond the purely economic rationale for road pricing.

1.1 Broadening the Framing for Road Pricing Policy Analysis

In traditional welfare economics (Cost-Benefit Analysis), a policy measure is deemed to be a welfare improvement if its benefits exceed its costs, and if net benefits generate enough surplus value to finance the mitigation of negative outcomes while still leaving overall net benefits in the black: "*Whether*" and "*how*" to repair negative outcomes, however, is deemed beyond the purview of the traditional approach – a matter for political, not economic rumination. "Neo-welfare" economics rejects this traditional definition of what constitutes a welfare improvement, however.[9] Under the new definition, public consensus is required in

[8] See for example, HLB Decision Economics Inc. *Issues Arising in the Consideration of Road Pricing on a National Scale*, Final Draft Revision #6, for the Office of the Secretary, U.S. Department of Transportation, January 31, 2005.

[9] Lewis, David. *The New Cost Benefit Analysis,* Ashgate, forthcoming 2005

order to deem a policy a welfare improvement. Under this definition, a policy option must include specific compensation or other means of repairing negative outcomes for those who are or who perceive themselves to be somehow disadvantaged: And, importantly, the package must draw widespread public consensus in order to qualify as a welfare improvement.

The new definition of welfare analysis outlined above broadens the scope of economic analysis. In the context of road pricing, it is not enough to establish whether or not the economic benefits of tolling would likely exceed the economic costs. Matters of fairness, mitigation and compensation must also be addressed in order to find a policy framework that draws nationwide consensus and that can thus be deemed a welfare improvement.

1.2 Purpose and Plan of the Paper

This paper establishes a policy analysis framework within which to facilitate analysis and discourse on road pricing that can, in principle, result in consensus. The framework is thus designed to embrace all effects that bear on the realization of consensus, including the geographic scope and level of road prices; their economic costs and benefits; the means by which negative effects, both tangible and philosophical, might be repaired; and the disposition of toll revenues. As a starting point for analysis and discourse, we use evidence from road pricing applications in different localities to give operational expression to the framework. While this operational expression does not seek to anticipate what a policy consensus might ultimately look like, it reflects a sampling of real-life outcomes and as such represents a reasoned, tangible potentially acceptable starting point for discussion and consensus.

The analysis and discourse framework itself is developed in Section 2. This section provides qualitative and quantitative evidentiary record as it relates to elements of the framework. Employing the evidence given in Section 2, Section 3 gives operational expression to the framework as a baseline for initiating discussions of regional road pricing policies. Section 4 concludes the paper.

2. FRAMEWORK FOR POLICY ANALYSIS AND DISCOURSE

Regional and local road pricing policies are shaped by discussions of both community-wide and individual stakeholder effects. The assessment and discussion of community-wide effects tend to be framed by the economic model. The community is seen to gain if the economic benefits of tolls exceed the economic costs. Economic benefits include the value of reduced delay for auto and truck users and the collateral effects of lower traffic volumes and smoother traffic flow. Collateral effects include lower fuel and other vehicle operating costs; fewer accidents; reduced environmental emissions; diminished greenhouse gases; and more productive distribution logistics. Economic costs include the loss of value among those obliged by tolls to make new, less preferred travel choices; the loss of value among users of un-tolled roads that become more congested due to traffic diversion from tolled roads; potential costs to businesses along tolled routes; and the cost of collecting and administering tolls.

Different stakeholders are recognized as experiencing road pricing in different ways: There are, in short, "gainers" and "losers." The range and intensity of gains and losses depends on the geographic spread of road prices and levels at which tolls are set. Based on a taxonomy developed by Gomez-Ibanez (1992), gainers include: [10]

- Private vehicle users who value savings in travel time more than the tolls they pay. Such users tend to have relatively higher incomes;

- Bus and rideshare travellers who enjoy improved service due to reduced congestion;

- Recipients of toll revenues, including owners of share capital in private toll road operations, holders of revenue-backed construction bonds, government treasuries, and the beneficiaries of services financed from government treasuries; and,

- Road user and non-user groups who benefit from reduced vehicle emissions as well as drivers who experience lower vehicle costs and accident rates due to reduced congestion.

Those who stand to lose from road pricing (also from Gomez-Ibanez) include:

- Private vehicle users who pay tolls because they have no other alternative but do not value the time they save more than the tolls they pay. Such users tend to have relatively lower incomes;

- Private vehicle users who forego trips or who shift to other, less preferred routes or modes of travel to avoid a toll; and,

- Private and public road users on un-tolled roads who experience increased congestion due to the diversion of traffic from tolled roads.

[10] Gomez-Ibanez, J. (1992). *The Political Economy of Highway Tolls and Congestion Pricing*. Exploring the Role of Pricing as a Congestion Management Tool, FHA, Washington.

Regional and local experience signifies that consensus requires concurrence on the geographic scope and level of fees; a perception of positive net economic outcomes (including the consideration of congestion effects on adjacent free roads); an allocation of resources to maintaining toll roads in good condition; and, in some cases, an allocation of resources to non-road applications in recognition of "balanced transportation planning" and fairness to those who stand to lose mobility in some respect. Evidence indicates that stakeholders equate the size of the resource pool to be available for road and non-road applications with the volume of revenues generated by tolls: Although economic theory argues that lump sum transfers represent the most efficient way to finance mitigation and compensation schemes, the way toll revenues themselves are allocated matters to stakeholders and cannot be ignored in forging a consensus on toll road policy.

2.1 Generalized Framework

A formalization of the above is given in Figure 1, a simple framework within which road pricing packages can be arrayed and discussed among stakeholders as a basis for finding consensus.

As discussed earlier, certain user groups would undoubtedly experience welfare losses resulting from the imposition of road tolls. In order to gain sufficient levels of political acceptability for any road pricing policy, it may thus become necessary to address the adverse impacts of tolls on these user groups through a considered utilization of surplus revenues generated from the pricing program. This surplus constitutes a reserve from which user groups can in principle be made better off. Thus for these groups, the benefits of road pricing are contingent on the actual distribution of the funds collected from tolls. Various allocation schemes have been presented in the literature arguing for the need to form winning coalitions of advocacy in order to gain acceptance for road pricing.

For example, Goodwin (1989) proposes a "rule of three" to satisfy the various road pricing interest groups by allocating surplus revenues in equal parts to: (a) build new roads, improve existing ones or improve current road maintenance standards; (b) improve public transport services; and (c) reduce existing taxes or increase social expenditure.[11] Improved road networks would benefit those who continue to use the road system despite the presence of tolls; enhanced public transport would be welcomed by those forced off the road as a result of tolls; and lower taxes or increased public expenditure would have broad appeal. Goodwin acknowledges the arbitrariness of this three-part proposal while arguing that there is no theoretically justified non-arbitrary allocation of revenues. Instead, he bases his approach on the grounds that this is an easy-to-understand clear division of revenues and represents a good starting point to reach an agreement.

Small (1992) proposes an alternative allocation of excess revenues in three equal parts to: (a) fund monetary reimbursements to travellers; (b) reduce general taxes currently used to pay for transportation services; and (c) finance new transportation services, for example, in highway and transit sectors.[12] Small identifies seven specific measures within the above categories designed to achieve the objectives of offsetting negative road pricing impacts, promoting social goals and

[11] Goodwin, P.B. (1989). *The Rule of Three: A Possible Solution to the Political Problem of Competing Objectives for Road Pricing*. Traffic Engineering and Control, 30.
[12] Small, K.A. (1992). *Using the Revenues from Congestion Pricing*. University of California Transportation Center.

garnering political support from interest groups. The strategy is to fund programs with such a variety of distribution of impacts that nearly everyone affected will find at least some offsetting benefits, and a majority will perceive the entire package as an improvement (after accounting for benefits from travel time savings).

Small's scheme ensures that all surplus revenues remain in the transportation sector. He bases this scheme on a principle advocated by Burtraw (1991) for compensating losers from decisions in environmental policy. 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.[13] In the case of road pricing, the biggest loss *is* a monetary transfer, thus offsetting transfers in (a) and (b) can be viewed as forms of linked compensation. For those who avoid the toll and change their travel patterns, (c) represents a means by which to directly address their losses by improving the overall transportation infrastructure.

Another revenue allocation scheme has been proposed by DeCorla-Souza (2000) as part of a road pricing strategy named Fast and Intertwined Regular (FAIR) Networks.[14] The concept broadly entails converting existing congested freeways into premium-service free-flowing freeways during peak periods with tolls charged on single-occupancy vehicles while allowing toll-free access to carpools. Revenues earned from the tolls would be allocated to a number of uses to satisfy a variety of policy objectives. Although the exact shares assigned to each revenue objective are derived arbitrarily, their relative proportions combine to provide a package of benefits designed to enhance overall transportation options available to the public.

For example, to mitigate possible equity concerns, a portion of surplus revenues is to be earmarked for toll or transit fare credits (or refunds) offered to low-income individuals to help them pay for peak period tolls or transit fares. Funds would also be used to provide express bus service during peak hours, build new park-and-ride facilities to support increased transit ridership and enhance arterial networks to accommodate possible traffic diversions. All remaining surplus revenues could then be allocated to addressing new highway capacity needs thereby improving the transportation system in the region.

There is some discussion in the academic literature as to whether "earmarking" of revenues as described in the various allocation schemes above has justification in terms of economic theory. Many economists dislike the notion of earmarking, i.e., the tying of revenues to specific expenditure items. They argue against the arbitrariness of such schemes and believe that a rational entity should not 'limit' itself in the ways in which it spends revenues but rather seek out uses that generate the highest return.[15] However, others contend that the use of earmarking by a public authority cannot be judged on the same terms as it would for a private company. Earmarking in the public sector context tries to ensure that citizens can see how charges paid are matched by benefits received. Buchanan (1963) advocated the use of earmarking on this basis, noting the increased transparency and accountability afforded by it.[16]

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[13] Burtraw, D. (1991). *Compensating losers when cost-effective environmental policies are adopted.* Resources 104 1-5. Washington, D.C. Resources for the Future.

[14] Decorla-Souza, P. (2003). *Clearing Existing Freeway Bottlenecks with Fast and Intertwined Regular Networks: Costs, Benefits and Revenues*. Paper presented at TRB Annual Meeting in January 2004.

[15] Button, K. (2004). *Final Report of ITS Center Project: Road Pricing.* Center for ITS Implementation Research.

[16] Buchanan, J.M. (1963). *The Economics of Earmarking.* The Journal of Political Economy, 71: 457-469.

In the context of road pricing, earmarking may also be necessary to create a dominant political coalition in support to the policy. Hau (1992) argues that unless revenues are earmarked and travelers perceive that the funds are channeled back in areas such as reduced taxes, lower user charges or improved transport services, neither the tolled or the tolled off will support road pricing.[17] Hau suggests the establishment of a dedicated road or transport fund as a potentially necessary device if road pricing is to gain political acceptance. In some cases, earmarking may have strong economic logic, such as when revenues are allocated to fund roadway improvements. This would be considering economically justifiable since improvements in a particular corridor would be financed directly from users of the system. In other cases, allocations may be driven largely by political logic, such as when funds are used to promote social objectives and build public support through reduction in taxes, provision of direct monetary transfers and investments in public transport.

In practice, there are a few examples of road pricing programs that have been implemented in recent years, both in the United States and abroad. These programs range from tolling newly constructed lanes (e.g., SR-91 Express Lanes, Orange County) and existing facilities such as High Occupancy Vehicle lanes (e.g., I-15 'FasTrak', San Diego, I-10 'QuickRide', Houston) and bridges (Lee County, Florida, New York/New Jersey Port Authority) to charging road users within entire city areas (e.g., central London, Oslo toll ring). Revenues earned from these operations have generally been utilized or earmarked for one or both of two main purposes: (1) funding roadway construction; (2) funding public transport service improvements.

[17] Hau, T.D. (1992). *Economic Fundamentals of Road Pricing: A Diagrammatic Analysis.* Policy Research Working Papers, Infrastructure and Urban Development Department. The World Bank.

Figure 2: An Analysis Framework for Road Pricing Policy

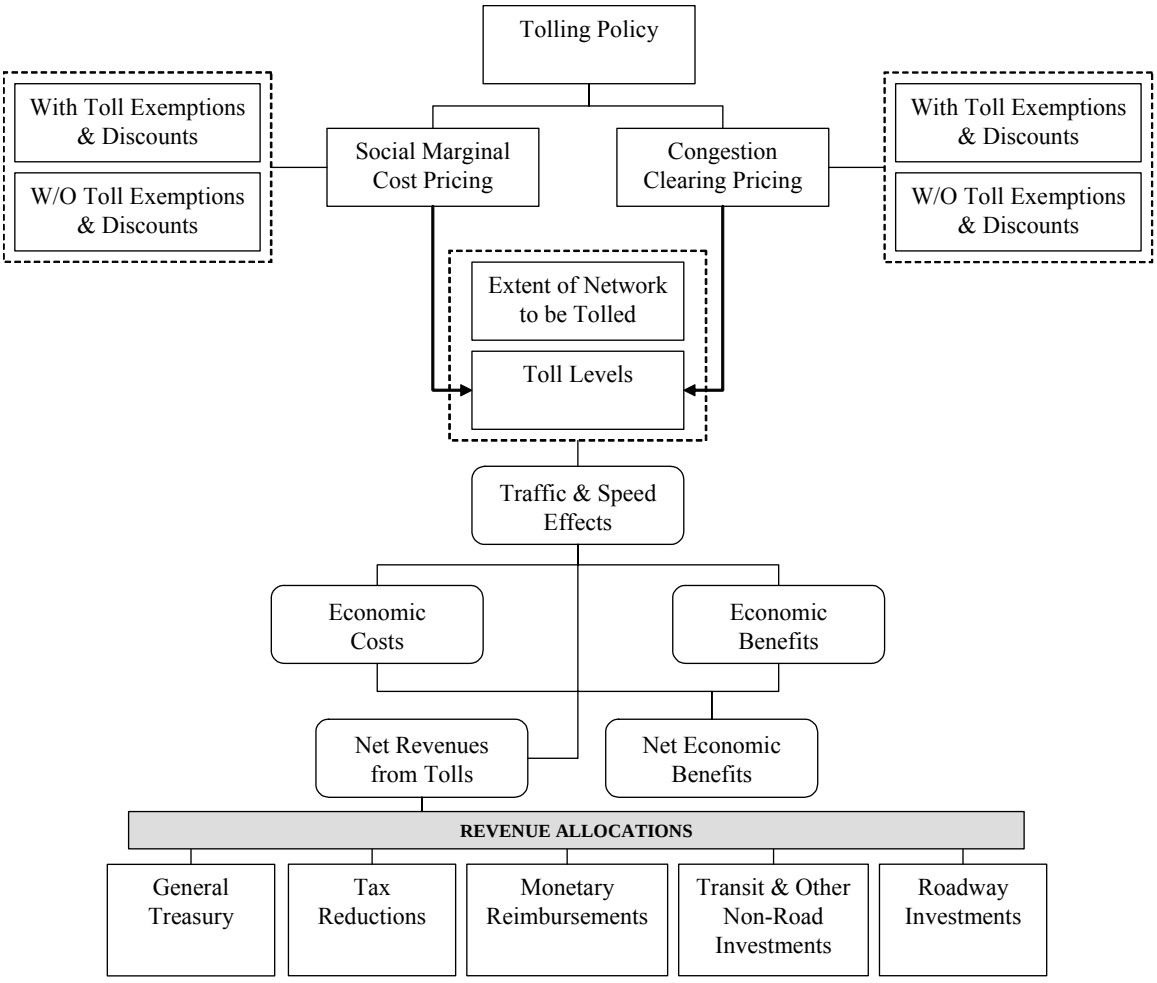


Table 1 below provides a summary of the linkages between the user groups who may potentially lose from road pricing implementation and the associated revenue use options that may alleviate the adverse impacts they experience. Depending on their specific design, some revenue uses (for example, monetary reimbursements) may provide benefits to all user groups. However, the table below is developed to serve the purpose of highlighting the *primary* revenue use policies benefiting each user group that stands to lose from road pricing.

Depending on the structure of the tax reduction scheme (for example, decreases in property tax rates), all users may benefit from the implementation of such a measure. All user groups would also enjoy the benefits of an improved roadway network through higher investments in road maintenance and new construction. Users who remain on the tolled road network despite the new charges are also likely to gain from monetary reimbursements in the form of toll credits that would reduce the burden of out-of-pocket expenses they face. Users who are forced off the tolled roads to other modes such as transit would gain from enhanced transit service in those same travel corridors.

Table 1: Linkage between Revenues and User Groups Adversely Affected by Road Pricing

Adversely Affected User Group	Revenue Uses to Benefit Affected Groups			
	Tax Reductions	Monetary Reimbursements	Transit Improvements	Roadway Improvements
Users who pay tolls due to lack of alternative, but do not value time savings more than the toll.	▲	▲		▲
Users who forgo trips or who shift to other, less preferred routes or modes of travel to avoid toll.	▲		▲	▲
Users of un-tolled roads who experience increased congestion due to diversion of traffic from toll roads.	▲			▲

2.2 Allocation of Road Pricing Revenues

2.2.1 General Treasury

Although some economic theorists argue that channelling toll revenues to the general fund represents an efficient approach to resource management, the tradition in the United States has been one of dedicating (through the trust fund mechanism) all roadway taxes to transportation purposes. There is no U.S. precedent to suggest that toll revenues would, in whole or in part, need to be channelled to the general fund in order to secure a policy consensus on road pricing.

2.2.2 Tax Reductions

Diverting some of the revenues generated from road charges to reduce general taxes has been cited as a potential policy instrument within an overall revenue allocation strategy. A variety of taxes are used to fund transportation programs and services in the United States. Studies have proposed that the new pool of road pricing revenues may be used to partially substitute for general taxes currently used to pay for transportation services, or may be used to reduce taxes in other areas. This measure would have general appeal with the public, as reduced taxes would serve as partial compensation for the increased road fees.

Small's study provides the most detailed allocation scheme with respect to tax reduction in the literature.[18] He proposes reductions in sales tax surcharges dedicated to financing transportation programs that may apply in the region. Other federal, state or local taxes whose proceeds feed into general revenue coffers (property taxes, for example) may also be reduced using a portion of road pricing revenues. In designing an allocation scheme for Los Angeles, he assigns roughly

[18] Small, K.A. (1992).

one-third of net revenues to tax reduction purposes, split between a sales tax reduction (18 percent) and property tax rebate (16 percent).

Although the allocation discussed above has been proposed in theory, a survey of current road pricing programs worldwide did not uncover any cases where toll revenues are being used to finance tax reductions.

2.2.3 Monetary Reimbursements

Returning a portion of revenues to travellers in the form of monetary reimbursements is another mechanism that could be used to address the potential adverse impacts of road pricing. Providing transfers to individuals may be viewed as a direct means by which to compensate those affected by road pricing programs, particularly lower and middle-income groups. Studies have proposed that reimbursements may be distributed in the form of employee commuting allowances, road user fee rebates or toll and transit fare credits or refunds.[19] Figure 3 illustrates a sample revenue allocation framework of various reimbursement options and is intended to guide the reader in identifying the potential components of a viable allocation strategy[20].

Commuting allowances would be structured so as to partially compensate those who change their travel patterns due to the toll as well as those who continue to pay road charges, without undermining the efficacy of the pricing program itself. Revenues could also be used to issue rebates on road user charges such as vehicle license fees or fuel taxes, thus providing monetary benefits directly to users of the road system. Small assigns around one-third of net revenues to these purposes, divided between employee commuting allowances (23 percent) and fuel tax reductions (12 percent).

DeCorla-Souza proposes the issuance of road toll and transit fare credits or refunds (constituting roughly 23 percent of net revenues in a scenario analysis for FAIR networks in Washington, D.C.) as another means to address the potential negative equity effects on low-income groups. Commuters would receive direct compensation in the form of toll and transit fare credits usable at a later time and/or partial refunds. DeCorla-Souza suggests a scheme where the rate of reimbursement is inversely proportional to the income of the commuter's household (based on self-identification and verification). Based on this approach, the lowest income groups would have a higher reimbursement rate relative to middle-income commuters.

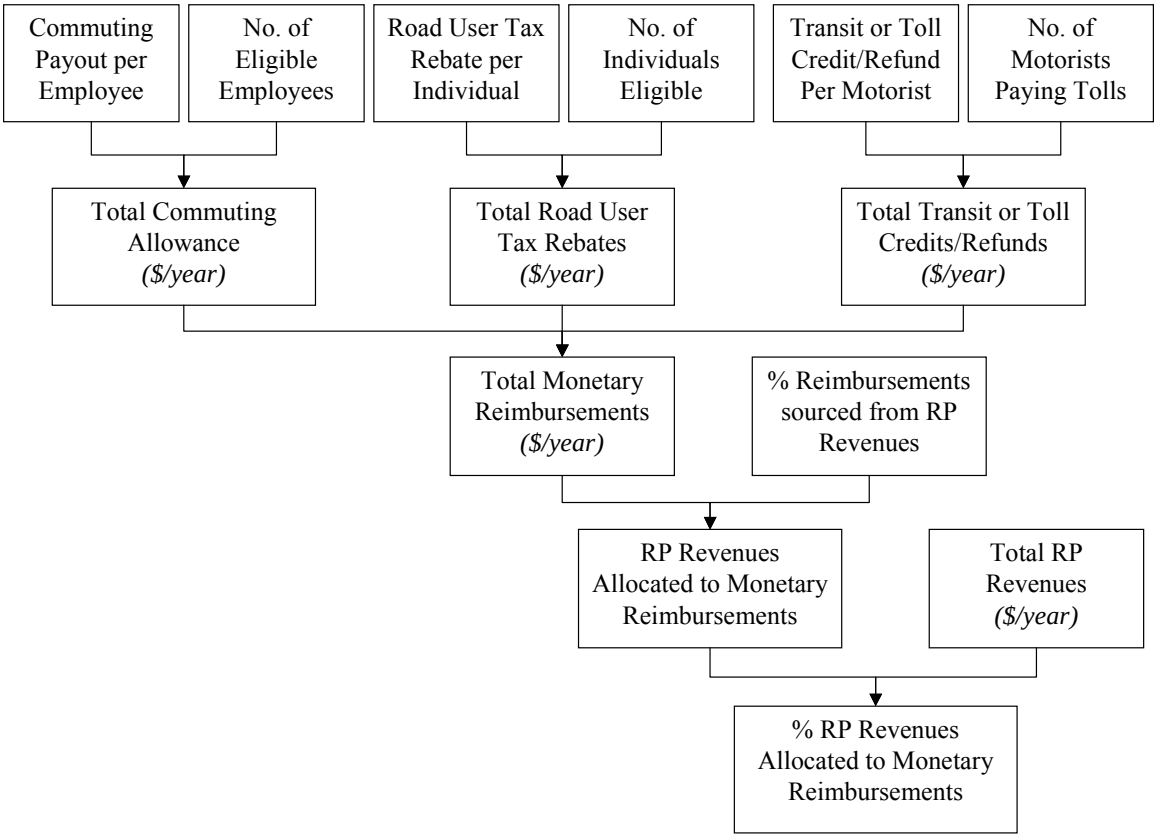
Although the allocations discussed above have been proposed in theory, a survey of current road pricing programs worldwide did not uncover any cases where toll revenues are being used to provide monetary reimbursements to individuals.

Related to the idea of toll refunds and credits discussed above, some in the literature, including DeCorla-Souza, have proposed toll discounts and exemptions for certain users groups such as transit and high-occupancy vehicles. Current road pricing programs in California and Texas, for example, have incorporated such elements into their toll schedules. For instance, the SR-91 express lanes in California provide discounts to 3+ carpoolers (exemptions at non-peak hours), motorcycles, zero-emission vehicles and vehicles with disabled persons.[21] In the context of

[19] Small, K. A. (1992); Decorla-Souza, P. (2003).
[20] A side note relates to the treatment of toll discounts and exemptions as a revenue "use". This is discussed later in this sub-section.
[21] SR-91 Express Lanes website FAQ. http://www.91expresslanes.com

revenue allocation in this paper, toll exemptions and discounts are viewed as components of the overall pricing plan and represent "foregone" revenues to the tolling authority. Since, these revenues are not actually "earned", they are not included as a *direct* use of road pricing revenues as are the other measures discussed herein.

Figure 3: Revenue Allocation to Monetary Reimbursements



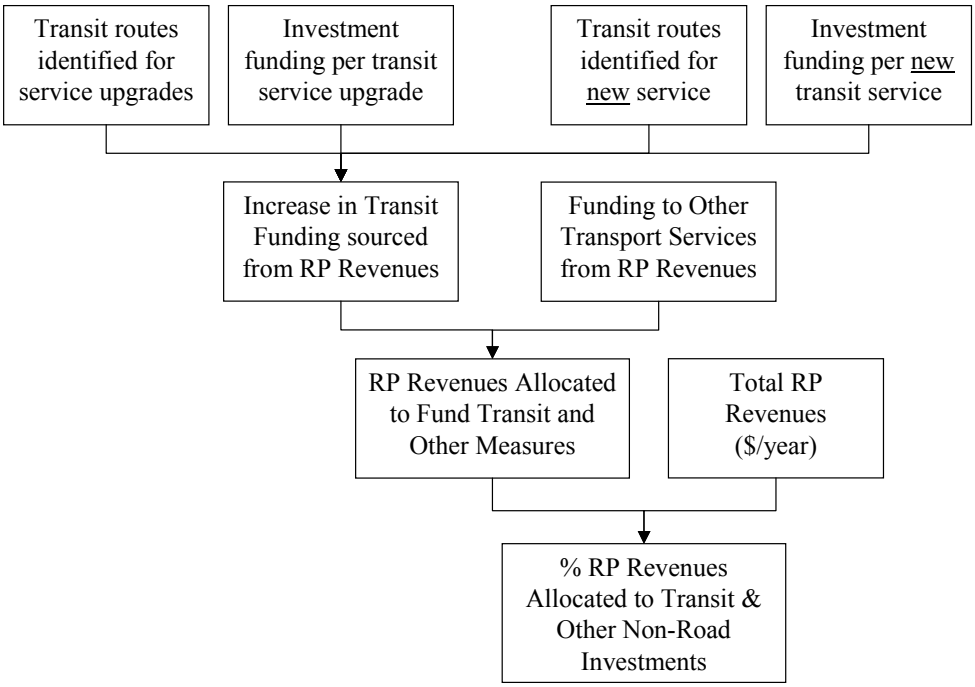
** RP = Road Pricing*

2.2.4 Transit and Other Non-Road Investments

Improving transportation alternatives is considered a viable option for mitigating the possible negative equity impacts of road pricing. Studies support the notion that expanded transit service and other improvements to road alternatives offer a form of compensation to those who switch to other modes because of the tolls. Enhanced transit service, for example, would partly placate those users forced off the road as well as gain the support of existing users. Transit funding may be disbursed in the following ways: (1) investments to upgrade current transit services, for example, improvements to existing operations; or (2) investments in new transit services, for example, a *new* bus or subway line. To some extent, increased investment in these alternative modes may also become necessary in order to accommodate the higher anticipated patronage as a result of the road fees.

Figure 4 illustrates a sample revenue allocation framework intended to assist the reader in considering the assignment of funds to transit and other non-road investments.

Figure 4: Revenue Allocation to Transit and Other Non-Road Investments



There are a few real-world instances of road pricing revenues being used to support transit initiatives. All surplus revenues (i.e., net of operating and maintenance costs) generated from High Occupancy Toll (HOT) lanes on the I-15 in San Diego are used to finance an express bus service in the corridor.[22] The "Inland Breeze" express bus service operates during peak-travel periods and is fully funded from gross toll proceeds that are in the range of $2 million a year. In London, road user charges were recently implemented to reduce traffic congestion in the city center. Net revenues from this program will be used to improve public transit services, including operating more buses and effecting major renovations to the subway system.[23] In Oslo, Norway, although most of the toll revenues are funnelled into roadway projects, around 20 percent of net funds are earmarked to improve the city's bus service.[24]

Revenues may also be targeted toward other transportation projects such as bicycle paths and pedestrian walkways, which would improve the travel options for those individuals who forgo vehicle usage for short trips. Small proposes allocating approximately 11 percent of revenues to these and other transportation improvements, primarily in city centers. Another possible allocation could be made toward expansion of park-and-ride facilities. As tolls during peak periods are expected to reduce overall vehicle travel, a greater number of individuals may switch to transit necessitating increased investment in park-and-ride facilities built near transit stations. In a proposed application of FAIR networks in Washington D.C., DeCorla-Souza estimates that funding enhanced facilities would require around 7 percent of net revenues generated from the program.[25]

[22] Ward, J.L. (2001). *Value Pricing: A Synthesis of Lessons Learned*. H.H. Humphrey Institute of Public Affairs, University of Minnesota.
[23] Litman, T. (2004). *London Congestion Pricing: Implications for Other Cities*. Victoria Transport Policy Institute.
[24] San Diego State University Foundation (1997). *Worldwide Experience with Congestion Pricing.* I-15 Congestion Pricing Project Monitoring and Evaluation Services.
[25] Decorla-Souza, P. (2003).

2.2.5 Roadway Investments

Using a portion of revenues generated from road pricing programs to finance investments in new roadway capacity and service improvements is considered an economically logical strategy since it ensures that road users are not inefficiently subsidizing non-users and non-users not subsidizing users. Studies in the literature support the use of revenues to fund road system enhancements. Some would argue that funding new highways is the "only politically salient case" for road pricing.[26] It likely represents the most compelling policy to the public at large, since it has a direct link to highway charges and the benefits would be easily visible.

There are a few real-world cases of road pricing revenues being used to support new road construction and expansion. For example, the imposition of cordon tolls in Oslo, Norway coincided with the opening of an express bypass for congested downtown traffic that was to be financed by toll revenues.[27] As part of the toll program, 80 percent of revenues were earmarked to build new roads and constituted an important source of funds for infrastructure investment. Revenues generated from toll ring programs in other Norwegian cities such as Bergen and Trondheim are also part of financial packages used to fund major regional road improvements.

The tolled express lanes built in the median of the SR-91 in Orange County present another example. Privately built in 1995, the express lanes were bought by the Orange County Transportation Agency (OCTA) in 2003 returning the project to the public sector. Under private ownership, any revenues in excess of capital and operating costs and debt payments represented profit to the company. However, since the purchase by OCTA, any excess revenues (i.e., net of O&M and debt service costs) earned from the express lanes are earmarked for roadway improvements to the SR-91 corridor as and when they become available.[28] The authorities are currently engaged in identifying and developing plans for freeway improvement projects over the next several years.

Toll revenues may also be used to improve service on arterial road networks that may experience increased traffic due to the imposition of peak-period tolls on freeways and interstates. Traffic flow on these networks may be improved though the widespread deployment of Intelligent Transportation System (ITS) measures such as signal coordination and adaptive traffic signal control systems. DeCorla-Souza's FAIR networks concept recognizes advanced signal systems funded from toll revenues as an important part of road pricing policy.[29] In a hypothetical evaluation of FAIR network costs and benefits for Washington D.C., DeCorla-Souza estimates that roughly 2 percent of net toll revenues would be required to cover the management and operational costs of arterial networks.

[26] Gomez-Ibanez, J. (1992).
[27] San Diego State University Foundation (1997).
[28] Orange County Transportation Authority (2003). *91 Express Lanes Fiscal Year 2003 Annual Report.*
[29] Decorla-Souza, P. (2003).

3. A STARTING POINT FOR FACILITATING DISCOURSE

Section 2 of this paper developed a policy analysis framework within which to facilitate analysis and discourse on road pricing that can, in principle, result in consensus. Using evidentiary support from literature as well as road pricing applications in practice, this section presents an operational expression of the framework as a starting point for initiating discussions of road pricing policy.

3.1 Preliminary Proposal for Revenue Allocation

3.1.1 Summary of Evidence

Tables 2 and 3 provide a summary of the evidence with regard to the allocation of revenues gathered from the road pricing literature and operational examples worldwide.

Table 2: Proposed Revenue Allocation Schemes in the Literature

Uses	Goodwin	Small	DeCorla-Souza
Improve road system	33%	11%	51%
Improve public transport	33%	10%	18%
Reduce taxes/Increase spending	33%	34%*	
Employee commuting allowances		23%	
Fund transit/toll credits			23%**
Reduce road user taxes		12%*	
Fund transportation facilities		11%	7%

* Small's allocation to reduce/replace taxes that largely finance transportation can be viewed, in part, as an indirect allocation to transportation investments.

** Toll exemptions extended to HOVs etc. have not been included as a "direct" use of net revenues in terms of their availability for allocation purposes. Exemptions and discounts constitute a component of the overall pricing plan and can be viewed as a form of "foregone" revenues. For the purpose of this paper, we consider the allocations from "earned" revenues only.

Table 3: Revenue Allocation Schemes in Practice

Uses	I-15, San Diego	SR-91, Orange County	NY/NJ Port Authority	Oslo, Norway	London, UK
Improve roads		100%	N/A*	80%	
Improve public transport	100%		N/A*	20%	100%
Toll discounts & exemptions**					

* N/A: not available - unable to obtain data.

** Not considered a "direct" use of toll revenues. See discussion on page 10.

3.1.2 Estimated Ranges for Proposed Revenue Allocation

The share of revenues allocated to each policy use will be strongly influenced by political considerations and will ultimately be determined through negotiation and consensus amongst the many interest groups who may be affected by the implementation of road pricing programs. Based on our findings, a preliminary estimate of possible ranges for the revenue distribution shares is provided in Table 4 below.

Table 4: Proposed Revenue Allocation Strategy

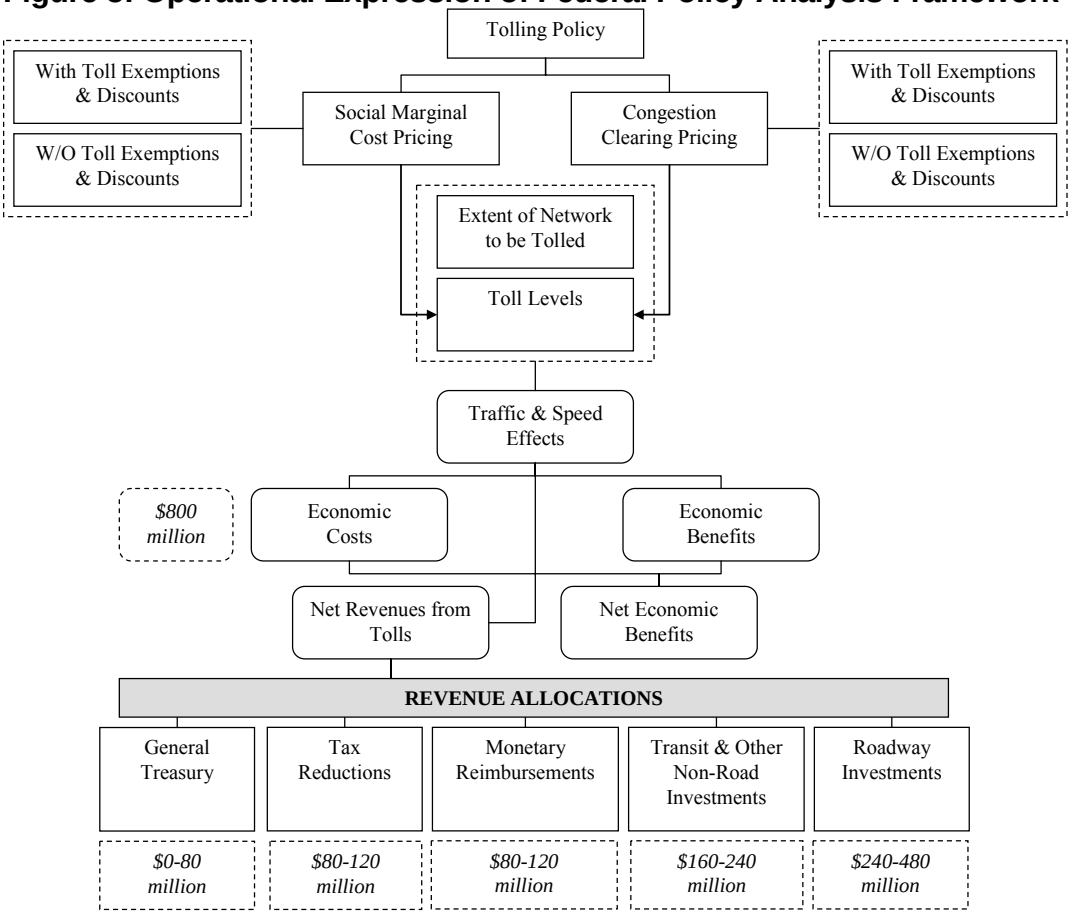
No.	Revenue Allocation Element	% of Total Revenues*	Comments
1	General treasury	0-10%	No federal precedent to suggest that toll revenues would need to be channelled to the general fund.
2	Tax reductions: - Sales tax - Property tax - Other taxes	10-15%	Substituting taxes used to finance transportation with road charges would garner public support and may also improve the overall efficiency of the tax system.
3	Monetary reimbursements: - Employee commuting allowances - Road user fee rebates - Toll/transit fare refunds or credits	10-15%	Providing direct monetary transfers to users can mitigate equity and fairness issues for middle and low-income groups.
4	Non-roadway transportation investments: - Transit - Other	20-30%	Funding transit is a key policy instrument in improving transportation alternatives in a tolled corridor. Real-world examples support using revenues to fund bus service improvements in San Diego, London etc.
5	Roadway investments: - New capacity - Service improvements	30-60%	Improving the roadway network would directly benefit users of the system who pay the tolls. Real-world examples support using revenues to fund highway improvements in California, Norway etc.

** Taking the mid-point of each range will sum to a total of 100%*

3.2 Operational Expression of Locality-Level Road Pricing Policy Analysis Framework

A recent HLB study for the Department of Transportation[30] simulated the effects of introducing road pricing on congested urban interstate highways and other freeways in the United States. Revenues (net of operating costs) were estimated to be $49.5 billion in 2002. For a representative urban center with a population of approximately two million, annual road pricing revenues would be in the neighborhood of $800 million.[31] This estimate is derived using the relative share of peak period vehicle travel for a city of this size from a dataset of 85 urban centers in the U.S.[32] Utilizing the preliminary revenue allocation proposal presented in Table 4, we estimate the revenues allocated to each policy element in the context of the framework developed for this paper. These preliminary estimates are intended to serve as a starting point for discussion of locality-level road pricing policy among all concerned stakeholders.

Figure 5: Operational Expression of Federal Policy Analysis Framework



** Note: Taking the mid-point of each range above will sum to the net revenue total of $800 million.*

[30] HLB Decision Economics Inc. *Issues Arising in the Consideration of Road Pricing on a National Scale*, for the Office of the Secretary, Final Draft Revision #6, U.S. Department of Transportation, March 14, 2005

[31] The total budget for a city of this size may also lie in this range. For example, the city of Denver (population around 2 million) projects 2006 budget revenues to be $752 million.

[32] Dataset sourced from Texas Transportation Institute 2004 Urban Mobility Study. As an aside, it can be noted that this approach yields an estimate of around $4.4 billion in road pricing revenues for Los Angeles. Small's 1992 study estimated L.A. revenues in the order of $3.0 billion. Accounting for growth in vehicle traffic in the intervening years, Small's estimate would now likely lie in a range of $3.5 to $4.0 billion.

4. CONCLUSION

Most economic historians trace the roots of today's interest in marginal cost pricing for roadway services to Vickrey's seminal work in the 1940s and 1950s. Consider this quotation from Vickrey's influential 1955 article in the American Economic Review:

> *As a preface to discussion of the role of marginal cost pricing, it is perhaps well to state explicitly that in common with any other theoretical principle the principle of marginal cost pricing is not in practice to be followed absolutely and at all events, but is a principle that is to be followed insofar as this is compatible with other desirable objectives, and from which deviations of greater or lesser magnitude are to be desired when conflicting objectives are considered. On the other hand, I propose to maintain that marginal cost must play a major and even dominant role in the elaboration of any scheme of rates or prices that seriously pretend to have as a major motive the efficient utilization of available resources and facilities.*[33]

To this we can add the more general proposition, first espoused by Buchanan, that a precondition for a deeming a policy to constitute a welfare improvement is broad public consensus regarding benefits, costs, and collateral distributional outcomes and their treatment.

The general framework developed in Section 2 (Figure 1) and elaborated in Section 3 (Figure 4) is consistent with Vickrey's proposition. Marginal cost plays the dominant role; compatibility with other desirable objectives is accommodated insofar as collateral steps to achieve them are evident in road pricing implementations at the state and local level. The only major steps in application today are that of payments to enhance roadway infrastructure and improve transit service to certain low-income groups, with such payments being financed from toll revenues. Direct monetary reimbursement (cash subsidies and the like) for low-income groups and reduction in general taxes have been proposed in the academic literature but have not emerged in practice. In the same vein, a direct reduction in marginal cost prices for the sake of minimizing deleterious effects on disadvantaged groups has arisen in neither the literature nor in implementation.

Section 3 populates the framework as a first step in elaborating what a federal road pricing policy might look like if it contained sufficient attention to collateral objectives so as to obtain general consensus. The policy reflected in this test of the framework is that of marginal cost pricing on congested segments of the nation's urban interstates and freeways. The test indicates that consensus-based federal road pricing structure might have the following characteristics:

- Prices (tolls) would reflect full social marginal costs rather than departures from marginal cost as a means of serving other objectives;

[33] Vickrey, William (1955). *Some Implications of Marginal Cost Pricing for Public Utilities*, American Economic Review, Supplement, Vol. 45, no. 2 pp. 605-20

- Net economic benefits from road pricing would lie in the region of about $4.5 billion annually[34];

- Tolls would generate revenues (net of operating costs) of an estimated $46 billion a year;

- Toll revenues would be acknowledged as a source of funds for both roadway capacity and for financing programs designed to ease the effects of road pricing on disadvantaged groups;

- A significant share, between 20 and 30 percent, of toll revenues would be committed to transit investment purposes (with a minor share going to operating support in order to hold down fares). This represents between $9 billion and $14 billion annually (in constant 2002 dollars);

- Between 30 and 60 percent of toll revenues would be committed to roadway capacity investment purposes. This represents between $14 billion and $27 billion annually (in constant 2002 dollars);

- The balance of revenues, about $14 billion annually, would flow to private equity, excise tax reductions, monetary reimbursements and general revenues.

Further indications that the package outlined above might secure broad consensus is evident in the contribution that revenue allocations could make to closing acknowledged highway and transit funding shortfalls. The $14-$27 billion committed to interstate and freeway investment represents between 13 percent and 24 percent of the Department of Transportation's estimated $112 billion in annual investment requirements (through 2020) to improve these roadways.[35] Combined with annual revenues from federal fuel taxes of an estimated $26 billion[36], the estimated allocation of road pricing revenues to highways would sharply reduce the "highway needs gap."

The significance of a $14 billion to $27 billion commitment to transit investment can similarly be ascertained by comparison to government estimates of transit investment requirements. As shown below, the Department of Transportation's 2002 Conditions and Performance Report to Congress indicates that investment requirements lie between $14.8 billion and $20.6 billion.

[34] Values referenced on an annual basis (net economic benefits, net revenues) represent the base year (2002) value of their respective annual streams (Source: HLB Decision Economics Inc. *Issues Arising in the Consideration of Road Pricing on a National Scale*, Final Draft Revision #6, for the Office of the Secretary, U.S. Department of Transportation, January 31, 2005).
[35] 2002 Conditions and Performance Report
[36] 2002 Conditions and Performance Report

Table 5: Summary of Average Annual Transit Investment Requirements, 2001-2020 (Billions of 2000 Dollars)

CONDITIONS	PERFORMANCE	AVERAGE ANNUAL COST
Maintain	Maintain	$14.8
Improve	Maintain	$16.0
Maintain	Improve	$19.5
Improve	Improve	$20.6

Source: 2002 Conditions and Performance Report