

SPECIAL REPORT 303:
EQUITY OF EVOLVING TRANSPORTATION FINANCE MECHANISMS

Remediating Inequity in Transportation Finance

David A. King
Columbia University

Paper prepared for the
Committee on the Equity Implications of
Evolving Transportation Finance Mechanisms
Transportation Research Board

2009

Remediating Inequity in Transportation Finance

DAVID A. KING
Columbia University

1. INTRODUCTION

Policymakers are strongly considering new tolls and fees to manage congestion, provide environmental benefits, and raise money for transportation investment and maintenance. Understandably, such a shift in the way transportation is financed raises concerns about equity. In the United States driving is so ubiquitous that any efforts to raise the marginal costs of driving will have implications across a broad swath of the population, including raising the cost of travel for many people who are poor and have no alternatives. Understanding how existing transportation financing schemes compensate for inequities is critical for developing policies that will ensure fairness in the future. To this end this essay explores how inequity is remediated through revenue recycling and dedicated programs using transportation finance.

Concern over inequities and fairness is as old as toll roads. The early toll roads in the United States frequently exempted farmers and folks going to church from paying tolls due to such complaints (1). More recent supporters of congestion pricing are concerned with equity (2-7), and many scholars have identified potential winners and losers from various pricing schemes (5, 8). Yet if the revenues from congestion pricing are not distributed—so the only benefit is less congestion—then high-income groups gain and low-income groups will lose (6). This situation has obvious implications for remediating inequity, and suggests that if inequity is a concern at least some of the revenue should be used to promote fairness and compensate those who are made worse off. In particular, the people who lack meaningful alternatives to paying the new tolls and fees should be afforded some type of compensation.

Congestion management is not the only rationale for road tolls, however. The shift towards user fees and other new financing mechanisms for transportation is often driven by the need to generate new money for infrastructure investment and maintenance. Yet much of the political opposition to new user fees remains focused on perceived and real inequities (5, 9). This concern over equity suggests that some type of remediation is required in order to implement new finance mechanisms.

Scholars have approached inequity remediation as critical for political acceptability and observe that the distribution of the revenue is critical for achieving equity (10-13). These studies propose revenue distributions in order to overcome political opposition to new tolls, and these approaches are typical of how equity is considered in the literature. That is, equity concerns are something to overcome for political reasons and not something that should be built into the system of finance in order to make the new methods of financing transportation more fair.

Ultimately, inequity remediation is not nearly as widespread as the fierce opposition to new finance mechanisms suggests, but this will likely change. Toll and new transportation fees are challenged on equity grounds where opponents and public officials are concerned that new taxes will harm the poor and middle class at the expense of the wealthy. At the same time, congestion is getting worse and traditional transport finance is strained, leading to more interest in tolls, user fees and other taxes than ever before. As more projects come on line and more

people of all incomes are expected to pay more for travel, resolving such concerns about equity will become a greater concern for policymakers than it has been. The lessons learned from existing efforts to remediate inequity will prove useful for crafting future policies.

2. LITERATURE REVIEWED

The literature promoting equity as a desirable goal of transportation policy is rich, yet the scholarly work evaluating efforts to remediate inequities is surprisingly thin. In order to present a full picture of how inequity is remediated within transportation finance this essay uses multiple sources and types of materials. There are two main areas that provide the most fruitful materials. First, existing toll and user fee projects were identified through reference materials, government documents and other literature. These projects are varied in scope and intent, and include cordon toll projects in Europe, High Occupancy Toll (HOT) lanes in the United States, and conventional toll facilities in the United States. Representative selections of these projects are discussed below. The selected projects were chosen based on availability of information and related materials. For each of the projects examined relevant public and consultant reports, websites and other materials were used to explore how revenues were used and ways that inequity was compensated. Second, peer-reviewed journals were searched for articles that presented research on transportation equity and evaluated road pricing projects. The scholarly works were oriented towards proposed policies for remediating inequity and ways to make new transportation finance mechanisms politically acceptable, though there are some examples of equity-enhancing policies.

Special cases of road pricing that were reviewed but not included in this paper include projects where existing tolled facilities were leased to private companies. These contracts include the Chicago Skyway and the Indiana Toll Road. These concessions provided the public with lump-sum cash payments in exchange for management and maintenance of the tolled facilities for decades to come. In the cases of the Chicago Skyway and the Indiana Toll road the payments to the public were dedicated to transportation investment. Equity was not a major concern in these projects, in part because there were already tolls on the facilities. Ultimately these concessions do not offer any examples of using transportation finance to directly reduce inequities, and because the roads under contract were already toll facilities the concessions offer little insight for overcoming political opposition to new financing mechanisms.

The last areas examined for remedial efforts were pilot projects testing the viability of tolls and other user fees. These projects were not concerned with equity specifically and are not yet permanent installations. For instance, projects in Gothenburg and Copenhagen were used to research impacts and acceptability of road pricing, and a project in Helsinki explored attitudes towards various alternative pricing schemes (14). Ultimately, these pilot projects provided little guidance for improving equity through finance. May and Sumalee examined many of the pilot projects for their overview of road pricing applications and note that these projects all took much longer to implement than originally projected (14). The authors argue that the delay in implementation is caused mainly by political uncertainty and popular criticism of pricing, and that the primary reason there are not more permanent, large-scale pricing projects is political acceptability, which is greatly influenced by concerns over equity.

3. BACKGROUND AND DEFINITIONS

Inequities arising from transportation finance are distributed across people and places, leading to multiple ways of conceptualizing compensatory measures. The evidence reviewed in this essay is organized around geographic and income definitions of equity and comes from a variety of sources. The number of recent congestion pricing projects suggests that the next few years hold great potential for studies that focus on equity in transportation finance, but the current state of the research is disappointing in that there are few studies that specifically examine remediating inequity (15, 16). The implications of the shallow pool of examples are considered in section 7.1.

Income-based equity (or redistributive equity) is perhaps the most common equity concept; the effect of a policy on low-income people is of primary interest. Income-based equity is an obvious issue for new transportation taxes and fees, and one that has received a great deal of attention in the literature. However, the research on the distribution aspects of tolls and fees tends to focus on incidence of tolls and who pays rather than ways to compensate those who are harmed. Owning a car is a major benefit for access to employment and other services, and an expense that many poor households have little choice about. It is these poor households with few or no other alternatives to driving that are of primary concern for policy makers when considering the equity impacts of road tolls and fees.

Geographic equity is another way to think about fairness; it assumes that transportation investment should largely be located in the areas where the revenue was raised. Such investment might cycle the revenue into transportation investment in general or specify a particular mode or project. Examples in the United States include those High Occupancy Toll (HOT) lanes where there is a requirement to spend net revenues on transportation projects in the tolled corridors (16), and the case of San Diego where the toll revenue from I-15 is dedicated to transit service along the toll road (17).

Public officials are often concerned with geographic equity because it is they who are charged with collecting and spending taxes and fees (18). After all, elected officials represent districts, and they have incentives to pursue policies that benefit the areas they represent. This political situation promotes investments that have geographic benefits, though these benefits may not necessarily compensate those who are harmed by new finance mechanisms.

4. GEOGRAPHIC REMEDIATION

Geographic equity has obvious implications for transportation finance. The rise in local option taxes to fund transportation investment is in part due to geographic equity concerns (19, 20). Toll roads have long been subject to concerns about where the revenues would be spent, and these concerns are reflected in the ways that toll revenues are distributed. In many cases legislation requires that revenues be spent on transportation investment, though transportation is defined broadly.

A related concept to geographic equity is modal equity, where revenues are dedicated to the modes where they were generated.¹ Szeto and Wuestefeld (16) examined how toll revenues were used from 24 toll systems in the United States and found that one-third of them were

¹ As previously mentioned, many states require that gas taxes are spent on roads. This is an example of modal equity.

generating revenues for transit investment; these latter systems were in the New York City region, Delaware or the Bay Area. Two facilities generated revenues for economic development investment. The remaining 14 facilities cycled toll revenue into road construction or the state transportation departments. The authors did not review the investments made for distributional considerations, so it is unclear if these revenue uses improve equity or compensate those who pay the tolls.

An important feature of these conventional toll projects is that the revenues generated were dedicated to retiring debt associated with the projects. For instance, a toll project that is representative of conventional tolling for transportation investment is the E-470 project in Colorado. This project issued bonds to cover the costs of the project that will be paid back through toll revenue. The bonds will be retired in 2039, and the revenue after that point is already assigned to the Colorado Department of Transportation (21). The fact the tolls are already dedicated to future transportation investment diminishes the likelihood that remedial actions will be undertaken. However, 2039 is many years away and whether the current agreements will be maintained under new types of financing is unknown. More importantly, the revenues from the toll roads are committed to debt service for the next two decades. The E-470 is not a congestion pricing project, so the tolls are set on a fixed schedule, but there is little ability for officials to use the revenues for other projects or remediation.

4.1. Survey of United States HOT lane projects

There are many HOT lane projects in the United States that have opened in recent years. These projects convert High-Occupancy Vehicle lanes into toll lanes while maintaining the existing “free” lanes of traffic. [Table 1](#) shows eight projects that are in operation, and describes the uses of net revenues for each project. The United States has embraced HOT lanes to a greater degree than other countries using tolls (14), in part because of federal support. Many of the HOT lane projects are sponsored by the Urban Partnership Agreement (UPA) program, which was created in 2006 to promote aggressive congestion-relief programs across the country (22). The UPA supported projects are in Miami, Minneapolis and Salt Lake City; additional UPA projects are currently funded but are not yet in operation and are not considered here. The projects listed in [Table 1](#) serve as a useful guide to how equity concerns arise in practice and what, if anything, has been done to promote fairness.

The net revenues for these projects are dedicated to specific uses. The projects that opened in the past few years have not yet covered initial costs, so there is very little net revenue to use. For the projects where the net revenues are dedicated to uses beyond operations and maintenance of the facilities, geographic equity is addressed by requiring that the money be spent in the corridor. For the Minneapolis facility net revenues are split evenly between capital improvements and transit investment. In most other cases the distribution is not pre-divided. In Houston the revenues are not limited to the corridor, but do have to be spent in the County on roadway investment. For a sense of potential net revenues, consider the facility in San Diego, which has been in operation for over a decade. The facility is fully financed by tolls, and since 1997 has contributed \$7 million to transit investment in the corridor (17). This works out to about \$600,000 per year, which is a small fraction of the gross toll revenues of more than \$30 million annually, but overall a sizeable contribution to transit investment in the corridor.

Toll facility	Location	Year opened	Use of revenues (excluding debt service)
I-394 MnPass	Minneapolis, Minnesota	2005	50% for capital improvements in corridor, 50% for bus transit investment in corridor
SR 91	Orange County, California	1995	Operations and transportation investment in corridor
I-15 FasTrak	San Diego, California	1999	50% for bus service in corridor, 50% Highway Patrol and Operations
I-25 Express Lanes	Denver, Colorado	2006	Operations and maintenance
I-95 Express Lanes	Miami, Florida	2008	Operation and maintenance costs of express lanes and transit on corridor, Highway Patrol
I-15 Express Lanes	Salt Lake City, Utah	2006*	Operations and maintenance
SR 167	Tacoma, Washington	2008	Operation and maintenance costs of express lanes and transit on corridor
US 290	Houston, Texas	2008	Operation and maintenance costs of toll lanes and roadway investment in Harris County

*Utah is currently using a decal system that allows solo drivers to use HOV lanes. In late 2010 an electronic payment system will replace the decals.

Source: (17, 22-28)

Perhaps the most striking lesson from these projects is that the perceived fairness of toll facilities minimizes concerns about equity and access to tolled roads. No project makes any mention of actions meant to remediate inequities. Rather, they all argue that HOT lanes are perfectly equitable and there is no point in offering compensation. As an example, here is how the Florida Department of Transportation explains why the I-95 Express HOT lane project is fair in their online FAQs:

“The 95 Express project does not require any person from any socio-economic group to use the express lanes and pay a toll. Instead, it offers all persons in every group the choice of deciding for themselves which option works best for them on any given day. It should also be noted that experience on similar projects elsewhere in the country has shown that people in all socio-economic groups use express lanes. Express lanes are available for use whenever the cost of being late or having to allow extra time is greater than the price of the toll.” [(24) FAQs]

The argument they are making is that because the toll facility is promoted as a choice facility, there are no inequities to remediate. This approach follows the logic of “do no harm” since the road users who do not pay tolls are not made worse off. The MnPass project in Minnesota extends this claim to say that everybody benefits:

“Q: Do the MnPASS Express Lanes benefit all income levels? A: Yes. Recent research indicates drivers of all income levels are equally likely to use the Express Lanes. Surveys also reveal that people of all income levels support the idea.”[(26) FAQs]

The eight toll projects shown in Table 1 all feature a version of this statement on their websites. The claims of enhanced choices and the voluntary nature of the toll facilities are usually coupled with claims about improvements resulting from lower levels of congestion and from new transit investment using some of the toll revenues. In fact, according to the I-95 Express website, tolls help transit run more smoothly and more reliably. These transit improvements are not mentioned as compensation or an intentional outcome. Rather, transit improvements seem to be viewed as a pleasant side effect of the HOT lanes.

European examples of road pricing are very different than the U.S. HOT lane experiences. Table 2 shows selected toll projects in Europe and the net use of revenues. The five projects shown in the table were designed to raise money for transportation investment, reduce congestion, or do both, and in all cases the revenue is spent in the city or area where the tolls are incurred. The two Norwegian cities (Trondheim and Oslo) explicitly created toll rings to raise money for road investment in the city where the tolls are collected, and recently have extended the tolls as the original twenty-year project was coming to an end. The London experience is reviewed in the next section. The Stockholm program demonstrates unique challenges to compensation. Stockholm voters approved the congestion charges in 2006 and the tolls were installed permanently. Yet one feature of the vote was that the suburban voters could not cast valid votes, and they opposed the tolls. Because the Stockholm elections included a switch in ruling parties, the commitment to the original toll program changed and the revenues were shifted from transit investment to infrastructure investment in the suburbs (15, 29, 30).

None of the projects address remediation specifically, and there are no examples of compensation programs. These projects differ from HOT lanes in that these tolls are unavoidable for travel in the tolled area, however, which leads to other partial solutions to inequities, including transit investment and geographic exemptions. These cases are described in the following sections.

4.2. Transit Investment

Investing transportation revenues into transit is one way to promote geographic equity and improve transportation choices for low-income travelers and those who are affected by new charges. In addition, transit is politically popular among elected officials and the public for congestion reduction. A prominent example of transit investment from pricing occurred in London. In 2003, London instituted a cordon toll that charged motorists for entering the central city. In anticipation of the cordon charges, Transport for London purchased 300 new buses and increased the kilometers of service in operation to the greatest extent since the 1960s (33). The combination of new charges for motorists and expanded bus operations helped increase bus ridership almost 20 percent (31) and demonstrated immediate benefits to the public.

In London the speeds of buses increased due to the decreased congestion on surface streets (34), which also helped improve ridership. London already had a majority of travelers using transit, however, which changes the calculus of using revenues from tolls or other user fees. When the cordon toll was implemented, there was already a mature and dense transit

TABLE 2 Selected Recent European Toll Projects Revenue Uses

Location	Date Opened	Use of revenue excluding operation and debt
London	2003	Transit operations and investment; road and transit safety
Stockholm	2005	Transit operations and investment; road projects
Rome	2001	Transit operations and investment
Trondheim	1991	Road projects
Oslo	1990	Road projects

SOURCE: (14, 15, 30-32)

network that people priced out of their cars could use. In many metropolitan areas this is not the case, and the people who are harmed by user fees or tolls for motoring do not have adequate access to transit as a substitute mode of travel (7, 10).

4.3 Geographic Exemptions

Geographic exemptions are used to gain support and ensure fairness. In Stockholm, Sweden, road tolls were introduced into the central city to manage congestion. The tolls are mostly paid by suburban motorists, which is a reason the toll project was able to gain political support. Another reason was the exemption of residents who were forced to drive through the cordon ring regardless of where they were going. Residents of the island of Lindigo only have access to the mainland through the tolled area and are exempted from paying the tolls on equity grounds (15).

In London, residents who live within the cordon are granted a 90 percent discount on the toll charge as a form of compensation. The discount is popular with the residents, but there have been no studies that examine the equity effects of this exemption. While these types of exemptions are common for cordon tolling, they are not necessarily designed to address inequities, though the residents who drive and are forced to pay the tolls argue that their lack of choice is not fair.

From the limited evidence, it is not clear if geographic remediation is used to promote fairness or is a way to minimize political opposition to projects. Certainly in the case of London raising money for transit investment was critical for implementing the cordon toll, and because transit users are a majority in the city, most are made better off. But this also suggests that those who are responsible for paying the tolls are not compensated at all beyond experiencing improved traffic conditions (reduced congestion). In the context of transportation finance, these geographic investments and exemptions do little to compensate those who pay the tolls.

5. INCOME REMEDIATION

Many of the concerns with road pricing, higher transit fares and other new transportation fees focus on income equity, and specifically on the fact that many new taxes and fees are regressive with respect to income (35). This concern is not misplaced. Under the current system of transportation finance, a typical household pays more for transportation than for all other household expenses except housing, and the lowest income quintile of households (approximately those below the poverty line) spend over 40 percent of their income on transport (36). From these figures, and from the impact that spikes in fuel prices had on driving and auto purchasing behaviors in 2008, it is clear that people are price sensitive with regard to transport and that changes in the marginal costs of travel are difficult for many people to afford.

5.1. Income and Disability Exemptions

Using transportation finance revenue to directly compensate disadvantaged populations is widely considered to be an effective way to reduce inequities but has rarely been attempted in practice for congestion pricing or other user fees (37). However, cordon tolls nearly always feature some type of subsidy, discount or exemption (4). For instance, in London disabled people are able to apply for exemptions from the cordon tolls through the Blue Badge London program (38). The

Blue Badges are placards available to disabled motorists and widely used throughout Europe. These exemptions are fair for disabled motorists who may not have reasonable alternatives; transit use can be challenging for those in wheelchairs or with limited mobility. The Blue Badges are also attached to the vehicles (unlike a placard that hangs from the mirror), which are often adapted for special users.

A 1993 proposal to implement congestion pricing on the San Francisco Bay Bridge included “lifeline” credits to low-income motorists (39, 40). The credits as proposed maintained the bridge toll at the then prevailing toll rate of \$1 for those who were eligible. Drivers would qualify for the lifeline toll rate if they also qualified for the lifeline utility services through Pacific Gas and Electric. In effect the lifeline credits would hold harmless the motorists who would be harmed by the new tolls. However, the proposed congestion pricing program was not implemented due to a lack of funding so the effectiveness of lifeline credits to remediate inequity is unknown.

AC Transit in the Bay Area undertook a project that provided free bus passes to low-income middle and high school students in response to outrage over the elimination of school bus service (41). Called the Low Income Flexible Transportation (LIFT) program, the free passes were issued in conjunction with a reduction in costs for monthly youth passes from \$27 to \$15. Unfortunately, the LIFT program only offered the free passes for one year (2003) before budget constraints ended the program early. The monthly youth passes remained at \$15, however.

The LIFT program was not in place long enough to adequately assess the effect of free transit passes on youth travel, school attendance, and scholastic achievement (41). Yet within the study area 25,000 free passes were distributed, all of which went to students who were enrolled in a free or reduced-price lunch program. In some schools over 60 percent of the students were receiving free transit passes. Even though the program duration was not long enough to judge the effect of free transit on scholastic achievement, there were a number of encouraging results that suggest the program improved the welfare of a disadvantaged population. Coordinators reported increased participation in after-school programs, though they also expressed concerns about safety of transit usage at night. Students with free passes reported using the bus more for school-related trips, more weekend transit trips, and taking the bus to work. For low-income students, any of these transit uses is beneficial in improving access to school or employment.

Of course, one of the problems with the youth passes was the cost of the program. AC Transit saw revenues fall during the LIFT program, though there is no way to know how much of the decline was due to free passes and how much was due to the reduction in price of monthly fare cards. The closure of this program highlights a substantial problem for remediation efforts, namely that public transportation budgets are stretched thin and subsidies to a particular group are subject to budget cuts and claw backs. In the case of AC Transit the agency was unable to keep the program at a time when it had to cut back on other services. The program was a success on its merits, but unfortunately AC Transit ran out of resources to maintain funding.

5.2. Fare Policy

Fare policy holds great promise as an area where remedial actions can benefit people in need, but again the evidence is thin that transit agencies are designing alternatives to benefit those most affected by fare policy. Nuworsoo et al. examined the equity distributions of various fare

policies for a California transit agency using three criteria: the benefit criterion, the cost criterion, and the ability to pay criterion (42). What they found is that flat fares per ride and the reduction of unlimited ride passes had a disproportionate impact on low income riders for all criteria. This was not only because of the affected riders' socio-economic class—the low income riders also tended to be youth and/or minorities—but because of how these riders used the system. Those most affected by flat fares were those who made a lot of transfers and often took short trips. While this is an area where transit agencies could structure fare policy to benefit those most affected, there are no major transit agencies that feature policies to directly benefit low-income riders.

Raising fares can improve overall revenues for a transit agency, but low income and transit dependent populations may be disproportionately harmed due to fare price elasticity. Elasticity for transit ridership is generally estimated around -0.40, indicating that a 10 percent increase in fares reduces ridership by about four percent (43). However, a much larger concern is the effect of increased fares on transit dependent populations, who are hit particularly hard by fare increases since they do not have alternatives. This is a particularly regressive outcome that can exacerbate inequities if transit service cuts are imposed simultaneously.

5.3. Credit-Based Transportation Allowances

The lack of real-world examples for remediating inequity leads to considering theoretical approaches that have attracted researchers' attention. Credit-based programs have been theorized as another way to overcome the political obstacles to and promote fairness in congestion pricing (44), but they have not been implemented anywhere. More than overcoming opposition, credits potentially offer a more direct way to address inequities. Credit-based pricing works by allocating vouchers to all qualified travelers. In the case of congestion pricing, each driver would be allowed a certain number of credits based on average amounts of travel. Drivers could then trade their credits with other drivers so those who drive less than average could be paid for not driving and those who drive a lot would pay extra for the privilege. This is one way to implement Levinson and Rafferty's delayer pays principle (45). Since driving tends to increase with income, distribution of transportation credits could result in a transfer from high income motorists to low income motorists because members of the low income group could sell some of their credits.

The credit program was modeled for the Dallas-Fort worth area (46). Overall the program could be welfare enhancing from two effects. First, those who have alternatives can sell their credits and come out ahead. Ultimately enough people should shift from driving to transit to increase demand for transit and other alternatives. Second, those who are dependent on driving will travel in uncongested conditions, saving time and improving reliability of travel times. Both results leave travelers better off and improve equity. However, wide distribution of credits is difficult to use as a targeted policy to improve equity for specific groups. Immigrants or low income travelers may not have access to basic mechanisms for buying and selling credits, such as bank accounts or online capabilities. This means that additional outreach and education may be required to gain the trust and acceptance of those who can benefit from the program.

6. LEGAL CHALLENGES TO TRANSPORTATION FINANCE AND INVESTMENT

The previously described experiences with remediating inequity highlight cases where policies are designed to mitigate inequity. However, in some cases the groups who suffer the consequences of unfair policies are not offered any type of (or sufficient) compensation, and use the courts to try to enforce fairness. These efforts are considered and studied as part of Environmental Justice (47-50). Environmental Justice is defined as “the fair treatment of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies”[(51) p.43]. This concept has been established for many years, and is related to what geographer David Harvey describes as ‘a just distribution justly arrived at’ (52).

Title VI of the 1964 Civil Rights Act guarantees the rights of all Americans for any project that receives Federal assistance. The statute reads “No person in the United States shall, on the ground of race, color, or national origin, be excluded from participating in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance.”² This federal requirement was bolstered when in 1994 then-President Clinton signed an executive order requiring environmental justice concerns to be addressed for any projects receiving federal money.³ This order was important but essentially restated the prohibition of discriminatory practices. Clinton’s order did establish environmental justice as a major federal concern and outlined how to evaluate and mitigate undesirable outcomes. Specifically, the order sought to improve the participation of affected communities and populations in the early phases of projects; i.e., to improve process equity. Such legal protections tend to alter projects before they are completed. They ultimately result in more equitable outcomes than would otherwise be the case but offer few lessons for mitigating inequity within transportation finance.

6.1. Lawsuits on Equity Grounds

One example of a successful legal remedy that focuses explicitly on mitigating an inequitable outcome rather than improving process equity is the lawsuit against the Los Angeles Metropolitan Transit Authority (MTA). In 1994 the Los Angeles MTA was sued by the Bus Riders Union (BRU) on the basis of racial and geographic discrimination (53, 54). The BRU argued that the MTA had invested in rail service at the expense of low-income and transit dependent riders, and won a consent decree that required the MTA to improve bus service and freeze fares. This was a landmark decision for transportation equity that has inspired other challenges to the ways in which transit agencies distribute funding among different services.

Bridge and tunnel tolls have been successful in generating revenue to support transit expansion and maintenance. In 1968 the New York Triborough Bridge and Tunnel Authority was merged into the Metropolitan Transportation Authority (MTA). Prior to this merger, the revenues from tolls went towards roadways. Since the merger, \$16 billion has been dedicated to New York City Transit, the Long Island Railroad and Metro North commuter rail. This transit

² Title VI, Nondiscrimination in Federally Assisted Programs, Civil Rights Act of 1964, 42 USC 2000(d)-2000(d)(1).

³ Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations” was signed February 11, 1994.

investment has not necessarily remediated existing inequities, and in some cases results in unfair distributions of services and fare policy.

In 1995 the New York Urban League filed a lawsuit against the New York Metropolitan Transportation Authority (MTA), arguing that the MTA's differential fare structure for subway and commuter rail discriminated against transit-dependent city dwellers. The MTA had proposed a 20 percent increase in fares for subways versus a 9 percent increase for commuter trains (55). The impacts of these fare increases were made worse by the demographic differences between users of different modes; the subway and bus riders were generally lower income than commuter riders. The Urban League won the initial lawsuit and an injunction was issued to block the fare increase. This injunction was later lifted and the parties agreed to a settlement that required a report on the distribution of transit resources but no efforts to promote fairness through fares or services.

The Southeastern Pennsylvania Transportation Authority (SEPTA) was sued in 1990 on the grounds that it allocated a disproportionate amount of its federal and state subsidies to commuter rail. At the time of the lawsuit, 84 percent of SEPTA ridership was on City Transit, and a majority of these riders were black and/or low income. Even though the courts ruled against the plaintiffs and supported SEPTA's allocations as legal, the rulings accepted that SEPTA's subsidy allocations were discriminatory against blacks. The legal basis for accepting the court's ruling was that the stated goal of increasing ridership on regional rail was a legitimate use of subsidies, which aimed in part to reverse commuter rail ridership declines and in part to ensure a viable regional mass transit system.

A more recent lawsuit was filed against the MTC in the San Francisco District Court in 2005 with the court's ruling handed down in 2009. That case, *Darensburg v. MTC*, argued that low-income and minority bus riders in the nine-county region were unfairly treated in the Regional Transit Expansion Program (Resolution 3434). The expansion program had a heavy focus on rail expansion and other capital projects while underfunding AC Transit bus operations, which serve a transit-dependent, largely low-income and minority population. Much like the SEPTA case, the court agreed that the MTC's proposed actions could cause disproportionate impact on AC Transit's bus operations, but this was reasonable under the constraints of diverse interests the MTC serves. The suit has been appealed to the 9th Circuit Court of Appeals and the outcome is unknown as of November 2009.

The few court cases that have been brought are important for considering inequity in future transportation finance. Perhaps the major conclusion from these cases is that transit agencies have legal justification for pursuing projects that may result in inequitable outcomes. The ability to enforce remediation through the courts seems to be minimal, as the courts have tended to find in favor of the transit agencies on the grounds that pursuing a particular group of riders was within their purview. One caveat in interpreting these cases is that all were brought by transit riders. Transit riders are greatly outnumbered by drivers, so it seems likely that there will be more legal challenges to pricing and fees when the potential groups of plaintiffs include a majority of travelers.

7. DISCUSSION

Equity remains a major concern for policymakers when implementing new financing schemes, but there are few examples of compensation for those who are most adversely affected. The existing financing projects reviewed here suggest few proven ways to remediate inequity, and bring into question whether equity is as important a political issue as theorized in the literature. If inequity is not perceived as a major impediment to new financing mechanisms, then remediating inequities will not be a priority for officials. The HOT lane projects in the U.S. are indicative of this challenge. All of the HOT lane projects referenced here describe equity concerns on their websites and other public materials, but largely argue that no serious inequities are created. The limited number of these projects means that any inequities will not be widespread, but also means that these projects produce limited revenues and are of limited value for general transportation finance. Road pricing will have to expand beyond HOT lanes in order to support more transportation investment (56). When that expansion occurs, dismissing equity concerns because people have a free option may not be possible.

Conventional toll projects in the United States support the idea that generating revenues for transportation investment is the greatest driving factor in pursuing new financing mechanisms. Thirty-seven states have some type of toll road or planned toll facility (22, 57, 58). While some of these projects are designed to reduce congestion, many more are conventional toll roads designed to raise revenue. There are many implications for compensating inequities if new taxes, tolls and fees are implemented solely to invest in new transportation infrastructure.

Using the need for new investment as a reason for pursuing new funding mechanisms increases the chances that geographic equity will be maintained. This does not mean that inequities caused by infrastructure investment or placement will be compensated. It only means that it is reasonable to expect that new transportation fees designed to raise money for transportation projects are likely to be used to improve the tolled corridors. That new revenues are dedicated to transportation is not surprising considering historical precedents. Just as 30 states require that all net revenues from gas taxes be used to fund roads exclusively (59), HOT lane and toll legislation generally requires that the net revenue be spent on transportation. However, because the tolls reveal where the revenue was raised, there is a perceived fairness to spending the money in the corridor, and public support for tolls increases when the revenue is earmarked for transportation projects.

The evidence from European cordon toll projects suggests that exemptions or discounts based on location are popular and will likely be included in future toll projects. These exemptions are valuable for maintaining affordable travel in areas where there are few alternatives, such as the island of Lindigo in Stockholm. In both London and Stockholm geographic inequities were remediated through exemptions or discounts, but there were no efforts to ensure fairness based on income.

Income inequity has proven much more difficult to address in existing projects. As mentioned, the fact that most projects are pilot projects (14) or focused on demonstrating the effectiveness of pricing to manage congestion (60, 61) reduces the need to deal with inequities because the charges and impacts are not permanent. With the notable exceptions of two proposed (but not implemented) congestion toll programs, none of the projects reviewed here had specific plans to remediate inequities. The two proposals that offered compensation to low-income motorists were the San Francisco Bay Bridge congestion pricing proposal in 1993 (39), and the 2008 plan by New York Mayor Bloomberg to implement a congestion toll in lower Manhattan.

The New York proposal was altered to include rebates to everyone who qualified for the federal Earned Income Tax Credit (62). Those who qualified would have been eligible for a rebate equivalent to the annual value of a Metrocard (the transit fare card). While these proposals were not implemented due to political opposition in New York and lack of funding in California, they are similar in that they include remedial efforts. The extra effort to promote fairness is the consequence of pricing programs that do not offer a free option.

Public support for toll projects also offers clues as to why there are not more examples of remedial efforts. The Federal Highway Administration cites separate surveys of San Francisco and Seattle residents conducted in 2007 that help illustrate the importance of dedicated revenues and the difficulty of remediating inequity (58). In San Francisco 600 people were asked about their support for congestion pricing and the results show that support was somewhat higher among very-low- and low-income residents than among the population of the region as a whole. The Urban Partnership project managers attribute these attitudes to the expected transit improvements from which the transit-dependent respondents would benefit, namely through increased service and reduced congestion. In Seattle, greater support for tolls was discovered when the revenue was directed to transportation, and the respondents supported even higher tolls if the money went to transit.

These survey results, and many others like them, suggests that inequitable outcomes are not a large issue for policy makers in part because it is not clear that road pricing is viewed as unfair (63-65).⁴ However, limiting the examination of public attitudes to low-income people does not paint a clear picture of what is considered equitable. Previous studies have explored public attitudes towards congestion pricing by low-income motorists. Overall, low-income motorists support congestion pricing but are less likely to use paid lanes on a daily basis than wealthier drivers (66). These attitudes reflect the availability of a free option, and the fact that these low-income drivers do have occasional need for fast and reliable travel.

Perhaps even more important in assessing public attitudes toward road pricing is the observation that pricing programs increased in popularity after implementation in London and Stockholm (29, 32, 67). Subsequent extensions of the London cordon toll ring have proved less popular, however, so there are limits to what the public is willing to support. In fact, after the Western Extension was implemented new concerns about equity were raised. A survey conducted by Transport for London found that:

“Among those clearly supporting its removal [of the Western Extension], a number drew attention to the views of businesses that the scheme had adversely affected the local economy. They also cited its perceived lack of success in reducing congestion, its impact on residents who receive visits from carers, access to services, and the financial cost it imposes on those who pay it. Several of those supporting the removal of the scheme did so because the Residents' discount applies across the whole extended zone, which was seen as potentially unfair and leading to increased congestion.” [(68) p.10]

The overall support for the extension collapsed and the Mayor announced that the extension will be removed. No mention was made of attempting to address the equity concerns

⁴ It is worth noting that equity is rarely discussed in the leading texts for transportation students. During the course of this research I searched the indexes of transportation economics and planning books commonly used in graduate studies and found that most had no entry in the index for “equity” or “fairness.” Of those that did mention these concepts, the entry was brief and in passing.

of the residents and maintain the extended toll cordon. The lessons learned from this example are that equity concerns do not go away after implementation, and that they may get worse in programs where everyone is expected to pay. Unlike HOT lanes in the U.S., most motorists in London did not have a “free” option. The lack of a free option changes the calculus of equity politics, and raises the requirements that some type of remediation strategy is included in the program.

7.1. Limitations in the Literature and Directions for Future Research

The quantity and quality of refereed publications promoting equitable outcomes within various financing schemes demonstrates that there is no shortage of ideas for how to remediate inequities, but as discussed in this essay these ideas have been rarely put into practice. Many studies discuss equity within the context of political acceptability (11-13, 69, 70), and others are concerned with the distributive nature of tolls and pricing (45, 71-73). Others still are concerned with proving the benefits of pricing (60). These studies share common themes which help explain why there are not more studies of inequity remediation. Thus, the studies are focused on the implementation of pricing programs and proving the effectiveness of such programs rather than on evaluating existing pricing schemes. In other words, these studies address the expected obstacles to new methods of financing transportation.

As new types of transportation finance are adopted and more projects are undertaken, there will be many more opportunities for researchers to examine the issues raised in this paper. A number of scholars propose that an equity framework should be included in the evaluation of transportation planning and finance (71, 74-77), arguing that equity impacts and potential inequities should be identified for all groups under all pricing schemes. There is also a growing number of calls to make social exclusion an explicit concern for travel behavior analysis (78), though few are linking social exclusion to the financing aspects of transportation systems. By incorporating measurable equity goals into transportation finance and investment, and by devoting effort to evaluate how well the equity goals are met, policy makers can craft responses that remediate inequities that arise. Whether these approaches would improve fairness is unknown, but describing expected equity effects—in particular inequities—would provide researchers with a useful baseline for project evaluation and help develop compensation schemes.

8. CONCLUSIONS

Equity remains a major concern for any system of transportation taxes and fees, but the evidence to date suggests that equity is more of a political matter than practical one. This is not to say that there are not real inequities, but rather that there has been far more discussion and concern about inequity than actions taken to remediate inequity. If equity were treated as a practical concern, we would expect to see more efforts to remediate inequitable outcomes arising from transportation finance through direct subsidies, exemptions and other targeted programs. The research reviewed here does not support the notion that remediating inequity resulting from transportation financing mechanisms is widespread, and there are few examples on which to draw.

The scarcity of examples is not the result of a lack of interest on the part of researchers or officials. The interest in understanding how to deal with inequities is considerable, as is the overall interest in new mechanisms for transportation finance. The London congestion charge alone has resulted in dozens of papers over the past few years. Every innovative pricing project is issuing reports, surveys and other materials that are greatly expanding our knowledge and experience. Considering that the programs included in this review are mostly less than ten years old, it is reasonable that there is not more written about the effects of these programs. Many of the effects have not yet been realized. The number of innovative pricing projects under consideration, whether congestion pricing, pay-by-mile programs, or conventional tolling, bode well for expanding the available literature and research in the near future.

A final consideration is that remediating inequities is something that is not well suited to legal challenges. The few examples of court cases challenging transportation investment have not resulted in judgments supporting equity goals of social justice and compensation. In addition, binding settlements may constrain the potential flexibility of financing mechanisms, such as variable tolls or fares. It is best to address inequities and issues of fairness in ways that preserve the benefits of innovative transportation finance mechanisms.

Perhaps the biggest obstacle to meaningful policies for remediating inequities is that current limitations and constraints on generating and spending transportation revenues are likely to carry forward. If the intent of new funding streams is to raise money for infrastructure and transportation investment, then it seems unlikely that inequities will be directly compensated, though geographic equity may be enhanced through targeted transportation investment, especially in transit systems. The traditional model of transportation finance is that everyone contributes, and the gas tax is currently a user fee to some degree. The HOT lane programs in the U.S. work well for demonstrating how tolls work and in some cases financing corridor improvements, but these will be inadequate for replacing the gas tax. However, if the intent is to reduce congestion or vehicle miles traveled, or to bring about some other behavioral response, then some type of remediation or exemption for inequities should be included. Some people will be harmed by the new charges because they have few alternatives due to cordon locations or geographic isolation. Maintaining and improving access to transportation alternatives should be the paramount concern for any new types of transportation finance.

REFERENCES

1. Klein, D.B., and G.J. Fielding, *Private Toll Roads: Learning from the 19th Century*. Transportation Quarterly, Vol. 46, No. 3, pp. 321-41, July 1992.
2. Arnott, R., T. Rave, and R. Schöb, *Alleviating urban traffic congestion*. 2005, Cambridge, Mass.: The MIT Press.
3. Deakin, E., and G. Harvey, *Transportation pricing strategies for California: an assessment of congestion, emissions, energy and equity impacts: final report*, California Air Resources Board, Sacramento. 1996.
4. Ecola, L., and T. Light, *Equity and Congestion Pricing: A Review of the Evidence*. 2009, RAND Corporation: Santa Monica.
5. Giuliano, G., *An assessment of the political acceptability of congestion pricing*. Transportation Quarterly, 1992. **19**(4): p. 335-358.
6. Giuliano, G., *Equity and Fairness Considerations of Congestion Pricing*, in *Curbing Gridlock: Peak Period Fees to Reduce Congestion*, Transportation Research Board. 2004: Washington, D.C.

7. Richardson, H., and C.-H.C. Bae, *The Equity Impacts of Road Congestion Pricing*, in *Road Pricing, Traffic Congestion and the Environment: Issues of Efficiency and Social Feasibility*, K. Button and E.T. Verhoef, Editors. 1998, Edward Elgar: Northampton. p. 247-262.
8. Gomez-Ibanez, J., *The Political Economy of Highway Tolls and Congestion Pricing*. Transportation Quarterly, 1992. **46**(3): p. 343-360.
9. Schweitzer, L., and B. Taylor, *Just pricing: the distributional effects of congestion pricing and sales taxes*. Transportation, 2008. **35**(6): p. 797-812.
10. Eliasson, J., and L.-G. Mattsson, *Equity effects of congestion pricing: Quantitative methodology and a case study for Stockholm*. Transportation Research Part A: Policy and Practice, 2006. **40**(7): p. 602-620.
11. Goodwin, P., *The rule of three: a possible solution to the political problem of competing objectives for road pricing*. Traffic Engineering and Control, 1989. **30**(10): p. 495-497.
12. King, D., M. Manville, and D.C. Shoup, *The Political Calculus of Congestion Pricing*. Transport Policy, 2007. **14**(2): p. 111-123
13. Small, K.A., *Using the revenues from congestion pricing*. Transportation, 1992. **19**(4): p. 359-382.
14. May, A.D., and A. Sumalee. *One Step Forward, Two Steps Back? An Overview of Road Pricing Application and Research Outside the United States*. in *International Symposium on Road Pricing*. 2003. Key Biscane, Florida: Transportation Research Board.
15. Albalade, D., and G. Bel, *What Local Policy Makers Should Know about Urban Road Charging: Lessons from Worldwide Experience*. Public Administration Review, 2009. **69**(5): p. 962-974.
16. Szeto, C., and N.H. Wuestefeld, *Historical and Contemporary Toll Revenue Uses*. Transportation Research Record, 1996 **1558**: p. 16-23.
17. Transnet. *Interstate 15 Corridor*. [cited 2009 November 12]; Available from: <http://www.keepsandiegomoving.com/I-15-intro.html>.
18. Taylor, B., *Geography of Urban Transportation Finance*, in *The Geography of Urban Transportation*, S. Hanson and G. Giuliano, Editors. 2004, Guilford: New York. p. 294-331.
19. Goldman, T., and M. Wachs, *A Quiet Revolution in Transportation Finance: The Rise of Local Option Transportation Taxes*. Transportation Quarterly, 2003. **57**(1): p. 19-32.
20. Wachs, M., *Improving Efficiency and Equity in Transportation Finance*, in *Transportation Reform Series*, B. Institution., Editor. 2003, Brookings: Washington, DC. p. 1-19.
21. Colorado Department of Transportation. *E-470*. [cited 2009 November 12]; Available from: <http://www.e470.com/pdf/When%20will%20the%20bonds%20be%20paid%20and%20toll%20removed.pdf>.
22. Federal Highway Administration. *Urban Partnerships*. 2007 [cited 2009 November 12]; Available from: <http://www.upa.dot.gov/index.htm>.
23. Colorado Department of Transportation. *I-25 HOV Express Lanes*. [cited 2009 November 12]; Available from: <http://www.coloradodot.info/programs/i-25-hov-express-lanes>.
24. Florida Department of Transportation. [cited 2009 November 12]; Available from: <http://www.95express.com/home/FAQ.shtm>.
25. Harris County Toll Authority. *Katy Freeway Managed Lanes*. [cited 2009 November 12]; Available from: <https://www.hctra.org/katymanagedlanes/faq.html>.
26. Minnesota Department of Transportation. [cited 2009 November 12]; Available from: https://support.mnpass.net/kayako/index.php?_m=knowledgebase&_a=view.
27. Orange County Transportation Authority. *91 Express Lanes*. [cited 2009 November 12]; Available from: <http://www.91expresslanes.com/>.
28. Utah Department of Transportation. *Express Pass*. [cited 2009 November 12]; Available from: <http://www.udot.utah.gov/expresslanes/index.php>.
29. Eliasson, J., *Lessons from the Stockholm congestion charging trial*. Transport Policy, 2008. **15**(6): p. 395-404.
30. Isaksson, K., and T. Richardson, *Building legitimacy for risky policies: The cost of avoiding conflict in Stockholm*. Transportation Research -Part A, 2009. **43**(3): p. 251-257.

31. Transport for London, *TfL Annual Report*. 2004.
32. Winslott-Hiselius, L., K. Brundell-Freij, A. Vagland, and C. Byström, *The development of public attitudes towards the Stockholm congestion trial*. Transportation Research Part A: Policy and Practice, 2009. **43**(3): p. 269-282.
33. Transport for London, *TfL Annual Report*. 2003.
34. Small, K.A., *Road Pricing and Public Transit: Unnoticed Lessons from London*. Access, 2005. **26**(3): p. 10-15.
35. Weinstein, A., and G.-C. Sciara, *Unraveling Equity in HOT Lane Planning: A View from Practice*. Journal of Planning Education and Research, 2006. **26**: p. 174-184.
36. Bernstein, S., C. Makarewicz, and K. McCarty, *Driven to Spend: Pumping Dollars out of Our Households and Communities*, Surface Transportation Policy Project and Center for Neighborhood Technology, Editors. 2005: Washington, D.C.
37. Lewis, D., *America's Traffic Congestion Problem: Toward a Framework for Nationwide reform*, in *Hamilton Project 2008*, Brookings Institution: Washington, D.C.
38. Transport for London. *Blue Badge holders*. [cited 2009 November 12]; Available from: <http://www.tfl.gov.uk/roadusers/congestioncharging/6736.aspx>.
39. Frick, K., S. Heminger, and H. Ditmar, *Bay Bridge Congestion-Pricing Project: Lessons Learned to Date*. Transportation Research Record, 1995. **1558**: p. 29-38.
40. Van Hattum, D., and M. Zimmerman, *Buying Time*, in *Guidebook: A Guidebook for Those Considering Congestion Relief Tolls in Their Communities*. 1996, State and Local Policy Program, Humphrey Institute of Public Affairs, University of Minnesota: Minneapolis.
41. McDonald, N., S. Librera, E. Deakin, and M. Wachs, *Low-Income Student Bus Pass Pilot Project Evaluation: Final Report*. 2003, Institute of Transportation Studies, University of California, Berkeley.
42. Nuworsoo, C., A. Golub, and E. Deakin, *Analyzing Equity Impacts of Transit Fare Changes: Case Study of Alameda-Contra Costa Transit, California*. Evaluation and Program Planning, 2009. **32**(4): p. 360-368.
43. Pratt, R., *Traveler Response to Transportation System Changes*, Transit Cooperative Research Program, Editor. 2000, Transportation Research Board: Washington, D.C.
44. Kockelman, K., and S. Kalmanje, *Credit-based congestion pricing: a policy proposal and the public's response*. Transportation Research -Part A, 2005. **39**: p. 671-690.
45. Levinson, D.M., and P. Rafferty, *Delayer Pays Principle: Examining Congestion Pricing with Compensation*. International Journal of Transport Economics, 2004. **31**(3): p. 295-311.
46. Gulipalli, K.P.K., and K. Kockelman, *Credit-based congestion pricing: A Dallas-Fort Worth application*. Transport Policy, 2008. **15**: p. 23-32.
47. Cairns, S., J. Greig, and M. Wachs, *Environmental Justice and Transportation: A Citizen's Handbook*. 2003, Institute of Transportation Studies at the University of California Berkeley: Berkeley.
48. Schweitzer, L. and A. Valenzuela Jr., *Environmental Injustice and Transportation: The Claims and the Evidence*. Journal of Planning Literature, 2004. **18**(4): p. 383-398.
49. Bullard, R.D., and G.S. Johnson, *Just transportation : dismantling race and class barriers to mobility*. 1997, Gabriola Island, BC ; Stony Creek, CT: New Society Publishers. xiv, 193 p.
50. Bullard, R.D., G.S. Johnson, and A.O. Torres, *Highway robbery : transportation racism and new routes to equity*. 2004, Cambridge, Mass.: South End Press. ix, 245 p.
51. Bullard, R.D., G.S. Johnson, and A.O. Torres, *Sprawl city : race, politics, and planning in Atlanta*. 2000, Washington, D.C.: Island Press. xiii, 236 p.
52. Harvey, D., *Social justice and the city*. 1973, London,: Edward Arnold. 336 p.
53. Grengs, J., *Community-Based Planning as a Source of Political Change: The Transit Equity Movement of Los Angeles' Bus Riders Union*. Journal of the American Planning Association, 2002. **68**(2): p. 165-178.

54. Mann, E., *Los Angeles Bus Riders Union Derail the Los Angeles MTA*, in *Highway Robbery: Transportation Racism and New Routes to Equity*, R.D. Bullard, G.S. Johnson, and A.O. Torres, Editors. 2004, South End Press: Cambridge.
55. Briffault, R., E. Sclar, and W. Hook, *Fairness and the Fare: Equity and Adequacy in the Financing of the Operating Agencies of the Metropolitan Transportation Authority*, The Legislative Drafting Research Fund of the Columbia Law School, Editor. 1998: New York. p. 98 pgs.
56. Weinstein, A., and G.-C. Sciara, *Assessing the Equity Implications of HOT Lanes*. 2004, Santa Clara Valley Transportation Authority. p. 29.
57. Federal Highway Administration, *Toll Facilities in the United States*. 2007, U.S. Department of Transportation Federal Highway Administration.
58. Federal Highway Administration, *Income-Based Equity Impacts of Congestion Pricing--A Primer*. 2008, U.S. Department of Transportation Federal Highway Administration: Washington, D.C.
59. Puentes, R., and R. Prince, *Fueling Transportation Finance*, in *Taking the high road : a metropolitan agenda for transportation reform*, B. Katz and R. Puentes, Editors. 2005, Brookings Institution Press: Washington, D.C. p. 45-76.
60. DeCorla-Souza, P., and R.E. Whitehead, *The Value Of Pricing The Use Of Roads*. Public Works Management Policy, 2003. **7**(4): p. 267-276.
61. Eliasson, J., L. Hultkrantz, L. Nerhagen, and L.S., Rosqvist, *The Stockholm congestion - charging trial 2006: Overview of effects*. Transportation Research Part A: Policy and Practice, 2009. **43**(3): p. 240-250.
62. Lisberg, A., *Low-income drivers would get break under a revised version of congest plan*, in *New York Daily News*. 2008, March 31.
63. Dill, J., and A. Weinstein, *How to pay for transportation? A survey of public preferences in California*. Transport Policy, 2007. **14**: p. 346-356.
64. Podgorski, K.V., and K.M. Kockelman, *Public perceptions of toll roads: A survey of the Texas perspective*. Transportation Research Part A: Policy and Practice, 2006. **40**(10): p. 888-902.
65. Supernak, J., J. Golob, T.F. Golob, C. Kaschade, C. Kazimi, E. Schreffler, and D. Steffey, *San Diego's Interstate 15 Congestion Pricing Project: Attitudinal, Behavioral, and Institutional Issues*. Transportation Research Record, 2002. **1812**: p. 78-86.
66. Sullivan, E., *Continuation study to evaluate the impact of the SR 91 value-priced express lanes: final report*. Traffic Operations Program, State of California Department of Transportation, HOV Systems Branch, Editor. 2000: Sacramento.
67. Santos, G., *London Congestion Pricing*. Brookings-Wharton Papers on Urban Affairs, 2008: p. 177-233.
68. Transport for London, *Non-statutory consultation on the future of the Western Extension of the Congestion Charging Zone: Report to Mayor-Executive Summary*. 2008: London.
69. Taylor, B.D., *The politics of congestion mitigation*. Transport Policy, 2004. **11**: p. 299-302.
70. Schade, J., and B. Schlag, *Acceptability of urban transport pricing strategies*. Transportation Research Part F: Traffic Psychology and Behavior, 2003. **6**(1): p. 45-61.
71. Levinson, D.M., *Equity Effects of Road Pricing: A Review*. Transport Reviews, 2009. **30**(1): p. 33-57.
72. Lindsey, R., *Do Economists Reach a Conclusion on Road Pricing? The Intellectual History of an Idea*. Econ Journal Watch, 2006. **3**(2): p. 292-379.
73. Santos, G. and L. Rojey, *Distributional impacts of road pricing: The truth behind the myth*. Transportation, 2004. **31**: p. 21-42.
74. Thomopoulos, N., S. Grant-Muller, and M.R. Tight, *Incorporating equity considerations in transport infrastructure evaluation: Current practice and a proposed methodology*. Evaluation and Program Planning, 2009. **32**(4): p. 351-359.
75. Sanchez, T.W., R. Stolz, and J.S. Ma, *Moving to Equity: Addressing Inequitable Effects of Transportation Policies on Minorities*. 2003, The Civil Rights Project at Harvard University: Cambridge, MA.

76. Levinson, D.M. *Road Pricing and Compensation for Delay*. Presented at Transportation Research Board Annual Meeting, January 14-18, 2002, Washington, D.C.
77. Ungemah, D., *This Land Is Your Land, This Land Is My Land: Addressing Equity and Fairness in Tolling and Pricing*. Transportation Research Record, 2007. **2013**: p. 13-20.
78. Lyons, G., *The introduction of social exclusion into the field of travel behavior*. Transport Policy, 2003. **10**(4): p. 339-342.

Transportation infrastructures are becoming increasingly complex, requiring new forms of financing. 1. Private Participation in Transport Infrastructure. Infrastructures can be funded, implying that the public sector provides capital from general funds or taxation and that this capital is not expected to be recovered. Infrastructures can also be financed, mostly by private sources, and in this case, capital recovery is expected. Like many civil engineering sectors, the private sector can be involved in transportation project delivery, which can include design and construction, project management such as maintenance and operations, and project financing, namely raising capital. Contemporary transportation infrastructure financing is facing the following challenges: Lack of funding.