Perceptions of Congestion Charging: Lessons for U.S. Cities from London and Stockholm

Marin Odioso[*]
Department of Systems and Information Engineering
University of Virginia
Email: marin@virginia.edu

Michael Smith
Department of Systems and Information Engineering
University of Virginia
Email: mcs5f@virginia.edu

Submitted for Presentation and Publication to the
88th Annual Meeting of the Transportation Research Board
Washington, D.C.
January 11-15, 2009

6,781 words

November 12, 2008

[*] Corresponding Author

ABSTRACT

Despite successful examples of congestion charging schemes abroad, one of the greatest barriers to implementing congestion charging in the United States is winning public approval. The research reported in this paper analyzed factors influencing public approval of congestion charging by learning from public perceptions abroad. Surveys in London and Stockholm, where congestion charging has been successfully introduced, were used to evaluate the perceived effects of congestion charging on traffic, the environment, and public transport. Additional surveys in Atlanta, Washington DC, and New York City illustrated awareness and support of congestion charging in U.S. cities. Data analysis revealed that respondents who were familiar with congestion charging, who trusted the reported benefits, or who often used transportation modes other than cars were more likely to express support. The research indicates that U.S. cities considering congestion charges could increase the chances of acceptance by promoting the environmental benefits of congestion charging, improving public transit accessibility, and having a clear plan for revenue spending to increase public approval.

INTRODUCTION

The U.S. Department of Transportation (US DOT) is proposing a new strategy to improve mobility: congestion charging. In the 2006 *National Strategy to Reduce Congestion on America's Transportation Network,* US DOT presented the Urban Partnerships Program, which offered federal aid for "aggressive strategies" to reduce congestion. The program required proposals to include a form of congestion pricing ranging from high-occupancy toll (HOT) lanes to a per mile charge on all roads within a certain region *(1)*. US DOT expects that charging cars during rush hour will "deter some commuters from traveling during peak times…keeping highways near capacity without descending into gridlock" *(2)*.

On April 22, 2007, New York City Mayor Michael Bloomberg announced *PlaNYC: A Greener, Greater New York*, which contains 127 policy initiatives to make New York City more sustainable *(3)*. In the plan, Bloomberg called for a pilot congestion pricing program that would charge drivers to enter the city's center *(4)*. On August 14, 2007, the Urban Partnerships Program selected New York as one of five cities to receive funding to support Bloomberg's plan *(5)*. Bloomberg believed that "federal officials saw New York's plan as a way to show other cities that congestion pricing can work" *(6)*.

While New York City's plan was paving the way for area–based congestion charging in the United States, schemes abroad, particularly in London and Stockholm, had already proven successful. Drivers in London have paid a congestion charge since February 2003. A six-month trial period for congestion taxing began in Stockholm in January 2006 and a permanent scheme started in August 2007. As a result, congestion initially decreased within each city's charging zone by approximately 20 percent. The City of London has been able to introduce more dedicated bus lanes and to perform road works projects without congestion rising above levels present before the charge began. Officials also state that emissions are lower. Public transport riders enjoy better bus service due to shorter travel times. Similarly, businesses have benefited from more predicable and faster delivery trips *(7 - 10)*. Each city reports several benefits from congestion charging.

While the general principle remains the same, congestion charging schemes vary, as shown in Figure 1. Commuters in London pay a daily fixed rate, whereas the city of Stockholm uses variable pricing based on peak congestion hours, more accurately representing the social costs imposed. London commuters make payments in advance online, at kiosks, by mail, over the phone, or by text message. There are fewer methods of payment in Stockholm, and tax decisions are issued monthly to the registered owner of a vehicle based on accumulated passages through designated control points. While this method of electronic toll enforcement and monthly collection is more convenient, it requires additional infrastructure and toll gantries. However, in London the less intrusive network of cameras to enforce payment is expensive, with operating costs consuming approximately 42% of the revenue (*7 - 10*). These differences allowed officials to tailor the design of each city's charging scheme to fit the city's unique needs.

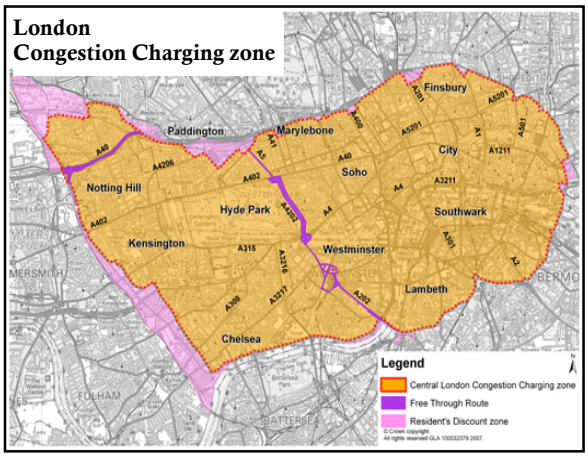
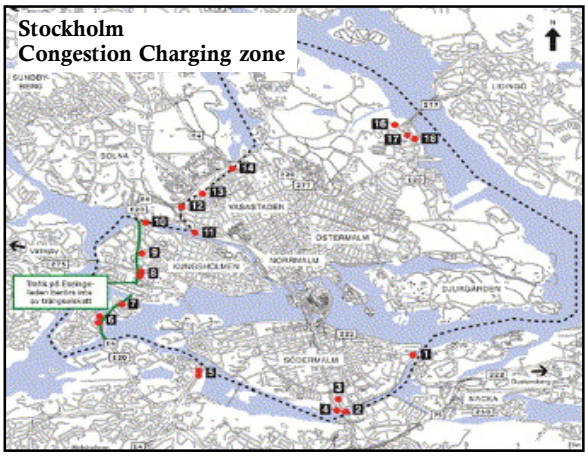
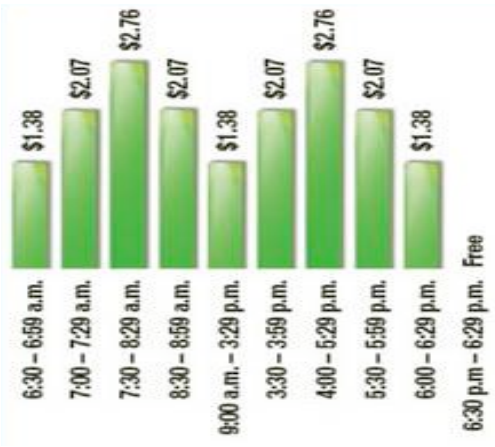
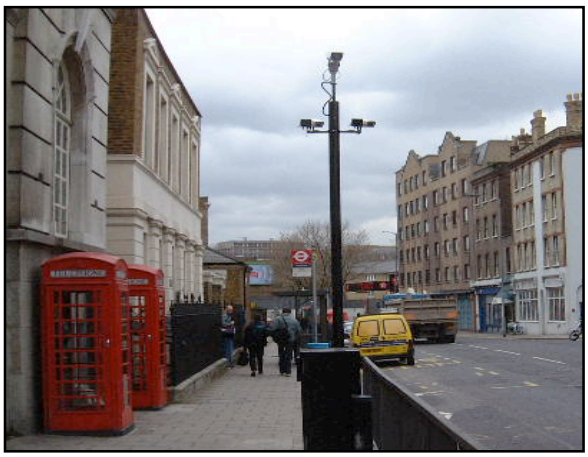
	London	Stockholm
Charging Zone		
Pricing Scheme	 **Daily fixed rate**	 **Variable pricing**
Enforcement Technology	 **Cameras**	 **Toll gantries**

Figure 1 Comparison of Congestion Charging Schemes in London and Stockholm *(7 - 10)*.

Despite successful examples of congestion charging schemes abroad, one of the greatest barriers to implementing congestion charging in the United States is winning public approval. A recent poll found that only 44% of New York City residents support the proposed congestion charging initiative *(11)*. The offer for federal aid under the Urban Partnership Program expired on April 7, 2008 after the New York State Legislature failed to approve the congestion charging plan. The issue was blocked from being "put to a public vote on the floor of the State Assembly" because it was believed that there was not enough public support to generate the necessary votes *(12)*. While this setback is significant, supporters of the charging scheme are hopeful that congestion charging will be part of New York City's near-term strategy to improve mobility.

Initially, London and Stockholm also faced disapproval for their road pricing schemes. When London City Mayor Ken Livingstone initiated congestion charging, the London Daily Telegraph named him "London's deadliest enemy" *(13)*. In Stockholm, newspaper headlines shouted, "Prepare for hell!" immediately before the charging began *(14)*. However, public opinion can shift. While only 40% of Londoners supported congestion charging when it was announced, support rose to 57% just one month after charging started *(15)*. In Stockholm, only 43% were initially in favor of congestion charging, but after a six-month trial period, voters passed a referendum to continue the charging scheme *(16)*. After experiencing congestion charging, people begin to recognize "the benefits gained for the costs" *(17)*.

While arguments for road pricing are clear to economists and traffic engineers, it is difficult to sell the concept to city residents who have not witnessed congestion charging firsthand. Officials must find ways to communicate the benefits of congestion pricing to win over public support. By considering the experiences of existing schemes in London and Stockholm, officials can learn from perceptions abroad to promote this approach in the United States.

To understand attitudes towards congestion charging in cities where a charging scheme has been successfully introduced, public opinion surveys were conducted in London and Stockholm during the summer of 2007. Similar surveys were also conducted in Atlanta, Washington DC, and New York. Data analysis revealed that respondents who were familiar with congestion charging, who trusted the reported benefits, or who often used transportation modes other than cars were more likely to express support. The research indicates that U.S. cities considering congestion charges could increase the chances of acceptance by promoting the environmental benefits of congestion charging, improving public transit accessibility, and having a clear plan for revenue spending to increase public approval.

DATA

European Survey Development and Collection

A 24-question survey instrument was created to compare the perceived effects of congestion charging on traffic, public transport, and the environment. Public opinion surveys conducted by the Manchester Evening News and the Royal Borough of Kensington and Chelsea were used as models *(17, 18)*. Experts at the University of Virginia Center for Survey Research helped improve the initial survey design. The University of Virginia Institutional Review Board for Social and Behavioral Sciences (IRB-SBS) approved the final survey instrument and procedures.

The survey first asked if participants were familiar with the congestion charge in their city and if they were in favor or against it. The questions then determined the commuting patterns of respondents and any changes in behaviors due to the congestion charge. Next,

subjects rated their concern regarding traffic and the environment as well as their satisfaction with the public transit system. Respondents were then asked if they agreed or disagreed that congestion charging leads to three reported benefits (i.e., traffic reduction, public transit improvements, and environmental protection) and two concerns of congestion charging (i.e., privacy and unfairness). Participants suggested suitable uses for the revenue from the charging schemes before demographic data (i.e., age and gender) were collected.

Following IRB-SBS regulations, each survey began with a short description of the survey purpose and the participants' rights. Subjects had to be at least 18 years old to be eligible for the study. The data were anonymous by participant as the only identifying information requested was age and gender.

During the summer of 2007, surveys were conducted in London and Stockholm. A trial run with eight subjects in London tested the survey for clarity and length. Minor revisions were made to the questions and answer choices. The trial observations were removed from the final dataset. Two hundred surveys were collected in both London and Stockholm, for a total sample size of 400 European respondents.

Many strategies were used to survey a representative sample population. Surveys were conducted on weekdays and weekends from 9:00 am to 9:00 pm. Subjects were interviewed both inside and outside the congestion charging zones in different types of locations, such as parks, street corners, and shopping centers. An intercept method was used to draw participants, and every third person was approached to select participants randomly. While these methods limited the sample bias, because all of the surveys were in English, participants without a conversational understanding of English were excluded.

U.S. Survey Development and Collection

To compare the results of the surveys abroad with national opinions of congestion charging, an American version of the European survey was created. This 21-question survey instrument assessed the awareness of and support for congestion charging in selected American cities. Since American participants had not experienced congestion charging in their own city, they were asked to predict their behavior if a charging scheme were implemented. As in the European survey, American respondents rated traffic, public transportation, and environmental concerns to determine if these values have a relationship with support for congestion charging. The questions regarding benefits and arguments against a congestion charge remained the same to allow for comparison with European responses. Finally, participants gave appropriate uses of the congestion charging revenue before they were asked for their age and gender.

IRB-SBS approved the modified version of the survey instrument for U.S. cities. The same consent procedures, age requirement, and data collection methods were used to conduct the American surveys as in Europe, with the exception that no respondents were within a congestion priced zone since none have been implemented in the U.S. cities surveyed.

Fifty surveys were completed in Washington DC in August 2007. In January 2008, 50 more surveys were conducted in Washington DC and 100 people were surveyed in both Atlanta and New York City. Overall, 100 participants in Washington DC, Atlanta, and New York City completed surveys, for a total sample size of 300 American respondents.

Demographics

More males (n=431) than females (n=269) participated in the survey, resulting in a sample population of 61.6% males and 38.4% females. As shown in Table 1, when compared to census data for the five cities considered, males were overrepresented in the sample population by 13.1% on average *(19 - 23)*.

As shown in Table 2, participants also tended to be younger when compared to age data for residents in the five cities *(19 - 23)*. While 49.6% of respondents were between 18 and 35 years old, only 31.8% of city residents are in this age range.

TABLE 1 Gender of Sample Population Compared to Census Data

Gender	Stockholm	London	NYC	Atlanta	DC
Male	61.0% (49.3%)	62.0% (49.0%)	58.0% (47.4%)	64.0% (48.8%)	63.0% (48.0%)
Female	39.0% (50.7%)	38.0% (51.0%)	42.0% (52.6%)	36.0% (51.2%)	37.0% (52.0%)

Percentage of Sample Population (Percentage from Census Data)

TABLE 2 Age of Sample Population Compared to Census Data

Age	Stockholm	London	NYC	Atlanta	DC
18-24	22.5% (10.6%)	24.5% (12.1%)	13.0% (12.0%)	16.0% (12.2%)	13.0% (12.3%)
25-34	31.0% (19.0%)	30.5% (25.1%)	35.0% (17.1%)	27.0% (20.4%)	26.0% (18.4%)
35-44	14.5% (20.3%)	13.5% (21.7%)	13.0% (20.8%)	19.0% (23.3%)	13.0% (22.1%)
45-54	12.0% (16.3%)	12.5% (14.7%)	17.0% (19.3%)	24.0% (19.9%)	21.0% (20.1%)
55-64	14.5% (15.6%)	14.5% (11.2%)	14.0% (14.1%)	9.0% (13.4%)	20.0% (14.4%)
65+	5.5% (18.2%)	4.5% (15.2%)	8.0% (16.7%)	5.0% (10.8%)	7.0% (12.7%)

Percentage of Sample Population (Percentage from Census Data)

Traffic Ratings

Most respondents in all cities expressed dissatisfaction with traffic levels. On a scale from one (best) to ten (worst), the average rating of city traffic was 7.22 (σ=1.97). Moreover, 47.0% of respondents rated the traffic levels to be 8 or worse. Only Stockholm's traffic rating was found to be significantly better than the other cities' ratings using Tukey's multiple comparison test. According to the Texas Transportation Institute, the annual delay per peak traveler in both Atlanta and Washington DC is 60 hours while peak travelers in New York experience 46 hours of delay each year (*24*). While respondents often said they were more concerned about other

issues (e.g., health care and education), they did feel that traffic was a big problem in their city. Because of the widespread concern, this issue should be a priority for city officials.

Statistical Analysis

Microsoft Excel and S-PLUS statistical software were used to analyze the data. Following systems engineering practice *(25)*, the researcher hypothesized that there was no relationship between the variables to determine if the data suggested otherwise. Binomial logistic regression was used to estimate the relationship between all of the factors (e.g., car ownership, age) and support for congestion charging. The response variable SUPPORT was divided into two categories (i.e., favor and oppose); participants who were unsure were removed for this step of the data analysis only. A stepwise approach was used to eliminate terms with a P-value greater than 0.05. In addition, Tukey's multiple comparison test showed differences in the responses of several variable pairs, such as traffic rating and city.

Interview Data

Academic and transport officials were interviewed to learn about the history and effects of congestion charging. Interview questions focused on the factors that contribute to the development of a charging scheme. Each interview concluded with a question about the lessons U.S. cities could learn from existing charging schemes.

The survey and interview data were combined to learn how users perceive the effects of congestion charging. The results of the statistical analysis helped determine which design elements and objectives were preferred. The interview responses revealed the considerations and constraints of each scheme design. Recommendations were formulated from these results for selecting appropriate cities in the United States in which to implement congestion charging and for strategies to build public support for introducing a charging scheme.

RESULTS

Data analysis revealed that European respondents, who are already experiencing congestion charging, were more likely to favor the concept than respondents in U.S. cities where it is currently being considered. Figure 2 shows the support for congestion charging by city. Stockholm had the greatest support rating (71%), while Atlanta had the lowest (34%). Of the US cities considered, participants in Washington DC were the most in favor of introducing a charging scheme (53%).

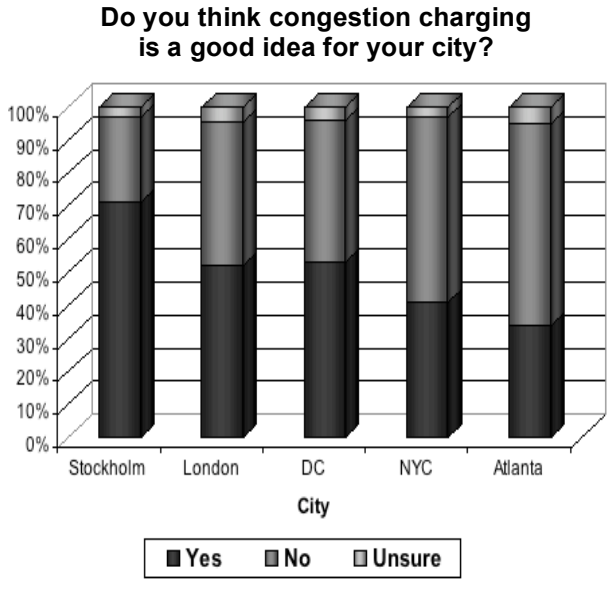


FIGURE 2 Support for congestion charging by city.

The final logistic regression model revealed the factors with the greatest significance in predicting support. Table 3 summarizes the nine predictor variables with P-values less than 0.05 contained in the final logistic regression model.

TABLE 3 Predictor Variables in Final Logistic Regression Model

Variable	Description	Coefficient	P-Value
FAMILIAR	Heard of concept before: 0 = No 1 = Yes	0.968	< 0.001
OFTEN DRIVE	Frequency of car trips to city: 1 = Never 2 = Once a month or less 3 = A couple times a month 4 = About once a week 5 = A couple times a week 6 = Almost everyday	-0.159	0.007
CHANGE BEHAVIOR	My travel plans change/ would change: 0 = No 1 = Yes	-0.715	0.004
LIVE	Live in city/charging zone: 0 = No 1 = Yes	0.454	0.032
ENVIRO RATE	Environmental concern: 1 = A little 2 = Somewhat 3 = A lot	0.478	0.001
IMPROVE TRAFFIC	Charging improves traffic: 0 = No 1 = Yes	1.451	< 0.001
IMPROVE PT	Charging improves public transit: 0 = No 1 = Yes	0.865	< 0.001
PRIVACY	Charging invades privacy: 0 = No 1 = Yes	-0.953	< 0.001
UNFAIR	Charging is unfair to poor: 0 = No 1 = Yes	-1.171	< 0.001

Relationship between Familiarity and Support

Only 1.2% of European respondents were unfamiliar with the charging schemes in their cities. However, 53.0% of American respondents had not heard of road pricing. In New York, the US city where congestion charging has received the most publicity, this proportion falls to 27.0%. American respondents who were familiar with congestion charging were more often supportive of using charging schemes to reduce traffic as shown in Figure 3.

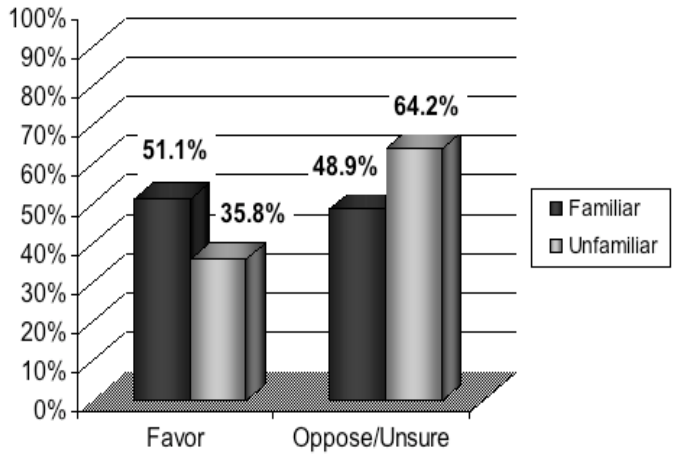


FIGURE 3 Relationship between familiarity and support for American respondents (n=300).

Effects of Individual Travel Behaviors on Support

If participants drove into the city frequently, they were less likely to be in favor of using congestion charging. Only 31.8% of those who reported driving almost everyday supported congestion charging, while 62.3% of respondents who said they never drive into the city were in favor of the concept.

How individuals are affected by congestion charging schemes appeared to be a key component in determining support. Europeans with access to a car who regularly changed their travel plans because of the toll (33.7% of car users) were less likely to be in favor of congestion charging (60.3% opposed). Likewise, American car users who believed they would alter their travel behaviors due to a charging scheme (49.5% of car users) were more likely to be against introducing a congestion charge (61.7% opposed).

While European respondents who lived outside the charging zone divided their support for congestion charging almost evenly (49.8% in favor), 61.3% of respondents who lived inside the charging zone were supportive.

Effects of Perceived City Benefits and Support

In Europe, 71.0% of respondents believed that the charging scheme in their city reduced congestion. However, only 59.3% of American respondents expected a congestion charge to lower traffic. Of those who thought a toll would improve mobility, 67.3% supported congestion charging. In contrast, only 26.9% of respondents favored congestion charging if they believed it would not significantly reduce traffic.

Participants were also more likely to support congestion charging if they agreed that it improves public transport. In London, only 34% thought that the charge had made a difference. While Londoners commented that there were more buses, they also said that the Underground was more crowded than ever. In Stockholm 44.5% of respondents agreed it was a benefit. One bus driver in Stockholm remarked, “On the first day of the Stockholm Trial, there were so few cars on the road that I had to wait longer at each bus stop to stay on schedule.” 49.3% of the American participants believed that congestion charging would help public transport and 53.3% said they hoped some of the revenue from the charges would go towards this effort.

Overall, 55.2% of participants were very concerned about pollution and the environment and 33.5% said they were somewhat concerned. Respondents who said they were very concerned were more likely to support congestion charging (57.3%) than those who said they were somewhat concerned (54.1% in favor) and those who reported they were a little concerned (34.9% in favor).

Effects of Common Concerns and Support

Respondents who identified with an argument against congestion charging were more likely to be opposed. In all, 24.6% agreed that congestion charging infringed on privacy rights, and 67.4% of these respondents were opposed to it. Similarly, if participants considered congestion charging unfair to the poor (51.4%), they were more likely to be against introducing a charging scheme (61.7% opposed).

Variables not in the Final Model

Demographic factors (age and sex) do not appear to have a strong relationship with support. Males and females expressed approximately the same level of support (53.8% of males and 53.2% of females). When considering age, even though older participants seem more likely to favor congestion charging (61.3% of respondents age 55 and over), the results of Tukey's multiple comparison test, shown in Figure 4, revealed that none of the age groups have a significantly different percentage of support than any of the other groups.

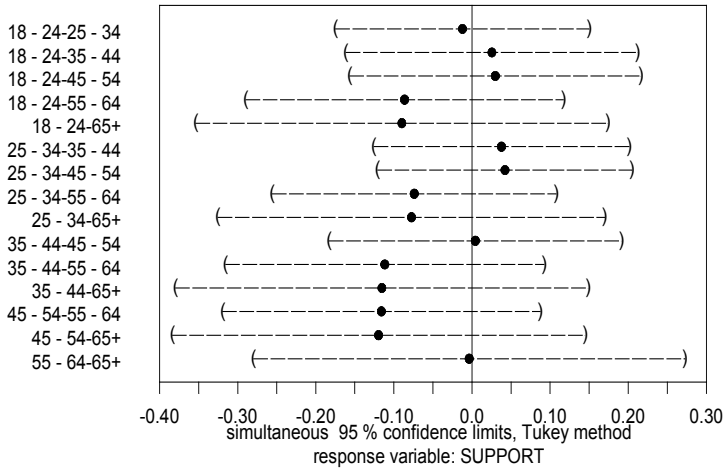


Figure 4 Tukey's test for support by age group.

Other variables not included in the final model involved commuting patterns (WORK, COMMUTECAR) and car access (CAR). The scatter plots illustrated in Figure 5 indicate a slight negative correlation between these variables and support; however, it was not strong enough to justify using these predictor variables in the final model. Of respondents who work in the city, have access to a car, and at least occasionally commute by car (n=82), only 28.0% favored congestion charging.

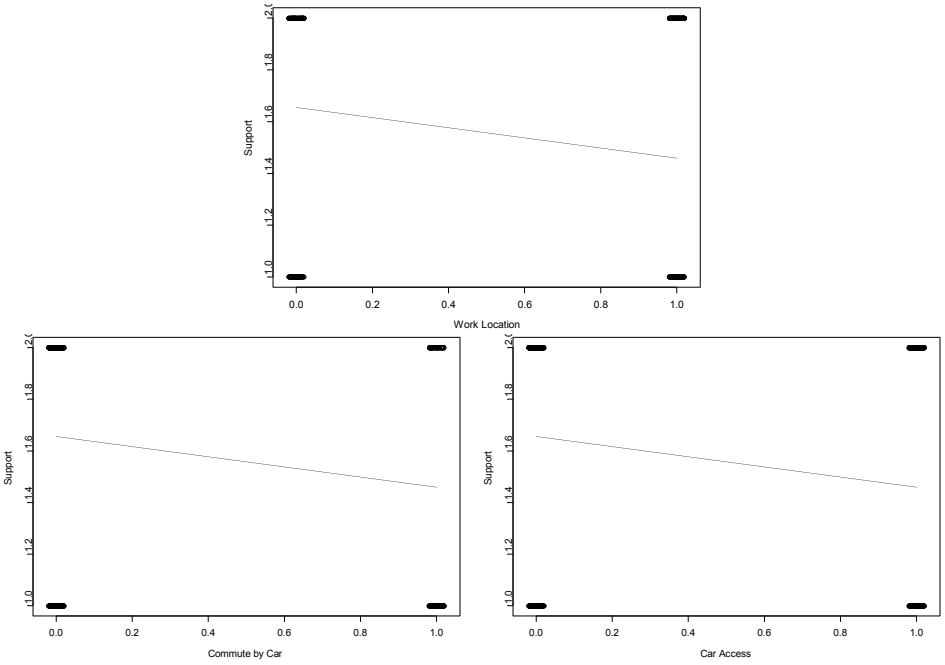


Figure 5 Scatter plots of support by commuting patterns and car access.

Change in Support for European Respondents

Of European respondents who reported changing their opinion after experiencing congestion charging (n=88), 78.4% (n=69) said their support increased while only 21.6% (n=19) became more opposed. Other studies of support over time in London and Stockholm have found similar results *(15, 16)*. Of participants who became more opposed, many commented that they did not experience a reduction in travel time or see improvements to public transit services as they had hoped. Many participants who experienced a positive shift in opinion admitted they were skeptical at first, citing concerns about the technology and the effectiveness of a toll to deter car trips. However, especially in Stockholm, these respondents said they were later convinced that the charging scheme reduced traffic.

DISCUSSION

Recommendations for U.S. Cities

Overall, support for congestion charging appears to be dependent on familiarity with the concept, an individual's travel behaviors, access to other modes of transportation, and trust in the potential benefits. While the majority of American respondents disliked the concept of congestion charging, the research results reported in this paper suggest that officials might be able to improve public approval by addressing their concerns. The research results suggest that officials should focus on the environmental benefits of congestion charging because of increased advocacy for environmental protection measures. Growing concern for climate change has created urgency for new government policies protecting the environment. According to a 2007 Yale Environment Survey *(26)*, 62% of Americans believe the government should establish more laws to enforce energy efficiency. Congestion charging could be introduced as one of these policies because it is not only a way to reduce traffic but also to lower car emissions.

The research also suggests that introduction of congestion charges in cities with highly developed public transit systems is less likely to raise concerns about equity, especially for low-income drivers. Furthermore, improving the availability and service of public transport should be linked financially to the introduction of congestion charges. The success of the schemes in London and Stockholm is due in part to the improved public transportation services introduced in alongside the congestion charge. Several Americans surveyed believed congestion charging could help improve public transit; however, a candidate city is much more likely to support for congestion charging if it has a well-developed public transit system before a charging scheme is introduced. Exemption or discount policies for low-income drivers could also be introduced to address equity concerns.

In addition, officials should communicate a clear vision for the use of revenues collected from congestion charging. Many respondents opposed to congestion charging feared mismanagement of funds and viewed congestion charging as just another tax. In addition, respondents in Stockholm voiced frustration that the government did not always channel congestion charging revenue into local projects. Officials could combat these objections by including a well-defined plan for the revenues in the initial proposal.

Recommendations for Future Work

This paper is useful as a preliminary study of factors influencing support for congestion charging in U.S. cities; however, future researchers can greatly expand the work. Additional surveys that compare cities and continents would provide further insights into the similarities and differences in perspectives on road pricing. Expanding the sample size and increasing the number of survey locations would also allow for detailed depictions of support by city area. Because the final model was not always accurate, researchers should evaluate how other factors (e.g., income, ethnicity, and education) influence support.

In addition to using general surveys, public official in cities where congestion charges are being proposed should consider conducting their own survey specific to their proposed charging scheme. Many American respondents found it difficult to answer questions without knowing more about design choices. Tailored descriptions of plan details for each city (e.g., boundaries of the charging zone, pricing levels, exemptions) would increase the accuracy of self-reported behaviors and opinions. This is especially important due to the findings in this study that suggest support for congestion charging is related to how a scheme affects each individual's travel plans.

Future researchers should also consider other survey methods. While directly interviewing candidates allowed the researcher to clarify responses and gather an impression of reasons behind direct answers, it was difficult to gather a significant sample size. Other distribution methods (e.g., mailings, email) could address this weakness. In addition, a written survey could help prevent response bias from the "respondents' desire to present themselves in a favorable light" *(27)*. Combining results from several survey methods may increase the understanding of public opinion.

Related Issues

While supporters of congestion charging point to the benefits as stated above, it is important to mention that opponents have questioned the true outcome of congestion charging. For instance, the reduction in congestion could make it easier for those who choose to drive by making automobile trips faster and more predictable, encouraging these commuters to drive more. This would keep the total number of vehicle miles traveled constant, and the city would not experience the travel time reduction nor the environmental benefits anticipated.

Other concerns have been identified that are beyond the scope of this research that should be noted. For example, how will congestion pricing affect local businesses and related employment both within and outside congestion priced zones and will the effect differ depending on the size and competitive position of the business? Will some employers reimburse some employees for the congestion charge thus offset the effects of pricing (or transfer it to others) and will this become widespread policy? Can congestion pricing be used in conjunction with innovative land use policies to revitalize city centers as more pedestrian friendly and more attractive as places to live and work? Can congestion pricing help replace existing funding sources needed to manage and operate transportation systems (including transit) as we transition to alternative fuels that do not generate gasoline tax revenues? Further issues will surely arise as congestion pricing and other innovative approaches are considered for creating better quality of life, more accessible city centers, and more effective use of available resources.

CONCLUSION

While congestion charging may not be the answer to traffic problems in all cities, the growing need for a solution calls for researchers to continue studying the benefits and drawbacks of this method. Since political will is required for implementation, it is important to understand what influences public acceptance of this policy. Studies focusing on the opinions of individuals of congestion charging can reveal perceptions that influence overall support. The research reported in this paper suggests some strategies elected officials and other leaders might consider as they seek to advance congestion pricing as an approach for addressing the problem of increasing traveler delays due to growing traffic congestion. By addressing concerns and highlighting valued benefits, officials may be able to foster public acceptance to increase the likelihood of implementing congestion charging.

ACKNOWLEDGEMENTS

This work was supported in part by a Harrison Undergraduate Research Award from the University of Virginia.

REFERENCES

(1) US DOT. *Brief description of Urban Partnerships Program and congestion pricing*, 2006. ops.fhwa.dot.gov/tolling_pricing/value_pricing/publications.htm. Accessed July 28, 2008.

(2) Sullivan, W. Road warriors. *U.S. News & World Report, 142*, pp. 42-49, 2007.

(3) Lueck, T. Bloomberg draws a blueprint for a greener city. *The New York Times*, B1, April 23, 2007.

(4) City of New York. *PlaNYC: A greener, greater New York*, 2007. *www.nyc.gov/html/planyc2030/downloads/pdf/full_report.pdf*. Accessed July 28, 2008.

(5) US DOT. *U.S. Secretary of Transportation names five communities to receive funding to help fight traffic congestion*, 2007. www.dot.gov/affairs/dot8507.htm. Accessed July 28, 2008.

(6) Neuman, W. New York to get U.S. traffic aid, but with catch. *The New York Times*, A1, August 15, 2007.

(7) Transport for London. *Central London congestion charging impacts monitoring: Fifth annual report*, 2007. www.tfl.gov.uk/assets/downloads/fifth-annual-impacts-monitoring-report-2007-07-07.pdf. Accessed July 28, 2008.

(8) City of Stockholm. *Facts and results from the Stockholm trial: Final version*, 2006. www.stockholmsforsoket.se/templates/page.aspx?id=12555. Accessed July 28, 2008.

(9) Transport for London. *Central London congestion charging impacts monitoring: Sixth annual report*, 2008. http://www.tfl.gov.uk/assets/downloads/sixth-annual-impacts-monitoring-report-2008-07.pdf. Accessed November 12, 2008.

(10) Swedish Road Administration. *Congestion Tax in Stockholm*, 2008. http://www.vv.se/templates/page3____17154.aspx. Accessed November 10, 2008.

(11) Tri-State Transportation Campaign. *Congestion pricing: Support among New York City residents*, 2006. www.tstc.org/press/2006/112706-TSTCPoll.pdf. Accessed July 28, 2008.

(12) Confessore, N. Congestion Pricing Plan Dies in Albany. *The New York Times*, April 7, 2008. cityroom.blogs.nytimes.com/2008/04/07/congestion-pricing-plan-is-dead-assembly-speaker-says/index.html?hp. Accessed July 28, 2008.

(13) Trefgarne, G. London's deadliest enemy - Mayor Livingstone. *The London Daily Telegraph*, February 16, 2003, pp. 23.

(14) Eliasson, J. *The Stockholm congestion charging system: A summary of the effects*. Presented at the World Conference on Transport Research. Berkeley, California, 2007.

(15) Transport for London. *Central London congestion charging impacts monitoring: Second annual report*, 2004. www.tfl.gov.uk/roadusers/congestioncharging/6722.aspx. Accessed July 28, 2008.

(16) Å, Vagland and C. Byström. *Attitudes to the Stockholm Trial*, 2007. curacaoproject.eu/documents/road-pricingattitudes-stockholm.pdf. Accessed July 28, 2008.

(17) Manchester Evening News. *Congestion charge survey: Greater Manchester*, 2007. www.manchestereveningnews.co.uk/news/s/1002/1002413_con gestion_charge_survey__gtr_manchester.html. Accessed July 28, 2008.

(18) Royal Borough of Kensington and Chelsea. *Congestion charging survey results*, 2004. wwrbkc.gov.uk/consultation/general/ccs_survey0402results.pdf. Accessed July 28, 2008.

(19) Statistics Sweden. *Population by county, marital status, age and sex; Year 1968-2007*. www.ssd.scb.se/databaser/makro/start.asp?lang=2. Accessed July 28, 2008.

(20) The Office for National Statistics. *T09p: Quinary age groups and sex for local authorities in the United Kingdom; estimated resident population mid-2005 population estimates; reflecting the revisions due to improved international migration*, 2007. www.statistics.gov.uk/statbase/ssdataset.asp?vlnk=9673&More=Y. Accessed July 28, 2008.

(21) US Census Bureau. Atlanta-Sandy Springs-Marietta, GA Metropolitan Statistical Area, *American Community Survey*, 2006. factfinder.census.gov/. Accessed July 28, 2008.

(22) US Census Bureau. New York-Northern New Jersey-Long Island, NY-NJ-PA Metropolitan Statistical Area, *American Community Survey*, 2006. factfinder.census.gov/. Accessed July 28, 2008.

(23) US Census Bureau. Washington-Arlington-Alexandria, DCVA-MD-WV Metropolitan Statistical Area, *American Community Survey*, 2006. factfinder.census.gov/. Accessed July 28, 2008.

(24) Texas Transportation Institute. Key Mobility Measures – 2005. *2007 Annual Mobility Report*. http://mobility.tamu.edu/ums/. Accessed November 12, 2008.

(25) Faraway, J.J. *Practical regression and ANOVA using R*, 2002. ww.maths.bath.ac.uk/%7Ejjf23/book/. Accessed July 28, 2008.

(26) Yale Center for Environmental Policy and Law. *2007 Environment Survey – Key Findings*, 2007. research.yale.edu/envirocenter/uploads/epoll/YaleEnvironmentalPoll2007Keyfindings.pdf. Accessed July 28, 2008.

(27) J. C. Newman, D. C. Des Jarlais, C. F. Turner, J. Gribble, P. Cooley, D. Paone, The differential effects of face-to-face and computer interview modes, *American Journal of Public Health, 92*, pp. 294-297, 2002.