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ABSTRACT

This paper describes the findings of a comprehensive evaluation of traveler reactions to congestion pricing concepts for the Tappan Zee Bridge in Westchester County, New York. Central to the Tappan Zee Bridge Congestion Relief Study was an analysis of traveler reactions to congestion pricing concepts. The bridge is already tolled and the existing structure of steep commuter discounts for passenger vehicles runs directly counter to the pricing schemes that would be used to reduce peak period delays. A comprehensive program of qualitative and quantitative survey research was specified to determine how existing corridor travelers felt about congestion pricing concepts and to determine how they would likely behave if the concepts were implemented.

The focus groups conducted as part of the study indicated, as have previous studies, that travelers must understand the congestion benefits and believe that they will accrue before supporting congestion pricing concepts. The quantitative surveys found that many travelers have some flexibility in when they can make their trips and will exercise that flexibility in response to tolls that vary by time-of-day. The surveys also found, when the concept and its potential benefits are explained, a slight majority favor congestion pricing. Finally, the level of support does not appear to differ significantly across gender or income categories.

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- value
- pricing
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- congestion
- preference

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INTRODUCTION

Using pricing as a means for reducing traffic congestion is a relatively simple concept. However, this concept evokes a wide range of reactions among those who are potentially affected by its implementation. Whether congestion pricing can be implemented in practice and whether it will achieve its objectives depend directly on the nature of these reactions. This paper describes the findings of a comprehensive evaluation of traveler reactions to congestion pricing concepts for the Tappan Zee Bridge between Westchester and Rockland Counties in New York.

The work on this project was funded as one of the Federal Highway Administration's ten current congestion pricing pilot projects. The Congestion Pricing Pilot Program, authorized by the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991, encourages the study and implementation of congestion pricing, which is a market-based approach to traffic management that involves charging higher prices for travel on roadways during periods of peak demand. As described in the U.S. Department of Transportation Federal Highway Administration's April 1996 Report On The Congestion Pricing Pilot Program, congestion pricing, also known as peak-period pricing or road pricing, is designed to maximize existing highway capacity by encouraging some travelers to shift to alternative times, routes, or modes of transportation. The follow-on to this program is the Value Pricing Pilot Program authorized by the Transportation Equity Act for the 21st Century (TEA-21).

The purpose of the Tappan Zee Bridge Congestion Relief Study is to provide an initial evaluation of the use of pricing to relieve congestion in the Tappan Zee Bridge corridor. Although the results reported here are specific to this corridor, the work provides additional details about travelers' reactions to congestion pricing concepts beyond what has been reported previously.

PROJECT BACKGROUND

The Tappan Zee Bridge is a toll facility owned and operated by the New York State Thruway Authority that connects Westchester and Rockland Counties in the suburbs of the New York City metropolitan area. Fixed one-way tolls of \$1.00 for commuters and \$3.00 for non-commercial cash customers are collected in the southbound direction at a toll plaza located on the east side of the Hudson River. The seven-lane, five-kilometer (three-mile) bridge carries I-87/I-287 across the Hudson River. I-87/I-287 is a highly congested

route with a large volume of commuter traffic. The 1997 average annual weekday traffic at the bridge was 124,700, with one-way morning peak-hour volumes of more than 7,000 vehicles. Over 35% of the southbound daily traffic occurs during the period between 6:00 a.m. and 10:00 a.m., and speeds during the morning peak period are frequently below 48 kilometers per hour (30 miles per hour). The nearest alternate river crossings are the George Washington Bridge and the Bear Mountain Bridge located approximately 27 kilometers (17 miles) to the south and north, respectively.

Both Rockland and Westchester County are in non-attainment of the Clean Air Act Amendments of 1990. The New York State Thruway Authority has implemented a variety of programs to help minimize congestion on the bridge. E-Z Pass electronic toll collection, used by over 75% of vehicles crossing the bridge in the morning peak hour, allows traffic to flow through the toll collection area more smoothly, reducing delays. A reversible lane, achieved by moving a barrier from one side of the center lane to the other, provides additional capacity in the peak direction. For commercial vehicles, tolls were recently increased and peak-period pricing was implemented to encourage trucks to use alternate routes and travel at off-peak times. Despite these efforts as well as increased bus service in the corridor, the Tappan Zee Bridge remains congested, especially during the morning peak period.

The Tappan Zee Bridge is being considered for a congestion pricing program because it lies in a strategic location to affect commuter patterns in the region. It is located on one of the area's major commuter routes, and it is the only Hudson River crossing in the vicinity of the major employment centers located in and around the city of White Plains, New York. The purpose of a congestion pricing program would be to reduce congestion, and thereby improve air quality. Under a congestion pricing program tolls would potentially be increased during the peak traffic period, which for this study is defined as weekdays from 7:00 a.m. to 9:00 a.m. In addition, toll incentives could be offered to high occupancy vehicles and E-Z Pass electronic toll collection users.

The overall purposes of this study were to:

- ◆ Determine what changes in the toll schedule at the Tappan Zee Bridge toll plaza are necessary to alter travel patterns and mode choices in the corridor so that congestion is reduced,
- ◆ Assess the resulting potential benefits/costs and impacts that such a program would have in the region, and

- ◆ Develop a computer model, designed to analyze the impacts of various congestion pricing alternatives.

The study of congestion pricing options is being managed by the New York State Thruway Authority with a Steering Committee consisting of transportation stakeholders, that include representatives from the New York State Thruway Authority, the New York State Department of Transportation, the Federal Highway Administration, the New York State Bridge Authority, Port Authority of New York and New Jersey and Westchester and Rockland Counties. The Capacity and Pricing Working Group of the Mid-Hudson South Mobility Advisory Committee, acts as an advisory committee for the study. Resource Systems Group, Inc. is conducting the study with Wilbur Smith Associates and Howard/Stein-Hudson Associates.

RESEARCH APPROACH

Central to the Tappan Zee Bridge Congestion Relief Study is an analysis of traveler reactions to congestion pricing concepts. This information in turn will be used to determine what changes in toll structure are necessary to alter travel patterns and mode choices in the corridor, so that congestion is reduced. The bridge is already tolled and the existing structure of steep commuter discounts for passenger vehicles runs directly counter to the pricing schemes that could be used to reduce peak period delays. A comprehensive program of qualitative and quantitative survey research was specified to determine how existing corridor travelers felt about congestion pricing concepts and to determine how they would likely behave if the concepts were implemented.

The qualitative component of the research included focus groups with travelers, conducted both before and after the quantitative survey. The “before” focus groups were used to identify general reactions to the concepts and likely response under different scenarios. The “after” focus groups were formed using respondents from the quantitative survey who fell into each of three categories of receptivity to congestion pricing. One-on-one interviews and a series of focus groups with major employers in the region also were conducted to determine their willingness to support the flexibility in work hours that would increase the effectiveness of congestion pricing.

The quantitative research component consisted of a detailed stated preference survey of travelers in the Tappan Zee Corridor. The survey was administered as a multi-method, multi-instrument questionnaire to car and transit travelers in the general corridor. The survey collected data on current travel and attitudes

about congestion pricing. It presented the pricing concepts being studied and collected trade-off information about choices among travel alternatives such as paying a higher toll to travel during the peak period, paying a lower toll and changing the time of travel, carpooling, taking an alternate route, using transit, or not making the trip. The stated preference data were used to develop a nested logit model that estimates the degree of competition among travel alternatives and, in turn, is used to forecast the effects of congestion pricing concepts.

A separate commercial vehicle survey was conducted to collect data on the travel patterns and preferences of commercial vehicle operators. Commercial vehicle interviews were conducted to determine and quantify factors that impact truck routing decisions.

TRAVELER REACTIONS: INITIAL QUALITATIVE FINDINGS

Three focus groups were conducted as one of the initial study tasks to determine, generally, how corridor travelers would react to the concept of congestion pricing. Participants were recruited randomly by phone from a list of E-Z Pass customers. The focus groups began with discussions of participants' current travel in the corridor, the degree of flexibility in their travel patterns, their opinions about travel conditions and their suggestions for ways that conditions could be improved. The moderator then introduced congestion price concepts and asked how such changes would affect participants' travel patterns and, in general, how they felt about the concepts.

In the first focus group, the concepts were presented with no exposition from the moderator about the possible benefits that might accrue to peak period travelers from reduced peak period travel times. In that group, the participants were substantially negative to the pricing concepts presented, perceiving no direct benefits to themselves and seeing the potential price changes as threatening what they saw as a vested right to commuter discounts. They also suspected that price changes would be used to increase revenues to the Thruway Authority, with no return in the form of bridge improvements.

In subsequent focus groups, the introduction of congestion pricing concepts was preceded by an explanation of how even modest changes in peak traffic demands can reduce both the average and the variability of travel times. In these groups, the concept was received more positively overall, but some participants remained skeptical as to whether enough travelers would change their patterns to result in the types of peak period travel time savings that were described. Some of the participants indicated that they

had considerable flexibility over when they made their trips and that pricing changes would cause them to shift times of travel. Others said that, while their employers officially sanctioned flexible hours, in practice they would not be allowed to change their work times. And, some said that, in any case, family, personal or carpooling obligations would prevent them from shifting travel periods.

Participants were mixed as to whether they preferred pricing options that increased total toll revenues, but a significant majority felt that any increased revenues should be spent to improve traffic conditions on the bridge and/or the corridor.

The findings from the focus groups were used to specify and refine a structured quantitative survey that paralleled the focus group discussion guide. The following section describes the design and findings from that survey.

TRAVELER REACTIONS: SURVEY FINDINGS

Survey Design

The quantitative survey was designed to cover the same basic issues as the focus groups, but to provide population-representative information about traveler reactions to the congestion pricing concepts. The questionnaire included four major sections: 1) questions defining the respondents' current travel patterns, levels of flexibility and general opinions about toll pricing alternatives, 2) a description of congestion pricing, 3) stated preference experiments designed to elicit information about likely response to change in pricing and 4) follow-up opinions and demographic data.

This traveler survey was designed to be administered to weekday peak-period travelers and potential travelers on the Tappan Zee Bridge (TZB). Since the purpose of congestion pricing is to encourage travelers to avoid driving alone during periods of peak congestion, the primary target group was individuals who travel frequently during the busiest part of the peak period (7:00 a.m. - 9:00 a.m.). Both E-Z pass users and cash customers were included in this target group.

Also included in the survey sample were people who might begin driving on the TZB during the peak period, if peak period congestion were reduced. Travelers who could potentially switch into the peak and who were therefore included in the survey were those who currently:

- travel during the less busy part of the peak period, called the "shoulder" period (6:00 a.m. - 7:00 a.m. or 9:00 a.m. - 10:00 a.m.),

- travel by carpool during the peak period (7:00 a.m. - 9:00 a.m.),
- use an alternate route during the peak period (7:00 a.m. - 9:00 a.m.), or
- use transit during the peak period (7:00 a.m. - 9:00 a.m.).

The seven traveler population segments that were covered by the survey are described in Table 1

Because the target respondents use different travel modes and payment methods and because their options with congestion pricing would differ, a multi-instrument multi-method survey plan was developed. The different survey instruments and recruiting methods were used together in various combinations to reduce bias and ensure that the survey was available and convenient to all types of potential respondents. Each of the survey instruments included detailed revealed preference information that provide a partial check on the stated preference responses.

Three distinct survey instruments were developed:

- 1) *Printed*: developed for TZB cash customers (both peak and shoulder period) and transit users. The stated preference section was customized for these three market segments and used a fixed fractional factorial design (an experimental plan designed to efficiently measure respondent preferences).
- 2) *Computer-based*: available on the Internet to all auto travelers (E-Z Pass and cash customers, peak or shoulder period travelers, people driving alone or in a carpool, and TZB or alternate route travelers). It was also made available at two locations in the study area on desktop computers. This version of the questionnaire provided maximum flexibility and internal data validation. The stated preference section was customized to the market segment of each respondent and used a randomized experimental design.
- 3) *Combination telephone and mail (“phone-mail-phone”)*: available to TZB E-Z Pass users traveling during the peak or shoulder periods, TZB carpool members, and alternate route travelers. All trip description and demographic questions were asked over the phone during initial contact. The stated preference section was mailed to the respondent, and an interviewer called back to collect responses to the stated preference and follow-up attitude questions.

Respondents were recruited using four methods:

- 1) *Toll plaza handout:* cash-paying travelers on the TZB were recruited with a paper questionnaire and accompanying letter of explanation and instructions when they stopped to pay the toll. Each questionnaire was labeled with a password so that the recipient could take the Internet questionnaire instead of the paper version. All passwords were tracked to ensure that respondents did not complete both a paper-based and Internet questionnaire. A total of 6,650 paper questionnaires were handed out in all cash toll lanes between 6 and 10 a.m. on Thursday, November 6; Wednesday, November 12; and Thursday, November 13.
- 2) *Transit on-board:* riders using transit to cross the TZB during the peak period were recruited on board the bus. Bus riders were asked to complete a paper questionnaire during the trip and hand it back to the survey administrator. They also had the option of returning the completed questionnaire by mail. On eight busses that crossed the Tappan Zee Bridge between 7 and 9 a.m. on Wednesday November 5 and Friday November 7, 165 paper survey forms were distributed.
- 3) *Intercept:* TZB peak and shoulder period travelers were intercepted at two locations in the study area and recruited for the computer-based questionnaire. Four desktop computers were set up at these locations so respondents could participate in the survey immediately. Professional interviewers assigned respondents to a survey station and assisted with questions or concerns. Anybody interested in the survey but without time to take it right away was given a password to take it over the Internet when convenient. Over 400 respondents completed the computer-based interview during 50 hours of recruiting on three weekends in November between approximately 11 a.m. and 6 p.m.
- 4) *Telephone:* current E-Z Pass users and alternate route travelers were recruited by telephone primarily for the Internet questionnaire. They were given a survey password over the phone or, if they did not have Internet access, were administered the phone-mail-phone version of the questionnaire. About 1750 E-Zpass customers were contacted by phone over a one-month period that overlapped the transit on-board and intercept survey administration dates.

Except for transit users, each segment was offered at least two different ways of completing the questionnaire. Table 1 shows a matrix of the different recruitment methods and survey instruments available to each segment. The three instruments (computer-based, paper, and phone-mail-phone) are shown together with the four types of recruiting (phone, intercept, toll booth hand-out, and bus hand-out) in the three right-hand columns. The far left column identifies the sample segments by number (refer to Table 1). Phone recruitment in the “computer” column represents recruiting specifically for the Internet survey.

Two basic scripts were developed for the survey questionnaire:

- 1) Version 1, for all auto travelers, was developed in paper-based, computer-based, and phone-mail-phone formats.
- 2) Version 2, for transit users, was developed in a paper-based format only. It asks questions specific to a transit trip.

In the stated preference section of the survey, respondents were presented with a set of experiments in which they were asked to indicate their likely choice among future options for a trip like the one they described. Respondents selected the one option they would most likely choose among the following travel options.

- Drive on the Tappan Zee Bridge at the same time you do now
- Drive on the Tappan Zee Bridge at a different time
- Drive on the next best bridge
- Registered carpool with toll discount on the Tappan Zee Bridge
- Ride a new bus across the Tappan Zee Bridge
- Do not make the trip

The travel times, toll costs, and certain other attributes of the travel options were varied from one experiment to another. The attributes and levels that were presented to people who traveled during the peak period and paid the toll with E-Z Pass are listed in Table 2. The table shows the levels that were used for both the paper-based/phone-mail-phone and the computer based version of the survey for this segment.

The levels of some attributes for the computer-based survey were customized based on the respondents' answers to previous questions. For example, the time of day when the respondent crossed the bridge was used to determine whether to present an earlier or later bridge crossing time for the time-shift alternative. Respondents were shifted away from the midpoint of the peak period toward the nearest shoulder period.

Customized sets of options and attribute levels were developed for each of the seven different traveler segments. For example, people who paid the toll in cash (current toll \$3.00) were presented with peak

period toll costs of \$4.00, \$5.00, and \$6.00, rather than the costs of \$1.50, \$2.50, and \$5.00 shown to current E-Z Pass travelers (current toll \$1.00). Also, respondents who currently travel in the shoulder period were presented with shoulder period travel times that were the same as, 5 minutes more than, or 10 minutes more than current travel time; whereas current peak-period travelers saw shoulder period travel times of 5 minutes less than, 10 minutes less than, and 15 minutes less than current travel time.

Figures 1 and 2 show a paper-based/phone-mail-phone and a computer-based stated preference experiment, respectively.

The Survey Sample

Over 3,000 travelers and potential travelers across the Tappan Zee Bridge completed the survey questionnaire. The response to the computer-based and telephone survey instruments was particularly high: 41% of respondents took the electronic version of the questionnaire (either over the Internet or at a central location where desktop computers were provided), and 34% completed the phone-mail-phone type of survey. All seven traveler types are represented in the sample, although peak and shoulder E-Z Pass users together were targeted and therefore make up the largest segment (Figure 3).

The response rates for the telephone and computer-based surveys were well over 50%, however, there is always an opportunity for non-response bias. To reduce self-selection biases, individuals were recruited into the survey using only a general description of its content as dealing with planning in the Tappan Zee Bridge corridor.

While no independent data are currently available on the demographics of each of the traveler segments targeted in the survey, a comparison of the demographics of survey respondents to 1990 Census of the Population data shows that the survey sample includes age, gender, and employment industry representation that is similar to the resident population. Variations in the distributions are most likely attributable to the differences between the commuting population and the resident population. In any case, the survey data indicate no distinct demographic patterns in the time periods used for travel. Figure 4 shows income distributions by travel period.

Travel Period Flexibility

Survey participants were asked how much flexibility they had in making their trip. They were instructed to consider current restrictions like employer policies and personal issues before deciding how much earlier

or later they could have made their trip. Travelers in all segments exhibited some flexibility in making their trip earlier but reported less flexibility in making the same trip later. In all, 72% of auto travelers said they could change the timing of their trip (Table 3). The data show no substantial difference in degree of flexibility between men and women, nor is there a material difference among income categories.

Respondents describing a work trip were also asked if their travel flexibility would change if their employer allowed a change in work schedule. They were instructed to assume that other travel considerations (like coordinating with family members) remained the same. Employees in all segments showed more ability to shift their trip to a later time than to an earlier time. For peak period travelers using E-Z Pass, average flexibility to make their work trip earlier would increase by about 10 minutes if employers allowed schedule changes, and average flexibility to make their work trip later would increase by about 13 minutes.

The tabulations of flexibility should be interpreted only as an indication that travelers are willing to consider travelling at an alternative time of day.

Opinions about Congestion Pricing

All versions of the survey asked respondents for their opinion of congestion pricing before giving them any information about it. After providing information on transportation changes being considered for the Tappan Zee corridor and describing congestion pricing, the survey asked again for the respondents' opinion. Survey data indicate that the overall feeling about congestion pricing is generally favorable, and that opinions improve after receiving more information. However, favorable opinions tend to be much weaker than unfavorable opinions.

Information was provided to respondents in two ways. The first was a series of bulleted lists describing what congestion pricing is and what impacts it could have. The second way that information was provided was through the stated preference experiments where respondents were presented with a series of situations with varying toll costs and time savings for a variety of travel options. The scenarios showed toll costs as high as \$5 or \$6 in the peak period and time savings during the peak period of up to 15 minutes. It should be noted that some of the price and travel time scenarios shown may be outside the range of what could realistically be implemented.

Just over 50% of all respondents either strongly favored or somewhat favored congestion pricing on the Tappan Zee Bridge, while about 30% were opposed or strongly opposed. There was only a slight variation in opinion across survey segments, with E-Z Pass peak travelers were more opposed to congestion pricing than other groups. There was virtually no difference in opinion between men and women. Travelers with different income levels appear not to differ strongly in their opinions (Figure 5).

Survey respondents were also asked about their feelings regarding tolls for truck traffic. All auto traveler segments overwhelmingly favor congestion pricing for commercial vehicles. When asked what their preference was for utilizing peak surcharges, about 40% of all auto segments said they would prefer a decrease in off-peak tolls. The next most favored option was improving the Tappan Zee Bridge, followed by other highways improvements in the area.

The survey explained that, although Tappan Zee Bridge toll revenue could not be used to improve transit service because of bond regulations, other agencies could provide these improvements. When asked which one of four transit improvement options they would most favor, more than 40% of each of the auto segments said they would prefer no improvement in transit. Of the transit options, 'More bus routes in Rockland County' and 'More frequent bus service' were the two improvements selected most frequently overall. Except for a slightly stronger preference for 'More bus routes in Westchester County', the transit improvement opinions of peak period E-Z Pass travelers are similar to the opinions of all auto travelers.

Preferences among Travel Options

The stated preference data from all versions of the survey were combined into a single dataset of over 15,000 observations. Each choice observation includes the information from one of nine stated preference experiments presented to a respondent. Each stated preference experiment comprises a choice among up to six travel alternatives:

- Drive on the Tappan Zee Bridge at the same time you do now
- Drive on the Tappan Zee Bridge at a different time
- Drive on the next best bridge
- Registered carpool with toll discount on the Tappan Zee Bridge (not available to cash customers)
- Ride a new bus across the Tappan Zee Bridge
- Do not make the trip

Some alternatives were unavailable to certain individuals. For example, the carpool option was not shown to people who currently pay the toll with cash. Auto options were excluded from the analysis for

transit users who do not have a car, and the alternate route option was considered unavailable to individuals who have no knowledge of the travel characteristics of the next best route.

The stated preference data were tabulated to determine the degree to which respondents substituted different travel options when prices were varied. The tabulations indicate that most travelers do actively consider changing some aspect of their travel in response to pricing changes. Figure 6 shows the fractions of experiments in which respondents chose alternatives other than their current travel mode, route and time of day.

These tabulations should be interpreted only as an indication that travelers do consider alternatives; the price ranges and conditions tested may be outside the range of what could realistically implemented. The primary use of the stated preference experiments was to construct travel choice models that can be used to test the effects of different pricing options. Nested logit models were developed that describe choices among options using the current travel route and those that use other routes or modes. The variables in the model include travel service components such as travel time and cost as well as variables that describe the offset between the traveler's current travel time and the "edge" of the time-of-day rate.

The model coefficients indicate, in general, that price changes can push travelers to make their trips earlier or later by approximately equal amounts. Two types of demographic effects on this willingness to shift time period were identified. First, as would be expected, it was found that income affected the respondents' value of time; in general, higher income travelers have higher values of time. This translates into a lower propensity of higher income travelers to shift time-of-day for a given price differential. Second, it was found that employment type affected willingness to change the time of day of travel. Specifically, employment as a school teacher or a government worker significantly reduced willingness to shift to an earlier time period. Outside of these effects, no other demographic effects were identified; for example, there was no apparent gender influence.

The choice models developed using the survey data and detailed in the project report, are part of a travel forecasting model that is being used to evaluate the amount of traffic diversion that will result from congestion pricing schemes.

FOLLOW-UP QUALITATIVE STUDY

A set of three focus groups was conducted after the quantitative survey was completed. The purpose of these groups was to determine, in more detail, the reasons that travelers responded the way that they did to the survey questions. The groups were constituted so that one included only those who indicated strong opposition to congestion pricing concepts, the second has those who indicated that they strongly supported the concept and the third included those who were somewhat neutral.

The focus group discussions indicated, first, that the reasons travelers reacted the way they did were quite varied. It was also apparent that those who opposed the concept were quite firm in their opposition. Those who indicated that they were neutral appeared to be easily swayed to opposition and somewhat more difficult to convince of the desirability of the concepts. Those who indicated on the survey that they supported the pricing concept had relatively low levels of commitment to the concept.

CONCLUSIONS

The purpose of this study was to provide a detailed analysis of the travelers' reactions to congestion pricing concepts for the Tappan Zee Bridge. However, the findings presumably provide an indication of the way travelers would respond to projects that may be planned elsewhere. It is clear that travelers are primarily concerned about the effects any changes would have on their travel times and costs. They are very quick to recognize the possibility that their travel costs may increase but have a more difficult time understanding the benefits that might accrue in the form of reduced peak period congestion. In part, this appears to be because they do not believe that price changes will influence enough other peak period travelers to reduce congestion levels. Similar reactions have been noted in previous studies.

The survey indicated that many travelers will actively consider time-of-day shifts when peak period prices are increased. Although a number of travelers are constrained somewhat by personal and employment obligations, many do have some flexibility and will exercise that flexibility when the toll structure varies by time-of-day. Thus, in practice, the travel time benefits could be obtained at some price.

The more surprising finding of this work is that there are not pronounced differences among major demographic segments in the receptiveness to congestion pricing concepts. In particular, the quantitative survey identified no differences in the stated support for congestion pricing across income or gender

categories. While the income profile of the Tappan Zee Bridge travelers is decidedly upscale, there are low income travelers and their opinions are not decidedly different from those of middle or upper income travelers. This may be explained in part by the fact that all segments place high value on the perceived benefit of reduced commuting times.

Overall, a slight majority across the full traveler population support congestion pricing concepts. However, the degree of that support appears to be somewhat more tenuous than the vehemence of those who oppose the concepts. Certainly, the case for congestion pricing would have to be articulated clearly and carefully to firm up the support and to persuade those who are “on the fence.”

TABLE 1: Matrix of Survey Sample and Survey Instrument Availability

SEGMENT	RESPONDENT POPULATION	COMPUTER		PAPER	PHONE-MAIL-PHONE
		PHONE	INTERCEPT	TOLL HAND-OUT BUS HAND-OUT	PHONE
1	Use the E-Z Pass commuter discount on the TZB during the peak period (7:00 a.m. – 9:00 a.m.)	✓	✓		✓
2	Pay the cash toll on the TZB during the peak period (7:00 a.m. – 9:00 a.m.)		✓	✓	
3	Use the E-Z Pass commuter discount on the TZB during the shoulder period (6:00 a.m. – 7:00 a.m. or 9:00 a.m. – 10:00 a.m.)	✓	✓		✓
4	Pay the cash toll on the TZB during the shoulder period (6:00 a.m. – 7:00 a.m. or 9:00 a.m. – 10:00 a.m.)		✓	✓	
5	Use E-Z Pass carpool discount on the TZB during the peak period (7:00 a.m. – 9:00 a.m.)	✓	✓		✓
6	Drive on an alternate route during the peak period (7:00 a.m. – 9:00 a.m.)	✓	✓		✓
7	Take a bus across the TZB during the peak period (7:00 a.m. – 9:00 a.m.)			✓	

TABLE 2: Attributes and Levels for Peak Period E-Z Pass-Paying Tappan Zee Bridge Travelers

Drive on the Tappan Zee Bridge at the Same Time You Do Now		
Travel Time	<ul style="list-style-type: none"> • 5 minutes less • 10 minutes less • 15 minutes less 	
TZB Toll	<ul style="list-style-type: none"> • \$1.50 • \$2.50 • \$5.00 	
Drive on the Tappan Zee Bridge at a Different Time		
Time of Day	For Computer: <ul style="list-style-type: none"> • 60 minutes earlier/late* • 45 minutes earlier/late* • 20 minutes earlier/late* *(used later if current time is after 8:00 a.m.)	For Paper and Phone-Mail-Phone: <ul style="list-style-type: none"> • 45 minutes earlier • 20 minutes earlier • 20 minutes later
Travel Time	<ul style="list-style-type: none"> • 5 min. less • 10 min. less • 15 min. less 	
TZB Toll	<ul style="list-style-type: none"> • 50¢ • \$1.00 • \$1.25 	
Drive on the Next Best Bridge		
Travel Time	<ul style="list-style-type: none"> • 10 min. less than next best bridge takes now • same time as next best bridge takes now • 10 min. more than next best bridge takes now 	
Toll	<ul style="list-style-type: none"> • same toll as next best bridge has now (not varied) 	
Carpool on the Tappan Zee Bridge		
Occupancy	<ul style="list-style-type: none"> • 2 or more people • 3 or more people 	
Travel Time	For Computer: <ul style="list-style-type: none"> • 5 minutes less than your trip takes now • same time as your trip takes now • 5 minutes more than your trip takes now 	For Paper and Phone-Mail-Phone: <ul style="list-style-type: none"> • same time as your trip takes now
TZB Toll	<ul style="list-style-type: none"> • No toll • 50¢ • 25¢ 	
Ride a New Bus Across the Tappan Zee Bridge		
Mode	For Computer, if destination is New York City: <ul style="list-style-type: none"> • Ride new Bus • Ride New Bus and Connect to Train 	For Paper, Phone-Mail-Phone, and Other Computer: <ul style="list-style-type: none"> • Ride new Bus
Travel Time	<ul style="list-style-type: none"> • 10 minutes less than your trip takes now • same time as your trip takes now • 15 minutes more than your trip takes now 	
Fare	<ul style="list-style-type: none"> • 50¢ to Westchester or \$1.00 to other places • 75¢ to Westchester or \$200 to other places • \$1.25 to Westchester or \$400 to other places 	
Do not make the trip		
-	-	

FIGURE 1: Example Paper-Based and Phone-Mail-Phone Stated Preference Experiment

SITUATION 1

Which one of the six options below would you choose for this situation?

<div style="background-color: black; color: white; text-align: center; padding: 2px; font-weight: bold; margin-bottom: 5px;">Option 1</div> <p style="text-align: center; font-weight: bold;">DRIVE ON TAPPAN ZEE BRIDGE at the SAME TIME as you do now</p> <p style="text-align: center;">Trip takes 5 MINUTES LESS than your trip takes now</p> <p style="text-align: center;">\$1.50 EZ Pass toll on Tappan Zee Bridge</p> <p><input type="checkbox"/> I'll pay more and save time</p>	<div style="background-color: black; color: white; text-align: center; padding: 2px; font-weight: bold; margin-bottom: 5px;">Option 2</div> <p style="text-align: center; font-weight: bold;">DRIVE ON TAPPAN ZEE BRIDGE 20 MINUTES LATER than you do now</p> <p style="text-align: center;">Trip takes 15 MINUTES LESS than your trip takes now</p> <p style="text-align: center;">\$1.25 EZ Pass toll on Tappan Zee Bridge</p> <p><input type="checkbox"/> I'll save time but leave later</p>	<div style="background-color: black; color: white; text-align: center; padding: 2px; font-weight: bold; margin-bottom: 5px;">Option 3</div> <p style="text-align: center; font-weight: bold;">DRIVE ON THE NEXT BEST BRIDGE</p> <p style="text-align: center;">Trip takes the SAME TIME as next best bridge takes now</p> <p style="text-align: center;">SAME TOLL as the next best bridge has now</p> <p><input type="checkbox"/> I'll change my route</p>
<div style="background-color: black; color: white; text-align: center; padding: 2px; font-weight: bold; margin-bottom: 5px;">Option 4</div> <p style="text-align: center; font-weight: bold;">CARPOOL of 3 or more people on TAPPAN ZEE BRIDGE</p> <p style="text-align: center;">Trip takes the SAME TIME as your trip takes now</p> <p style="text-align: center;">25¢ EZ Pass toll on Tappan Zee Bridge</p> <p><input type="checkbox"/> I'll carpool and pay less</p>	<div style="background-color: black; color: white; text-align: center; padding: 2px; font-weight: bold; margin-bottom: 5px;">Option 5</div> <p style="text-align: center; font-weight: bold;">RIDE A NEW BUS ACROSS THE TAPPAN ZEE BRIDGE</p> <p style="text-align: center;">Trip takes the SAME TIME as it takes you now</p> <p style="text-align: center;">\$1.25 fare to Westchester \$4.00 fare to other places</p> <p><input type="checkbox"/> I'll use transit and pay less</p>	<div style="background-color: black; color: white; text-align: center; padding: 2px; font-weight: bold; margin-bottom: 5px;">Option 6</div> <p style="text-align: center; font-weight: bold;">DO NOT MAKE THE TRIP</p> <p><input type="checkbox"/> I won't make the trip at all</p>

FIGURE 2: Example Computer-Based Survey Stated Preference Experiment

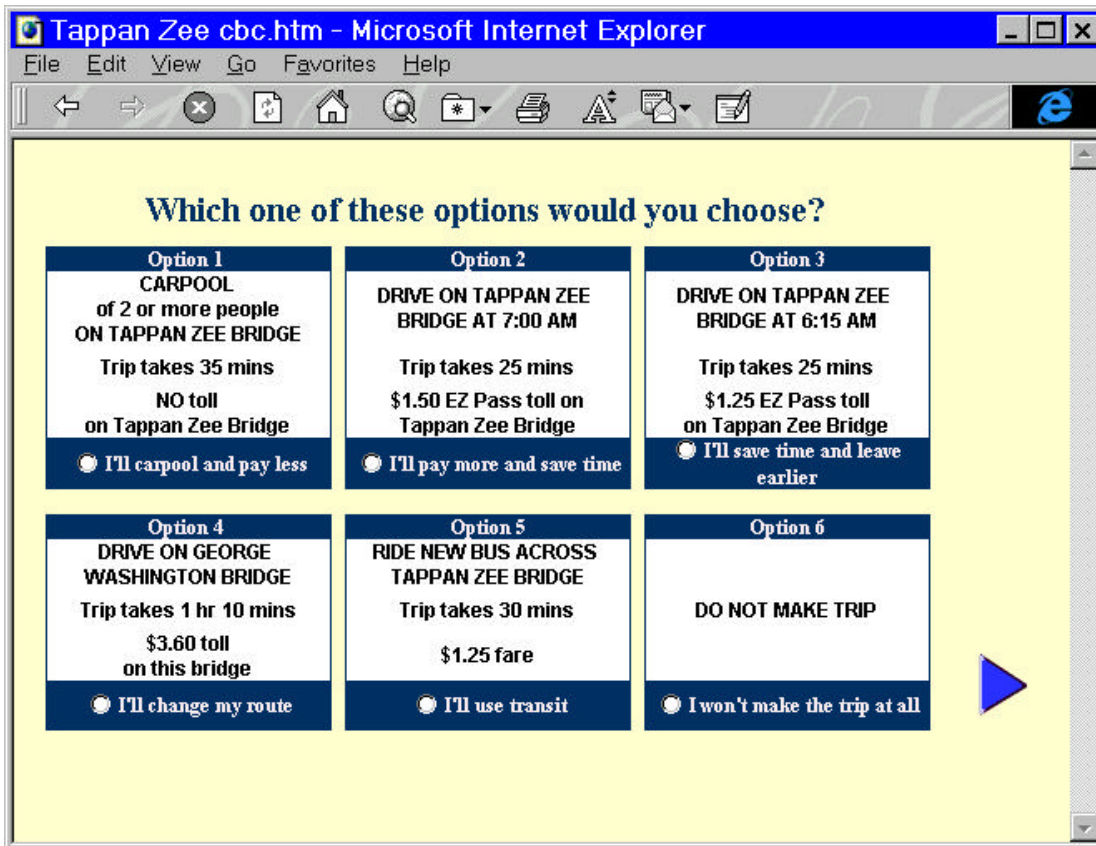


FIGURE 3: Representation of Trip Types

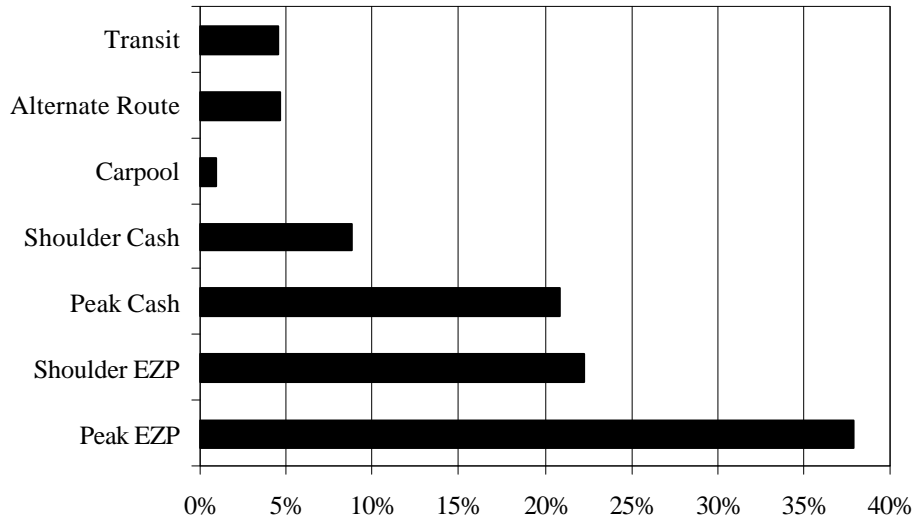


FIGURE 4: Income Groups by Time Period

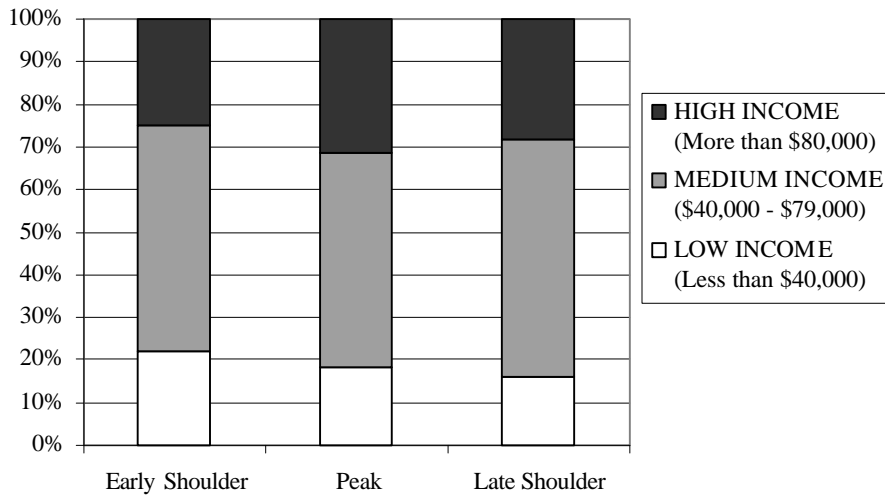


Table 3: Percentage of Respondents Exhibiting Travel Flexibility¹

	No later	Up to 30 min. later	More than 30 min. later	ROW PERCENT
No earlier	28%	10%	4%	42%
Up to 30 min. earlier	28%	18%	3%	49%
More than 30 min. earlier	6%	2%	2%	10%
COLUMN PERCENT	62%	29%	9%	100%

¹ The cells in this table represent percent of total auto travelers. For example, 28% of all auto travelers reported being unable to shift their trip either earlier or later. Another 28% said they could travel 5 –30 minutes earlier but not at all later and 10% said they could leave 5 –30 minutes later but not at all earlier. The bottom row is the sum of all the column percentages (e.g.: a total of 62% said they could not shift their trip to a later time) and the far right column shows row totals (e.g.: 42% could travel no earlier).

FIGURE 5: Opinion of Peak Period Travelers

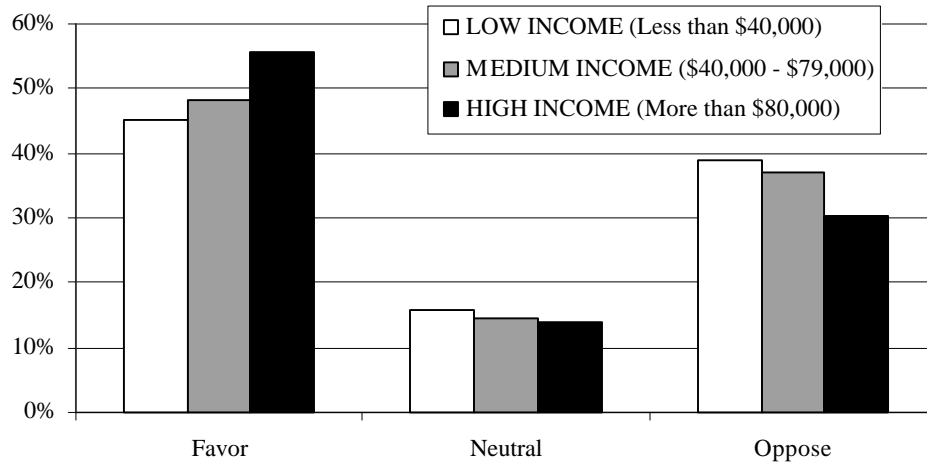
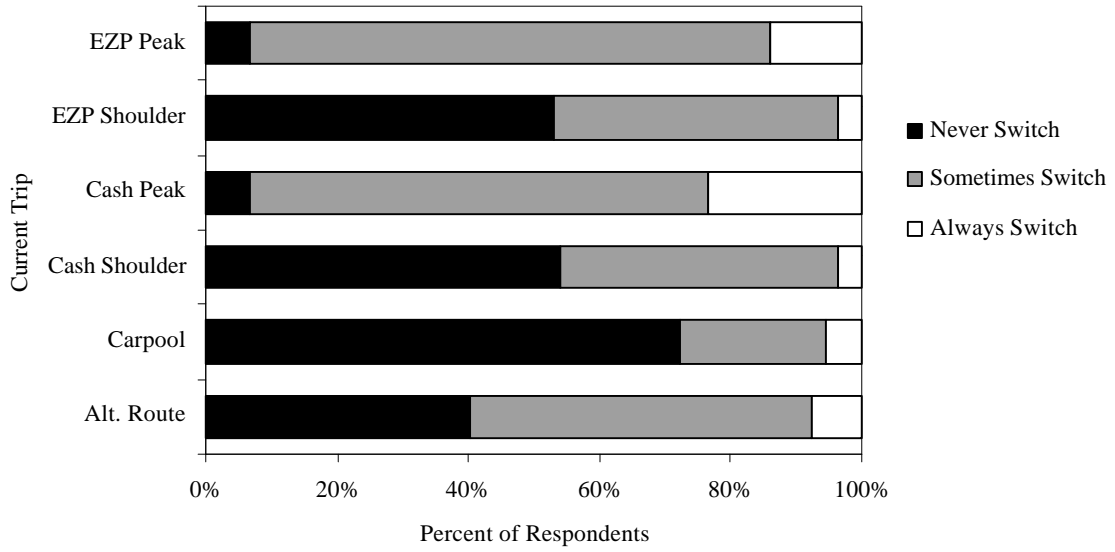


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