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Answering Aggregation Questions in Contingency Valuation of Rural Transit Benefits

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16. ABSTRACT

While the qualitative benefits of transit are relatively well known, quantifying the benefits of transit is still a developing methodology. Quantifying benefits offers improved operational management and planning as well as better information for policy makers. But most benefits are in non-market areas and, as such, require tools like contingent valuation to quantify them. This tool has several implementation problems, one of which is how to aggregate individual quantitative responses into regional or system wide total benefits.

This study looks at the alternatives of aggregation via households versus individual responses, seeking the appropriate aggregation level. A data set from responses to an earlier TransNow research project is used as a base. Telephone interviews with those respondents will investigate socioeconomic characteristics, relative importance of benefits and the level of aggregation applicable to each respondent. The results should answer aggregation questions and provide improved estimates of benefits.

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Executive Summary

Quantifying benefits for publicly provided services and goods is an essential but difficult task for determining optimum provision levels. Often the arguments over provision of these public goods stem from measurement problems; we truly do not know the overall community benefits of providing free public transit, or the future impact of the loss of a particular species. In this study, a contingent valuation survey method is used to measure user and non-user benefits for publicly provided regional transit services in rural areas. Then, the question of specific aggregation techniques is presented. The techniques used could easily be adapted for evaluating the provision levels for other publicly provided goods and services.

Nearly all forms of travel, including public transit, receive government support in the form of financial subsidies, land allocation, and agency resources. The rationale for such support, from personal or institutional perspectives, relates to benefits that can be broadly classified as mobility and efficiency benefits. The very nature of rural areas means that passenger needs are usually met by privately owned and operated personal vehicles. The growth in private automobiles has led to increased independence in rural areas for those who have access, physically and economically, to such vehicles. At the same time, it has also exacerbated the isolation of those dependent on such services as the overall demand for public transit has declined. Mobility benefits result from increased travel options, particularly for people who have mobility limitations or are without access to any form of alternative transportation (often in rural areas). Efficiency benefits result from savings that result when transit is used in place of less efficient modes, if such alternative modes exist in rural areas.

While the qualitative benefits of transit are relatively well understood, quantification of transit benefits is still a developing methodology. Estimation in a quantitative, rather than qualitative manner, of these transit benefits is difficult, requiring estimation and summing those benefits ascribed to users, non-users, and those that want the option for them and others to use it, if and when needed.

The total benefits of two regional transit systems in rural areas in Washington State were quantified in a previous study. A novel method of collecting contingent valuation method (CVM) data was employed, one that may be particularly suitable for small-scale policy studies. Alternative estimates of the total benefits for the two regions under study were presented, based on different methods of aggregating the results. This report details follow up work to narrow down the range of benefits as aggregation occurs. The overall purpose of this study was to determine an appropriate procedure (household or population) to aggregate the quantified individual estimates of the non-market user and non-user benefits of transit.

The specific survey for this study used the original list of the panels of participants. They were contacted and interviewed relative to what basis (individual or household) they had been considering in their earlier responses. Additional information on household size and composition was also requested in this second survey.

Slightly more than half (56%) of respondents indicated that their initial "willingness to pay or accept" responses were their estimates for their entire household. Forty four percent of the contacted panel indicated their responses had been based on the value of the transit system, in the various scenarios, to them as individuals, allowing a point estimate.

The size and composition of the households allows an alternative-weighting scheme. Since the benefits to a household of six family members may be significantly different than a one-person household, the data were evaluated using the household membership information. The average family size was 2.59 people but there was a significant difference between those stating they responded as a household and those responding as individuals. Household responders had almost three family individuals, on average, compared to the individual responders with slightly more than two (2.93 to 2.17). Incorporating these findings, and weighting the initial response distribution by this information, produces a family weighted distribution of 63% of respondent family members being in the "response reflects household" versus 37% responding "as individuals". This provides an alternative method for developing point estimates of the aggregated value of transit benefits.

The earlier method of aggregation yielded estimates for the region of willing to pay for an efficient transit system of $3,386,000 to $6,115,000. Use of the point estimate distribution from this following study found that value to be $4,914,000. If the family weighted response is used, a reasonable estimate becomes $5,105,000. Thus, the new range, depending on the available information, is narrowed to $4,914,000 to $5,105,000.

Use of these extended datasets and methodology narrows the estimate of broad community benefits to $3,670,000 to $3,813,000. The third valuation question asked respondents to value their current public transit system (V-CURRENT SYSTEM), in addition to any fares currently being paid. The original aggregated benefit range of the current system of $2,535,000 to $4,578,000 decreased to $3,679,000 to $3,822,000 in the new analysis. Finally, the range for value of compensation to give up their access to public transit, originally a range of $16,395,000 to $29,609,000, now narrowed substantially to $23,795,000 to $24,720,000.

Utilizing the non-weighted responses, the combined value of the existing system and the broad community values (user and non-user values) is a point estimate of $7,349,000 per year, split about evenly between users and non-users. This provides policymakers a base of benefits against which to contrast investment and operating costs for alternative systems. Using the weighted responses increases the estimate of value by $286,000 or 3.9%. Thus, either of the two methods of analysis, at least in this pilot study, yields reasonably similar information for decision makers.

In summary, this analysis was able to provide preliminary point estimates of value of rural transit benefits. The statistical reliability of this sample was not determined; what is certain is that concerns about how to aggregate individual responses, whether by household or population, can be answered with the appropriate survey approach and design.

Introduction

Quantifying benefits for publicly provided services and goods is an essential but difficult task for determining optimum provision levels. What is the worth to society of public transit, of a new park, of better schools, or preservation of an endangered species? Often the arguments over provision of these public goods stem from measurement problems; we truly do not know the overall community benefits of providing free public transit, or the future impact of the loss of a particular species. If there are substantial non-user benefits, non-market evaluation may be necessary to determine total public benefits. In this study, a contingent valuation survey method is used to measure user and non-user benefits for publicly provided regional transit services in rural areas. Then, the question of specific aggregation techniques is presented. The techniques used could easily be adapted for evaluating the provision levels for other publicly provided goods and services.

Nearly all forms of travel, including public transit, receive government support in the form of financial subsidies, land allocation, and agency resources. The rationale for such support, from personal or institutional perspectives, relates to benefits that can be broadly classified as mobility and efficiency benefits (Litman). Mobility benefits result from increased travel options, particularly for people who have mobility limitations or are without access to any form of alternative transportation. Lack of alternative transportation is particularly common in rural areas. Efficiency benefits result from savings that result when transit is used in place of less efficient modes. In addition to these direct use benefits, we discover that indirect and non-user benefits of transit make significant contributions to total community-wide transit benefits. Transit systems contribute to the general social and economic infrastructure of a community, also known as its social capital.

The very nature of rural areas means that passenger needs are usually met by privately owned and operated personal vehicles. The growth in private automobiles has led to increased independence in rural areas for those who have access, physically and economically, to such vehicles. At the same time, it may also exacerbated the isolation of those dependent on such services as the overall demand for public transit has declined. Those without access to transportation in isolated rural areas may find themselves unable to take advantage of social service programs, to receive adequate medical care, to participate in the work force, or in some other way to provide for their basic human needs. Demand for public transit in rural towns and areas differs from that in urban areas in that the demand is less efficiently located, thus more costly to service. The density of movement with its attendant economies of size, is very low.

Mobility benefits provided by transit include economic benefits to society, personal benefits to citizens, equity benefits for mobility-limited citizens, and option value benefits for those with mobility options. An efficiency benefit of transit services refers to decreased costs from efficiency gains. These savings can be a direct result of reduced user costs for individuals using transit services. Economic development benefits include an increase in shopping and use of other services due to easier, less expensive access, with more dollars from private travel savings available to spend on other items. Other indirect efficiency benefits include a reduction in traffic congestion, reduced roadway costs, less air pollution, safety improvements, and a reduction in demand for parking.

While the qualitative benefits of transit are relatively well understood, quantification of transit benefits is still a developing methodology. There is little research in this area, particularly for rural transit. As reduced public transit eliminates opportunities for a range of rural residents for employment, recreation, training, and retraining opportunities, rural businesses face a shrinking customer and working pool. Rural residents, particularly the frail, elderly, youth below the driving age, the physically challenged and low income families, are very sensitive to transit availability due to the fact that they often must travel considerable distances to access basic human services. These characteristics, combined with the low-density nature of rural transit, indicate some special benefits could be achieved from provision of transit in rural areas.

Problem Statement

Estimation in a quantitative, rather than qualitative manner, of these transit benefits is difficult, requiring estimation and summing those benefits ascribed to users, non-users, and those that want the option for them and others to use it, if and when needed. Benefit-Cost Analysis (BCA) is often used to make decisions, at the firm and/or public policy level. This management process relies on estimating non-market benefits and costs to fairly plan for and evaluate the total effects of an action. Contingent valuation method has become an accepted, though evolving; tool to derive individual estimates of benefits. But, operations managers, planners and policy makers are usually interested in the aggregated benefits on a system-wide, regional or state level. Specific need exists for a procedure to accurately aggregate the responses from the individuals into the desired relevant level of interest. Such a measure and technique should be capable of measuring both user and non-user benefits from public transit systems in order to accurately measure total benefits of publicly provided transportation in rural areas for use in BCA or other decision environs. The purpose behind the use of BCA is to evaluate the social efficiency of projects and programs by valuing all effects in terms of comparable monetized value measures.

The total benefits of two regional transit systems in rural areas in Washington State were quantified in a previous study (Scott, et.al., 1999). A novel method of collecting contingent valuation method (CVM) data was employed, one that may be particularly suitable for small-scale policy studies. Alternative estimates of the total benefits for the two regions under study were presented, based on different methods of aggregating the results. This report details follow up work to narrow down the range of benefits as aggregation occurs.

The original study did identify a range of benefits, depending on the aggregation technique used. It was stated that the true aggregate benefit level was estimated to lie somewhere within the identified ranges. In evaluating the use of CVM to measure the benefits of public transit, the experiment involving the case study areas of Chelan/Douglas and Clallam counties appeared to be successful. The CVM survey elicited values that provide internally consistent and reasonable information for a benefit-cost analysis of rural transportation projects. One important lesson resulting from this work, of importance to this follow up analysis, involves the aggregation of benefits from the study sample to the larger population. The typical practice in CVM studies is to elicit a value from a single representative of the household, and then aggregate that information using households as the unit of aggregation. Evidence from this study shows that there are potentially greater values to transit among household members than those reflected by the responses of a single household member. Future work using CVM to measure transit benefits needs to develop alternative strategies to elicit transit values from household members to determine if the unit of aggregation should be households or population. That was the goal of this current study.

Objectives

The overall purpose of this study was to determine an appropriate procedure to aggregate the quantified individual estimates of the non-market user and non-user benefits of transit. The specific objectives were to:

1) Review the recent literature on contingent evaluation in various applications, including transit.

2) Review and restructure the data set developed by the Principal Investigator in the earlier TransNow project on benefits of rural transit.

3) Develop and test a questionnaire on appropriate level of aggregation of individual responses.

4) Conduct telephone interview survey of the sample population, emphasizing aggregation level, household size and individual relevant benefits.

5) Analyze survey data, comparing it to range of benefits in the earlier work and developing point estimates of benefits.

Research Design

In order to measure the total benefits of public transit for a community, two regional transportation systems in Washington State, the LINK System in Chelan and Douglas counties and the Clallam County Transit System in Clallam County were examined in the earlier study by these principal investigators. Data measuring the benefits of rural transit were collected in different stages. The first stage involved conducting traditional focus groups to investigate the nature and extent of benefits to rural transit. In the second stage, a random sample telephone survey was conducted in the counties involved in the study. Citizens in these two regions were asked to participate in a panel on local transit issues. This phone survey also contained questions that provided useful information for aggregating data to be collected in the third phase. The third phase involved administering a CVM questionnaire to a panel of local residents. This survey measured the economic benefits participants received from public transit services in their area as well as their attitudes and perceptions of the transit system in their area. The panel of participants included randomly selected citizens recruited from the telephone survey as well as a convenience sub-sample of citizens recruited through local church and community groups.

The specific follow-up survey for this study used the original list of the panels of participants. They were contacted and interviewed relative to what basis (individual or household) they had been considering in their earlier responses. Additional information on household size and composition was also requested in this second survey.

Traditional Focus Groups

A focus group consists of a small group of people led by a moderator that engages in an in-depth conversation on a particular topic. Group discussions such as these are standard practice for identifying community perceptions and attitudes to use in the development of CVM questionnaires. A test focus group was conducted in Pullman, Washington. This process was instrumental in developing a good script and identifying relevant topics for focus group discussion. The two main focus group sessions conducted in the study areas included six to eight participants from various citizens' advisory councils for each transit authority. While focus group participants felt strongly that their areas needed public transit and that transit availability made a substantial difference in their quality of life, they had a difficult time placing a dollar value on the benefits of transit on an annual basis. Respondents indicated that the amount was actually fairly substantial and they would need more time to reflect on an actual amount.

The focus group discussions played a vital role in developing the CVM questionnaire. A comprehensive picture of the perceived benefits of transit accruing to both users and non-users of transit services in each region was obtained from these small sessions with informed participants.

Random Sample Phone Survey

A list of randomly drawn names from the telephone directories in the two study areas was purchased from Survey Sampling, Inc., of Westport, CT. The Social and Economic Sciences Research Center at Washington State University was hired to perform a short, random sample phone survey on public transit preferences and usage in the general population of the two study areas, while also recruiting participants for the CVM survey. Results from the survey were later used in developing an aggregate estimate of the benefits of rural transit for the two study areas, and then further used in this current study.

CVM Panel Groups

The final stage of the initial project involved a survey with a panel of area residents in both regions under the study. The survey was designed to measure the perceived benefits that transit provides to both users and non-users as well as to obtain information on attitudes and preferences on public transit issues. The session held in Wenatchee, Washington, had a total of 81 participants, and is the database used for these point estimates of aggregated benefits.

This type of forum, utilizing a specific questionnaire, retains some of the flexibility of traditional focus groups, in that participants are free to voice their opinions, while it collects hard data for quantitative analysis from structured questions. The data are immediately ready for analysis, and data entry errors are eliminated.

Data Generation

A series of valuation questions were used to arrive at a range of estimates for the value of transit in these areas. First, participants were asked to imagine a local transit system that closely reflected their idea of an efficient transit system. This question attempted to forestall any protest bidding, in which respondents refuse to acknowledge any benefits because of some *minor* irritation with the current system. This approach was used in order to separate any frustrations with the current system from their opinion of public transit in general. Participants were reminded that the system had to be realistic, i.e., if service frequency were to increase, the system would be more expensive. Respondents were then asked how much they would be willing to pay each month to have this modified system (V-GOOD SYSTEM). With this hypothetical scenario, the fare structure for each system remained the same; any money the respondents agreed to pay was above any fares currently being charged. (One transit system in the study charged fares while the other was free, totally funded by sales tax.)

The second valuation question asked respondents how much they would be willing to pay to have this modified system if they were unable to personally use it (V-GOOD SYSTEM, NON-USER). This question can be considered a "pure" measure of the broad community level benefits for public transit since users are told that their use of the modified system would be prohibited.

The third valuation question asked respondents to place a value on their current public transit system (V-CURRENT SYSTEM). Again, this value was in addition to any fares currently being paid.

The final valuation question (V-COMP. FOR NO SYSTEM) asked respondents how much they would need to be compensated each month for giving up access to public transit. This is a willingness-to-accept compensation question, whereas all other valuation questions are in the willingness-to-pay format.

Study Results

Phone Survey Results

As part of the recruiting process for the Tell-back survey, a short random-sample telephone survey was conducted. In addition to requesting participation in the Tell-back survey, respondents were asked questions regarding transit usage and their attitudes and perceptions of public transit. The most important result of the phone survey for this study was the proportion of users to non-users in the general population for the two study groups. This information was vital to determining the final dollar valuation of the benefits of transit. These two groups, users and non-users, had the largest differentials in valuing transit in their areas. The average value of each group was used to aggregate to the whole population based on the proportion of this group in the population.

CVM Survey Initial Results

The ultimate use of CVM value information in BCA is to provide an estimate of the aggregate benefits, reflecting the total economic benefit to the general population. Information taken from a sample of respondents that is representative of the target population was generalized to provide these aggregate estimates of benefits.

The first question asked participants to imagine a local transit system that closely reflected their idea of an efficient, realistic transit system for their area. The average value they would be willing to pay for this ideal transit system, which is over and above any amount currently being paid for their existing system, was $9.30 per month (V-

GOOD SYSTEM). Definitions of the economic valuation variables as well as the overall mean responses are provided in Table 1.

Table 1. Overall Survey Means and Standard Deviation for Economic Valuation (WTP and WTA) Variables, CVM Surveys, Washington State, 1999

Economic Variables	Variable Definition	Mean	Std
V-GOOD SYSTEM: Value of a Good Transit System	WTP per month for a modified transit system in which any minor irritants that trouble the respondent have been removed.	$9.30	10.93
V-GOOD SYSTEM, NON-USER: Value of a Good Transit System For a Non-User	WTP per month for a modified transit system that the respondent does not use.	$7.10	10.14
V-CURRENT SYSTEM: Value of Current Transit System	WTP per month for the present transit system.	$7.06	10.85
V-COMP. FOR NO SYSTEM: Necessary Compensation for Removal of Transit	WTA per month if public transit were no longer provided.	$45.42	40.48

Next, participants were asked what they would be willing to pay for this hypothetical transit system with the restriction that they would not be using it. The average monthly mean value of this modified system that the participant could not use was $7.10 (V-GOOD SYSTEM, NON-USER). This non-use value provides a measure of community benefits, as opposed to personal benefits, of a transit system. The next valuation questions asked participants to value their current transit system. The monthly mean value for this question was $7.06 (V-CURRENT SYSTEM).

Finally, respondents were asked how much they would have to be compensated if their transit system were removed. (This is the WTA compensation question.) The mean value for receiving compensation to forgo transit was $45.42 per month (V-COMP. FOR NO SYSTEM).

Data needed to aggregate the sample mean responses to the general populations of the respective study areas include the number of households and the population of the case study areas. (See Scott, et.al., 1999, for the full data source and construction.)

Using the population and household proportions and applying the mean value responses provided the basis for the calculations in Table 2. As an example, the aggregate benefits for the LINK service area using the (1) the mean values of users and non-users for V-GOOD SYSTEM, and (2) the number of user and non-user households, are calculated as follows:

10,513 (User Household)	X	$150.33 (Annual WTP by Users)	=$1,580,419 Total User WTP
23,400 (Non-User Households)	X	$ 77.16 (Annual WTP by Non-Users)	=$1,805,554 Total Non-User WTP
Total User WTP	+	Total Non-User WTP	=$3,385,973 Total WTP

All of the other aggregated household benefits in Table 2 were calculated in the same manner.

Table 2. Annual Aggregated Values for Transit by Variable, CVM Survey, Washington State, 1999

Variable	Annual WTP	Aggregate Annual WTP by Household	Aggregate Annual WTP by Population
Mean of Stated WTP (users and non-users) from V-GOOD SYSTEM	User: $150.33 Non-user: $77.16	$3,385,973	$6,114,947
Mean of Stated WTP (users and non-users) from V-GOOD SYSTEM, NON-USER	User: $120.36 Non-user: $54.00	$2,528,945	$4,567,195
Mean of Stated WTP (users and non-users) from V-CURRENT SYSTEM	User: $117.48 Non-user: $55.56	$2,535,171	$4,578,441
Mean of Stated WTA (users and non-users) from V-COMP. NO SYSTEM	User: $748.32 Non-user: $364.44	$16,394,984	$29,608,838

Similarly, aggregated estimates of the benefits are also derived based on the population estimates of users and non-users age 20 and over in the two study areas.

Asking one individual to estimate the total utility for households with multiple members, particularly for public goods with non-use values such as altruism (defined as selfish concern for the welfare of others), may be problematic. As a result, because of the uncertainty associated with using this type of sample, the "true" aggregate benefit probably lies somewhere between the households aggregated benefits and the population aggregated benefits. Therefore, values were expressed as ranges rather than point estimates in this initial evaluation.

Question V-GOOD SYSTEM provides a measure of the total annual benefits of having public transit. As shown in Table 2, the range of annual benefits associated with V-GOOD SYSTEM was $3.4 million (household aggregate benefit) to $6.1 million (population aggregate benefit). Question V-GOOD SYSTEM, NON-USER is a measure of the broader community level benefits resulting from transit, separate from any benefits resulting from direct use. The range of annual benefits associated with V-GOOD SYSTEM, NON-USER was $2.5 million (household aggregate benefit) to $4.6 million (population aggregate benefit).

Question V-CURRENT SYSTEM (value of the current system) represents values of the current transit systems. The range of annual benefits associated with V-CURRENT SYSTEM is from $2.5 million (household aggregate benefit) to $4.6 million (population aggregate benefit).

Point Estimate Results

The CVM panel files provided names and phone number identification for 43 of the original participants. These respondents were contacted and interviewed via telephone survey. Specific information was sought on the "mind set" of the individual as they participated in the original panel. Specifically, they were asked whether their numerical responses reflected a value for them as individuals or were the willingness-to-pay or willingness-to-accept value reflective for their household. Additional information on household size and composition was received from the 27 individuals who were successfully contacted and responded to this survey. There were no people who refused to respond to the survey; non-responses were due to "wrong number," "machine," "disconnected," "moved" or "no answer." The resultant sample, while less than statistically desirable, does offer descriptive information and inferences on 62% of the original panel participants.

Slightly more than half (56%) indicated that their initial "willingness to pay or accept" responses were their estimates for their entire household (Table 3). Forty four percent of the contacted panel indicated their responses had been based on the value of the transit system, in the various scenarios, to them as individuals. Thus, a potential point estimate can be identified, and is done below, for the aggregated transit benefits.

Table 3. Household Versus Individual Basis for Responses, Number of Survey Responses

Response Basis	Evening Panel	Afternoon Panel	Total	Percent
Household	7	8	15	56
Individual	4	8	12	44
Total	11	16	27	100

The size and composition of the households allows an alternative-weighting scheme. Since the benefits to a household of six family members may be significantly different than a one-person household, the data were evaluated using the information developed in Table 4. The average family size was 2.59 people but there was a significant difference between those stating they responded as a household and those responding as individuals. Household responders had almost three family individuals, on average, compared to the individual responders with slightly more than two (2.93 to 2.17). (The overall regional relationship between household and population was 1.8 individuals per household, significantly less than this sample.) Incorporating these findings, and weighting the initial response distribution by this information, produces a family weighted distribution of 63% of respondent family members being in the "response reflects household" versus 37% responding "as individuals". This provides an alternative method for developing point estimates of the aggregated value of transit benefits.

Table 4. Average Size of Household

Response Basis	Evening Panel	Afternoon Panel	Total	Family Weighted Percent*
Household	2.71	3.13	2.93	63
Individual	3	1.75	2.17	37
Total	2.82	2.44	2.59	100

*Response distribution from Table 3, weighted by number of people in the household, including adults and children.

The specific estimates of aggregated rural transit benefits are presented in Table 5. The earlier method of aggregation yielded estimates for the region of willing to pay for an efficient transit system of $3,386,000 to $6,115,000. Use of the point estimate distribution from this following study found that value to be $4,914,000. If the family weighted response is used, a reasonable estimate becomes $5,105,000. Thus, the new range, depending on the available information, is narrowed to $4,914,000 to $5,105,000.

Table 5. Annual Aggregate Values for Transit, Range and Alternative Point Estimates

Variable	Range	Point Estimate (000s)	Family Weighted Point Estimate
Mean of Stated WTP (users and non-users) from V-GOOD SYSTEM	$3,385 – 6,115	$4,914	$5,105
Mean of Stated WTP (users and non-users) from V-GOOD SYSTEM, NON-USER	$2,529 – 4,567	$3,670	$3,813
Mean of Stated WTP (users and non-users) from V-CURRENT SYSTEM	$2,535 – 4,578	$3,679	$3,822
Mean of Stated WTA (users and non-users) from V-COMP. NO SYSTEM	$16,395 – 29,608	$23,795	$24,720

Similarly, the level of broad community benefits of public transit was estimated, by economic variable, V-GOOD SYSTEM, NON-USER, to be $2,529,000 to $4,567,000. Use of these extended datasets and methodology narrows the estimate to $3,670,000 to $3,813,000. The third valuation question asked respondents to value their current public transit system (V-CURRENT SYSTEM), in addition to any fares currently being paid. The original aggregated benefit range of $2,535,000 to $4,578,000 decreased to $3,679,000 to $3,822,000 in the new analysis. Finally, the range for value of compensation to give up their access to public transit, originally a range of $16,395,000 to $29,609,000, now narrowed substantially to $23,795,000 to $24,720,000.

Summary

Utilizing the non-weighted responses, the combined value of the existing system and the broad community values (user and non-user values) is a point estimate of $7,349,000 per year, split about evenly between users and non-users. This provides policymakers a base of benefits against which to contrast investment and operating costs for alternative systems. Using the weighted responses increases the estimate of value by $286,000 or 3.9%. Thus, either of the two methods of analysis, at least in this pilot study, yields reasonably similar information for decision makers.

It is also interesting to briefly note, for future survey and researchers, that there is an apparent difference in participants in evening panels versus in afternoon panels. The evening panel, evaluated by average size of household, had a substantially (16%) larger household size than did the afternoon panel. If size of household becomes an important variable in any analysis, timing of the panel would seem to be important.

In summary, this analysis was able to provide preliminary point estimates of value of rural transit benefits. The statistical reliability of this sample is uncertain; what is certain is that concerns about how to aggregate individual responses, whether by household or population, can be answered with the appropriate survey approach and design.

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