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Looking at Administrative Innovation and Change Abroad

What Local Policy Makers Should Know about Urban Road Charging: Lessons from Worldwide Experience

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Congestion costs are emerging as one of the most important challenges faced by metropolitan planners and transport authorities in developed economies. In the United States, these costs were as high as $78 billion in 2005 and are growing as a result of rapid increases in travel delays. In order to solve the current and severe levels of congestion, the U.S. Department of Transportation has recently started a program to initiate congestion pricing in five metropolitan areas. In this context, it is important to identify factors that influence successful implementation, as well as the problems or difficulties associated with charging projects. The authors review, synthesize, and analyze worldwide experience with urban road charging in order to extract lessons for policy makers who are considering the implementation of congestion pricing projects and for those who are interested in the introduction of traffic management tools to regulate entrance to city centers.

Congestion costs are emerging as one of the most important challenges faced by metropolitan planners and local public authorities in developed economies. In the United States, the costs of delays and excess fuel consumption rose to $78 billion in 2005, important economic losses for individuals and for the national economy (Schrak and Lomax 2007). Consequently, policy makers at all levels of government are searching for policies and strategies to lower traffic congestion and its attendant costs. The traditional approach to reducing congestion costs has been infrastructure enlargement and road investments, but to date, the impact of this approach has proved limited. A recent study by Winston and Langer (2007) estimates that each dollar spent on highways only reduces road congestion costs by 11 cents.

Based on implementation in large urban areas outside the United States, American policy makers are increasingly considering the use of charges and fees on road users to reduce traffic in heavily congested urban areas (Geddes 2007). Congestion pricing is a credible alternative to infrastructure investments because it reduces congestion more efficiently and without a significant investment of public funds (Parry 2002). As a result, the U.S. Department of Transportation recently selected five major urban areas to receive funds for pilot congestion charges projects. These projects are intended not only to alleviate traffic congestion, but also to identify factors that facilitate the successful implementation of congestion charges and fees.

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In advance of the findings to be generated from the studies of these U.S. cities, we draw on the experience of cities around the globe that have implemented congestion charges to reduce peak-time traffic in their city centers. Specifically, we review, synthesize, and analyze the results of studies that have examined the five most prominent cases of congestion charges implementation: London, Singapore, Stockholm, Bergen/Oslo/Trondheim, and Edinburgh. By identifying and examining the factors leading to success or failure in these cities, this article offers valuable lessons learned on the implementation of congestion charges for policy makers, planners, and transportation managers in the United States.

National and local characteristics and different institutional frameworks influence perspectives on the way in which road user charges are addressed. Debates on road user charging in Europe have focused largely on tolls versus budgets to fund motorways. In the United States, the debate has mostly focused on the use of gas taxes to fund non-toll motorways, and more recently, some discussion of the use of tolls to fund motorways has arisen (e.g., Bel and Foote 2009). This article does not deal with road user charges as a funding tool, but rather their use as regulatory tools (congestion charging) in order to manage road demand. That said, an interesting question that links congestion charging with transport financing is what to do with the net revenues from charges—the improvement of mass transportation and the funding of new infrastructure being the two most important options.

The rest of the article is organized into five sections beyond this introduction. In the first section, we provide background on the basic logic of congestion charging, highlighting its attractiveness to U.S. policy makers. In the second section, we present a simple framework for understanding the implementation of congestion pricing based on the world's experience, organized around three factors: fee structure and technology, revenue use and investment, and sources of political support. In the third section, we apply this framework to the five cases identified earlier and use the results of this analytical review to distill some preliminary lessons learned in the fourth section. A fifth section concludes the essay with some suggestions for future research based on the American experience and recent developments in other European cities.

The Logic of Congestion Charging

The main intuition behind congestion charging is to "price" the time costs and delays (i.e., negative externalities) that are imposed on other road users by an additional driver entering the road (Knight 1924; Pigou 1920).[1] In this way, road users not only weigh their own costs and benefits when deciding whether to enter a congested area, but also the costs they impose on other drivers. Traffic is efficiently allocated when the price paid by each road user equals the marginal cost faced by the rest of users. As is supposed by congestion pricing in the short run, infrastructure enlargements are not feasible, and the optimal allocation of traffic must rely on toll collection. Thus, in order to reduce traffic, a toll is administered that accounts for the increasing costs of congestion.

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In order to dissuade an additional driver from entering the road, the price of the toll must be higher than the benefit the driver receives from the journey (Vickrey 1963; Walters 1961). Only drivers with high estimations of the value of the journey will pay the charge, and as a result, efficient use of the road will occur.

The potential benefits from congestion pricing have attracted many U.S. policy makers to the possibility of its implementation in heavily congested urban areas across the country. As noted earlier, estimates indicate that congestion costs amount to almost $80 billion annually in the United States, up dramatically from $15 billion in 1982 (see table 1). Therefore, the use of congestion charging could become a central tool in the reduction of this increasing loss for the community.

Additionally, a recent Brookings Institution study estimates that the implementation of road pricing in the largest 98 metropolitan areas of the United States would generate $120 billion per year in revenues, which could be used to fund road and urban transportation projects (Winston and Langer 2008). Estimates such as this fuel policy makers' interest in the approach. Indeed, former U.S. Secretary of Transportation Mary Peters argued that user fees in metropolitan areas would both reduce congestion and raise significant revenues for other projects (*The Economist,* July 28, 2008). This is in large part why the Department of Transportation's $850 million subsidy program to initiate congestion pricing projects has targeted three of the 10 most congested cities in the country (see table 2)—New York ($354.5 million), Miami ($62.9 million), and San Francisco ($158 million)—as well as two other cities with major traffic congestion problems, Minneapolis ($133.3 million)

Table 1 Congestion Costs in 437 U.S. Urban Areas, 1982–2005

	1982	1995	2004	2005	Change 2004–5
Individual congestion costs (constant 2005 dollars)	$260	$570	$680	$710	4.4%
National congestion costs (billions of 2005 dollars)	$14.9	$45.4	$73.1	$78.2	7.0%
National travel delays (billions of hours)	0.8	2.5	4.0	4.2	5%

Source: Schrak and Lomax (2007).

Table 2 Congestion Cost Ranking in U.S. Urban Areas: Top 10 Areas, 2005

Rank	Urban Area	Congestion Costs ($ millions)	Median Household Income	Population (millions)	Travel Delays (1,000 hours)
1	Los Angeles–Long Beach–Santa Ana, CA	9,325	45,903	17,776	490,552
2	New York–Newark, NY–NJ–CT	7,383	50,795	18,816	384,046
3	Chicago, IL–IN	3,968	51,046	9,525	202,835
4	Dallas–Fort Worth–Arlington, TX	2,747	47,418	6,145	152,129
5	Miami, FL	2,730	20,454	5,413	150,146
6	Atlanta, GA	2,581	51,948	5,279	132,296
7	San Francisco–Oakland, CA	2,414	63,024	4,204	129,919
8	Washington, DC–VA–MD	2,331	57,291	5,306	127,394
9	Houston, TX	2,225	38,632	5,628	124,131
10	Detroit, MI	2,174	24,275	4,468	115,547

Source: Adapted from Schrak and Lomax (2007). Data on population and median household income taken. from the U.S. Census Bureau.

and Seattle ($138.7 million). In the next section, we present a framework for analyzing the implementation of congestion pricing projects such as these.

Congestion Pricing Implementation

Charging congestion tolls is a technically optimal policy strategy for reducing congestion, but it is not always a politically optimal strategy. Politicians and planners are usually reluctant to charge for a good that has always been free and is considered by citizens to be a right. As stated by De Palma et al. (2005), the degree of consensus among economists in support of congestion pricing seems to be inversely proportional to its acceptance among the public and politicians. Thus, the main obstacle to road pricing is political, much more than operational (Downs 1992; King, Manville, and Shoup 2007; Wachs 1994).

Take the example of New York. In April 2007, New York City mayor Michael Bloomberg unveiled a plan to charge drivers $8 to enter Manhattan south of 60th Street during peak hours on weekdays. The goal was to reduce traffic and raise revenue for other projects around the city. One year later, the Democratic-controlled state legislature in Albany prohibited New York City from moving forward with the plan because the charges were seen as a form of regressive taxation, and it questioned the distribution of the funds. The proposed plan brought together two coalitions in opposition: state legislators from the city and its suburbs whose districts would have been affected by the charge, and legislators from districts outside the city who questioned the plans for distributing the funds that were raised. The principal objections were not focused on whether the pricing plan would actually reduce traffic congestion.

Here, we lay out a simple framework for analyzing the implementation of congestion pricing that consists of three main factors: (1) fee structure, (2) revenue uses and investments, and (3) political impacts. This framework helps identify where the bases of support and opposition are likely to lie, and how strong the sentiment is likely to be either for or against congestion pricing. This is important because the main difficulty with congestion pricing is persuading stakeholders who are concerned about equity, fairness, privacy, the tax burden, and the risks often associated with complex projects (Giuliano 1994; Goodwin 1989; Jones 1998; May 1992; Schade and Schlag 2003). As a result, policy makers must consider all stakeholders affected by the policy when discussing congestion pricing schemes and its feasible implementation.

Fee Structure

The first issue that policy makers must address is the fee structure and the operational technology. Both must be studied according to the objectives pursued, and must rely on the particular characteristics of the city and its traffic patterns. If the entrance to the city center or business district is congested the whole day, planners have reasons to establish a constant fee. On the contrary, if traffic gets calmed during some periods and congestion is only a significant problem during peak hours, then variable tolls (time varying) can emerge as the appropriate instrument. While the constant fee is simpler in its operation, it can produce some inefficiency in the allocation of journeys. On the other hand, variable tolls administered through electronic charging can ensure a more appropriate pricing, closer to the optimal price, but require a more complex system from the operational side. The number of entrances and infrastructure needs can also influence decisions on technology. Projects based on other cities' plans and technologies can be seen as noncredible by the public and by lobby groups, thus affecting acceptability. After all, each city has very particular characteristics and mobility patterns.

Revenue Uses and Investments and Other Policy Impacts

Road pricing implies charging users, and as Schade and Baum (2003) conclude, it is naturally challenging to win major support among motorists. But it also raises funds that can be used for different purposes. Goodwin (2004) highlights that the policy discussion of road pricing and consensus building cannot avoid explicit attention to the use of its revenue. In the same way, Harrington, Krupnick, and Alberini (2001) claim that public discussions of congestion often ignore the fee revenues, making it difficult for the public to see that it is receiving value for the new charges imposed. Marcucci, Marini, and Ticchi (2005) assert that a key to successful implementation of congestion pricing is to distribute toll revenues to public mass transport. Investing in an efficient, accessible, and efficient alternative to individual travel by car increases support for the implementation of a new fee, or at least diminishes opposition, and this connects this result with the political impacts described here.

Distributional concerns arise not only from the imposition of the toll, but also from how the revenues are spent (Button 2006). Policy decisions have to accommodate this allocation in order to achieve political support. For example, in a study of popular sentiment for congestion pricing in Edinburgh, Scotland,Farrel and Saleh (2005) found that voters were most in favor of the new fee structure when the revenues were directed to bus service improvements. In fact, in all successful experiences, the share of drivers charged was a minority, and toll revenue was expected to be invested in public transport. Because of this, congestion charging was seen as favoring the majority's welfare. This helps to make the project politically feasible, but the promise of project investments may not be credible to current commuters who lack choices (Giuliano 1994). In fact, the use given to revenues is crucial for the purpose of enlarging the group of supporters, and public beliefs on revenue use as well. For these reasons, Goodwin (1989) proposes a revenue distribution that tries to retain the broadest possible group of supporters by compensating an optimal share of losers in order to increase support.

Political Impacts

The benefits and costs of a prospective policy promote the birth of interest groups that will also play an important role in the implementation process. Adversely affected groups are easily organized and often rally against the project, while the group of beneficiaries usually remains more passive. This is often the case because the benefits are usually widespread and shared across large groups, whose organization and coordination is difficult, while the costs often only affect smaller groups (Olson 1965). The consequence is the emergence of a political obstacle from active opposition by those groups damaged by the proposed policy.

King, Manville, and Shoup (2007) provide two convincing explanations for this asymmetric activism: loss aversion and the free-rider problem. The fear of loss typically outweighs the prospect of gain. Kahneman, Knetsch, and Thaler (1991) and Tversky and Kahneman

(1991) describe this phenomenon by explaining that the disutility associated with losing an already enjoyed benefit is greater than the utility associated with the expectation of a future gain. This can partially explain strong reactions against projects involving a loss for a group. On the other hand, the second phenomenon reflects the fact that the large and diffuse group of beneficiaries has incentives to avoid taking action and incurring the political costs to promote policy implementation. Each beneficiary expects to enjoy the same gains from policy enactment without incurring the costs. This is especially aggravated when individual benefits are small in a large group of winners. In the words of King, Manville, and Shoup, "no one will be so much better off that they will take the lead to implement the program" (2007, 114). Only severe awareness of congestion will lead to higher policy support (Jones 1998; Schade and Baum 2007; Steg 2003).

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Sometimes, the existence of different political levels where incumbent parties are different and rivals may become an important obstacle for congestion pricing implementation. Then, political controversy can arise more easily when different parties control different stages of the decision process. Many of the cases we describe in the next section show how congestion charging can become caught up in traditional divisions between political parties. Recent developments in New York's congestion charging plan, or the political processes in Stockholm and Copenhagen (see Rich and Nielsen 2007), are good illustrations of this complication. On the contrary, where political consensus is already in place, congestion charging is more easily implemented, as was the case in the Norwegian cities. The same can happen when no distinction is made between the municipal level and the legislating level, as was the case is Singapore (the local government was the only one in charge of deciding whether to implement the charge). Past literature has not focused attention on this political controversy between parties and government levels in congestion pricing implementation. For this reason, in the review here, we pay special attention to this issue in order to illustrate that project success or failure may also depend on partisan or opportunistic political strategies.

Worldwide Experience with Congestion Pricing

In this section, we apply our simple analytical framework to five key cases of congestion pricing implementation in the world: London, Singapore, Stockholm, Bergen/Oslo/Trondheim, and Edinburgh. Our inquiry is based on a review of the extant literature of these cases. While there have been several studies on each of these cases individually, no study to date has synthesized analysis across the cases. In comparison with studies that examine only one or two cases, our review allows us to distill general lessons for policy makers, planners, and transportation managers in the United States. We have selected these five cases because they are the most well-documented experiences and there is sufficient information to provide results and lessons.

We organize the presentation of the cases into two groups: successes and failures. This allows us to draw sharper distinctions between factors that facilitate or hinder successful implementation. We conclude our analysis by providing a table that summarizes the background information of each case, the implementation factors, the known impacts of the pricing program to date, and the political conditions and conflicts involved in each one of them.

Successful Experiences

London

London's congestion pricing program was the first important experience in the use of charges to regulate traffic demand and the best-known success in reducing congestion costs in a large European city. Since February 2003, London drivers pay a fee (neither time varying nor vehicle varying) to enter the city center through almost 200 entry points during weekdays between 7:00 a.m. and 6:30 p.m., with the exception of motorcycles, public transport vehicles, and other particular vehicles (disabled people or emergency vehicles).[2] Once the charge is paid, it includes unlimited journeys into and around the restricted area. The people living in the city center are essentially exempted as well, as they receive high discounts. The area charged was extended in 2007. The price has been increased from £5 ($9) to £8 ($14) over the last three years (July 2005) and was expected to rise to £10 by the end of 2008. The cordon enjoys almost 200 entry points.

Revenues obtained from congestion charges are used to fund public transportation investments (80 percent of total net revenues), but the electronic camera recording system used in the city is quite expensive, and a substantial amount is devoted to covering operational costs. In fact, these costs were higher than expected, and net annual revenues were half of the original expectations. Leape (2006) explains that the low net revenue is attributable to the success of the plan in reducing car use, the expensive implementation costs, and the extended discounts awarded to several groups of citizens. However, growing fees over time have caused an increase in revenues that has reduced the relative weight of the operational costs. According to Banister (2003), the main beneficiaries from congestion charging are assumed to be commercial vehicles and those still using private cars and enjoying substantial time decreases, as well as those who were already using public transport because of new public investments funded from charging revenues. Savings from reductions in road accidents are also considered a gain related to the implementation of the measure. To date, there has been a reduction of 2 percent to 5 percent in personal injury accidents in the cordoned area. In addition, 11 percent of revenues were devoted to improving road safety at the beginning; however, this share has recently decreased to 3 percent (Transport for London 2008).

As a result, right after the implementation, private vehicles declined between 15 percent and 20 percent in two weeks—30 percent after several months—and significant increases were found in the use of public transportation. According to Transport for London reports, 50 percent of car reductions resulted in transfers to public transport, 25 percent were diverted around the charging cordon, 10 percent decided to use other private modes such as taxis, motorbikes, or bicycles, and the remainder decided to avoid trips or shifted to non-charging hours.

Traffic speed also improved within the restricted area, achieving a 37 percent increase, and delays during peak time dropped about

30 percent for private vehicles and 50 percent for buses. In order to compensate for this demand increase, Transport for London increased the number of available buses with 300 new vehicles. Regarding environmental impacts, the project achieved significant reductions in greenhouse gases emissions. Carbon dioxide emissions declined in the charging zone by 16 percent.

Moreover, after the western extension undertaken in 2007, traffic entering this zone declined by 14 percent, and traffic in the boundaries outside the zone increased by 4 percent (Transport for London 2008). Again, bus services in and around the western extension were increased in advance of the scheme.

The evidence suggests that the congestion charge influenced the decisions of road users on whether to take a trip, the mode used, and the time of the day chosen, but also produced a virtuous circle for bus transportation, according to Leape (2006). This virtuous circle is based on the idea that less congestion increases the average speed for buses, which, at the same time, enjoy more passengers, and as a result, more revenues to improve the system are obtained (Small 2005).

The origin of the measure comes from the political restructuring of London in 2000, when Ken Livingstone (first elected as an independent before rejoining the Labour Party) won election to become the new mayor of the London area (Greater London Authority), with a platform including congestion pricing (Litman 2006). The British Labour government endorsed the mayor's plan, and public consultations reported enough public support to engage the project thanks to the severity of congestion in the city center. On the contrary, the Conservative Party promised the end of the program, receiving support from some labor organizations and motorist clubs. In fact, the city of Westminster council, a local authority ruled by conservatives and responsible for governing the borough restricted by the system, was the most difficult obstacle faced, as it challenged the project on the basis that it was unlawful and would produce even more pollution (Banister 2003). The British High Court rejected that claim.

Nonetheless, after some years of implementation, the system enjoys popular support and political opposition has diminished. In this direction, some business groups also support the system because its costs are offset by its benefits (lower delivery time, employees arriving on time, etc.). Moreover, for most workers in the area, the fee represents a small amount relative to the high wages paid in Central London. In this sense, for those working in the restricted area, the time advantage can compensate the monetary costs of the toll. However, smaller retailers still oppose the scheme, perhaps as part of a political strategy to gain special treatment (Litman 2006). However, Quddus, Carmel, and Bell (2007) found that congestion charging did not affect overall retail sales in Central London, although some individual stores did suffer reduced sales. Indeed, a survey of 500 firms in 2004 found that 72 percent recognized the effectiveness of the congestion charge (Clark 2004). Transport for London (2005) reports that the scheme was neutral for business as well.

More recent data on congestion in Central London has been disappointing. Indeed, Transport for London admits that streets are as congested as they were in 2002, but highlights that traffic would be even worse without the fee. Their managers and public authorities recognize that public works going on in the capital and cramped road space have also eroded the congestion charge's impact. Recently, the change of mayor in London has already affected the congestion charge policy. In fact, Ken Livingston was backing a plan to charge £25 ($44) a day to use the most polluting cars in Central London, but new mayor Boris Johnson (Conservative) cancelled the charge in July 2008, only two months after his electoral victory. He argued that this would have hit families and small business hardest. The new mayor has kept congestion charging in place (although the Conservative Party was strongly against it in the early stages), but the western extension is now being reconsidered. A public consultation has begun to take into account views in order to remove or amend the project.

To conclude, according to Santos and Fraser (2006), the London congestion charging project constitutes an economic and political success, attributable to several factors. First, it took into consideration public opinion but avoided the use of referenda to make the decision about implementing the measure—it is not clear the support it would have enjoyed. Second, a cost–benefit analysis was carried out, which took into account distributional effects. Finally, it was specifically planned for the characteristics of Central London, and for London as a city with unique characteristics: There is a predominance of public transport users, which also influenced the interpretation of the case and must be considered before extending the London project to other cities with different mobility patterns and urban development.

Politically, its success in reducing congestion also weakened interest groups' objection and support for political opposition. A well-designed plan and revenue use established the foundations of a successful policy that backed up its policy makers. However, it must be considered that new data and recent political developments might affect the design of the current system.

Singapore

The experience of Singapore is also well known for its unique length and its success in using variable daily road charges to manage traffic efficiently (Olszewski and Xie 2005). The objective of the measure was to manage traffic allocations rather than generate revenue, and it remains unique as the longest standing full-scale urban road pricing scheme designed to reduce peak-time traffic in the world (Olszewski 2007). Congestion pricing was introduced in Singapore in 1975 when authorities decided to use an Area Licensing Scheme in the center of the city. This measure was contained in a wider traffic management plan, together with tax increases (vehicle ownership, petrol, imports, etc.), higher parking fees, and the development of public mass transport.

Despite its name, the Area Licensing Scheme was implemented as a cordon toll, as vehicles were only charged upon entry. The system was manually enforced, and Santos (2005) considers that this is the reason behind the low operational cost of the project. The fee (S$3) was raised six months later, but decreased to the same amount in 1989. The scheme was initially based on 22 entry points, and its charging hours covered 7:30 a.m. to 9:30 a.m., the peak rush hour period. However, several changes to this basic schedule have been added. For instance, in 1989, peak-time charges from 4:30 p.m. to 7:00 p.m. were introduced to reduce evening traffic.

Payment exemptions were given to passenger cars carrying three or more passengers, taxis, public vehicles (buses, police, and ambulances), commercial vehicles, and motorbikes. However, these last two groups of vehicles lost this advantage in 1989 (Willoughby 2000).

Later, in 1998, after sustained successful reduction in peak-time traffic congestion, Singapore decided to upgrade the system by using electronic road pricing. This decision was made to maintain the current traffic speed but also to alleviate congestion at pricing points. Charges are paid in the central area between 7:30 a.m. and 7:30 p.m. on weekdays, but those entering from 10:00 a.m. to 12:00 p.m. are exempted. On the other hand, in other radial arterial roads, charges are only paid between 7:30 a.m. and 9:30 a.m. As mentioned, tolls vary depending on time, but also by vehicle (Olszewski 2007). The highest fee is $3 during the peak time (8:30 a.m. to 9:00 a.m.), and the lowest toll is $1 during off-peak time (9:00 a.m. to 9:30 a.m.).

As in London, Singaporean authorities were committed not only to reducing traffic, but also to providing public mass transport alternatives (Santos 2005). As a result, they expanded the railway network and improved the quality of bus services. In addition, they promoted the integration and coordination of different public transport modes by introducing smart cards that could be used to pay in several modes. Congestion reductions were achieved right after the introduction of the Area Licensing Scheme. Traffic demand was reduced by 45 percent during the morning peak, and car entries fell by 70 percent in the restricted area (Willoughby 2000), and another 15 percent after the introduction of the electronic system (Menon 2000). In fact, after the introduction of traffic charging, the share of private cars over total commuters declined from 48 percent to 29 percent (Watson and Holland 1978) and carpooling rose by 300 percent. According to Santos (2005), this huge impact was well above government expectations and is a sign of system inefficiency because of the underutilization of road capacity. Tolls were set too high (McCarthy and Tay 1993).

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Nonetheless, authorities realized that after the introduction of electronic road pricing, drivers were using alternative roads and other periods of time (Christainsen 2006, 80). Indeed, traffic increases were found during the rest of the time slots. Holland and Watson (1978) point out that the volume of cars entering the restricted zone outside the charging period rose by 23 percent. That is the same percentage of increase in cars entering 30 minutes before the charging period.

Estimates on the elasticity of demand with respect to fee levels—which is the percentage of traffic that changes when there is an additional 1 percent price increase—are established at –0.21 in the short run and in –0.30 in the long run, the elasticity in the long run being 42 percent higher than that in the short run (Olszewski 2007). Also, public transportation received benefits from the measure by increasing its average speed, making buses a good choice and increasing trip profitability with the additional demand. Indeed, its use increased about 20 percent.

Concerning politics, the Singaporean experience is probably the easiest process of all. Despite its parliamentary democracy (British oriented) with a unicameral parliamentary government—where the bulk of the executive powers rests with the cabinet—only the 1993 election has been contested to date. In fact, the People's Action Party has controlled politics in Singapore since self-government was attained. In fact, foreign political analysts see it as essentially a one-party state. This lack of opposition and the absence of coordination across different levels of government eased the political passage of congestion pricing.

Thanks to public transport investments, which delivered productivity gains and traffic reduction, the implementation of congestion pricing in Singapore has been successful, and acceptance of congestion tolling has been relatively easy to maintain (Santos 2005).

Stockholm

After a trial period from January 2006 until July 2006,[3] congestion pricing was permanently introduced in the city of Stockholm in August 2007. The main purpose of the measure was to reduce congestion, increase accessibility, and improve the environment. In fact, concrete objectives were set: reduce traffic volumes on the busiest roads by 10 percent to 15 percent, improve the flow of traffic on streets and roads, reduce emissions of pollutants harmful to human health, improve the urban environment as perceived by Stockholm residents, provide more resources for public transport, and improve road safety outcomes.

Charges are collected at the entrance of the city center in the form of two cordon lines where vehicles are charged every time they cross—though some classes of vehicles are exempt from payment. The fee changes depending on the time of the day and fluctuates between $1.50 and $3.00 during the weekday rush hour period. No congestion charging applies on weekends. The minimum fee ($1.64) is charged between 6:30 a.m. and 6:59 a.m. and between 6:00 p.m. and 6:29 p.m., and it rises to the maximum toll ($3.28) between 7:30 a.m. and 8:29 a.m. and between 4:00 p.m. and 5:29 p.m. Before 6:30 a.m. and after 6:30 p.m., no toll must be paid when crossing the cordon.

Results of the measure are more than satisfying if we consider the expected goals. The reduction for all of the congestion charge periods over 24 hours was about 19 percent, and this decrease in traffic across the cordon was largest during the morning and afternoon rush hours—from 6:30 a.m. to 6:00 p.m.—when passages dropped by 22 percent on weekdays (Stockholmsförsöket 2006, 6). Average journey times also fell in the inner city, and queuing times dropped by approximately a third in the morning rush period and by half in the afternoon rush. At the same time, more people—approximately 6 percent more than a year before—changed transport mode by leaving private cars to use public transport, and the number of cars in park-and-ride facilities grew by 23 percent as well. In addition, there was significant journey suppression to the inner city, around 2 percent to 3 percent, which affected medium and high-income groups the most (Eliasson and Mattsson 2006).

A counterpart is provided by the case of the island Lidingö, which only has one access way connecting the island to the city center, as well as access by the E4/Essingeleden bypass. These routes remained free of charge because of the lack of free alternatives, and they have experienced a significant increase of traffic and average travel time.

Another interesting fact from the Swedish experience is that during the period in which public transport was expanded without congestion charges, no significant reductions in motor traffic were achieved, but this investment was considered necessary in order to make it easier to switch from private transport to public after the introduction of charges.

Concerning the environmental impacts, there has been a reduction of 8 percent to 14 percent in emissions in the inner city. On the contrary, for Greater Stockholm, the reduction has been lower, around 1 percent to 3 percent. Carbon dioxide emissions also dropped by 40 percent in the inner city, while in the rest of the area, the decrease was only 2 percent to 3 percent. Road safety also improved thanks to the measure, and the reduction in accidents involving injuries achieved a significant 5 percent to 10 percent in the inner city (about 70 accidents).

Equity effects can also be considered. Congestion taxes negatively affected the inner city more than other areas (inner-city residents pay twice as much as outer residents), high-income individuals more than low-income individuals (they pay three times more), employed people more than others (they pay three times more), households with two adults and children more than other types of households, and men more than women (they pay 50 percent more). However, these are the groups that also enjoy the largest gains in reduced traffic time (Transek 2006).

Finally, congestion charges had only a minor impact on retail, but it is too early to draw conclusions. Sales developed under the same pattern as before, but transport business—taxis, couriers, and tradespeople—enjoy the benefits from improved accessibility and lower trip times.

The direct cost of implementation rose to 3.8 billion Swedish krona ($0.6 billion), and adding 197 new buses, 16 new bus lines from the metropolitan area of Stockholm into the inner city, and the reinforcement of the existing underground and commuter train lines improved public transportation. Also, more park-and-ride facilities were provided.

As happened in some cities, a referendum on the permanent implementation of congestion charging was carried out in September 2006. In the city of Stockholm, 51.3 percent of citizens supported the project, while 45.5 percent voted against it. The rest were blank or invalid votes. However, the rest of the municipalities in the county surrounding the city of Stockholm rejected the implementation of this measure—39 percent supported the project and 60 percent voted against it—although the Social Democratic Party (SDP), which was then in office, announced that only results from the city of Stockholm would be considered. On the contrary, the conservative opposition—Alliance for Sweden—announced during the campaign that their decision would take into consideration the rest of the municipalities if the party won the general election, which took place on the same day the referendum was held. In fact, only one party in the coalition was clearly in favor of the measure. Results adding votes from the city of Stockholm and the rest of the municipalities reported a slight rejection of the project—53 percent no votes versus 47.5 percent yes votes.

Table 3 Correlations between Shares of Party Votes in General 2003 Elections and Share of Yes Votes in the Referendum

Correlations	Yes
Social Democratic Party (2006)	.56
Moderate Party (2006)	–.23

Source: Authors' calculations.

One reason for this political controversy may be the institutional power enjoyed by both parties in the county of Stockholm. The SDP was ruling Stockholm as the main party in the governing coalition, while the conservative coalition had a strong presence in the councils in the surrounding municipalities. In fact, in 11 of the 14 cities where the referendum took place, the conservatives were in government, enjoying a wide majority.

In table 3, we provide, by showing correlations, some preliminary evidence on the relationship between the share of votes in the municipal elections for both leading parties in the two coalitions and the share of votes supporting the implementation of congestion charging. There is a positive correlation between the presence of SDP voters in those municipalities and the share of yes votes. The opposite relationship can be identified for the Moderate Party, though this is weaker. Indeed, the reason behind the Moderate Party's commitment to considering all municipalities was probably its institutional presence in these surrounding councils.

The most interesting point is what happened after the elections. The national election was won by the conservative coalition, and a new majority rose in Parliament. After some months, the new government decided to restart congestion pricing, even after having committed to considering the all-county results on the referendum. A political explanation is that they also won the local election in Stockholm, the capital and the most important council in the country, which can be considered a switching district—a district in which electoral differences between parties are small, so there are more probabilities of changing governments on elections. On the other hand, the rest of the county was traditionally conservative, and their majority was enhanced in most municipalities. The measure was approved in June 2007.

In spite of its approval, several changes were made in the use of the revenue obtained. Although these funds were devoted to public transport during the trial stage under the SDP government, in the permanent setting of the project, the new government decided to use the revenues to invest in infrastructure enlargements rather than public transport. Moreover, these investments are going to be devoted to improving the outer rings of the city, probably to compensate the outer voters for the decision that was contrary to the promise made.

Norwegian Cities (Oslo, Bergen, and Trondheim)

Road charging is also used in some Norwegian cities, such as Bergen, Oslo, and Trondheim, in the form of toll cordons. The first experience took place in Bergen in 1986, where tolling was based on manual collection. An automatic system was introduced in 2004. Bergen was followed by other important cities, notably Oslo and Trondheim in 1990 and 1991, respectively, which were, in turn, the first electronic systems of toll collection introduced in the country. The same rationale behind Bergen's plan was established in both cases, which was initially expected to be closed in 15 years (Larsen and Ostmoe 2001). In spite of this, it remained in place after this period elapsed. The motivation behind congestion charging was not to achieve an efficient allocation by reducing congestion, but to raise money to fund road projects. The main reason that led Bergen's council to undertake this project was the expected delay of national funds to cover infrastructure needs. That is why the project was expected to finish in 2001.

In Oslo, the system is always operating. In Bergen, the toll was initially charged to users between 6:00 a.m. and 10:00 p.m. on weekdays, but nowadays operates 24 hours, Monday through Saturday. Trondheim decided to charge users from 6:00 a.m. to 5:00 p.m. In all cases, the toll is not time varying, with the slight exception of Trondheim, where the fee is lower after 10:00 a.m., but heavy vehicles pay double.

In these experiences, most of the revenues were devoted to investments in road projects. Only small amounts were invested in public transport, as the law supporting toll collection restricted the use of revenues to road infrastructure investments. In fact, the only purpose of toll collection was to raise money for these projects, and traffic management was never an issue (Larsen and Ostmoe 2001). That is why it is not strictly correct to consider these experiences as congestion charging projects and the source of popular opposition. However, fiscal constraints in a moment of enlargement and improvement needs justified its introduction from a political point of view.

In spite of this consideration, Oslo allocated 20 percent of the investment scheme to public transport investments (such as reserved bus lanes and metro lines and terminals), and Bergen renewed its investment plan in 2003, putting more emphasis on environment and public transport than the old road investment scheme did (Inge 2005).

As a result, Norwegian toll cordons were successful in their objective of funding road projects but did not consider any traffic management function. In spite of this, a reduction of about 10 percent was found during the peak hours, at least in Trondheim. In Oslo and Bergen, no traffic reduction can be found in the literature that studies these experiences (i.e., Larsen and Ostmoe 2001).

The popularity of the measure has never been significant, but the issue was never politically controversial. In fact, there was a political consensus between the main parties that prevented a failure in the project. Once the system was implemented, the popular and lobby opposition diminished as a result of the obvious effects on new infrastructure investments, which were very visible. Indeed, the main parties' agreement diminished the electoral risk derived from the measure.

After these successful experiences, other cities introduced the same scheme in the country (Kristiansand, Stavanger, Tønsberg, and Namsos), and the prospects of introducing congestion charging are made possible by the amendment of the Road Act, which previously restricted the use of revenues to fund road projects (Santos and Fraser 2006, 267). However, the social costs of this measure were not considered during the initial implementation, and there are reasons to doubt whether this is the most efficient way to raise money by governments.

Table 4 summarizes the background information of each successful case, the implementation factors, the known impacts of the pricing program to date, and the political conditions and conflicts involved in each one of them.

Failure Experiences

Edinburgh

The city of Edinburgh in Scotland had been developing a congestion pricing scheme for almost a decade when it decided to carry out a referendum in February 2005. The scheme proposed two cordon congestion zones—charged between 7:00 a.m. and 6:30 p.m. in the inner cordon, and 7:00 a.m. to 10:00 a.m. in the outer one—that would serve as a blueprint for other areas in Scotland, such as Glasgow, Aberdeen, and Dundee. The proposed scheme was expected to start in 2006, and the intention was to utilize London's congestion charging technology. Implementation costs were shared 50 percent with the Scottish government. The daily fare charged to private transport users would be £2, allowing them to pass several times in the same day.

Revenues were going to be devoted to improving public transport, and expectations placed congestion reduction at 15 percent and the funds raised for new transport projects (including public transport investments, park-and-ride constructions, pedestrian and cycling lanes improvements, road maintenance, etc.) at around £50 million a year.

Nonetheless**,** Edinburgh citizens widely decided to reject the project in a referendum—74.4 percent voted against—and the council abandoned the idea of charging road users. Councilor Donald Anderson announced after the results that "the idea is now dead and buried for Edinburgh but we are as committed as ever to further improving our city's transport."[4] This result also stopped other plans in U.K. cities to implement similar congestion charging systems.

As in other experiences, pressure groups were involved in the campaign. Transform Scotland, a national alliance for sustainable transport, and Friends of the Earth Scotland, an environmental group, supported the proposal because of its expected environmental impacts. Others, such as Yes to Edinburgh and Get Edinburgh Moving also campaigned for the scheme to achieve better mobility standards in the city. In contrast, business associations contested the scheme because of its projected impacts on retail, and the National Alliance Against Tolls also campaigned against the proposal. Generally, interest groups against the project were strongly organized, while supporters of the measure were weakly organized.

Gaunt, Rye, and Allen (2007) sent a survey to voters in order to understand the decision process that led most citizens to reject congestion pricing. Their results show that the principal factor for those rejecting the project was a preference for individual car use,

Table 4 Summary of Congestion Charging Experiences: London, Singapore, Stockholm, and Norwegian cities

	London	Singapore	Stockholm	Bergen/Oslo/ Trondheim
Implementation	2003/western extension in 2007	1975/1998	2006	1986/1990/1991
Charging type	Cordon (camera controlled)	Called Area Licensing Scheme, but was a cordon toll/electronic road pricing	Two cordon lines	Toll cordons
Covered size	22 square kilometers (land percentage 1.3%)	7 square kilometers (land percentage 1.2%)	35 square kilometers (land percentage 9.2%)	—
Hours charged	7:00 a.m.–6:30 p.m. (weekdays)	7:30 a.m.–7:30 p.m. (except Sundays)	Weekdays	6:00 a.m.–10:00 p.m./24 hours/6:00 a.m.–5:00 p.m.
Toll	Non-varying fee	Time and vehicle-varying	Time-varying	Non-varying/non-varying/ time-varying
Discounts and exemptions	City center neighbors (90%) and specific vehicles: light vehicles, emergency vehicles, disabled	Vehicles entering 10:00 a.m.–12:00 p.m., vehicles with more than three passengers	Traffic from Lidingö and Essingeleden and specific vehicles: emergency vehicles, motorcycles, environment friendly vehicles, disabled	—
Annual revenue/costs*	2.04 (2008)*	5.8*	3.45	—
Revenue use	Public transport, walking facilities, road works. and road safety improvements	—	Public transport under Social Democratic government, road projects connecting outer districts under Conservative government	Road projects
Prior public transport investments	11.000 new seats available in public bus transport before implementation, 300 new vehicles, investments in Tube's quality.	—	197 new buses, 16 new bus lines, reinforcement of the existing underground and commuter train lines, more park-and-ride facilities	20% or Revenue/2003 onward/No
Impact on congestion	15%–20% decline in two weeks, 30% in long run	40% traffic reduction, 15% additional reduction with electronic road pricing technology	19% reduction in congestion	No effects/no effects/10% reduction in congestion in peak hours
Impact on pollution	16% decline in carbon dioxide emissions	—	8%–14% reduction in pollutant emissions	—
Impact on road safety	2%–5% reduction in personal injury accidents, 70 fewer accidents	—	5%–10% decrease in victims	—
Political levels involved	Municipal/metropolitan (Greater London Authority)	Only one level in the country	National and municipal government	National and municipal government
Political support	Government support (Labour), opposition against (Conservatives)	Government support (pseudo-dictatorship)	National and municipal government support (Social Democratic), opposition against (Conservatives)	Government and opposition support
Public opinion	Support	Acceptability gained	Support in the city of Stockholm, rejection in surrounding cities	Against

Source: Authors, Transport for London (2005, 2008), and Santos (2005).

but the public's limited understanding of the scheme also increased the strength of the opposition vote. Moreover, voters were unconvinced that the scheme proposed would achieve its dual objectives of reducing congestion and improving public transport. The main view was that government was trying to collect money from road users by using this charge as a substitute for tax increases, with no real intention of investing in public transportation. In fact, this was the experience with previous fees, and because public transport improvements were not initiated, its users considered that the project would shift more people into the public network, damaging its quality. Following the same rationale, McQuaid and Grieco (2005) also consider that reducing congestion was a secondary motivation for congestion charging, given the high revenue-raising component.

Politically, this issue was also part of the debate between government and opposition, and this probably had a strong impact on referendum results. The Labour Party and their Liberal Democrat coalition partners in the Scottish executive supported the plan—the Labour Party was ruling the city of Edinburgh as well—while opposition parties, with the exception of the Green Party, defended the negative vote. However, the Scottish government stated that the final decision was up to local authorities, and it was conditional on public acceptability. Conservatives and the Scottish National Party argued that the measure was not about congestion, but about raising money. All of this made it an issue in the 2003 elections.

This time, the surrounding municipalities, such as West Lothian, Midlothian, and Fife (also controlled by the Labour Party, but with a strong opposition from the Scottish National Party), were against the project and claimed that the project was unfair for those living far from the capital. However, their political weight was very small in comparison with Edinburgh institutions. For this reason, the referendum only took into account the opinion of the citizens of Edinburgh, while prior consultations had included surrounding municipalities. Probably, the executive expected better results by avoiding the opposition of the neighbors.

Lessons Learned

These cases present interesting lessons to help those policy makers who are engaged in the challenge of implementing congestion charging in their cities, as well as for those who are interested in traffic management tools. These lessons are characterized in the present section and are divided into three subsections. First, we extract the main lessons from the challenge of making road charging acceptable to the public. Second, because there is concern about the distributional effects that the policy may produce, we highlight the main aspects that must be considered by policy makers and city planners in this area. Finally, we summarize the general results and political lessons derived from the experiences.

Making Road Pricing Acceptable

The main obstacle to the implementation of urban charges is public acceptance and political support in cities enjoying well-developed mass transit systems (Glazer and Niskanen 2000).[5] These problems on pricing acceptance usually appear attributable to the difficulty of explaining to the public the application of marginal cost pricing in order to achieve efficiency goals. In fact, too much weight has been put on efficiency criteria, which are the most difficult to convey to the public (Viegas 2001). In addition, this lack of understanding and confidence from the public shifts fear to politicians, who also see the pricing solution as politically unacceptable. Because citizen preferences are major determinants in policy decisions, they turn to alternative ways of controlling car use (May and Nash 1996).

One important obstacle to achieving acceptability is the transition from free access to mandatory payment. The public usually considers this access to be a right, as it is generally assumed that demand is highly inelastic and road pricing produces unfair effects (Jones 1998).

> One important obstacle to achieving acceptability [for road charging] is the transition from free access to mandatory payment. The public usually considers this access to be a right, as it is generally assumed that demand is highly inelastic and road pricing produces unfair effects.

Interesting lessons on the importance of public acceptance are shown by the case of Edinburgh, where the project was rejected because of equity concerns and a lack of information. In the case of the Norwegian cities, the public opposed the measure without success. On the other hand, better acceptance was found in London, Singapore, and Stockholm. The motivation for supporting urban road pricing (the need to fund capacity enlargements in the transport system in those cities, especially in public transport) was more important than the traffic management argument in cases where congestion was not as severe as in London. Raising revenues to improve transportation is easier to understand. However, in Norway, the fiscal motivation was what led most people to react against the project. Indeed, one of the most important aspects of congestion charging is the proposed use revenues and its political accountability. In Norway, the revenues are used to fund road projects rather than to improve local transport, but in the cases of Stockholm and London, resources were mainly devoted to public transport. As a result, opposition in these two cities decreased over time as the public transportation system improved through investments.

In fact, Oberholzer-Gee and Weck-Hannemann (2002) argue that the revenues of road pricing can also be used to overcome political resistance because policy makers favor instruments that weaken the government's budget constraint and funds can be returned through compensations. In fact, in all experiences, a large list of discounts is awarded to those citizens who are affected the most.

Moreover, some surveys point out that the public is more prone to support environmental programs rather that traffic management reforms. That is why Jones (1998) defends the importance of targeting additional goals beyond simply raising revenue. Therefore, including these measures in environmental packages may help in its acceptance (May and Nash 1996; Oberholzer-Gee and Weck-Hannemann 2002).

A clear pattern in most experiences is that opposition to congestion charging diminishes after some time. Therefore, trial periods are good instruments before any referendum. The trial, at least in Stockholm, was a key factor in gaining support for the measure. Another possibility is to impose congestion charges if there is a political agreement that prevents the use of this issue against the government, knowing that after some months the public will get used to the measure and the opposition's intensity will be lowered without electoral consequences. In fact, Schade and Schlag (2003) state that this reaction also appears when the measure is imminent, and the opposition is wasteful. In Schade and Baum (2007), there is another explanation based on the adjustment of public beliefs when a measure is unavoidable in order to reduce their own stress.

Equity Effects of Road Charging

Besides efficiency, other objectives are usually pursued by road charging. Environmental goals and equity are normally integrated in the project and can help in its motivation and justification. Moreover, these other dimensions are basic aspects in the acceptance of road pricing. In fact, Viegas (2001) includes equity in the core of acceptability, as this is strongly related to the perception of fairness. The main problem is the exclusion of a range of users who are not willing to pay the fee for the road use. This range of users is usually the low-income group of citizens who are shifted to other public transport modes. However, Bonsall and Kelly (2005) alert that these groups can be especially hit by the measure if there are no viable alternative modes.

According to Eliasson and Mattsson (2006), equity effects are important because the magnitude of the redistribution can be so large that it dwarfs the net benefit of the project—and also because it can be regressive, as high-income groups give higher value to their time and may support paying to get time gains (Arnott, de Palma, and Lindsey 1994; Evans 1992).[6] Thus, equity in this framework "involves not only equality between mode users and between operators, but also the risk of increasing inequalities between users or consumers, and the desire to preserve social or spatial solidarity" (Raux and Sauche 2004, 193).

For this reason, it is important to analyze distributional effects and consider the impact of the use given to the revenues raised in order to compare them with the net welfare surplus. In fact, May and Nash (1996) consider that the net effects are crucially influenced by how the revenue from road pricing is used. In this direction, Eliasson and Mattsson (2006) consistently found for the case of Stockholm that the net impact of the project is decided by how the revenues are spent. If revenues are devoted to improving public transport, the system might be considered progressive. But if funds are devoted to proportional tax cuts, we obtain the opposite conclusion. Also, inhabitants and employees in the city center are the most affected by the charges, and discounts have been the general solution to this negative impact on specific groups of citizens.[7]

Therefore, the use given to the revenue raised by tolls becomes a central aspect of equity effects and its perception by the public (Small 1992). In most experiences, this revenue has been devoted to funding public transport supply, and Viegas (2001) identifies two advantages from this policy. First, it reduces the costs (loss of utility) from mode change, and second, it favors the low-income group of citizens who are usually the ones using the most public transport. In addition, this policy helps in obtaining wide public support. Banister (2003) also concludes that charging revenues must be reinvested in the transport system in order to overcome equity concerns favoring the low-income group of citizens.

Another equity factor that must be considered is the shape of the city and the mobility relationship between the center and its surroundings. Stockholm and Edinburgh showed important opposition from neighbor cities affected by the measure. Most of their citizens work in the city center. If low-income families inhabit surroundings, the policy may produce regressive results, while if high-income citizens inhabit the surroundings, the policy may obtain the opposite outcome. Hence, taking into account surroundings and mobility networks in providing public mass transport alternatives are other factors on equity that policy makers must address.

General Results and Political Issues

Urban road charging experiences, once implemented, have shown interesting results leading to success in the reduction of peak-time traffic. Therefore, they become a successful tool to manage demand and decrease congestion and environmental costs. In the cases of London, Stockholm, Singapore, and even in the Norwegian cities, where the goal was not traffic management, this measure provided significant reductions in the congestion costs associated with entrance to city centers, providing revenue to invest in public transportation or road projects. Moreover, the measure increased average speeds everywhere, improving private and public transport productivity. The revenues helped make public transportation more attractive, which at the same time received more passengers and, in turn, more revenues. In fact, modal split is found, as a decrease of private cars in favor of public transportation is easily achieved. It is also considered that road pricing improves the environment in the city because reductions in greenhouse gases are found in all experiences. On the other hand, rerouting and the use of other periods to shift trips are recognized and must be considered by the planner.

The political situation may also play an important role in implementing the measure as we see in the Swedish, Scottish, and British experiences, where the opposition used the issue against the incumbent government. On the contrary, when big parties agree to use prices to restrict traffic, as in the Norwegian cases, the measure is easily introduced in spite of public opposition. There is no doubt that in Singapore, this process was even easier given its political characteristics.

Nonetheless, the review of international experiences in urban road charging shows some other interesting patterns deriving from the political context in which the decision to implement congestion charging is to be adopted. First, it clearly appears that when the decision is to be made by the local government, congestion charging faces fewer obstacles than when the decision is to be made by supralocal legislators. Most successful cases, such as those in Singapore, London, several smaller cities in the United Kingdom, and several Norwegian cities, have made the local government responsible for the decision. Indeed, the failure in Edinburgh is an exception to this pattern, and clearly shows how important it is that the local government adopts a good strategy for implementing the policy. In absence of a good strategy, lack of credibility or the inability of the local government to commit to the expected uses for revenues killed the measure.

An interesting political process emerges when the decision to adopt congestion charging is to be made by a supralocal legislator. In this case, having the same parties holding a majority in local government and in supralocal legislator can help in approving the proposal made by the local government. In the case of Stockholm, the identity of the ruling parties existed in the preparation process (before the final approval), as well as at the time when the final approval was to be decided. At the beginning of the process, the SDP (together with their left-wing allies) enjoyed a majority both in the city of Stockholm and in the national legislature. At the time when the decision was to be made, the Conservative Party (together with their right-wing allies) enjoyed a majority in both institutions. The Conservative party—now enjoying the majority in the national Parliament—decided to approve the congestion charge, even though it had opposed the measure in the referendum and even though most voters (in Stockholm and the surrounding counties) had voted against it. As stated earlier, a likely political explanation is that the Conservative Party also won the council of Stockholm, the most important one in the country, which can be considered a switching district. One can wonder whether the congestion charge would have been approved if the SDP had retained control of the city of Stockholm.

However, an opposite story is found in the case of the failed congestion charge in New York City. The Republican Party controlled the local government, while there was a Democratic majority in the state legislature. Besides the fact that many Democratic members were elected in districts affected by the congestion charge, partisan controversy likely played an important role in the denial of the proposed charge. Indeed, having the same party ruling both local and supralocal institutions can facilitate the adoption of congestion charging, as there is a better alignment of incentives, as well as of political benefits and costs, from implementing urban road charging.

Finally, trial periods are also recommended before any referendum, as it is found that opposition to the measure declines after its introduction, especially if the revenues collected can provide better public transport and it is made visual for the citizens. The experiences of

Stockholm and Edinburgh in this field are opposite, as was their success.

Also, it is important to take into account that, according to McQuaid and Grieco (2005), the winners from new policies are likely to be less strident than economic losers and this inspires some fear in policy makers who prefer to avoid the opposition of interest groups (Feitelson and Salomon 2004; Harrington, Krupnick, and Alberini 2001).

Once the main lessons obtained from real experiences have been drawn, it is necessary to warn policy makers that any congestion charging project must be designed according to the nature and shape of each urban area, in order to solve its own mobility problems. It is not a good practice to just replicate projects that worked well in other jurisdictions, as unexpected results can distort expectations, resulting in the failure of the project from different sides.

Conclusion

In this article, we have highlighted the main aspects that must be considered by policy makers when implementing road charging measures to fight urban congestion costs. Some lessons emerge from the review of these five cases. First, the project must be designed to account for the particular characteristics of the city and its traffic patterns because of the importance of local circumstances. If this condition is fulfilled, all experiences show significant congestion reductions. Second, the hardest implementation obstacle is public opinion. Therefore, we highlight the importance of the use of revenues and the influential treatment of equity concerns to diminish public rejection. Moreover, the use of trials and early investments in public transportation may support the project. Finally, policy makers must carefully consider the political context in which the policy will be promoted; evidence indicates that strong political opposition can derail well-planned projects. This is particularly the case when different levels of government with different parties in office are involved. Active opposition by opposing lobbies and the passive behavior of winners can be expected and discounted by the authority. However, after implementation, these problems usually decrease. Therefore, we have presented a local–national political interaction as another central factor in determining whether a road charging scheme is adopted.

This article was based on a review of important experiences worldwide. Future research should take advantage of recent developments in U.S. cities, extending this analysis and exploring the issues we highlight here. Additionally, new lessons may be learned by comparing the American experience and its context (political system, mobility patterns, interest groups, etc.) with the experience and context of the countries around the globe. Future research must also pay attention to other new forms of traffic management emerging in European cities where environmental taxes or restricted permits to access the city center have been recently implemented.[8]

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Notes

1. The concept of efficient road charging to fight congestion is not new. The seminal works by Pigou (1920) and Knight (1924) already established the main baseline in the 1920s. In this regard, the externalities caused by congestion are an important part of the social cost of transport, particularly in large metropolitan areas. There are other important externalities, such as pollution, accidents, or space constraints that can also be addressed by the use of efficient pricing.
2. The use of a flat charge for the whole period makes sense in the London case because average speeds were similar during the charging period (Leape 2006).
3. In fact, the trial started on August 2005 with extended public transport, but congestion charges were not implemented until January 2006.
4. BBC News, February 11, 2005.
5. See Jaensirisak, Wardman, and May (2005) for a good and recent review.
6. Eliasson and Mattsson (2006) argue that this is likely to happen when congestion levels are low or demand is relatively inelastic.
7. Specific results distinguishing gender also show that men are more affected than women.
8. For instance, the cases of Berlin (Germany) and Milan (Italy).

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