Title
Addressing Equity Challenges to Implementing Road Pricing

Authors
Taylor, Brian D., PhD
Kalauskas, Rebecca, MA
Iseki, Hiroyuki

Publication Date
2010-03-01

CALIFORNIA PATH PROGRAM
INSTITUTE OF TRANSPORTATION STUDIES
UNIVERSITY OF CALIFORNIA, BERKELEY

Addressing Equity Challenges to Implementing Road Pricing

Brian Taylor, Rebecca Kalauskas, Hiroyuki Iseki

California PATH Research Report
UCB-ITS-PRR-2010-6

This work was performed as part of the California PATH Program of the University of California, in cooperation with the State of California Business, Transportation, and Housing Agency, Department of Transportation, and the United States Department of Transportation, Federal Highway Administration.

Final Report for Task Order 6330 Task A-5

March 2010

ISSN 1055-1425

CALIFORNIA PARTNERS FOR ADVANCED TRANSIT AND HIGHWAYS

ADDRESSING EQUITY CHALLENGES TO IMPLEMENTING ROAD PRICING

California PATH Project

Evaluation of Open Road Electronic Toll Collection for California Applications (XB-604)

Deliverable A-5
30 September 2009

By

Brian D. Taylor, PhD, AICP *
Professor and Chair of Urban Planning
Director, UCLA Institute of Transportation Studies
3250 Public Affairs Building
Los Angeles, CA 90095-1656
(310) 903-3228
E-mail: btaylor@ucla.edu

Rebecca Kalauskas, MA*
Research Assistant
UCLA Institute of Transportation Studies

And

Hiroyuki Iseki
Assistant Professor of Planning and Urban Studies
School of Urban Planning and Regional Studies
University of New Orleans
368 Milneburg Hall, 2000 Lakeshore Dr.
New Orleans, LA 70148
e-mail: hiseki@uno.edu
Phone: 504-280-6029; Fax: 504-280-6272

Abstract

Many public officials looking for ways to increase the efficiency, equity, and financial stability of transportation systems are turning to metering road use with electronic tolls. While tolling today is easier and cheaper than ever, officials face many obstacles to implementing tolling – especially concerning equity. Accordingly, this paper examines road pricing equity from a variety of perspectives. We begin by developing an evaluation framework that defines three distinct bases for evaluating equity – free markets, equal opportunities, and equal outcomes. We then use this framework to guide a review of five case studies of road pricing – in San Diego, Minneapolis-St. Paul, Germany, Stockholm, and New York – that explore how equity concerns have been raised and addressed in practice. We find that equity was a central question in each case, alternatively motivating (1) the implementation of pricing (Germany), (2) the funding of alternative modes (San Diego, Minnesota, and Stockholm), (3) mid-course restructuring of the pricing program (Stockholm), and (4) successful opposition to a pricing proposal (New York). Successful mitigation of equity concerns have entailed: (1) careful planning of the project or program, paying attention to the dedication of toll revenues to both transit and highway improvements in and around the tolled areas to create constituents for the pricing program, (2) a limited geographic scope to central, congested zones, particular travel corridors, or particular market segments, (3) incremental implementation to allow for mid-course adjustments in project development, and (4) ongoing, substantive, and sincere public outreach and education efforts that have meaningfully influenced program design.

Executive Summary

Concern with the sustainability of auto-dependence, chronic metropolitan traffic congestion, and a decades-long erosion in the buying power of motor fuel taxes has left many public officials looking for ways to increase the efficiency, equity, and financial stability of transportation systems. One approach to both increase transportation efficiency and secure new revenues is to meter road use with electronic tolls. While technological advances make such tolling easier, cheaper, and more reliable than ever, many worry that charging people for driving on public roads is unfair, even un-American. Such concerns reflect the complex, and sometimes confusing, nature of road pricing and its outcomes.

This paper examines road pricing equity from a variety of perspectives to facilitate understanding of various road pricing. Given the often competing views of equity, this paper develops an evaluation framework that defines three distinct bases for evaluating equity – free markets, equal opportunities, and equal outcomes (Table A).

Table A. Confounding Notions of Equity in Transportation Finance

Unit of Analysis	Type of Equity		
	Market Equity	*Opportunity Equity*	*Outcome Equity*
Geographic **States, counties, legislative districts, etc.**	Transportation spending in each jurisdiction matches revenue collections in that jurisdiction	Transportation spending is proportionally equal across jurisdictions	Spending in each jurisdiction produces equal levels of transportation capacity/service
Group **Modal Interests, racial/ethnic groups, etc.**	Each group receives transportation spending/benefits in proportion to taxes paid	Each group receives a proportionally equal share of transportation resources	Transportation spending produces equal levels of access or mobility across groups
Individual **Residents, voters, travelers, etc.**	The prices/taxes paid by individuals for transportation should be proportional to the costs imposed	Transportation spending per person is equal	Transportation spending equalizes individual levels of access or mobility

This framework transcends the sometimes ideological characterizations of equity to allow for a more practical consideration of the fairness of transportation finance and pricing (Table B).

Table B: Using the equity evaluation framework to compare congestion tolls and transportation sales taxes

Unit of Analysis	**Type of Equity and Level of Equity (underlined)**		
	Market Equity	***Opportunity Equity***	***Outcome Equity***
Geographic **States, counties, legislative districts, etc.**	*Congestion* *Toll*: <u>High</u> because expenditures are likely targeted to where they are collected *Sales* *Taxes*: <u>High</u> because expenditures are likely targeted to where they are collected	*Congestion* *Toll:* <u>High</u> because revenues are usually used to improve transportation service in jurisdiction where they are collected *Sales Taxes*: <u>Moderate</u> because revenues collected from all consumers are likely to improve service for travelers living in the area where the taxes are collected	*Congestion* *Toll:* <u>Low</u> because expenditures are not usually targeted to areas with low levels of mobility *Sales* *Taxes*: <u>Low</u> because expenditures are not targeted to areas with low levels of mobility
Group **Modal Interests, racial/ethnic groups, etc.**	*Congestion* *Toll*: <u>High</u> because revenues are used to improve mobility of each group is in rough proportion to the collection of toll from each group *Sales Taxes*: <u>Low</u> because light-users of transportation systems are almost certain to cross-subsidize heavy transportation system users	*Congestion Toll:* <u>High to Moderate</u> because the revenues are generally spent to improve transportation services for groups from whom the tolls are collected. *Sales* *Taxes*: <u>Moderate</u> because the revenues collected from all consumers are likely used to improve transportation services for the groups from whom the taxes are collected	*Congestion* *Toll:* <u>Low</u> because expenditures are usually not targeted to groups with low levels of mobility *Sales* *Taxes*: <u>Low</u> because expenditures are usually not targeted to groups with low levels of mobility
Individual **Residents, voters, travelers, etc.**	*Congestion* *Tolls*: <u>High</u> because revenues are generally used to improve mobility of toll payers *Sales Taxes*: <u>Low</u> because tax payments are unrelated to transportation system cost imposed or benefits received	*Congestion* *Tolls:* <u>Moderate</u> because transportation toll revenues are likely used to improve transportation services for individual travelers *Sales Taxes*: <u>Low</u> because transportation expenditures are unlikely to be returned to taxpayers in proportion to payments	*Congestion* *Toll:* <u>Low</u> because expenditures are usually not targeted to individuals with low levels of mobility *Sales* *Taxes*: <u>Low</u> because expenditures are usually not targeted to individuals with low levels of mobility

Given these frameworks, the paper then reviews five case studies of road pricing – in San Diego, Minneapolis-St. Paul, Germany, Stockholm, and New York – to explore how equity concerns have been raised and addressed. This review finds that equity was a central question in each case, alternatively motivating (1) the implementation of pricing (Germany), (2) the funding of alternative modes (San Diego, Minnesota, and Stockholm), (3) mid-course restructuring of the pricing program (Stockholm), and (4) successful opposition to a pricing proposal (New York).

We find from this review that, in practice, successful mitigation of equity concerns have entailed:

1. Careful planning of the project or program, paying attention to the dedication of toll revenues to both transit and highway improvements in and around the tolled areas to create constituents for the pricing program;
2. A limited geographic scope to central, congested zones, particular travel corridors, or particular market segments;
3. Incremental implementation to allow for mid-course adjustments in project development, and
4. Ongoing, substantive, and sincere public outreach and education efforts that have meaningfully influenced program design.

Such efforts have increasingly turned equity objections to pricing on their head by presenting pricing as, not only a way to substantially increase transportation system efficiency, but also to address and correct substantial inequities in our current systems of transportation finance. The equity analysis framework outlined in this paper is intended to foster such comprehensive evaluations of road pricing equity vis-à-vis other forms of transportation finance in the years ahead.

Overview

Allowing drivers to crowd onto roadways without regard to the costs their travel imposes on others increases traffic delays, fuel consumption, vehicle emissions, crashes, and encourages sprawling development. While economists and transportation analysts have long touted the potential efficiency benefits of directly charging users for the costs their travel imposes on society, technological limitations for years prevented road pricing. Recent technological advances, however, have made it far easier and cheaper to charge vehicles for road use, and indeed we are witnessing a gradual rise in electronic roadway tolling applications around the globe. While road pricing holds the promise of reducing congestion, emissions, and fuel use while raising needed revenues, the growth in toll programs and projects is halting, and well short of a groundswell. This is because the idea of road pricing—charging travelers fees to drive on roads that rise and fall with the level of congestion, vehicle weight, and so on—generally remains unpopular with businesses, voters, and the people whom they elect. In particular, many fair-minded people raise concerns that lower-income people might be unfairly priced off roads.

This paper examines the fairness of road pricing from a variety of perspectives, with a focus on successful efforts to address equity concerns in practice. This report begins by examining the circumstances that have led public officials to consider experimenting with tolls, and then places transportation finance into a broader context of social equity. It then discusses why various views of equity often conflict in the context of transportation finance and, based on this discussion, proposes a practical framework for evaluating transportation finance/pricing equity. The paper further explores how the tensions between equitable transportation finance programs and equitable transportation finance systems have led most elected officials to inappropriately separate transportation pricing from finance in policy debates. Next, the paper

uses the transportation pricing/finance equity framework to compare the equity of road pricing with the increasingly popular technique of dedicating local sales taxes to transportation. Finally, the paper summarizes the findings of five case studies of how equity concerns have emerged and been addressed in prominent road pricing projects, offering lessons learned from this review. The details of these case studies are summarized in the appendix.

Putting Transportation Pricing and Finance Equity in Context

Nearly all transportation policy and planning debates concern money, and nearly all transportation finance debates concern equity. To some, this second assertion may seem puzzling, even counter-intuitive. But the way that public officials think of equity in transportation pricing and finance is far different from the way that most social scientists or transportation analysts would define the term. Thus, "equity" gets defined quite differently by different interests at different times. To paraphrase former Supreme Court Justice Potter Stewart on the question of pornography, most of us cannot precisely define equity or inequity in transportation finance, but we think that we know it when we see it.

There are two principal ways one can think about transportation equity: We can conceive of transportation as an end in itself and a means to an end. With respect to the latter, transportation analysts typically describe the demand for transportation as a "derived demand." That is, with the exception of walks in the park or cruising the boulevard on Saturday night, the demand for transportation is derived from a desire to consume non-transportation-related products and services and engage in non-transportation-related activities. One stands on a crowded subway each morning not for the thrill of the ride, but to get to work on time; one searches for a parking space at the grocery store not for the pleasure of finding an open space,

but to stock one's house with food. As transportation is an important, often critical, link to education, paid work, recreation, health care, culture, and many other aspects of quality living, planners, policymakers and public officials are rightly concerned that most members of society have sufficient levels of mobility. Mobility, combined with the number of opportunities, services, and goods available in a given area, creates accessibility to quality living. So in addition to public goods and market failure rationales, many public officials justify public investments in transportation in order to provide for basic mobility needs (e.g. being able to move about in order to reach essential goods, services, employment, and housing) disadvantaged members of society regardless of ability to pay.

In addition to ability to pay, access is affected by peoples' age, sex, physical ability, cognitive ability, and cultural background. Indeed, a large body of research examines how the young and the old, the disabled, and the poor suffer from lower levels of mobility and accessibility (see, for example, Blumenberg & Waller, 2003; Bullard & Johnson, 1997; Deka 2004; Clifton & Lucas, 2004; Garrett & Taylor, 1999; Hodge 1995). The focus here, however, is four questions about the public sector role in transportation: 1) Who pays for transportation?, 2) How do they pay?, 3) Who benefits from transportation?, and 4) Where do they benefit?

Theorizing About Equity

Many transportation economists and policy analysts characterize along two dimensions. The first dimension is horizontal equity, which considers how similarly situated people (the elderly, bus riders, and so on) fare relative to one another. Horizontal equity is achieved, for example, when all members of the same income class pay equal taxes. The second dimension is vertical equity, which considers how differently situated people (poor vs. wealthy, drivers vs.

non-drivers, etc.) fare relative to one another. Vertical equity is achieved, for example, when taxes are levied on households proportional to the ability to pay. Increasingly, the concepts of longitudinal or intergenerational equity have been incorporated into the equity analyses of transportation policies, particularly in regards to road pricing (Levinson 2001; Szeto and Lo 2005; Viegas 2001). While horizontal and vertical equity are central concepts in taxation and finance, questions of transportation equity run much deeper and are summarized in Table 1.

How can we make sense of such a disparate set of competing theories, and how can they be applied, separately or in concert, to practical questions of road pricing? Arguments over transportation pricing and finance frequently directly or indirectly incorporate parts of the theories described in Table 1, but often in an internally contradictory, even illogical fashion. Voters, and the people they elect, frequently judge policies that distribute scarce resources based on instinct or feeling formed by limited or incomplete introductions to the many ideas of distributive justice. Indeed, public opinion research has consistently found that most people's conception of justice is highly variable and complex; studies of both stated preferences and actual behavior show that people switch among characterizations of justice according to the situation (Frey, 2003;Tetlock, 2002; Rozin et al., 1999; Gladwell, 2002). Members of the public, and the officials whom they elect, will frequently argue that roadway tolls would be unfair because they disproportionately affect the poor, and yet those same officials campaign for and voters approve highly income-regressive sales and other non-transportation-use-based tax increases earmarked for transportation without raising similar equity concerns. This may be because tolls represent a significant change from the status quo, are highly visible, and at times can be quite high. In contrast, sales taxes, in contrast, are not so visible,as they are levied in small amounts over very large numbers of transactions. Or it may be simply that sales taxes are

common, familiar, and therefore escape scrutiny, while things like congestion charges are less familiar, inviting skepticism (Derrick & Scott, 1998). But in either case such distinctions are not based on consistently applied principals of equity.

Table 1. Relating Theories of Justice to Public Finance

Theory of Justice	Conception of Justice in Relation to Public Finance	Relation to Notions of Transport Finance Equity in Table 3 Below
Strict Egalitarianism	Each member of society receives the same magnitude of goods and services irrespective of contribution.	Outcome Equity
Difference Principles	Individuals have equality in basic rights and liberties, but society is better off when individual success is cultivated and allowed to benefit individuals directly.	Opportunity Equity
Resource-based Principles	Goods and services are equally distributed at the outset, but there is little or no cross-subsidization from that point forward.	Opportunity Equity
Desert-based Theories	Those who increase wealth in society are entitled to benefit directly from that wealth.	Market Equity
Libertarianism	Consensual transfers of goods and services within a society are just by definition.	Market Equity

From Theory to Practice: A Framework for Transportation Pricing and Finance Equity

A common dilemma in public policy involves evaluating the tradeoffs between efficiency and equity. Policy analysts sometimes complicate matters further by analyzing the tradeoffs between efficiency, efficacy,[1] and equity (Table 2).

[1] We use the term "efficacy" here as synonymous with the term "effectiveness."

Table 2. Defining Efficiency, Effectiveness, and Equity in Transportation Policy	
Efficiency	The ratio of outputs (*lane miles of new roadway*) to inputs (*expenditures on land, labor, and capital*)
Efficacy	The ratio of consumption (*passengers*) to outputs (*vehicle hours of transit service*)
Equity	The relative distribution of transportation inputs (*transportation revenue collections*), outputs (*transportation expenditures*), or consumption (*driving on roads*).

But whether considering efficiency alone or in concert with efficacy, these two measures are often considered to be in tension with equity. Indeed, proposals to improve the efficiency and efficacy of transportation systems – such as through congestion pricing – are often objected to on equity grounds. Such protests notwithstanding, it is not evident that efficiency and equity in transportation finance are incongruent.

Programs of transportation finance have three broad effects: they generate revenues, they meter travel, and they redistribute income (among people, groups, and places). For example, congestion pricing, which aims to reduce traffic delay, emissions, and fuel consumption by variably pricing scarce road space, has long been favored by economists as a way to substantially increase efficiency in managing traffic congestion (Walters, 1961; Mohring, 1970; Small, Winston, & Evans 1989). Revenues collected for transportation from non-transportation-based sources, like the increasingly popular local option transportation sales taxes, used to provide transportation capacity and affect travel as well. By disconnecting the consumption of transportation capacity from the prices paid for travel, non-transportation-based finance instruments – like sales taxes and general obligation bonds – discourage travelers from considering how their travel choices impose costs on society (through congestion delays, noise, emissions, and so on).

A relatively large body of research suggests that travelers with lower incomes are more sensitive to variations of fares, tolls, and fees than higher income travelers (Cohen, 1987; Giuliano, 1994; Harvey, 1994; Richardson &Bae, 1998; Santos &Roley, 2004). However, a similarly well-established body of research shows that higher income travelers are more likely than lower income travelers to travel longer distances in peak hours and in peak directions – precisely the locations where congestion tolls are likely highest (Dittmar et al., 1994; CARB, 1995; Frick et al., 1996; Lari & Iacono 2006; Sullivan, 2000; Taylor, Garrett and Iseki, 2000; Jakobsson, Fujii and Gärling, 2000). So while a given lower income traveler is more likely to be discouraged by a toll from making a peak-hour, peak-direction trip, shifting from sales and other non-transportation-based taxes for transportation to peak-based tolls in many cases would shift the burden of transportation finance away from lower income travelers as a group and toward higher income travelers as a group (Schweitzer and Taylor, 2008). Thus, improving equity in transportation finance is not a simple task, and the most discernable effects are not necessarily the most important.

Disagreements over equity in transportation pricing and finance arise from the competing and contradictory ways that equity is both framed and evaluated. Further complicating matters is the wide variety of *reference units* by which one can measure the equity of a given policy's effects. For example, financing and pricing modes on the basis of trips, passenger-miles-traveled, or on a per capita basis all yield different measures of equity. These factors combine to intensify confusion and misunderstanding among public officials and the public over the fairness of transportation finance.

Borrowing from the theories of distributive justice described above, we can say that egalitarian philosophies emphasize outcomes, difference or resource-based philosophies

emphasize opportunities (or vertical equity), and libertarian philosophies emphasize markets (or horizontal equity). Each of these philosophies can, in turn, be applied to different actors, or units of analysis, in transportation pricing and finance debates – individuals, groups, or jurisdictions. While "units of analysis" may seem itself an abstract concept, it allows us to understand how and why people so often talk past one another in debates over transportation finance. The concept likewise allows for specificity in describing divergent conceptions of equity that the more common concepts of *horizontal and vertical equity* simply cannot (Table 3).

In Table 3, three units of analysis and three types of equity make up nine distinct bases on which road pricing equity can be debated. Market equity seeks to align who pays for travel with who benefits from travel in the fashion of private markets; opportunity equity seeks to equalize resource allocations on some consistent basis; and outcome equity seeks to equalize mobility outcomes. So while the effects of road pricing on travelers of different incomes is obviously a question of vertical equity, so too is the geographic distribution of road pricing revenues across jurisdictions and travel modes.

Table 3. Confounding Notions of Equity in Transportation Finance

Unit of Analysis	Type of Equity		
	Market Equity	*Opportunity Equity*	*Outcome Equity*
Geographic **States, counties, legislative districts, etc.**	Transportation spending in each jurisdiction matches revenue collections in that jurisdiction	Transportation spending is proportionally equal across jurisdictions	Spending in each jurisdiction produces equal levels of transportation capacity/service
Group **Modal Interests, racial/ethnic groups, etc.**	Each group receives transportation spending/benefits in proportion to taxes paid	Each group receives a proportionally equal share of transportation resources	Transportation spending produces equal levels of access or mobility across groups
Individual **Residents, voters, travelers, etc.**	The prices/taxes paid by individuals for transportation should be proportional to the costs imposed	Transportation spending per person is equal	Transportation spending equalizes individual levels of access or mobility

Source: Adapted by Taylor 2004 from Lem 1997.

In general, social science scholars of transportation tend to focus on *individual equity* (Fullerton &Rogers, 1993; Due &Mikesell, 1994; Besley& Rosen, 1998; Derrick & Scott, 1998; Bento et al., 2005; Santos &Catchesides, 2005; Shoup, 2005; Jia&Wachs, 1998; Sanchez et al., 2003; Blumenberg, 2003), advocates and activists are more likely to focus on *group equity* (Blumenberg&Ong, 2001; Raphael & Rice, 2000; Raphael & Stoll, 2000; Hodge, 1995; Garrett & Taylor, 1999; Deka, 2004; Forkenbrock, 2001;Martens 2009), while elected officials are most concerned with *geographic equity*. This focus on geography is because representation in the U.S. is organized spatially into a hierarchy of jurisdictions. And because it is elected officials who oversee the collection and distribution of transportation funds, most debates in transportation pricing and finance center first and foremost on questions of *geographic equity*.

The Geo-Political Equity Imperative

Geographic equity arises frequently in the context of federal transport policy. For example, the more populous, urbanized states tend to generate more in federal motor fuel tax revenues than they receive in fuel-tax-funded federal expenditures, whereas less populous, rural states tend to receive more in federal transportation funding than their motorists generate in federal fuel taxes. This redistribution of federal fuel tax revenues from "donor" states to "donee" states has been hotly debated in Washington for decades and actually delayed the passage of both the TEA-21 legislation in 1998 and the SAFETEA-LU legislation in 2005.

Supporters of redistribution argue that it enables wealthier states to cross-subsidize poorer states, and it allows us to have an inter-connected national highway system, and a basic level of public transit in most urban areas. Such redistribution is often used to justify federal

involvement in transportation finance. However, critics have countered that the redistribution reflects a rural bias in the federal transportation program (especially highways), and research has shown that it actually redistributes funds from poorer states (those with less fiscal capacity) to richer states (with more fiscal capacity) (Lem, 1997), and from states with high levels of transit use to states where driving dominates (De Cerreno et al., 2003).

Critics of the redistribution of federal transportation revenues contend further that the national highway system is largely in place, and the most significant transportation investment needs are in congested urban areas. If all federal fuel tax funds were simply returned to states exactly proportional to their collection, there would be no rationale for a federal fuel tax; it could be eliminated and states would then be free to collect as much as they needed from higher state fuel taxes. Some have even argued that federal transportation tax collections should be dropped and that each state should be left to make do on its own (Roth, 1998).

Along these lines, some have argued that systems of transportation pricing and finance favor suburbs over central cities. Chen (1994) argues that the intra-metropolitan distribution of federal transportation dollars and local non-transportation-based taxes for transportation tend to favor developing over developed areas and suburbs over central cities (as well as highways over public transit and rail transit over buses). Chen in effect criticizes market equity return-to-source rationales in favor of funding distributions based instead on opportunity or outcome equity. Likewise, Bullard, et al. (2004) complain that higher rates of street and highway expenditures in growing suburban areas is biased against disproportionately minority areas and, therefore, racist.

Similarly, Ong (2004) finds that automobile insurance premiums for drivers with identical driving records can vary dramatically by metropolitan area residential location. In general, insurance premiums are higher in central city areas and lower in suburban locations.

While insurance companies may base such rates on variable claims rates among neighborhoods, Ong argues that it is non-resident drivers (many of whom commute into job-rich central city areas from outlying suburbs) who are responsible for the higher crash rates, and claims rates, in central city neighborhoods.

Given overriding political concerns with geographic equity in the distribution of transportation revenues, distortions emerge when transportation use or demand does not vary comparably across jurisdictions. Public transit is perhaps the most striking example of this. Transit ridership is concentrated spatially in the largest, most densely developed cities. About one-third of all transit passengers in the U.S. are in the New York metropolitan area. The ten largest U.S. transit systems carry over 60 percent of all riders; the hundreds of other, smaller systems carry less than 40 percent of all passengers (Taylor & McCullough, 1998; Taylor, Miller, Iseki, & Fink, 2009). In the *realpolitik* of public transit finance, however, debates center on how resources are doled out to jurisdictions and the *suppliers* of transit service, with little regard for the enormous spatial variation in the *consumers* of transit service.

The New York Metropolitan Transit Authority (NY MTA) alone carries over 27 percent of the nation's transit riders each year (American Public Transportation Association (APTA), 2003a). During the six years between 1995 and 2000, federal capital and operating subsidies combined averaged $0.20 per unlinked passenger trip on NY MTA. In contrast, riders on Chapel Hill Transit in North Carolina, which carries three ten-thousandths (0.03 percent) of the nation's transit riders, enjoyed federal transit subsidies which average $0.97 per trip during the 1990s (APTA 2003a, 2003b). Such geographic disparities are not confined to federal transportation finance. In California, the San Francisco Municipal Railway carries nearly half (45 percent) of all Bay Area transit riders, but receives just 10 percent of the subsidies allocated through the

state Transportation Development Act (TDA). On the other hand, Santa Clara Valley Transit Authority in the San Jose area carries 11 percent of all Bay Area transit riders yet receives over one-third of the region's TDA transit subsidies (Metropolitan Transportation Commission, 2003; Taylor, 1991).

The reason for these disparities is quite straightforward: representation in Congress and most state legislatures (with the exception of the U.S. Senate) matches the geographic distribution of voters, not urban transit patrons. Geographic equity, therefore, allocates public transit funding "equally" among jurisdictions, often regardless of how they are used. The centrality of the imperative of geopolitical equity in transportation policy and planning can hardly be over-emphasized. It explains why Texas has received $2.7 billion *less* in federal fuel tax revenues between 1956 and 1994 than motorists in Texas paid in federal fuel taxes. In contrast, Hawaii has received $2.2 billion *more* than motorists in Hawaii paid in federal fuel taxes; for every $1.00 in federal fuel tax generated in Hawaii, the state has received $4.11 in fuel-tax funded appropriations (Poole, 2001). It also explains why new rail transit systems were built in Atlanta, Miami, and many other sprawling Sunbelt cities over the last quarter century, while the long-planned Second Avenue subway in transit-oriented Manhattan has yet to carry a passenger (Lawlor,1995).

Evidence of the geo-political equity imperative can be seen in the equity arguments over transportation pricing and finance. Arguments *in favor* of some transportation finance schema are often made on jurisdictional equity grounds, while equity arguments *against* some given proposal are most often made on group or individual equity grounds (Table 3). For example, calls to raise the guaranteed minimum return of federal motor fuel tax dollars to "donor" states prior to the passage of the recent federal SAFETEA-LU surface transportation legislation were

nearly always cast in terms of geo-political equity. On the other hand, arguments against congestion tolls, peak-hour transit pricing, or weight-distance truck tolls are often cast as unfair to the poor or individual owner-operator truck drivers. But as Wachs (1994) has noted, concern over the plight of the poor under various pricing proposals is frequently made by self-interested parties (trucking, auto clubs, etc.) who, "seem to have little concern over the well-being of the poor or of working women when considering other policy initiatives, such as sales tax increases to support the expansion of rail lines."

Equitable Transportation Programs versus Equitable Transportation Systems

This overriding concern with the geographic equity of transportation funding among states, districts, and jurisdictions ensures a political focus on the expenditure effects of transportation *finance programs*, which makes it all but impossible to consider how transportation funding decisions affect the efficiency, efficacy, or the equity of *transportation systems*. So to understand the pricing and finance equity of transportation systems, we must evaluate both the geo-politics of the transportation finance *program* and the effects of this finance program on the deployment and use of the transportation *system*. Table 4 offers an overview of how we might simultaneously evaluate the performance of transportation finance program in each of these realms.

Table 4: Program Performance and System Performance Criteria		
	Program Performance	**System Performance**
Efficiency	> Has low administrative, overhead, and transactions costs relative to the revenue collected.	> Optimizes provision of transportation service for a given level of expenditure
Efficacy	> Is politically feasible: has stable political support, is popular with voters, and has little opposition from powerful stakeholders. > Revenues generated meet needs and are stable and predictable.	> Optimizes utilization of existing capacity. > Lowers travel costs and promotes economic development.
Equity	> Is perceived as treating places and jurisdictions fairly. > Major stakeholders and interest groups perceive they are treated fairly.	> Provides all users with transportation access, regardless of circumstances (age, income, disability, etc). > Is progressive based on the ability to pay. > Charges users in proportion to the costs they impose on the system and society.

Source: Brown et al. 1999.

Program performance criteria evaluate how well a finance mechanism meets tests of political acceptability and administrative ease. These questions tend to be prominent in policy debates. *System performance* criteria, on the other hand, address how finance mechanisms influence the use and performance of the transportation system itself. System performance criteria acknowledge that finance policies are not just about collecting and distributing money. Pricing and finance instruments also profoundly affect the way transportation services are provided and the way citizens use them, though elected officials often act as though this were not the case.

The Divorce of Pricing and Finance in Transportation Policy

With all of the attention paid to the politics of geographic equity, public officials frequently fail to consider how transportation finance programs affect the use and performance of transportation systems. Yet the use and finance of transportation systems are tightly intertwined and cannot be considered separately, though many elected officials do try. Fees imposed on users in proportion to the costs users impose on society are typically the finance mechanisms that will help optimize resource allocation, efficiency, and transportation system efficacy. User fees make people more aware of the social costs of travel (in the form of wear and tear on the system, delay imposed on others, environmental damage, increased likelihood of accidents, and so on). Such information encourages drivers to shift low priority trips to less socially costly times of day, routes, modes, or destinations.

But despite the obvious and well-documented relationship between the pricing of transportation systems and their use, public officials are frequently loathe to even *consider* pricing transportation systems. What to build and where to build it, for example, are often treated as entirely separate from who should pay and how they should pay for it (Taylor 2004). But how both the supply of and demand for transportation are influenced by the price—production costs on the supply side and user costs on the demand side—is neither abstract nor trivial. On the demand side, the fares, fees, tolls, and taxes paid by travelers affect their decisions on where to travel, when to travel, how to travel, and even whether to travel. Use of the transportation system in turn greatly influences the maintenance and new capacity "needs" of the system, which, along with other factors, determines the costs to supply and maintain transportation infrastructure and services, and therefore affects the finance system. Thus, the

transportation finance system and the performance (in terms of efficiency, efficacy, and equity) of the transportation system are mutually reinforcing.

The issue of truck-weight fees provides an example of how the transportation finance system affects user decisions. Damage to pavements caused by heavy trucks increases significantly with weight per axle. Many people are surprised to learn that a relatively small share of trucks with heavy axle loads does most of the damage to roads (Small, Winston, & Evans, 1989; USDOT FHWA, 1997; Forkenbrock, 2001). Yet for decades many states levied truck weight fees based on the weight of *empty* trucks; and toll ways frequently set rates based on the number of axles per vehicle. Both policies encourage truckers to load heavy weights onto as few axles as possible, and thereby *maximize* damage to roadways. Such truck fee systems increase maintenance and rehabilitation costs in comparison to jurisdictions where fees are assessed in ways to encourage truckers to reduce axle weights. Thus, changing the way that fees are levied on trucks would change truckers' behavior, and, in turn, substantially lower maintenance costs without necessarily increasing either taxes or revenues.

Why the Push to Reunite Pricing and Finance?

Most transportation economists agree that transportation finance programs should, as much as possible, charge users the *marginal social cost* of travel (Walters, 1961; Mohring, 1970; Small, Winston, & Evans, 1989; Murphy & Delucchi, 1998). The term *marginal* refers to the cost of providing for one additional trip, given that others are already using the system at the same time. For example, when a car gets on a crowded freeway, it takes up space that other automobiles can no longer occupy, it imposes some delay on vehicles upstream, and it also causes some amount of pavement damage. If there are very few vehicles already on the freeway,

then the cost of providing for that one additional car is very small. On the other hand, if there are many cars already on the freeway, one additional vehicle can slow other cars upstream and increase congestion to a surprising degree. In such cases, the marginal cost of accommodating an additional car is large. The term *social* refers to the costs that society pays for providing for that one additional vehicle. These social costs result mostly from congestion, pollution, noise, vehicle crashes, and road wear and tear from a trip.

The same holds true for the provision of public transit. The marginal cost of providing additional peak period or peak direction public transit is much greater than the marginal cost of providing transit service in the off-peak or non-peak direction. This is because transit agencies must size their labor force and vehicle fleets to meet peak levels of demand, regardless of whether these workers and vehicles sit idle at other times (Taylor, Garrett, & Iseki, 2000).

A large body of research shows that the current transportation finance programs do not make users pay the marginal social cost (delays imposed on others, pavement damage, emissions, noise, non-renewable resource consumption, etc.)of vehicle use (USDOT, 1997; Littman, 2002; Delucci, 1996; California Department of Transportation (Caltrans), 1997; Forkenbrock & Schweitzer, 1997; CARB, 1995; National Cooperative Highway Research Program (NCHRP), 1994; Pozdena, 1995; Puget Sound Regional Council (PSRC), 1997). Yet as the role of the motor fuel tax has declined relative to non-transportation-related instruments like sales and other non-transportation-based taxes and bonds, we are actually moving further away from marginal social cost pricing of transportation (Goldman & Wachs, 2003; Sciara & Wachs, 2007; Sorensen 2006).

So in crafting our current system of surface transportation finance, we have often paid careful attention to geo-political equity questions regarding from where revenues for

transportation are collected and to where they are expended. But in doing so we have come to increasingly depend on highly income-regressive sales and other local taxes unconnected with transportation use. As a result, jurisdictional equity is trumping, not only transportation efficiency and efficacy, but group and individual equity as well.

Transportation Pricing Equity: Compared to What?

As revenues for transportation have lagged far behind the growth in travel and congestion in recent years on many transportation systems, elected officials are looking for new ways to raise revenue for transportation. But a waxing anti-tax climate amid concerns with rising fuel prices has made it all but impossible to increase traditional sources of transportation revenues, such as the motor fuel user tax, which have been the foundation of transportation finance for nearly a century.

Amid such a challenging fiscal climate, many public officials are for the first time open to considering various forms of road pricing. But these officials for the most part remain wary of transportation pricing: wary of something so new, of a possible political backlash, of something that might be, or seem to be, unfair.

It is in this climate that many equity arguments against road pricing transportation are posed. Many fear – some sincerely and others tactically – that poor people will simply be priced off roads and transit vehicles, leaving free-flowing systems for the wealthy. Such social equity concerns are indeed important, but they ignore the social inequities of our *current* transportation finance system based largely on income-regressive motor fuels, property, and sales taxes (Chernickand Reschovsky 1997; Schweitzer and Taylor 2008). These current inequities are often ignored in debates of transportation pricing equity.

Under the logic of market equity, equitable taxes are those levied on each individual in proportion to the costs imposed or benefits received by that individual. In practice, the benefits of pricing are more complex, ephemeral, and normative than the costs imposed by pricing (FHWA, 1997). When road pricing has been attempted, it has usually sought to internalize the normally external costs of travel. Within this rubric, charging users according to the incremental social costs they impose on society when using the transportation system is equitable. On the other hand, opportunity equity suggests that a method of finance based solely on costs each individual imposes on society may burden the poor. From this (vertical equity) perspective, an equitable finance program will treat fairly people who have different abilities to pay, with ability measured primarily by income.

Current transportation user fees, like the motor fuels tax and driver's license fees, fare well under market equity principles, but less well under opportunity equity (Chernick & Reschovsky, 1997; Lari & Iacono 2006; Poterba, 1991; Wiese, Rose, & Schluter, 1995). In contrast, transportation sales taxes – because they are income-regressive and unconnected with transportation system use – tend to fare poorly under *both* market equity and opportunity equity. Given that local option sales taxes for transportation and electronic roadway tolling are the two of the most frequently debated new forms of transportation finance (Abrams, 2007; Committee for the Study of the Long-Term Viability of Fuel Taxes for Transportation Finance, 2006; Hymon, 2008; Hymon & Weikel, 2008; Sorensen & Taylor, 2006), they are compared below with respect to the multiple dimensions of equity outlined above in Table 3.

While many scholars have examined equity in sales taxes (Derrick & Scott, 1998; Due &Mikesell, 1994; Poterba, 1996; Santi, 1994) and many more have examined the equity of congestion pricing (Arnott, de Palma, & Lindsey, 1994; Bonsall & Kelly 2005; Bureau &

Glachant 2008; Cohen, 1987; Giuliano, 1994; Glazer & Niskanen, 2000; Maruyama & Sumalee 2007; Richardson & Bae, 1998; Zhang et al., 2009), only one study has directly compared equity effects of sales taxes for transportation versus congestion pricing (Schweitzer & Taylor, 2008). They examine the household incomes of the toll payers on the State Route 91 High-Occupancy/Toll Lanes in Orange County, California and compare them to the household incomes of who would have paid had the four lanes of expressway capacity been financed with revenues from Orange County's local option sales tax. They find that two kinds of transfers would occur with such a change. First would be a transfer of burden from middle- and upper-middle income households to the highest and lowest income households. Second would be a transfer from people who travel in the corridor frequently to people who drive very little. With regard to the first burden transfer, the switch from congestion tolls to sales tax payments would cause the very highest income households to pay more in absolute terms (because high income people buy so many goods and services subject to the sales tax), while the lowest income households would pay substantially more in relative terms (because a large share of purchases by low income households are subject to the sales tax). And with regard to the second effect, the users of the toll lanes (who voluntarily pay a toll ranging from $1.25 to $10.00 depending on direction and time-of-day to bypass nine miles of frequently congested "free" lanes) carry the entire burden of retiring the debt on the $200 million (2008 $) capacity expansion, while sales tax finance would spread the burden over hundreds of thousands of consumers, most of whom never travel in the lanes. Weinstein et al. (2006) also undertook an assessment of the equity of various financing mechanisms for the State of California, including various tolling options and sales taxes. This report supports Schweitzer and Taylor's conclusions that the sales tax is the

least equitable method of funding transportation while tolls are more equitable from both user benefit and ability to pay perspectives (Weistein et al, 2006).

Drawing on both Schweitzer & Taylor (2008) and the broader literatures on sales tax and congestion pricing equity, Table 5 presents the transportation finance equity evaluation framework developed above with regard to the multiple dimensions across which the equity of congestion pricing vis-à-vis sales taxes for transportation might be compared. First, this comparison suggests that outcome equity is currently a radical notion in public policy. Equal outcomes, given only limited public policy influence over inputs, is much harder to achieve, so it requires extreme precision in targeting the particular units of analysis. For example, targeting expenditures to equalize outcomes among geographic areas seizes funds and consumes resources that might otherwise be available to increase outcome equity among groups with low levels of mobility, or among individuals with low levels of mobility. While market and opportunity equity do not have to be incongruous, specific outcome equity objectives require more trade-offs with other types of equity and units of analysis.

Table 4: Comparing the Equity of Congestion Tolls and Transportation Sales Taxes

Unit of Analysis	**Type of Equity and Level of Equity (underlined)**		
	Market Equity	***Opportunity Equity***	***Outcome Equity***
Geographic **States, counties, legislative districts, etc.**	*Congestion* *Toll*: <u>High</u> because expenditures are likely targeted to where they are collected *Sales* *Taxes*: <u>High</u> because expenditures are likely targeted to where they are collected	*Congestion* *Toll:* <u>High</u> because revenues are usually used to improve transportation service in jurisdiction where they are collected *Sales Taxes*: <u>Moderate</u> because revenues collected from all consumers are likely to improve service for travelers living in the area where the taxes are collected	*Congestion* *Toll:* <u>Low</u> because expenditures are not usually targeted to areas with low levels of mobility *Sales* *Taxes*: <u>Low</u> because expenditures are not targeted to areas with low levels of mobility
Group **Modal Interests, racial/ethnic groups, etc.**	*Congestion* *Toll*: <u>High</u> because revenues are used to improve mobility of each group is in rough proportion to the collection of toll from each group *Sales Taxes*: <u>Low</u> because light-users of transportation systems are almost certain to cross-subsidize heavy transportation system users	*Congestion Toll:* <u>High to Moderate</u> because the revenues are generally spent to improve transportation services for groups from whom the tolls are collected. *Sales* *Taxes*: <u>Moderate</u> because the revenues collected from all consumers are likely used to improve transportation services for the groups from whom the taxes are collected	*Congestion* *Toll:* <u>Low</u> because expenditures are usually not targeted to groups with low levels of mobility *Sales* *Taxes*: <u>Low</u> because expenditures are usually not targeted to groups with low levels of mobility
Individual **Residents, voters, travelers, etc.**	*Congestion* *Tolls*: <u>High</u> because revenues are generally used to improve mobility of toll payers *Sales Taxes*: <u>Low</u> because tax payments are unrelated to transportation system cost imposed or benefits received	*Congestion* *Tolls:* <u>Moderate</u> because transportation toll revenues are likely used to improve transportation services for individual travelers *Sales Taxes*: <u>Low</u> because transportation expenditures are unlikely to be returned to taxpayers in proportion to payments	*Congestion* *Toll:* <u>Low</u> because expenditures are usually not targeted to individuals with low levels of mobility *Sales* *Taxes*: <u>Low</u> because expenditures are usually not targeted to individuals with low levels of mobility

Given that transportation sales taxes represent the most significant change in transportation finance over the past two decades (Goldman & Wachs, 2003), Table 5 suggests that, in comparison with our current system of transportation finance, a user fee system based on the principles of marginal cost pricing (or its proxy in the form of road pricing) would clearly increase market equity and may increase overall opportunity equity as well. As noted earlier, travel behavior research has shown that use of the highway system in congested conditions is positively correlated with income. That is, higher-income travelers tend to spend a larger share of their travel time in traffic congestion than do lower-income travelers (Dittmar et al., 1994; Deakin& Harvey, 1995; Frick et al., 1996; Sullivan, 2000). Thus, a shift to a transportation finance system that charges drivers more on congested routes and less elsewhere would fare well under the market equity when compared to our current finance system (Schweitzer & Taylor, 2008).

While this framework allows us to consider the many possible dimensions of the equity of congestion pricing vis-à-vis sales taxes for transportation, such systematic evaluations have rarely been performed in practice. How have equity issues in road pricing been raised, and how have they been dealt with in actual pricing programs and projects? The following section examines five notable case studies of road pricing where equity issues have played a central role to examine how they arose and how they have been mitigated (or not in one case) in practice.

Case Studies: Addressing Equity Concerns in Practice

Since road pricing is an umbrella term for many different types of tolling policies – such as cordon tolls, high occupancy toll (HOT) lanes, and weight-distance based fees – the fairness issues raised often depend on the particulars of the road pricing initiative. Cordon tolls and HOT

lanes generally receive far more criticism on equity grounds than weight-distance fees, which charge (mostly commercial to date) users for distance traveled, not locations traveled. Programs that utilize a pay-as-you-go model of project finance tend to raise fewer questions of fairness criticism, and in fact are often hailed as improving equity (Sorensen & Taylor, 2005). In contrast, HOT lanes have often been dubbed "Lexus Lanes" and criticized as an unfair way for wealthy residents to buy their way out of congestion, leaving the less well-to-do stuck in the congested free lanes (Buckeye & Munnich, 2004;Sorensen & Taylor, 2005; Weinstein & Sciara, 2006). (Though of course, if true, the incidence of the fees with respect to income would be entirely progressive.) Like HOT lanes, cordon tolls, such as the schemes that are in place in central London and Stockholm and have also been proposed for New York, are often subject to extensive scrutiny on equity grounds since such tolls impose a new fee on what was previously uncharged. Given their geographic focus, cordon tolls are also more likely than other road pricing models to be criticized on geographic equity grounds; that is, they are criticized for treating residents, employees, or travelers in some areas differently than others.

Equity debates in five prominent congestion pricing programs were examined: San Diego, Minneapolis-Saint Paul, Germany, Stockholm, and New York City. These cases were selected because equity questions figured prominently in the planning and implementation of each program (the findings from these case studies are separately summarized in the appendix). These five cases collectively show that the three scales of transportation finance equity – individual, group, and geographic equity – motivate both support for and opposition to road pricing proposals. While most people think of equity in terms of opposition to pricing, road pricing proponents are frequently motivated at least in part by a desire to correct inequities in current systems of transportation finance– both in terms of unpriced externalities (emissions,

congestion, etc.) and in strengthening the link between who pays for and who benefits from transportation investments. The result is sometimes an equity paradox whereby efforts to use pricing to bring the distribution of transportation costs and benefits in line are opposed as unfair by those who disproportionately benefit from current, demonstrably inequitable, finance regimes. In response, road pricing proponents have sought to turn typical equity objections to pricing (double-taxation, would hurt the poor, etc.) on their heads by presenting pricing as a way to address and correct substantial inequities in our current systems of transportation finance, as well as to substantially increase transportation system efficiency. However, concerns with inequities in existing, long-standing systems of transportation finance have not gained much traction in a political system focused more on scrutinizing changes than the *status quo*.

Just as people's equity perceptions vary based on the type of road pricing proposal, the most effective approaches to mitigating equity concerns are situationally dependent. But some lessons can be generalized. First, the dedication of revenues is critical; successful programs have commonly dedicated toll revenues to transit and road improvements across the transportation system thereby creating constituents for the toll revenues. Second, limited scales keep the scope of the pricing program focused on the problems at hand, and phased, incremental implementation – such as the trial approach followed by a plebiscite employed in Stockholm – allows officials the opportunity to adjust the program to address equity issues that arise during implementation. Third, open and ongoing public dialogue on equity questions during project planning and development is common to every successful case of pricing implementation. An important part of this dialogue has been to use the planning process as an opportunity to consider and debate inequities in current systems of transportation finance, and how these might be addressed with a move to road pricing. Each of these three lessons is briefly reviewed in turn below.

Dedicating revenues to transit service and to road improvements in the tolled corridor

In developing San Diego's I-15 HOT lanes, toll revenues were dedicated to transit improvements to increase corridor travel options in an explicit effort to address equity concerns. While transit improvements are often funded with toll revenues, an exclusive focus on transit has often proven problematic. In Stockholm and New York City, transit funding proposals were downscaled and funds were shifted to roadway improvements in response to complaints that funding transit only with revenues was unfair to drivers and their passengers.

In Stockholm, outer suburban residents complained about geographic equity – that toll revenues collected from suburban commuters went to transit improvements that primarily benefitted central city and inner-ring suburban residents. In response, some of the toll revenues were shifted to road projects favored by suburbanites. This adjustment contributed significantly to increasing public acceptance of the congestion pricing program in Stockholm and its eventual endorsement by voters.

In the case of the ill-fated New York proposal, however, a politically acceptable modal and geographic balance of revenue dedication was never reached. Despite the vetting of a variety of proposals for the distribution of toll revenues, some critics of the pricing proposal complained that a modal split of toll revenues between transit and roadways would not leave sufficient funding for the increased transit service needed to accommodate the increase in demand due to the pricing of driving in Manhattan. Whether toll revenues are dedicated to transit, highways, or both, geographic equity concerns are most frequently assuaged by

dedicating the revenues to improvements in the tolled corridor(Small & Gomez-Ibanez, 1998; Minken and Ramjerdi, 2008).[2]

Limited scale and phased, incremental implementation

Successful implementation has typically entailed careful attention to reducing political risk and uncertainty of what can be new, unfamiliar, and, to many elected officials, potentially threatening pricing programs. Road pricing projects have commonly been limited in geographic scope to central, congested zones (Stockholm), particular travel corridors (San Diego and Minnesota), or particular market segments (such as commercial trucking in Germany). Further, the phased, incremental implementation plan has proved effective. The case of Stockholm's central area congestion fee is particularly instructive. Despite strong support from planners and key public officials, most greater Stockholm residents were – by a 2 to 1 margin – initially opposed to the proposal. To garner sufficient support to move forward, the project was structured at the outset as a short-term, fixed-end-date pilot test, which was followed by a thorough evaluation. The evaluation helped make a series of modifications to the program to address equity concerns; the modified pricing program was then put to a vote of the people, who voted to permanently adopt the modified central area pricing program. Had the program been put to a vote prior to the pilot test, it would have been resoundingly defeated. But a fixed-term

---

[2] King, Manville, and Shoup (2007) argue persuasively that revenues from road pricing projects should be dedicated primarily to the communities through which priced highways run, rather than to corridor highway or transit improvements, as these communities bear the brunt of the traffic, noise, and pollution generated by congested roads. Doing so, argue the authors, is both fair and would create a natural and powerful constituency for road pricing.

pilot test proved far less threatening, allowing Stockholmers to see first-hand the dramatic congestion reductions of the pricing program and allowing planners to adjust the program to address equity concerns that arose during the test.

Public outreach and education

As the San Diego and Minnesota cases demonstrate, public outreach is critical to addressing equity concerns in order to achieve popular and political acceptance of pricing. These public outreach efforts have been most effective when public feedback issincerely and substantively incorporated into the project design (Kuehn, 2008; Niskanene, et al., 2003; Weinstein & Sciara, 2006).

Such outreach efforts are critical because traffic congestion is both widely despised and poorly understood. Traffic delays are non-linear; small changes in the system can dramatically increase or decrease congestion. This non-linearity is non-intuitive, making most people unfamiliar with road pricing doubtful that it could meaningfully reduce congestion absent draconian tolls. This prevailing skepticism toward pricing makes outreach and education especially important.

Successful implementation of pricing has therefore required effective and ongoing communication with public officials, drivers, voters, and the media. Successful examples of public outreach have emphasized how road pricing improves travel conditions for all residents – not just those wealthy enough to pay the fees. Further, the idea that pricing programs increase traveler options – such as HOT lanes that allow drivers to decide on a trip-by-trip basis whether to pay for time savings or travel in congestion without paying a toll, or corridor transit

improvements that offer meaningful alternatives to driving – is often a central element of public education.

Outreach and education efforts have also presented opportunities to shift the terrain of pricing debates from general public distaste for tolling to using pricing to correct inequities in *current* systems of transportation finance (Schweitzer & Taylor, 2008). This was a primary focus on outreach efforts in Germany where rapid increases in commercial trucking were viewed by German officials as both problematic, and not sufficiently financed by the trucking industry, especially non-German truckers of maintaining and expanding the increasingly congested German highway network.

Conclusion: What's a Fair Price for Transportation?

While equity may indeed be in the eye of the beholder, this paper has shown that it is possible to systematically consider and evaluate any transportation finance instrument – including roadway pricing – in terms of the many possible dimensions of equity. But careful, systematic evaluations of transportation pricing and finance equity remain quite rare. Instead claims of inequity or bias are often tossed about in debates over transportation pricing and finance with little or incomplete supporting evidence, and sometimes quite cynically. While no scheme can satisfy all possible dimensions of equity, it is possible to offer comparative equity assessments of various approaches to transportation pricing and finance, and that efficiency and equity are not always at odds. Further, this paper has shown that the current trend in transportation finance toward dedicated non-transportation-based taxes (like local sales taxes) is, by most measures of equity, less fair than most forms of marginal cost transportation pricing (like congestion tolls) about which equity concerns are most often raised.

Finally, the review of five case studies of road pricing programs conducted for this paper shows that equity was a central issue in each, alternatively motivating (1) the implementation of pricing (Germany), (2) the funding of alternative modes (San Diego, Minnesota, and Stockholm), (3) mid-course restructuring of the pricing program (Stockholm), and (4) successful opposition to a pricing proposal (New York). In practice, successful mitigation of equity concerns has entailed:

- Careful attention to the dedication of toll revenues to both transit and highway improvements in and around the tolled areas to create program constituents,
- Limited geographic scope to central, congested zones, particular travel corridors, or particular market segments,
- Incremental, phased implementation that allows for corrections and adjustments during implementation and pilot testing, and
- Ongoing, substantive, and sincere public outreach and education efforts that have meaningfully influenced program design.

Such efforts have increasingly turned equity objections to pricing on their head by presenting pricing as both a way to substantially increase transportation system efficiency<u>and</u>to address and correct substantial inequities in our current systems of transportation finance as well. The equity analysis framework outlined in this paper is intended to foster such comprehensive evaluations of road pricing equity vis-à-vis other forms of transportation finance in the years ahead.

Acknowledgements

Funding for this report was provided by the California Department of Transportation (Caltrans) through the California Partners for Advanced Transit and Highways (PATH) program. The authors are grateful for this support, and any errors or omissions are the responsibility of the authors and not Caltrans or PATH. The material presented in this report draws on both previous research on this topic conducted by the first author of this report,[3] as well as original research conducted for this project by the two report co-authors.

---

[3] Taylor, Brian D. and Alexandra Evans. 2005. "Paying for Transportation: What's Fair Price?" *ITS Working Paper*. Los Angeles: UCLA Institute of Transportation Studies, UCLA. 39 pages.

Taylor, Brian D. 2008. "How Fair is Road Pricing? Evaluating Equity in Transportation Pricing and Finance," a white paper prepared for the Bi-partisan Policy Center. 56 pages.

Bibliography

Abrams, Jim. 2007. "Frozen gas tax leads to toll roads," *USA Today*, 20 May 2007. Available at: http://www.usatoday.com/news/washington/2007-05-20-3066887318_x.htm

American Public Transportation Association. 2003a. *Public Transportation Ridership Statistics*. Available at: http://www.apta.com/research/stats/ridershp

American Public Transportation Association. 2003b. *Transit Statistics*. Available at: http://www.apta.com/research/stats

Arnott, Richard, de Palma, André, Lindsey, Charles Robin. 1994. "The welfare effects of congestion tolls with heterogeneous commuters," *Journal of Transport Economics & Policy*, 28: 139–161.

Berger, Joseph. 2008. "Congestion Pricing: Just Another Regressive Tax?" *New York Times*, 20 April 2008.

Besley, Timothy J. and Harvey Rosen. 1998. "Vertical Externalities in Tax Setting: Evidence from Gasoline and Cigarettes," *Journal of Public Economics*: 383-398.

Blumenberg, Evelyn. 2003."Transportation Costs and Economic Opportunity Among the Poor," *Access*, 23: 40-41. Available at: http://www.uctc.net/access/23/Access.pdf

Blumenberg, Evelyn and Paul Ong. 2001. *Cars, Buses, and Jobs: Welfare Program Participants and Employment Access in Los Angeles*. TRB Paper 01-3068. Available at: http://www.uctc.net/papers/544.pdf

Blumenberg, Evelyn and Margy Waller. 2003. *The Long Journey to Work: A Federal Transportation Policy for Working Families. Transportation Reform Series*, Brookings Institution Center on Urban and Metropolitan Policy. 20 pages.

Bonsall, P., & Kelly, C. 2005. Road user charging and social exclusion: The impact of congestion charges on at-risk groups. *Transport Policy* , 406-418.

Brodsky, Richard L. 2007. *Interim Report: An Inquiry into Congestion Pricing as Proposed in PlaNYC 2030 and S.6068.*Committee on Corporations, Authorities and Commissions.

Brown, Jeffrey. 2001. "Reconsider the Gas Tax: Paying for What You Get," *Access*, 19: 10–15.

Brown, Jeffrey, Michele DiFrancia, Mary C. Hill, Philip Law, Jeffrey Olson, Brian D. Taylor, Martin Wachs and Asha Weinstein. 1998. *The Future of California Highway Finance. Report to the California Policy Seminar.*

Buckeye, Kenneth R. and Lee W. Munnich, Jr. 2004. "Value Pricing Outreach and Education: Key Steps in Reaching High-Occupancy Toll Lane Consensus in Minnesota," *Transportation Research Record*, 1864: 16-21.

Bullard, Robert D. and Glenn S. Johnson. 1997. "Just Transportation," *JustTransportation*, Bullard, Robert D. and Glenn S. Johnson, Editors. Stony Creek,CT: New Society Publishers. 7-21.

Bullard, Robert D. and Glenn S. Johnson, Editors. 1997. "Epilogue," *JustTransportation.*Stony Creek, CT: New Society Publishers. 173-177.

Bullard, Robert D., Glenn S. Johnson, and Angel O. Torres, Editors. 2004. *Highway Robbery: Transportation Racism and New Routes to Equity*. Cambridge, MA: South End Press.

Bureau, B., &Glachant, M.2008. Distributional effects of road pricing: Assessment of nine scenarios for Paris. *Transportation Research Part A* , 994-1007.

California Department of Transportation (Caltrans). 1997. *Transportation Financing–Vehicle Miles Traveled (VMT) Measurement and Assessment*. Transportation Planning Program, Caltrans.

California Air Resources Board (CARB). 1995. *Transportation Pricing Strategies for California: An Assessment of Congestion, Emissions, Energy, and Equity Impacts*. By Deakin, Elizabeth, and Greig Harvey. Draft Report to the California Air Resources Board and the TCM Working Group, Berkeley, CA.

Chen, Don. 1994. *Social Equity, Transportation, Environment, Land Use, and Economic Development: The Livable Community*. Paper presented at the Transportation, Environmental Justice and Social Equity Conference in Chicago, IL. November 16-17. Available at: http://www.fta.dot.gov/library/policy/envir-just/backcf.htm

Chernick, Howard and Andrew Reschovsky. 1997. "Who Pays the Gasoline Tax?" *National Tax Journal*, June: 233-259.

Civitas. 2006. *Background to The Stockholm Trial.* Available at: http://www.curacaoproject.eu/documents/stockholm-trial.pdf

Clifton, Kelly and Karen Lucas. 2004. "Examining the Empirical Evidence of Transportation Inequality in the U.S. and the U.K.," *Running on Empty: Transport, Social Exclusion, and Environmental Justice*, Karen Lucas, Editor. Bristol, UK: The Policy Press. 15-36.

Cohen, G.A. 1995. *Self-Ownership, Freedom, and Equality.* New York: Cambridge University Press.

Committee for the Study of the Long-Term Viability of Fuel Taxes for Transportation Finance. 2006. *The Fuel Tax and Alternatives for Transportation Funding: Special Report 285*. Washington, D.C.: Transportation Research Board.

De Cerreno, Allison L.C. and Mark Seaman. 2003. *Dividing the Pie: Placing the Transportation Donor-Donee Debate in Perspective.* The Rudin Center for Transportation Policy and Management, New York University, May, 33 pages. Available at: http://www.nyu.edu/wagner/transportation/files/dividingpie.pdf

Deakin, Elizabeth and Greig Harvey. 1995. "Transportation Pricing Strategies for California: An Assessment of Congestion, Emissions, Energy and Equity Impacts," *Consultant Report #92-316*, California Air Resources Board, Sacramento.

Deka, Devajyoti. 2004. "Social and Environmental Justice Issues in Urban Transportation," *The Geography of Urban Transportation*, 3rd Edition, Susan Hanson and Genevieve Giuliano, Editors. New York: The Guilford Press. 332-355.

Delucci, Mark. 1996. "Total Cost of Motor-Vehicle Use," *Access,* 8: 7-13.

Derrick, Frederick W. and Charles E. Scott. 1998. "Sales Tax Equity: Who Bears the Burden?" *The Quarterly Review of Economics and Finance*, 2: 227-237.

Dittmar, Hank, Karen Frick, and David Tannehill. 1994. *Institutional and Political Challenges in Implementing Congestion Pricing: Case Study of the San Francisco Bay Area Curbing Gridlock: Peak-Period Fees to Relieve Traffic Congestion – Transportation Research Board Special Report 242.* Washington, D.C.: Transportation Research Board.

Doll, Claus and Wolfgang Schade. 2005. *How using the Revenues of the German HGV Motorway System Efficiently and Equitable Under Different Regulatory Frameworks and Institutional Settings.* Berlin: 4th Infra-Train Conference.

Due, John F. and John C. Mikesell. 1994. *Sales Taxation*. Washington, D.C.: Urban Institute.

Evans, Alexandra E. 2006. *A Review of the Politics and Perceptions of Road Pricing.* Los Angeles: UCLA Institute of Transportation Studies.

Evans, Alexandra, Michael Gougherty, Eric Morris, and Megan Smirti. 2007. "Politics, Public Opinion, and Project Design in California Road Pricing," *Transportation Research Record,* 1996: 41-48.

Forkenbrock, David J. and Lisa A. Schweitzer. 1997. *Environmental Justice and Transportation Investment Policy.* Public Policy Center, University of Iowa.

Forkenbrock, David J. 2001. "Comparison of Freight Rail and Truck ExternalCosts," *Transportation Research, Part A,* 35A(4): 321-337.

Frey, Bruno S. 2003. "Why Are Efficient Transport Policy Instruments So Seldom Used?" *Acceptability of Transport Pricing Strategies,* edited by Schade, Jens and Bernhard Schlag. Oxford, UK: Elsevier Ltd. 63-74.

Frick, Karen T., Steve Heminger, and Hank Dittmar. 1996. "Bay Bridge Congestion-Pricing Project: Lessons Learned to Date," *Transportation Research Record,* 1558: 29-38.

Fullerton, Don and Diane L. Rogers. 1993. *Who Bears the Lifetime Tax Burden?* Washington, D.C.: Brookings Institution Press.

Garrett, Mark and Brian Taylor. 1999. "Reconsidering Social Equity in Public Transit," *Berkeley Planning Journal*, 13: 6-27.

Giuliano, Genevieve. 1994. "Equity and Fairness Considerations of Congestion Pricing," National Academies Press, *Curbing Gridlock: Peak-Period Fees to Relieve Traffic Congestion – Transportation Research Board Special Report 242,* Vol. 2: 250-279.

Gladwell, Malcolm. 2002. *The Tipping Point: How Little Things Can Make a Big Difference.* Boston: Little, Brown.

Glazer, Amihai and EskoNiskanen. 2000. "Which consumers benefit from congestion tolls?" *Journal of Transport Economics & Policy,* 34: 43-54.

Goldman, Todd and Martin Wachs. 2003. "A Quiet Revolution in Transportation Finance: The Rise of Local Option Transportation Taxes," *Transportation Quarterly,* 57 (1): 19-32.

Hakim, Danny. 2007. "Report Recommends Rejecting Plan on City Traffic," *New York Times*, 9 July 2007.

Hakim, Danny. "Silver Challenges Health Benefits Promised in Manhattan Toll Plan," *New York Times*, 12 June 2007.

Harvey, Greig W. 1994. "Transportation Pricing and Travel," National Academies Press, *Curbing Gridlock: Peak-Period Fees to Relieve Traffic Congestion – Transportation Research Board Special Report 242,* 2. Washington, D.C.: Transportation Research Board.90-114.

Hensher, David A. and Sean M. Puckett. 2005. "Road user charging: The global relevance of recent developments in the United Kingdom," *Transport Policy, Special Issue*, 12(5): 77-383.

Hodge, David C. 1995. "My Fair Share: Equity Issues in Urban Transportation," *The Geography of Urban Transportation*, 2nd Edition, Susan Hanson, Editor. New York: Guilford Press. 359-375.

Hymon, Steve. 2008. "U.S. offers funds for toll lanes," *Los Angeles Times*, 24 April 2008. Available at: http://articles.latimes.com/2008/apr/24/local/me-congestion24

Hymon, Steve and Dan Weikel. 2008. "MTA votes to seek sales tax hike to fund L.A. County transit, roads," *Los Angeles Times*, 25 July 2008. Available at: http://www.latimes.com/news/local/la-me-salestax25-2008jul25,0,7015819.story?track=rss

Jakobsson, C., S. Fujii and T. Garling. 2000. Determinants of private car users' acceptance ofroad pricing. *Transport Policy*. Volume 7, Issue 2, 153-158.

Jia, Wenyaand MartinWachs. 1998. "Parking and Affordable Housing," *Access*, 13: 22-25. Available at: http://www.uctc.net/access/access13.pdf

Keep NYC Congestion Tax Free. 2007. *Congestion Pricing in the Manhattan Central Business District: Let's Look Hard Before We Leap.*

King, David, Michael Manville, and Donald Shoup. 2007. "For Whom the Road Tolls: The Politics of Congestion Pricing," *Access,* 31: 2-7. Available at: http://www.uctc.net/access/31/Access%2031%20-%2002%20-%20For%20Whom%20the%20Road%20Tolls.pdf

Kuehn, D. 2008. Environmental Justice and the Distribution of Benefits from Highway Pricing Programs. *TRB 2009 Annual Meeting CD-ROM*.

Lari, Adeel and Michael Iacono. 2006. Transportation Finance, Congestion, and Equity: Some Policy Perspectives. *Transportation Research Record: Journal of the Transportation Research Board*: Issue 1983.

Lawlor, Matthew J. 1995. "Federal Urban Mass Transportation Funding and the Case of the Second Avenue Subway," *Transportation Quarterly,* 49(4): 43-54.

Lem, Lewison Lee. 1997. "Dividing the Federal Pie," *Access,* 10: 10-14.

Levinson, D. 2001. Financing Infrastructure Over Time.*ASCE Journal of Urban Planning and Development*,127(4): 146-157.

Maruyama, T. and Sumalee, A.2007. Efficiency and equity comparison of cordon- and area-based road pricing schemes using a trip-chainequilibrium model. Transportation Research Part A 41. 655–671.

Martens, K.2009. Equity Concerns and Cost-Benefit Analysis: Opening the Black Box. *Transportation Research Board.*Washington, D.C.

May, Anthony D. and A. Sumalee. 2003. "One Step Forward, Two Steps Back?: An Overview of Road Pricing Applications and Research Outside the United States," *International Perspectives on Road Pricing*. Key Biscayne, Florida: Transportation Research Board. 73-88.

Metropolitan Transportation Commission. 2003. *2002 Annual Report*. Available at: http://www.mtc.ca.gov/publications/AnnualReport-02/MTC_02_Annual_Report.pdf

Miljöavgiftskansliet/Congestion Charge Secretariat, C. o. 2006. *Facts and results from the Stockholm Trials.* Stockholm.

Minken, H., and Ramjerdi, F. (2008). Efficiency and Equity Considerations in Road Pricing. In C. Jensen-Butler, B. Sloth, M. M. Larsen, B. Madsen, & O. A. Nielsen, *Efficiency and Equity Considerations in Road Pricing* (pp. 193-206). Springer Berlin Heidelberg.

Mohring, Herbert. 1970. "The Peak Load Problem with Increasing Returns and Pricing Constraints," *American Economic Review*, 60(4): 693-705.

Munnich, Jr., Lee W. and Kenneth R. Buckeye. 2007. *I-394 MnPASS High-Occupancy Toll Lanes: Planning and Operational Issues and Outcomes.*

Murphy, James and Mark A. Delucchi. 1997. "A Review of the Literature on the Social Cost of Motor-Vehicle Use in the United States," *Journal of Transportation and Statistics*, 1(1): 15-42, January.

National Cooperative Highway Research Program. 1994. *Alternatives to the Motor Fuel Tax for Financing Surface Transportation Improvements. Draft Summary Report, NCHRP 20-24(7).* Washington, D.C.: Transportation Research Board.

Neuman, William. 2008. "Congestion Pricing Plan is Panned in Albany," *New York Times*, 31 January 2008l.

Niskanen, Esko and Chris Nash. 2008. "Road Pricing in Europe - A Review of Research and Practice," in *Road Pricing, the Economy and the Environment.*Chris Jensen-Butler, Editor. Springer. 5-29.

Niskanen, Eesko, Bruno de Borger, Andre de Palma, Robin Lindsey, Chris Nash, Jan Rouwendal, et al. 2003. *Phased Approach.* Leeds: Implementation of Marginal Cost Pricing in Transport – Integrated Conceptual and Applied Model Analysis (MC-ICAM).

Niskanen, Esko, Andre de Palma, Robin Lindsey, Nick Marler, Tony May, Chris Nash, et al. 2003. *Pricing of Urban and Interurban Road Transport: Barriers, Constraints and*

Implementation Paths. Leeds: Implementation of Marginal Cost Pricing in Transport - Integrated Conceptual and Applied Model Analysis (MC-ICAM).

Ong, Paul. 2004. "Auto Insurance Redlining in the Inner City," *Access*, 25: 40-41. Available at http://www.uctc.net/access/25/Access.pdf

Poole, Robert. 2007. "A Swedish Take on Congestion Pricing," *Newsday*, 22 July 2007.

Poole, Jr., Robert W. 2001. *Commercializing Highways: A "Road -Utility" Paradigm for the 21st Century*. Los Angeles: Reason Public Policy Institute.

Poterba, James M. 1991. "Is the Gasoline Tax Regressive?" *Tax Policy and the Economy*, 5: 145-164. MIT Press.

Poterba, James M. 1996. "Retail price reactions to changes in state and local sales taxes," *National Tax Journal*, 27(Fall): 169-179.

Pozdena, Randall J. 1995. *Where the Rubber Meets the Road: Reforming California's Roadway System*. Los Angeles: The Reason Foundation.

Puget Sound Regional Council (PSRC). 1997. *1997 System Performance Report*. PSRC. 159 pages. Available at: http://www.psrc.org/projects/cms/pdf-files/spr_1997.pdf

Raphael, Stephen and Lorien Rice. 2000. *Car Ownership, Employment, and Earnings.*JCPR Working Paper 179.Chicago:Joint Center for Poverty Research.

Raphael, Steven and Michael Stoll. 2000. *Can Boosting Minority Car Ownership Rates Narrow Inter-Racial Employment Gaps?*Chicago: Joint Center for Poverty Research.

Richardson, Harry and Chang-Hee C. Bae. 1998. "The equity impacts of road pricing," in *Road pricing, traffic congestion, and the environment: Issues of efficiency and social equity*, E. Verhoef and K. Button, Editors. Edward Elgar: London. 247-262.

Road Charging Scheme: Europe - Germany. 2006, June 21. Retrieved January 3, 2008, from Commission for Integrated Transport: http://www.cfit.gov.uk/map/europe-germany.htm

Roth, Gabriel. 1998. *Roads in a Market Economy* (Reprint). London: Avebury.

Rothengatter, Werner and Claus Doll. 2002. "Design of a user charge for heavy-duty vehicles on German motorways considering the objectives of efficiency, fairness, and environmental protection: Findings from the EU research project DESIRE," *IATSS Research*, 26(1): 6-16.

Rozin, Paul, Laura Lowery, SumioImada, and Jonathan Haidt. 1999. "The CAD triad hypothesis: A mapping between three moral emotions (contempt, anger, disgust) and three moral codes (community, autonomy, divinity)," *Journal of Personality and Social Psychology*, 99(4): 574-586.

Sanchez, Thomas W., Rich Stolz and Jacinta S. Ma. 2003. *Moving Toward Equity: Addressing Inequitable Effects of Transportation Policies On Minorities*. Harvard Civil Rights Project and the Center For Community Change. Available at: http://www.civilrightsproject.harvard.edu/research/transportation/MovingtoEquity.pdf

SANDAG. (n.d.). *I-15 Managed Lanes*. Retrieved January 5, 2008, from SANDAG: http://www.sandag.org/index.asp?projectid=34&fuseaction=projects.detail

Santi, L. 1994. "Estimates of the state sales and use tax on Arkansas households, 1989–1995," *Arkansas Business & Economics Review*, 27(1): 10-18.

Santos, Georgina and Tom Catchesides. 2005. *Distributional Consequences of Gasoline Taxation in the United Kingdom.*Transportation Research Record.

Santos, Georgina and Laurent Roley. 2004. "Distributional impacts of road pricing: the truth behind the myth," *Transportation*, 31: 21-42.

Savage, James. 2006, October 1. "Alliance: yes to congestion charging." Retrieved January 5, 2008, from *The Local: Sweden's News* in English: http://www.thelocal.se/5077/20061001/

Schreffler, Eric N., Jacqueline Golob, and JanuszSupernak. 1998. *I-15 Congestion Pricing Project Monitoring and Evaluation Services: Task 3.3.1 Phase I Implementation Procedures, Policies, Agreement and Barriers.* San Diego State University Foundation.

Schweitzer, L. and Valenzuela, A.2004."Environmental injustice and transportation; the claims and the evidence," *Journal of Planning Literature* 18(4): 383-398.

Schweitzer, Lisa and Brian D. Taylor. 2008. "Just Pricing: The Distributional Effects of Congestion Pricing and Sales Taxes," *Transportation*, 35(6): 797-812.DOI 10.1007/s11116-008-9165-9.

Sciara, Sciara and Martin Wachs. 2007. "Metropolitan Transportation Funding: Prospects, Progress, and Practical Considerations," Public Works Management & Policy, 12(1): 378-394. DOI: 10.1177/1087724X07303987.

Shoup, Donald. 2005. *The High Cost of Free Parking.* Chicago: Planners Press.

Small, Kenneth. 1992. *Urban Transportation Economics.* New York: Harwood Academic Publishers.

Small, Kenneth, Clifford Winston and Carol A. Evans. 1989. "Pavement Wearand Road Durability," in *Road Work: A New Highway and Pricing InvestmentPolicy*. Washington, D.C.: The Brookings Institution. 37-68.

Small, Kenneth A. and Jose A. Gomez-Ibanez. 1998. *Road Pricing for Congestion Management: The Transition from Theory to Policy.* University of California, Berkeley.

Sorensen, A. Paul. 2006. "Cheaper Gas and More Expensive Shoes: California's Transportation Finance Reform Proposal," *Journal of the Transportation Research Board*, 1960: 1-7.

Sorensen, Paul A. 2006. *Review and Synthesis of Innovative Electronic Tolling Applications Worldwide.* Los Angeles: UCLA Institute of Transportation Studies.

Sorensen, Paul A., and Brian D. Taylor. 2005. *Review and Synthesis of Road-Use Metering and Charging Systems.* Transportation Research Board.

Sorensen, Paul A. and Brian D. Taylor. 2006. "Innovations in Road Finance: Examining the Growth in Electronic Tolling," *Public Works Management & Policy*, 11(2): 110-125. DOI: 10.1177/1087724X06294067.

Stewart-Ladewig, Louise. 2005. "The Acceptability of Road Charges for Commercial Transit Traffic." *PIARC Seminar on Road Pricing with Emphasis on Financing, Regulation, and Equity*. Cancun, Mexico.

Sullivan, Edward. 2000. *Continuation Study to Evaluate the Impacts of the SR 91 Value-Priced Express Lanes. Final Report to Caltrans.*

Szeto, W., & Lo, H. K.2006. Transportation Network Improvement and Tolling Strategies: The Issue of Intergeneration Equity. *Transportation Research Part A*, 227-243.

Taylor, Brian D. 1991. "Unjust Equity: An Examination of California's Transportation Development Act," *Transportation Research Record*, 1297: 85-92.

Taylor, Brian D. 1995. "Program Performance Versus Transit Performance: Explanation for Ineffectiveness of Performance-Based Transit Subsidy Programs," *Transportation Research Record*, 1496,43–51. Washington, D.C.: Transportation Research Board, National Research Council.

Taylor, Brian D. 2004. "The Geography of Urban Transportation Finance," *The Geography of Urban Transportation*, Third Edition, Susan Hanson and Genevieve Giuliano, Editors. New York: The Guilford Press. 294-331.

Taylor, Brian D. and Alexandra Evans.2005. "Paying for Transportation: What's Fair Price?" White Paper prepared for the California Department of Transportation, Institute of Transportation Studies, UCLA. 39 pages.

Taylor, Brian D., Mark Garrett, and Hiroyuki Iseki. 2000. "Measuring Cost Variability in Provision of Transit Service," *Journal of the Transportation Research Board*, 1735: 101-112. DOI: 10.3141/1735-13.

Taylor, Brian D. and William S. McCullough. 1998. "Lost Riders," *Access*, 13: 26-31.

Taylor, Brian D., Douglas Miller, Hiroyuki Iseki, and Camille Fink. 2009. "Nature and/or Nurture? Analyzing the Determinants of Transit Ridership Across U.S. Urbanized Areas," *Transportation Research, Part A*, 43(1): 60-77. DOI: 10.1016/j.tra.2008.06.007.

Tetlock, Philip E. 2002. "Social Functionalist Frameworks for Judgment and Choice: Intuitive Politicians, Theologians, and Prosecutors," *Psychological Review*, 109(3): 451-471.

Transek. 2006. *Equity Effects of the Stockholm Trial.* Stockholmsförsöket.

Federal Highway Administration (FHWA). 1997. *Federal Highway Cost Allocation Study Final Report*. Washington, D.C.: U.S. Department of Transportation, Federal Highway Administration.

United States Government Accountability Office. 2006, April 4. Highway Trust Fund: Overview of Highway Trust Fund Estimates. Available at: http://www.gao.gov/new.items/d06572t.pdf

U.S. Department of Transportation, Federal Highway Administration. 2000. Highway Statistics 2000. Washington, D.C. Retrieved on February 24, 2005, from:http://www.fhwa.dot.gov/ohim/hs00

U.S. Department of Transportation, Federal Highway Administration. 2001. Highway Statistics 2001. Washington, D.C. Retrieved on February 24, 2005, from:http://www.fhwa.dot.gov/ohim/hs01

USDOT. 2008. *Low-Income Equity Concerns of U.S. Road Pricing Initiatives*. Retrieved August 25, 2008, from Urban Partnership Resources: http://www.upa.dot.gov/resources/lwincequityrpi/index.htm

Viegas, J. M.2001."Making Urban Road Pricing Acceptable and Effective: Searching for Quality and Equity in Urban Mobility,"*Transport Policy*8, 289-294.

Wachs, Martin. 2003. "Then and Now: The Evaluation of Congestion Pricing in Transportation and Where We Stand Today," *International Perspectives on Road Pricing*. Key Biscayne, Florida: Transportation Research Board. 63-72.

Wachs, Martin. 1994. "Will Congestion Pricing Ever Be Adopted?" *Access*, 4: 15-19.

Walters, Alan A. 1961. "The Theory and Measurement of Private and Social Cost of Highway Congestion," *Econometrica*, 29(4): 676-99.

Weinstein, A., Dill, J., Goldman, T., Hall, J., Holtzman, F., Recker, J., et al.2006. *Transportation Financing Opportunities for the State of California.* Mineta Transportation Institute.

Weinstein, Asha and Gian-Claudia Sciara. 2006. "Unraveling Equity in HOT Lane Planning: A View from Practice," *Journal of Planning, Education and Research*: 174-184.

Wiese, Aruther M., Adam Rose and Gerald Schluter. 1995. "Motor-Fuel Taxes and Household Welfare: An Applied General Equilibrium Analysis," *Land Economics,* 71: 229-249.

Zhang, L. 2008. The Short and Long-Run Impact of a Vehicle Mileage Fee on Income and Spatial Equity. *TRB 2009 Annual Meeting*.

APPENDIX: Five Case Studies of Equity in Electronic Road Tolling Projects

The case studies below explore how equity concerns have been raised and addressed in five very different tolling contexts. These five cases were selected because equity issues were central at some point in the planning and implementation process, and because the circumstances and outcomes differ substantially from one another. Information on each of these cases was drawn from primary, secondary, and tertiary sources. The mitigation efforts examined ranges from improving public outreach to dispel equity misconceptions, to dedicating revenues to offset both real and perceivedinequities. While elaborate compensation programs, such as FAIR lanes that would provide toll credits for low-income drivers, have been proposed, none have yet been put into practice (Weinstein & Sciara, 2006). Although equity concerns have delayed, and in one case helped to kill, road pricing projects, equity concerns have not been consistently proven a deal breaker. In most cases, sincere and comprehensive planning and community outreach efforts have shown that equity criticisms can be fully addressed.

San Diego's 1-15 HOT Lanes: Revenue Dedicated to Transit & Public Outreach Campaign

In converting the existing, underutilized HOV lanes to HOT lanes along the I-15 corridor in the suburbs north of downtown, San Diego transportation officials were able to avoid extensive equity objections by spearheading a comprehensive outreach campaign and dedicating revenue to transit improvements along the corridor. The HOT lane development was designed to address both the worsening congestion in the San Diego region and the dearth of public transit in the I-15 corridor. In 1996, the I-15 HOT lanes opened with single-occupant vehicles initially paying into the lanes with a flatmonthly fee. Phase II, FasTrak, was introduced in 1998, which incorporated the world's first fully dynamic variable congestion toll to assure free-flowing

traffic. Single occupant vehicles now pay a variable fee via transponders. To fund corridor transit improvements, revenues from the toll lanes are dedicated to funding the Inland Breeze Express Bus Service from Rancho Bernardo to downtown San Diego.

Throughout the planning and implementation of the HOT lanes, an ongoing public dialogue was encouraged by transportation officials. One of the project's most outspoken champions was Jan Goldsmith, the former Mayor of the north San Diego County City of Poway and newly elected State Assembly member, who adopted the issue as one of his primary causes. In the course of pushing for the I-15 HOT lanes, Goldsmith penned several op-ed pieces in local papers and appeared on numerous local talk radio shows. He also went to considerable effort to meet individually and repeatedly with the various stakeholders to build support among elected officials and the public. Goldsmith aggressively and enthusiastically touted the project as a means to generate revenues for needed services from an existing underutilized facility without raising taxes.

The San Diego Association of Governments (SANDAG) was also instrumental in communicating with the general public and media through a well-planned marketing campaign that included I-15 Express Lane newsletters and a series of town hall-style meetings (Evans, Gougherty, Morris, & Smirti, 2006). In addition to these education efforts, SANDAG employed focus groups and opinion surveys to frequently assess the public perception of the HOT lanes, particularly regarding the perceived fairness of the facility (Weinstein & Sciara, 2006). As part of these efforts, SANDAG established a Policy Advisory Committee and a Citizen's Advisory Committee, which were very active in the planning phase. Various consultants also played important roles in the planning phases by producing a series of analytical reports to support decision-making regarding the setting prices, public relations, and operational issues (Schreffler,

Golob, &Supernak, 1998). By incorporating public opinion surveys into the planning process, SANDAG was able to adjust the project design to assuage equity concerns as the project evolved. .

Once the I-15 HOT lanes opened, several evaluation studies tracked user demographics to address concerns that the lanes might become Lexus Lanes for the rich. Although the users of the I-15 HOT lanes were found to have higher average incomes than drivers in the parallel, free lanes, the lanes were used by middle, lower-middle, and some lower income drivers as well. Furthermore, opinion surveys conducted after the opening of the lanes found widespread support for the HOT lanes across all income groups and among both users and non-users. The San Diego officials were successful in selling the HOT lanes as a new transportation choice for all drivers, which aided in increasing approval levels of the project (USDOT, 2008). In addition to the new option of congestion-free toll travel, the increased utilization of the former HOV lanes reduced free-lane congestion, contributing importantly to their popularity.

The San Diego case demonstrates the importance of incorporating community input and outreach into the program design process from the outset. The I-15 project also illustrates the potentially important role that revenue dedication can play in assuaging equity critics. By funding transit service, the HOT lanes improved transportation options for drivers and non-drivers alike.

Minnesota's I-394 MnPass: Bipartisan Support Quells Equity Objections

HOT lanes proposals in the Minneapolis region weathered over a decade of criticism before finally being implemented in 2005. Although Minnesota transportation officials attempted to follow the San Diego's HOT lanes implementation model, Minnesota's residents

and political leaders proved much more critical of the HOT lane concept than those in San Diego. Much of this criticism focused around equity concerns, with opponents repeatedly dubbing the facility "Lexus Lanes." However, a broad bipartisan political coalition, which focused on public education and outreach, was eventually able to overcome and quell many of the equity concerns.

The Minnesota Department of Transportation (Mn/DOT) and the Twin Cities Metropolitan Council had been exploring the possibility of introducing value pricing in the Minneapolis/St. Paul metropolitan area since 1994. In 1997, the state legislature approved a HOT lane demonstration project on I-394, a congested freeway route into Minneapolis's western suburbs. However, the proposal met with strong initial resistance from the public and was subsequently withdrawn; much of the public outcry centered on questions of fairness. The Minnesota Governor at the time, Arne Carlson, responded to the public objections by rejecting Mn/DOT proposals to incorporate HOT lanes as part of Minnesota's transportation plan (Sorensen & Taylor, 2005). For a time, the proposal appeared dead.

Not to be deterred, a 30-member Value Pricing Advisory Task Force, consisting of state legislators, area mayors, and business, environmental, and transportation leaders, pushed a new demonstration project proposal beginning in 2001. Led by researchers at the Hubert Humphrey Institute at the University of Minnesota and funded through Federal Highway Administration (FHWA) value pricing grants, the coalition repeatedly and publicly championed value pricing through an aggressive communications campaign. As part of the campaign, a series of local and regional workshops were conducted to address citizen concerns. This public dialogue and gradual acceptance eventually led to bi-partisan support for the project. MnPass(as the project came to be known) planners also used focus groups and opinion surveys to assess the public

perception of HOT lanes (Weinstein & Sciara, 2006). As a result of this outreach work, public acceptance began to grow.

Beyond the education campaign, several other factors likely contributed to waxing support for the project. In the early 2000s, the Minnesota state budget deficit exceeded $4 billion, and the governor had pledged no new taxes. Furthermore, the Minneapolis-St. Paul metropolitan area's population was growing rapidly, exacerbating the already congested road network. In concert, congestion had become one of the top issues on the public agenda. This bipartisan support, along with the backing of a newly elected Governor Tim Pawlenty and Lt. Governor and Transportation Commissioner Carol Molnau, led to the passage of 2003 legislation that allowed for the conversion of HOV lanes to HOT express lanes. The legislation also stipulated that revenue were to be used first to pay back the state trunk highway fund for the costs of implementation and administration of the project. Any excess revenue was to both enhance transit service in the corridor and to expand corridor road capacity (Buckeye &Munnich, 2004).

With the legislation and public support in place, the Minnesota HOT lanes opened along I-394 in May 2005. The lanes featured dynamic pricing, with tolls varying from 25 cents to $8.00 depending on congestion levels (United States Government Accountability Office, 2006). As with the San Diego case, the MnPass program reduced congestion levels across the entire corridor, not just in the MnPass lanes. And similar to the San Diego case, although higher income drivers are somewhat more likely to purchase MnPass transponders and use the lanes, drivers of all income levels participate in the MnPass program, contributing to public acceptance of the project (Munnich & Kenneth, 2007).

German Toll Collect: Moving Towards a Fair Distribution of Costs

In contrast to the two previous case studies, the German Toll Collect program was motivated explicitly by a desire to develop a more equitable distribution of transportation costs among road users. With rise of international trucking in the European Union, the Toll Collect Program was structured to charge commercial users fairly for the costs they impose on the German highway system and to encourage the movement of goods by rail (Rothengatter& Doll, 2002).

Located in the heart of Europe, Germany has long served as a central hub for European transport. Estimates indicate that up to 35% of truck vehicle miles are driven byabout 470,000 foreign trucks each year (Hensher& Puckett, 2005). The Single European Market and the development of the European Union have dramatically increased the amount of intra-European trade and, in turn, levels of truck traffic traveling through Germany. This growth is expected to continue, with projections of a 64% increase in truck traffic between 2005 and 2015 (May &Sumalee, 2003). As truck travel has increased, so have the costs of maintaining and upgrading German highways. Prior to Toll Collect, Germany was not able to collect much revenue from the foreign vehicles, as fuel taxes paid in other countries remained in those countries.

In an attempt to fairly distribute the increasing road maintenance costs, the German government sought to incorporate distance fees for all heavy trucks on German roadways. In January 2005, Germany introduced the Toll Collect System, which electronically charges all truck over 12 tons fees that vary according to distance traveled, vehicle weight, and vehicle emissions. Every truck is equipped with an on-board unit that utilizes GPS and digital road maps to track the vehicle's use of the highway network and assesses the appropriate fee automatically. Although some trucks still pay tolls manually, the German Toll Collect System is the first large-

scale operation road pricing project that utilizes satellite-based electronic fee collection technology (Hensher& Puckett, 2005).

Research has long found that roadway damage increases exponentially with axle weights, depending on the "design capacity" of a given roadway. That is, road damage is greatest when a vehicle's weight exceeds a road's design capacity (which is determined largely by roadbed composition and thickness). Accordingly, the Germans devised a fee system that varied with vehicle weight in rough proportion to the damage costs imposed by vehicles of various weights(Rothengatter & Doll, 2002).

As with the San Diego road pricing programs, the allocation of the revenue collected from road users also plays a significant role in the public's perception of the equity of the tolls. Twenty percent of German Toll Collect revenue is returned to the toll operator to cover basic operation costs. The remaining 80 percent is dedicated to the federal transport network (50 percent to roads, 38 percent to rail and 12 percent to inland waterways). Dedicating the net revenues to freight infrastructure, and mostly to highways, proved critical in achieving the acceptance of the trucking organizations (Doll & Schade, 2005).

Although the Toll Collect program was initially conceived of as a mechanism to more equitably distribute infrastructure costs, many within the trucking industry view the charge as unfair to the commercial freight industry. In a 2005 survey, road users reported the belief that the charges would be more equitable if vehicle related taxes were reduced or a fuel tax rebate for those paying road charges was introduced (Stewart-Ladewig, 2005). Some users have also criticized the lack of transparency in determining the Toll Collect fees, which to the uninitiated may appear arbitrary. Furthermore, some users reported the opinion that the program would be more equitable if the truck tolls were consistent across all European countries, rather than current

system whereby each country implements different road finance systems (Stewart-Ladewig, 2005). Given that studies have repeatedly suggested that heavy trucks inflict more damage on roadways than they pay in road taxes, it is perhaps unsurprising that truckers would express dissatisfaction with a new pricing regime that explicitly and intentionally shifts more of the finance burden in Germany onto heavy vehicles.

As the Toll Collect case illustrates, perceptions of equity and fairness vary among those who now pay less or more in highway tolls and taxes. Although German residents and government officials widely viewed Toll Collect to be a logical step towards afairer distribution of costs, many truckers view the system as a new and unwarranted burden. Such complaints notwithstanding, the explicit focus on fairness and the dedication of the revenues to roadway and goods movement improvements have combined to quell opposition and keep the system in place.

Stockholm Congestion Tax: Pilot Program Allows Policy Adjustments

Although the various congestion charging proposals for the Stockholm area had been discussed since the 1970s, the proposals did not gain any traction until the late 1990s when mounting enviromental concerns led to renewed political pressure to reduce traffic congestion.The 2002 Swedish general election led to an agreement between the Social Democrats, the Left Party, and the Green Party that included a provision allowing for a congestion pricing trial in Stockholm. In June 2003, Stockholm City Council passed a proposal to introduce a congestion pricing trial, and the Swedish Parliament, the Riksdag, passed the Congestion Charges Act in June 2004, allowing Stockholm to proceed with the trial (Civitas, 2006).

Prior to the introduction of a congestion pricing trial, Stockholm area residents had little direct experience with congestion pricing and overwhelmingly opposed the central area cordon fee by a margin of two to one. Much of this opposition pertained to fairness issues, particularly concerns over geographic inequity, whereby central area residents and employees would be unfairly burdened by fees not levied elsewhere.

The trial began in 2006 when a fee was levied on all vehicles traveling within a 29.5 square-kilometer central Stockholm ring that varied by time of day.The revenue raised during the trial period was dedicated to public transit improvements in the Stockholm region. By both reducing congestion and enhancing public transit, planners of the congestion feesought to improve sustainable accessibility to Stockholm's downtown core. In order to maintain access to the city center throughout the trial, improvements to the public transportation system began prior to the implementation of the congestion tolls. The improvements constituted the largest coordinated expansion of the transit system since the initial Underground subway construction project in the 1950s (Civitas, 2006). Most of the public transportation improvements focused on enhancing bus service by introducing new routes and new buses. Rail lines and existing bus lines were improved as well. Finally, park and ride sites received funding for improvement (Civitas, 2006).

At the conclusion of the trial period in July 2006, the Congestion Charge Secretariat evaluated the trial run by examining a number of criteria reflecting the aims of and motives behind the congestion pricing program. The Secretariat study determined that, during the congestion toll period, traffic in Stockholm decreased by 22 percent, exceeding expectations, and public transit ridership increased by six percent. The study also concluded that carbon dioxide emissions within inner-city Stockholm decreased by 40 percent. However, the effect of the

reduced congestion levels on perceptions of the urban environment proved difficult to measure (Miljöavgiftskansliet/Congestion Charge Secretariat, 2006).

Although some complaints focused on unfair distribution of taxes, a study conducted during the trial period found that during one two-week period, almost half of all privately owned cars in Stockholm paid the congestion tax at least once. However, the study also concluded that 75 percent of the revenue was collected from fewer than 100,000 vehicles, which is approximately one-fifth of all cars in Stockholm County (Transek, 2006). Furthermore, because Stockholm's congestion fee covers the entire downtown area, larger, for example, than the zone in London, the congestion tax charges most auto commuters from outlying suburbs, which has contributed to perceptions of equity(Poole, 2007).

Although significant opposition arose among outer suburbs residents, the study found that the average payments by northern outer suburbs residents was only SEK 78 ($11 USD) per person/year, compared to SEK 500 ($70 USD) per person/year for residents of the inner city (Transek, 2006). The trial study concluded that residents of the inner city and Lidingö overall paid approximately twice as much as residents of other areas, with men (who are more likely to drive in Sweden) paying almost twice as much as women. Households with higher discretionary incomes paid nearly three times as much as households with lower discretionary incomes, and employed residents paid about three times as much as unemployed residents. Because higher income residents proved more likely to pay the congestion tolls, the burden of the tolls during the trial was highest, on average, among affluent men living in a two-adult household with children located in the inner city or in Lidingö(Transek, 2006). In total, the Stockholm congestion fee increased car travel costs by 31 percent for residents of the inner city, 11 percent for residents of

the inner suburbs, and only 5 percent for residents of the outer suburbs – where opposition to the fee was highest.

At the conclusion of the trial, the continuance of the program was put before the voters in a general referendum in September 2006. Residents of Stockholm voted in favor of maintaining the congestion fee, while residents of outlying suburbs voted to do away with it. The combined vote was a slim majority (52%) in favor of continuing the program. Even though the residents of the inner city paid a greater share of the tax, they also experienced the greatest benefit with significantly reduced traffic levels through their neighborhoods, faster auto and transit travel times, and enhanced transit options financed by the fee (Transek, 2006).

In this September 2006 election, the Green Party, whose leaders had originally introduced the congestion fee, lost. However, a new Alliance of center-right parties collectively decided to reinstate the congestion tax, honoring the Stockholm resident's vote. During political debates over whether to continue the fee, a compromise altered the use of revenue from the congestion tolls to be divided between new road construction in and around Stockholm and transit improvements, instead of dedicating revenue solely to transit as was done during the trial (Savage, 2006).One of the new projects to be funded by the tax is a $3 billion north-south expressway, underground through the western suburbs. With this new use of congestion tax revenue, overall support for the policy increased from 52 percent to 67 percent – a complete reversal of the two-thirds who had initially opposed the program prior to the trial(USDOT, 2008). With these new levels of support, the modified congestion tax was reintroduced in September 2007 on a permanent basis.

The trial period implementation in Stockholm allowed transportation officials to test a controversial pricing proposal for which equity concerns had been raised. This gave public

officials considerable political cover had the trial proven ineffective or unpopular. By introducing the congestion fee on a trial basis, residents were able to experience the congestion reduction effects first-hand, provide feedback to policymakers, and ultimately make a more informed decision when it came time to cast a ballot.To quell opposition from suburban voters who felt unfairly taxed during the trial, the revenue was split between central city transit and suburban highway projects resulting in supermajority support for the now permanent program.

New York City Congestion Pricing: Perceived Inequities Help to Kill the Proposal

The congestion pricing proposal in New York City is an illuminating story of equity concerns helping to kill a project. Proposed by New York City Mayor Michael Bloomberg in April 2007, the initiative was met with both fanfare and fierce political and public opposition. Many of the arguments against the proposal focused on equity issues – both geographic and economic fairness. As designed, the congestion pricing initiative would have charged vehicles entering Manhattan south of 60th Street $8 and vehicles traveling within the zone $4 during designated peak hours. The revenue collected would have been dedicated to mass transit improvements to help accommodate the many former drivers expected to switchto transit. Furthermore, had the proposal been approved, New York City would have received an additional $354 million of federal funding for mass transit improvements.

While the new revenue streams proved attractive to many elected officials, opposition to the project was never sufficiently quelled. In response to persistent vocal opposition to the proposal, the New York State Legislature failed to grant the necessary legislative authority for the program to proceed by the deadline for receipt of the federal funding in April2008.

Equity concerns with the proposal were raised by poverty advocates and elected officials representing low-income districts, as well as a number of politicians representing wealthy suburban districts. While the expression of these equity concerns was sincere among many critics, it's likely that such objections were largely tactical by others. Regardless, those campaigning against congestion pricing were successful in wielding inequity fears to help sink the proposal.

As with the other cases reviewed here, equity issues motivated pricing proponents as well. Although New Jersey vehicles account for only 24 percent of those entering the New York City CBD, their drivers pay 45 percent of all Manhattan bridge toll revenues. In comparison, Manhattan drivers contribute only 7 percent of the total toll revenues, while residents of the other four boroughs pay 29 percent. Under the proposed congestion pricing program, residents of Manhattan would have paid a larger share of the much larger pot of revenues – between 28 and 31 percent, residents of the other four boroughs would have paid between 38 and 49 percent of the tolls, and New Jersey residents between 7 and 17 percent of toll revenues. Proponents argued that this was a more equitable distribution of burden than the current system, since the revenue collected would be used primarily to fund transit improvements that would benefit the residents of New York City (USDOT, 2008).

As the proposal moved through the legislative process, equity issues were frequently cited as a key reason to oppose the legislation. Among the most vocal opponents were members of NYC Congestion Free, who frequently cited equity concerns(Keep NYC Congestion Tax Free, 2007). New York State Assemblyman Richard Brodsky, a Democrat from Westchester County, helped to spearheadopposition to the proposal (Berger, 2008). Brodsky claimed congestion pricing would be regressive, disproportionately burdening working and middle class

residents. In July 2007, Brodsky produced a report purporting to support his assertion (Hakim, 2007; Brodsky, 2007).

In addition to opposition from suburban representatives, many politicians from Manhattan, Brooklyn, and Queens strongly opposed the measure as well. Assembly Speaker Sheldon Silver, a representative of Manhattan's Lower East Side, backed Brodsky in opposition to congestion pricing. Silver voiced concerns that the neighborhoods surrounding the congestion pricing zone would be transformed into virtual parking lots, serving those who would drive in from the outlying areas and then park at the border of the zone to avoid the charges. Therefore, Silver argued, traffic levels would not be reduced in neighborhoods such as Harlem, the South Bronx, and Bedford-Stuyvesant. Since many supporters of congestion pricing cited improved air quality as one of the benefits of the program, Silver argued that the city's poorest neighborhoods would in fact experience no improvement in their local air quality and perhaps would even experience decreased air quality, doing little to battle the high asthma rates in these neighborhoods (Hakim, 2007). In the New York City Council vote, councilmembers from Brooklyn and Queens opposed the congestion pricing bill by a margin of nearly two to one.

Overall, however, representatives from the Bronx and Manhattan voted overwhelmingly in favor of the congestion pricing plan, moving it forward to the state legislature. But once in Albany, 16 of the 18 state assembly members from Queens signed a letter opposing the plan (Neuman, 2008). Assemblyman Hakeem Jeffries, a representative of Brooklyn neighborhoods Prospect Heights, Bedford-Stuyvesant, and Clinton Hills, joined with Brodsky in opposing to the proposal on the grounds that it imposed an unfair burden on working families. Some representatives from Brooklyn also claimed that the plan would geographically isolate residents of the borough by forcing drivers to pay a toll to cross Manhattan on the way to New Jersey.

But while concerns with the impacts on low-income households were raised by many, not all elected officials believed that the congestion pricing initiative would negatively affect their lower-income residents. Assemblyman Keith L.T. Wright, a Democrat representative from Harlem, supported the congestion pricing, as did the City Councilwoman for the East Harlem and the South Bronx, Melissa Mark-Viverito, who cited equity as a major reason behind his support of the proposal. Mark-Viveritoin particular questioned the sincerity of elected officials from suburban communities who claimed to be concerned about the impact of the congestion tolls on lower-income residents. Mark-Viverito argued that her lower-income constituents would benefit from reduced traffic from outlying suburbs en route to the CBD, resulting in improved air quality and public health. Noting that only five percent of commuters from Brooklyn, Queens, Staten Island, and the Bronx travel to Manhattan by private car, Mark-Viveritoargued that congestion pricingrevenues would benefit the public transit systems that transport the majority of commuters in the five boroughs (USDOT, 2008).

As the federal deadline neared in April 2008, equity arguments persisted among pricing proponents and opponents with no movement toward consensus. Speaker Sheldon Silver determined that there was not enough support in the Assembly to justify bringing the enabling legislation to a vote, which effectively killed the proposal.

The New York City experience suggests that equity concerns – both sincere and tactical – can indeed kill congestion pricing projects. The case in New York shows that geographic equity concerns – in particular, who pays and which areas might be negatively affected – can be multi-faceted and murky. Because questions over the geographic equity effects of the program were not adequately addressed by program proponents, *uncertainty* over who, and where, would win and lose led to the demise of congestion pricing in Manhattan.