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Working Paper 309

January 1991

**EVALUATION OF THE USE AND
NON-USE BENEFITS OF
PUBLIC TRANSPORT**

Report No.1

**Development of
a survey methodology**

AL Bristow, PG Hopkinson, CA Nash and M Wardman

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ABSTRACT

This paper reports on the development of a survey methodology to discover the value people place on the retention of local public transport services, both for their own expected use and as a standby, for the use of others or for the benefits in terms of reduced congestion, improved environment and accessibility they might bring.

A survey of the literature suggested that numerous problems of potential bias would be faced. The most serious were likely to be strategic bias, starting point bias, information bias and social-norm bias. Other problems were choice of payment mechanism, how to obtain household rather than individual valuations and non-response bias.

Initially a set of exploratory interviews were undertaken. These confirmed that people were able to understand the issues involved, but that they had difficulty particularly with open-ended willingness to pay questions and with assigning values to different types of benefit. They were also sensitive to the payment mechanism, being very hostile to the idea of a subscription scheme.

Based on these interviews, attempts were made to design a self completion questionnaire. However, two major problems were encountered. One was the low level of response (20% or less). The second was evidence (confirmed by follow up interviews) of incomplete response, misunderstanding of questions and a failure to think through the full implications of the situations and responses postulated.

This led us to develop a new technique, based on hand delivery and collection of a travel diary, which was used as a basis for a follow-up interview. This enabled the interview to be structured towards the unique circumstances of the individual, to explore the options available as alternatives to the existing mode, and to obtain use and non use values in the context of a detailed discussion of the use and importance of local bus services.

1. INTRODUCTION

This paper sets out the various stages in and thinking behind the development of a survey methodology to measure the value which people place on local public transport services. From the outset it was recognised that this work would be exploratory, and it would be necessary to identify the most appropriate techniques with which to obtain valuations. Accordingly the work involved a series of pilot survey designs and experiments which gradually led us towards a final method which has subsequently been used in the main survey. The findings from this survey are reported in a companion paper (Bristow et al, 1991).

The first part of the paper sets out the aims of the project. The second section deals with a number of key theoretical and methodological concepts and issues which led to the series of surveys reported in section three. Section four describes the final survey method, developed on the basis of the findings and conclusions from section three.

1.1 Background

Since the deregulation of local bus services in 1986, subsidising authorities have no longer been able to buy in a bus network via a global subsidy. Subsidy is now allocated to individual routes or batches of routes following a tendering process. Local authorities are now required to make explicit decisions on the value of maintaining unprofitable public transport services either for a route as a whole or at particular times of the day or week (especially evenings and Sundays) with the removal of network support and cross-subsidy. It is difficult to apply conventional project appraisal techniques to these issues for two reasons.

- (i)The complete withdrawal of a service requires one to estimate the user benefit of the service as a whole. Most transport appraisals work by comparing the benefit between two alternative levels of service. Measuring the total benefit is much more problematic, requiring one to know the shape of the demand curve at its extremity as it approaches the price axis.
- (ii)There are a number of reasons why the measured user benefits of a service may under-estimate the total willingness to pay for the preservation of local public transport services. For example, various non-use benefits of a service are not included at all.

1.2 Aims and Objectives

The aims of the project were as follows:

- (a)to develop and provide an appropriate methodology to extend the social cost benefit analysis of public transport services by examining the extent to which residents are willing to pay to secure the continuation of a service which would otherwise cease to operate either in total, or at certain times of the day or week,
- (b)to use this methodology to test the degree to which a more narrowly based cost-benefit analysis, which confines itself to conventional measures of user benefits, misrepresents the value placed on the availability of such a service by the community.

2. THEORETICAL AND METHODOLOGICAL ISSUES

2.1 Benefit Categories

Over the past 25 years economists have spent considerable effort in identifying the range of benefits which people derive from the existence and preservation of public goods and services. Many of these are relevant to public transport services. Those which we believe to be particularly pertinent are as follows.

2.1.1 Use Values

Benefits accrue directly to public transport users since they are prepared to pay more than they actually have to pay. The area described by the demand curve above the current price level is the consumer's surplus. This expected consumer surplus enters conventional cost-benefit calculations but its estimation for complete service withdrawals is problematic.

To estimate the expected consumer surplus from maintaining a public transport service as the relevant area under the demand function, we need to know the maximum willingness to pay of users before giving up all travel. In other words, we need to know the shape of the demand function as it approaches zero demand. For relatively small service changes, as are typically examined, problems surrounding the functional form of the demand curve are unlikely to have serious implications. However, if we have few or no observations of the demand curve at its relevant extremity, and instead rely on extrapolating from the observed demand levels, the estimated consumer surplus as the area under the function will be very sensitive to the assumptions made.

Clearly we would wish to obtain an improved method of estimating the expected consumer surplus accruing to the continued provision of the public transport service.

2.1.2 Non-use Benefits

This category covers a number of impacts of public transport which may be experienced by users and non-users alike. Evidence from studies undertaken in the USA shows that for certain public goods people express a willingness to pay for the preservation of those goods for a variety of reasons. In the case of public transport such reasons could include:

- (a)Option Value: Public transport services may have a value to those who do not normally use them, by providing a standby mode of travel. Car users may derive a benefit from the knowledge that an alternative is available should the car breakdown. Non car users know that they can travel to a variety of destinations should the need arise. Option value represents a risk premium that individuals with uncertain future demand for public transport are willing to pay over and above their expected user benefit from the service.
- (b)Indirect Benefits: A person may derive a benefit from the knowledge that others in the household (and/or friends and relatives) can and do use the public transport services. More prosaically, car users may benefit if they avoid the need to give lifts.
- (c)Altruistic Benefits: A benefit may be derived from the knowledge that others in the community have the use of a public transport service. This may be through an altruistic concern for the community as a whole or stem from a specific perception of the needs of certain people, for example, the elderly.
- (d)Environmental Benefits: The presence of bus and rail services may be seen as beneficial in reducing the number of vehicles on the roads and so easing levels of congestion and pollution. However, it is possible that the reverse perception will also apply of buses as noisy, dirty, slow vehicles,

causing more problems than they solve.

We appreciate that the inclusion of some of the benefits listed above is controversial and that problems of transfer payments and possible double-counting would have to be considered with the utmost care.

There is an extensive and valuable literature on the effects of bus-service withdrawal (e.g. Oxley 1982, TEST 1984) and some studies have asked questions regarding the willingness of respondents to see public transport financed in part from taxes or rates (e.g. Goodwin et al, 1983). We are not aware however of any attempts to incorporate these effects within a standard cost-benefits analysis framework. Whilst such an undertaking is likely to be ambitious, we felt there were sufficient grounds for optimism due to recent advances in survey methods. It is to this feature of the study we now turn.

2.2 Method of Estimating the Benefit

2.2.1 Revealed preference methods: There are no directly observable markets in which people can purchase the maintenance of public transport services. However data on the current use of existing services can be collected.

2.2.2 Hedonic pricing methods: This is a technique that attempts to identify the value of one good by observing variations in the market price of another, usually house prices, purchase of which provides access to the good being valued. This method has been widely used in the valuation of environmental and public goods (eg Brookshire et al, 1982, Cummings et al, 1986).

Whilst house prices in locations with varying levels of bus service could be studied, it is doubtful whether one could identify the influence of bus services amongst other more significant variables. Moreover, any value obtained would be an amalgam of use and non-use values and would not include all non-use values.

2.2.3 Alternative-cost methods: This approach involves identifying what people would do if a service was withdrawn, and the cost to them of changing activity and travel patterns.

The complete withdrawal of a service requires measurement of the full set of best alternative courses of action for all those affected and knowledge of the money values of all the attributes associated with the travel patterns and activities for the with and without public transport situations. This would clearly be very difficult to achieve. However, the value of a local bus service will in part be influenced by the cost of substitute modes and activities. In determining the value of a local service it is important therefore that people are confronted by or asked to consider the relative costs and convenience of alternative forms of transport and other methods of adjustment.

2.2.4 Hypothetical Questions: Hypothetical questions could be asked to identify how much people are prepared to pay to maintain a public transport service. We can distinguish two methods of approaching the question; contingent valuation (CV) and stated preferences (SP).

Contingent valuation involves asking direct questions about an individual's maximum willingness to pay (WTP) to maintain public transport or minimum acceptable compensation (MAC) for removal of the service. This technique is widely used in the USA for obtaining both use and non-use valuations of environmental resources. A survey question in a contingent valuation study might take the following form.

"What is the most you would be willing to pay to preserve your local bus service if it was

threatened with withdrawal?"

In comparison Stated Preferences (SP) are deduced by presenting the respondent with a series of scenarios, each characterised by different trade-offs between money (in some form) and public transport provision. A survey question in a stated preference experiment might take the following form.

"Suppose your local bus service was unprofitable and was to be withdrawn unless people in your area paid something towards keeping them (for example, in higher taxes). Which of the following options would you favour?"

- (a) Keep the service at a cost to you of £1 a year more (4p/week)
- (b) Withdraw service.

A large range of choice options are presented to a respondent, with varying monetary amounts to yield the maximum willingness to pay for preserving the bus service. The example shown forms a simple experimental revision. The technique can then be extended to include comparisons of morning versus peak buses, evening buses versus weekend buses and so on. The range of comparisons is only limited by the inventiveness of the researcher and the capacity or willingness of the respondent to respond.

The preferences expressed yield information on the money value of the services in question. This technique, which has been extensively applied to attributes which influence people's travel behaviour, does not seem to have been widely used to obtain valuations of public goods and services. Questions to a potential respondent can be posed by a questionnaire or an interview. We believed that hypothetical survey techniques offered the most promising method for the purpose of identifying and measuring the range of benefits in which we were interested. It was this approach therefore that we adopted during the course of the project.

2.3 Measurement Difficulties

The main criticism levelled at all methods based on hypothetical questions is that what individuals say they will do or pay does not necessarily correspond with what they would actually do or pay if the hypothetical circumstances under consideration were to occur in practice (Freeman, 1979). Whilst random error in responses is not a serious problem since it will tend to offset in the process of averaging across individuals, systematic measurement problems could be very serious.

The literature identifies a number of measurement problems. We considered the following to be potentially significant for our work: strategic bias; starting point bias; social norm bias and information bias.

2.3.1 Strategic Bias: For the stated response to be classified as containing strategic bias (rather than other types of bias or inaccuracies), the individual must be motivated to state a strategic payment in the hope of influencing policy to his/her advantage and must know that they are deliberately distorting their valuations to this end. This is distinct from the motivation to pay a sum of money in the hope of affecting policy.

A number of studies have examined the issue of strategic bias. The findings from these surveys show varied evidence. Some studies suggest that strategic bias is not a serious problem (Bohm, 1972; Brookshire et al 1976; Rowe et al, 1980) although others, particularly those in transport, suggest that it is (Bishop and Heberlein, 1979; Chatterjee et al, 1983; Couture and Dooley, 1981; Gunn, 1984). One way of detecting strategic bias has been to compare the values obtained from direct questioning with those obtained from either hedonic pricing or the alternative cost approach (eg see Cummings et al, 1986 for a review). However, discrepancies may be due to the fact that the different methods are measuring different benefits - "selfish" versus "altruistic" benefits, for instance.

A further possible means of detecting strategic bias is to compare the maximum willingness to pay to preserve a service with the minimum acceptable compensation required to forego the service. These are the compensating and equivalent variation measures of consumer surplus and the conventional economic theory asserts that they should, in the absence of income effects, be reported to be approximately equal. The evidence overwhelmingly indicates that the two are not reported as being equal and, in particular, that the maximum willingness to pay generally falls short of the minimum acceptable compensation (Bishop and Heberlein, 1979; Brookshire et al, 1980; Coursey et al, 1987; Knetsch and Sinden, 1984). This may be due to strategic bias, in that there is an incentive to overstate the required compensation and understate the willingness to pay, but we cannot be entirely sure since income effects or decision processes other than the conventional economic form may be influencing matters. For instance, people may simply be resistant to change.

Bohm (1972) examined another means of detecting strategic bias. This involved varying the incentive to strategic bias, either by varying the likelihood of paying the expressed willingness to pay or by varying the amount of it that would be paid. He found that the responses were insensitive to the incentive to strategic bias and hence concluded it was not a problem. In addition, Bohm (1979) proposed an interval method to detect strategic bias and to obtain useful results even in the presence of strategic bias. The basic approach is that the incentive to bias responses strategically is varied across the sample by varying the perceived likelihood of service changes and actual payments. If strategic bias is present, the mean value for those with an incentive to overstate their willingness to pay will exceed the mean value for those with an incentive to understate it. Given that the interval between these two is not too large, useful results can still be obtained in the presence of strategic bias.

The method has been used by Bohm (1984) and by Throsby and Withers (1986) but it does have its difficulties. There is no certainty that the attempt to influence individuals' perceptions in the desired direction will be successful. Indeed, there may be problems of realism or ethics in trying to do so. In our particular case we did not think it morally justifiable to exaggerate the likelihood of loss of bus services or of increases in charges. Alternatively, use could be made of the actual perceptions that respondents have in practice and hence their actual incentives to bias. Unfortunately, however, this may well require surveys to be conducted across many different types of bus routes and hence locations, making it difficult to control for other factors and adding to survey costs.

2.3.2 Starting Point Bias: There is some evidence (eg Rowe et al, 1980; Willis and Benson, 1988) that the values obtained from the iterative bidding process which is sometimes used in the contingent valuation methods, as opposed to asking for a direct willingness to pay, are influenced by the starting point. Here an individual might fix on the initial payment introduced and interpret it as a reasonable value. Alternatively it could also stem from boredom, fatigue or irritation. Although other studies have failed to find any significant effect (Brookshire et al, 1980, Brookshire et al, 1982; Thayer, 1981), it is a problem which we must be aware of and try to avoid.

2.3.3 Information Bias: There has been some discussion as to whether this category of bias is a bias at all (Cummings et al, 1986). The argument runs that the type and form of information presented to people will "bias" their responses. We feel that there is an important distinction to be made between information that biases a response and information that educates or makes people aware of issues. Where information is presented during the course of an interview then there is a possibility of interviewer bias whereby the interviewer leads the respondent towards particular responses or uses information in such a way as to hint at the appropriate types of response. This has often been used as an argument in favour of questionnaires over interviews, where the questionnaire permits a standardised presentation of information.

2.3.4 Social Norm Bias: Social norm bias is a general term to describe the possible pressures exerted knowingly or unknowingly by other people on a respondent in such a way as to affect his values and valuations. Such pressure may arise from people who are important to him (e.g. friends or family) or, in an interview, from the interviewer. The interviewer or the questionnaire may suggest acceptable views and affirmation bias represents the case where the respondent answers to affirm these views. Such pressure may cause an individual to pretend to certain values and thereby raise or lower his valuations. The nature of any bias will depend upon the nature of the survey (questionnaire or interview), the number of persons involved (face to face or group discussions) and the way in which the survey is carried out.

It is important that we distinguish between the effects of other people on an individual's valuation processes that are unwanted and those that are a legitimate cause of concern to an individual (altruism). It is the former that we must consider as bias although in practice it may be difficult to separate social norm biases from altruism. In practice social norm bias will be detected where a respondent alters his or her valuations in line with comments or perceived pressure from other group members or an interviewer. The wife who lowers her valuation as a result of comments from her husband or the respondent who when asked to take into account certain social groups such as the elderly or the young raises his valuation may be demonstrating social norm bias.

Social norm bias is likely to be most serious in situations involving interviews or group discussions where there is the pressure to present a particular self-image or affect one's responses to meet the perceived goals of the study. Such problems are kept to a minimum using a questionnaire approach at the expense of more detailed exploration of group concerns and values.

2.4 Choice of Payment Mechanism

A key consideration in the valuation experiment is the choice of payment mechanism by which the respondent can express their valuation of a good or service. Empirical evidence suggests that the values obtained can be influenced by the payment-mechanism used (Brookshire et al, 1980; Daubert and Young 1981; Greenley et al, 1981; Rowe et al; 1980).

The chosen mechanism needs to be meaningful and acceptable to the respondent whilst it would be desirable if the mechanism could be universally applied to all respondents. A number of possible payment mechanisms suggest themselves.

- (a)Local Property Taxes Until recently the UK property tax system (known as "the rates") was a main source of funds for UK local authorities and was identified with local authority support for local public transport. This system is no longer in operation and has been replaced with the Community Charge.
- (b)Community Charge (Poll tax) Although a potentially attractive mechanism, since it will be levied on almost everyone and should thereby reduce concerns about "free riding" by non payers, it has been a highly contentious issue. Whilst this mechanism could be used in the future, there is still too much controversy surrounding its introduction for use in this study.
- (c)Income or Sales Taxes Although widely used in surveys in the United States, neither of these taxes are levied locally within the UK and are therefore not readily associated with support for local facilities.
- (d)Public Transport Fares: Public transport fares are obviously an attractive candidate for a mechanism with which to identify the consumer surplus of current users. However, they are a less satisfactory means of paying for non-use benefits, nor could they be applied to non-users of public transport.
- (e)A Subscription Scheme, whereby only those people who pay to join it are permitted to use bus services. This approach suffers from two disadvantages. Firstly, it is unfamiliar and may be regarded as unrealistic. Secondly, such a mechanism would only be relevant for use-related benefits.
- (f)An "Abstract" Instrument, that is one without reference to any particular mechanism; has the attraction of avoiding the problems of other mechanisms and being appropriate to obtain non-use values.

2.5 To whom should our questions be addressed?

Our survey is concerned with individuals (adults and children) but also with household groups in as much as some of the benefits of public transport provision fall on the household as a whole and some of the possible payment mechanisms would similarly impact at a household level. There are at least three ways in which the problem could be addressed:

- (a)Asking All Individuals for Their Own Valuations: This approach is attractively simple and creates no problems in single person households. Unfortunately, however, it is not reasonable when a household includes young children. Nor do we think it acceptable merely to exclude such people, (or, as is often the case, to assign them arbitrary proportions of the "adult" value).

(b)Asking Individuals to Answer on Behalf of the Household: This approach is often adopted with the "head of household" being the respondent. An obvious risk with this method is that the respondent may not be the most appropriate person and if he or she is self selected there is an obvious risk that he/she will be more than averagely dependent on public transport and may thus present an exaggerated view of the household's valuation.

(c)Asking for a Collective Household Valuation: This approach might avoid several of the problems noted above provided that one can be confident that all members of the household have fully participated in the discussion and eventual decision.

2.6 Estimating Disaggregated Values

We have outlined the distinction between various benefit categories. We have argued that use-values are typically included in evaluation measures; whilst option and non-use values are not. Where people value public transport for a variety of reasons, which may include a combination of use, option and non-use benefits, it is desirable that these can be distinguished. Whether this can be achieved or how it might be achieved is not straightforward.

Two possible approaches are termed "compositional" and "decompositional". The former requires the respondent to give a separate value to each category of interest whereupon the overall value is the sum of the constituent parts (Greenley et al, 1981). The latter elicits a response denoting an overall value and then the respondent is required to apportion this between its various components (Walsh et al, 1984, 1985; Willis and Benson, 1988).

Even if it is not possible in practice to obtain values disaggregated into all the components of interest, the most important distinction is between use and non-use values. People who do not currently use or expect to use public transport will by definition only provide non-use valuations. Those who currently use or expect to use public transport need to be asked separate use and non-use valuations.

2.7 Service or Network

A public transport service may have benefit value by giving the individual access to locations and activities but it also forms part of a wider public transport network. One route may be used to give access to other parts of a network. This raises the question of whether we should be asking people to value a specific service or route or the network as a whole. We would expect there to be differences between the valuation of a specific service and that for the network as a whole. Ideally people should be asked to value both. This has the advantage of ensuring that any value given to a specific service is for that service only and is not confused with valuation of the network. This problem, whereby individuals are asked to value a specific environmental asset or good, but enclose it with the valuation of a much wider set of assets or goods has been recognised in the literature (Mitchell and Carson 1989).

2.8 Non-Response Bias

This represents the distortion introduced as a result of some people not participating in a survey. For example, a questionnaire concerned with public transport may well be deemed irrelevant by a large proportion of those who do not use public transport. To ignore non-respondents completely implicitly assigns them the same values as the average for those who did respond. Since users probably put a higher value on maintaining public transport service than do non-users, the net effect would be to inflate the community valuation.

In order to increase the response of non-users we should obviously attempt to maximise their interest in the survey. The literature is generally silent on non-response bias, the assumption being that the responding population is representative of the total population. There is evidence to show that factors such as educational attainment and income will affect response rates for certain methods. If we have access to information about the non-responding population then it would be possible to weight the sample of values obtained accordingly.

These then are the major issues which we considered to be most important to the valuation of public transport. This is by no means an exhaustive list. Nonetheless it indicates the potential complexity of the issues and the difficulties which might arise in the measurement of use and non-use benefits. We now turn to discuss how we approached the measurement task.

3. SURVEY DEVELOPMENT

The development of the survey instrument took place over a 12 month period. The first two sets of interviews took place in Bradford. These were exploratory interviews based around a simple questionnaire and were undertaken to identify the range of issues to be tackled in the main survey and the best way of making individuals consider the potential benefits of public transport provision. At the start of the study, it was hoped that we would be able to estimate both use and non-use benefits through a self-completion questionnaire. Our subsequent findings found the issues more complex than we had imagined.

3.1 Exploratory Interviews

3.1.1 First Pilot

These interviews took place with eight individuals (see Appendix 1). The interview covered the following topics:

- car and bus use,
- benefits of public transport services,
- views about subsidisation of public transport and,
- willingness to pay to maintain services using rates and subscription,
- perceived level of threat to public transport services,
- the source of subsidy,
- influence of public transport provision on home location decision making.

Valuation questions were asked using two approaches.

(1)The first approach was an iterative bidding contingent valuation technique. Respondents were asked whether they would be prepared to pay specified amounts ranging from £1 to £10 a year, through their household rates, to preserve the existing bus service. It was stressed that all adults would be required to pay the specified amount. They were not asked if they would be willing to pay more than £10. Respondents had to trade-off a specified cash amount against the presence or absence of the bus service. A scheme providing half price travel for the unemployed was proposed at an additional cost to rate payers of £1 a year and respondents were asked if they would be willing to pay such an amount.

(2)The second approach involved a subscription scheme in which everyone who wished to use the bus would first have to purchase a card granting access to the service. The cards were priced at between 25p and £2 week using an iterative bidding format. The payments proposed were in addition to the existing fare.

3.1.2 Findings

The responses to the questions showed a marked diversity in view points. Generally people were supportive of public transport provision even if they did not make current use of the bus service. It was found that respondents had, at times, quite strong opinions about bus services and provision and were willing to discuss these. In addition, many raised issues and discussed matters which the interview did not prompt for.

The values obtained through the first valuation questions were low; the average amount people were prepared to pay through the rates was £4 a year. The responses to the question indicated that people gave a valuation which they perceived to be an average or reasonable amount. These values seemed to be affected by the range of values presented. Moreover, a number of people wanted to know how much they would need to pay in order to preserve the services. A number of respondents expressed a resistance to paying more for local bus services through the household rates on the basis that they felt they already paid enough.

Most respondents (6 out of 8) were prepared to pay up to £1 a year to provide half price travel for the unemployed, indicating a degree of altruism. However, this is perhaps too nominal an amount to have any true significance.

Only three respondents were willing to pay anything at all for the subscription scheme, and they were the heaviest users of the service. They were willing to pay 50 pence to £2 per week. Several respondents objected to such a scheme on principle and this may explain the poor response.

A number of possible biases appeared to be present. Firstly, there seemed to be an aversion to paying more rates; several of the respondents stating that they paid enough already. Secondly, the influence of the time period over which people are asked to pay, with a weekly payment obtaining higher total figures. This confirmed our initial concerns that selecting a suitable payment mechanism would be problematic. Five out of eight said they were not sure about the likelihood of bus service reductions in the future. In the second exploratory survey, the vast majority did not perceive any reduction or removal of services to be likely. These findings would seem to preclude the use of Bohm's approach to identifying strategic bias using different levels of actual perceived threat of service removal because of the lack of variation in perceptions and the uncertainty involved.

All 8 respondents thought it preferable to subsidise services on loss making routes out of the revenue from profitable routes rather than from rates revenue. Whilst this might be expected, nobody raised the issue of whether bus fares might be reduced on profitable routes (and their services would most likely be perceived as profitable).

3.1.3 Conclusions

The first exploratory study gave encouragement that people were able to understand the purpose of the study although they found it less easy to say how much they value the maintenance of local services in monetary terms. This was not wholly unexpected. The major difficulty stemmed from the choice of payment mechanism to use to be able to estimate respondents' valuations. Whilst respondents articulated a number of issues without being prompted, it was found necessary when asking about the benefits of public transport provision to prompt for indirect benefits such as visitors using public transport and avoiding the need to give lifts. Whilst people did recognise the indirect benefits of public transport when presented with them, it raised the question of how much prompting or information we should provide in order to find out whether people really value public transport for those reasons. A second study following on from this study was thus proposed, to explore some of the issues further.

3.2 Second Pilot

The second set of interviews were also based around a questionnaire (see Appendix 2). Interviews took place with 15 individuals, 5 of whom reported no bus use.

This interview was a revised version of the first one and was conducted in the West Bowling area of Bradford which has a frequent bus service into the City Centre. The two main differences were as follows. Firstly, on the basis of the prompting required in the first interview, more questions were included to cover a wide range of consequences of bus service withdrawals. Secondly, open willingness to pay questions replaced the iterative bidding method and the value of maintaining bus services was disaggregated to examine Sunday, evening and weekday services. The half price scheme for the unemployed was again proposed at a cost of £1 a year, but respondents were also asked at what cost they would cease to support such a scheme. Hedonic pricing was used in a question on house prices in terms of willingness to pay more for accommodation with good public transport links. The subscription scheme was again proposed.

3.2.1 Findings

It was clear that respondents had more difficulties with the open willingness to pay questions asked than with the iterative bidding versions used in the first survey. Given that the willingness to pay question was disaggregated into evening, Sunday and Weekday services, 45 values could be obtained from the 15 individuals. Values were obtained in 33 cases (including zero values); the other cases being do not know and not sure. Where values were obtained, the respondents first reaction was often one of uncertainty. This could be due to the hypothetical and unfamiliar nature of paying to preserve bus services, but the difficulties with the question certainly seemed to be greater than with the iterative bidding version, such that it seems that the problem lies with the use of an open willingness to pay question.

Many individuals asked how much it would cost and, although this may stem from a reticence to reveal their maximum willingness to pay, our feeling was that it stemmed more from uncertainty. Having said that, two individuals protested that rates were already too high and would not pay more whilst a further two registered a protest against rates but did not supply zero values. Four respondents who had zero values were asked if they would like to see less spent on buses and receive a rate rebate but none of them favoured this. This is consistent with the general finding that monetary outlay is valued more highly than monetary gain.

The hedonic pricing approach failed with no realistic responses, seen as irrelevant or something that people already had and so could not offer more for. The subscription scheme again failed to work partly due to objections to the concept. Only two individuals stated they would join such a scheme and only one thought the scheme would be a fair way of guaranteeing the provision of bus services. The most noticeable feature of the responses was the general opposition, and in some cases strong hostility, to the scheme. The reasons for this ranged from the hassle involved in joining and that the scheme contrasted with buses being a public service through to the scheme being described as a bit like "Big Brother" by one respondent.

3.2.2 Conclusions

The survey again suggested potential problems with the rates mechanism and the opposition to the subscription scheme was sufficient to rule it out of further consideration.

The open willingness to pay question, although more direct than the iterative bidding approach, does seem to make the task required of the respondent somewhat more difficult. The disaggregation of the question into evening, Sunday and weekday services meant that the question was more complex than in the previous questionnaire. Even so, doubts about the ability of respondents to provide meaningful responses to an open-ended question were beginning to form.

The hedonic pricing approach was discounted for the purposes of this study. Although the availability of public transport was quite an important factor for those without a car, it was not an important factor for those with a car such that it would be difficult to discern any effects within the general house location/type decision. Some had not given the issue much thought, presumably because they had not recently moved house or were unlikely to do so in the near future. Concentrating on just those who are searching for a new house or who had recently moved would provide too little detail at high cost and was beyond the scope of this study.

Although more detailed questions were asked concerning the consequences of bus service withdrawal, it was found that considerable prompting was still required since individuals did not readily appreciate the benefits to themselves and to other members of their household from a continued bus service. This finding is not wholly unsurprising. Although public transport is a familiar topic of conversation, it is not

necessarily easy for respondents to immediately think about all the ways in which public transport might be of value to them, especially if they themselves do not ordinarily use it. We might therefore regard the survey methodology as having an educative component, making people aware of the various potential benefits of public transport, as well as being a measuring device. In any case, simply presenting people with questions about public transport will alert them or make them start to think about public transport, such that there is no escape from the fact that the survey instrument will help to form the measured values. The critical question though is how people can be alerted to the possible benefits of public transport in a non-directive way, and in a way that guards against biasing the responses towards support for public transport.

Despite some of the difficulties confronted in the first two sets of interviews, we felt sufficiently encouraged to design and test a self-completion questionnaire.

3.3 Third Pilot

A self-completion questionnaire was designed on the basis of the findings from the first two rounds of interviews (see appendix 3). We proposed to follow-up the self-completion questionnaire however with a number of interviews to identify problems which might not be apparent from the forms themselves, with the intention still to use a self completion approach. The following questions were asked of a specified person in the household.

- (a) Average bus use by all members of the household;
- (b) For each household member, the alternative mode of travel (if any) was identified if bus service not available for journeys to work, shopping or social/recreational purposes;
- (c) Benefits of public transport provision other than immediate personal use. The questions on the consequences of bus service removal enquired as to: whether bus would be used or has recently been used on emergency cover in the event of a car breakdown; whether more lifts would be requested in the absence of buses; whether visitors to the household used the bus and the consequences for visits to the household of removing bus services;
- (d) Iterative bidding questions involving trade-offs between changes in household rates/poll tax and withdrawal of the buses at different times of day. The poll tax version traded-off money versus frequency changes, only one of which implied the removal of (Evening and Sunday) services. The rates version traded-off the presence or absence of bus services against changes in rates payments. Separate exercises were used for weekday, evening and Sunday services. A similar procedure was involved for the compensation exercise based on rates only (see 5 below);
- (e) Stated preference questions which involved payments to the respondent in the form of reduced rates as compensation for the loss of the local bus services;
- (f) Allocation of points out of 100 to indicate the groups of people who should be given priority in decisions affecting bus service subsidy.

The willingness to pay exercise was based on both rates and poll tax, although the compensation exercise only involved rates. The poll tax was included because it would replace rates, although the timing of this was not clear when we were conducting the surveys, and also because of the reported problems with the rates.

3.3.1 Findings - Self Completion

100 self completion questionnaires were distributed, 50 based on the rates iterative bidding exercise and 50 based on the poll tax version. Eleven questionnaires containing the rates SP exercise and 9 based on poll tax were returned, leading to a disappointing 20% response rate. An obvious problem with such low response rates is that the sample may not be representative of the population of interest. If this is repeated in the main survey it would overstate the value of maintaining local bus services unless the samples were re-weighted according to relevant criteria. This requires information on the characteristics of non-respondents. This was not collected in this particular pilot study but the need to collect it was noted for future applications of the self-completion approach.

There was evidence that buses provide indirect benefits. All eleven for whom the question was applicable said that they would use bus in the event of the car breaking down. Of the eleven households where a car was owned, three stated that lifts would be asked for frequently in the absence of bus, whilst eight said lifts would be occasionally asked for and none said that lifts would never be requested.

The iterative bidding questions were almost fully completed suggesting that the exercise was simpler than the open willingness to pay approach. However, precise valuations cannot be deduced because only a limited number of trade-offs were introduced. The purpose of the exercise was to establish whether the approach worked, rather than to obtain precise estimates, and the interviews conducted examine this in more detail.

The values, in so far as they can be deduced, are greater in terms of compensation than payment, as typically found in the literature. The relative importance ratings were completed by almost everyone who returned a questionnaire. The average ratings (out of 100) for each category (after allowing for non-applicability) were:

Household members who usually travel by car:	16.87	
Household members who do not usually travel by car:	59.06	
Visitors to the household:		32.19
Young people in the area with no car:	81.33	
Elderly people in the area with no car:	93.43	
Other people in the area with no car:	86.56	

There is an element of reasonableness about the ratings, given that many only had a few visitors who used public transport and buses are not particularly important where a car is available, but the very high ratings for the final three categories may contain an element of social norm bias.

3.3.2 Findings - Interview

The self completion questionnaires were supplemented by 15 household interviews, 8 of which were based on the rates SP exercise. The interviews indicated that people generally had few problems in answering the questions asked. When asked the same relative importance ratings questions about the consequences of bus service withdrawal, the responses were similar to the self completion question. A notable difference was that the ratings of relative importance appeared more realistic and produced lower average scores for the categories relating to people in the community outside of the household. The ratings were:

Household members who usually travel by car:	9.91
Household members who do not usually travel by car:	77.51

Visitors to the household:	29.09
Young people in the area with no car:	42.86
Elderly people in the area with no car:	74.28
Other people in the area with no car:	60.00

The iterative bidding exercises using both rates and poll tax were completed with no apparent difficulties. Neither payment mechanism caused any of the problems we had experienced in the previous surveys, suggesting either that the problem was less severe than we had been led to believe or that the way in which the scenario was presented made it appear a more realistic or relevant mechanism.

During the interviews it became apparent that some people were having difficulty deciding whether they were answering on their own behalf or for their household; particularly where other people in the household used the local bus services. This was an issue for which we had been unprepared and led us to query whether the appropriate unit of measurement was the individual or the household.

At a more general level the interviews showed again that in a discussion about public transport people think about or recall events, people, situations or wishes that affect their subsequent valuation of public transport. This process does not follow any simple sequential pattern and often becomes quite involved. The extent to which these processes are triggered as a result of an interview discussion rather than a questionnaire was clearly of some interest to us. If people fail to give thought to issues presented in a questionnaire then it will mean that the values which are provided will be unreliable and fail to reflect the real value of public transport.

3.3.3 Conclusions

Non-response bias is a potentially serious problem for the self-completion approach given our experience of a low response rate and that public transport users are over-represented in the final sample. It is clear that socio-economic and trip information must be collected to adjust for this problem and this was tackled in the fourth pilot.

Where a household contains more than one person, then each respondent may value public transport for household use as well as his/her own use. This raises a serious issue of who should the respondent be valuing public transport for, themselves or for the household.

The questionnaire established that people could provide valuations when straightforward iterative bidding exercises were used. We were somewhat concerned however as to the amount of detail which people brought to a discussion about public transport and whether such detail or degree of thought would be generated by a questionnaire approach. Nonetheless we decided to persevere with a self-completion questionnaire in order to determine how far it was possible to obtain valuations of local public transport services and whether such an approach could support a more detailed investigation of non-use values.

3.4 Fourth Pilot

The fourth pilot survey was designed to shed further light on the issues raised by the third pilot survey, particularly in the light of our intention to use the self completion approach. The first of these was the problem of non-response, the second was the individual-household issue and the third was the measurement of different benefit categories. The first issue was dealt with by designing a much shorter questionnaire than on the previous occasions, which we felt would increase the likelihood of non bus-users being prepared to read and answer the questions (see Appendix 4). This was designed as a self-completion questionnaire. The questionnaire asked only 2 brief questions about bus-use to avoid giving

the impression that the survey was aimed at bus-users. In addition, a number of the questionnaires were hand-delivered to the household to identify whether certain classes of individuals' were more likely to refuse to take part in the study than others, particularly in relation to car-ownership.

Following these questions, we then decided to describe to respondents five possible effects of withdrawing local bus services. These five categories had all been found to be important from the previous interviews. They were:

- (1) need to make alternative travel arrangements;
- (2) losing the option of using the buses;
- (3) indirect effects caused by other people being unable to use buses;
- (4) concern for others in the household;
- (5) concern for people in the community outside the household.

The first category represents direct benefits, that is, consumers' surplus. The other four categories represent non-use benefits of which we would ideally wish to obtain separate estimates. Each respondent was asked how important these effects were and then the maximum amount they were personally prepared to pay to keep the local services for each of these five reasons. This was presented as an open willingness to pay question. The question made reference to several possible ways of paying (rates, taxes etc) rather than a single payment mechanism. This we felt might deter protest votes and enable people to state whether they were willing to pay, regardless of how they would pay. The choice of an open-ended willingness to pay was taken after long deliberation. Even though our earlier surveys had indicated that people had difficulties with such an approach we felt that asking people to value 5 separate benefit categories, each with a number of iterations, would make the questionnaire too long and deter some people from responding.

Following this, the respondent was then asked how much they thought the household as a whole would be willing to pay to keep local bus services as they are. This latter value represented all five categories in total.

3.4.1 Findings: Questionnaire

One hundred questionnaires were sent out to households in the Meanwood area of Leeds and a further 50 were delivered to the household. Altogether 23 questionnaires were returned, only 10 contained attempts to answer the valuation question.

3.4.2 Findings: Interview

Given the extremely low response rate to the questionnaire, it was decided to undertake a follow-up interview those respondents who had returned a questionnaire to find out what difficulties the questionnaire had presented. Our initial thought were that the low-response rate could have been a result of:

- (a) the self-completion, self-return questionnaire format;
- (b) the difficulty or complexity of the separate benefit category questions.

No attempt was made to return to households where questionnaire forms had been sent to find out why they had not returned the questionnaire. From visiting the area and talking to people who had completed the questionnaire, it was found that the area contains many households with retired couples or elderly people living on their own. Prior experience and anecdotal evidence from market researchers and people

who work with the elderly suggest that this group tend to be easily put off by forms especially where they involve complex issues.

From those who had attempted to complete the questionnaire the WTP question was found puzzling and difficult to answer by all the people interviewed. We found the difficulties in answering this question were of three types. The first type found it difficult to pick out a value to such an open-ended question. The second type were suspicious about giving a valuation because they wanted to know more about how much they needed to pay to keep a service going i.e. they would pay but need some guarantee of provision or enforcement. The third group who provided actual valuations either revised their valuations in the interview when they realised how much they had put down or had put down a value without too much thought and had put it against a category of benefit without really thinking.

The respondents were split fairly evenly between those who would support subsidy through the rates and those who would prefer to see higher fares including the removal of free fares for pensioners, etc. Some respondents would like to see a combination of the two mechanisms. The most difficult question arising from the interviews was whether people have option values and if so, how to disentangle the different aspects of option value from user-benefits. In most cases, people found it difficult to disentangle use and non-use benefits. Those who preferred higher fares as the means of financing loss-making services generally thought about public transport in relation to their own actual use and the use of other people in their household or area. This does not deny that part of the higher fare might be a premium for retention of the services but it is difficult to identify from the replies to our questions. Those who prefer the rates as the payment mechanism were more likely to see the benefits of public transport to other people in the area and the value of maintaining public transport as an option for the future.

3.4.3 Conclusion

Several important lessons were learnt from this survey. Firstly that a self-completion questionnaire was unlikely to be suitable by itself, as a means of obtaining separate use and non-use values. Secondly, great care was needed in the recruitment of a sample, and that non-response was likely to be a major source of potential measurement error and therefore needed more careful thought. Thirdly, that there was a research trade-off to be made between a desire for a large sample of respondents and the quality or meaningfulness of data obtained.

3.5 Fifth Pilot

The fifth pilot survey was used to determine ways in which we could recruit both bus-users and non bus-users to the sample, and to assess the balance we should aim to strike between a questionnaire approach and more detailed interviews.

A new questionnaire was designed, which returned to the format of the questionnaire used in the third survey (see Appendix 3), which we believed respondents could answer and which would then be followed up with by an interview. There were some differences however. Firstly, individuals were only asked about alternative modes of travel to bus for themselves, rather than for each household member. Secondly, a stated preference question was used to ask people to compare a situation where the level of bus service is preserved and they have to pay an amount per week towards its preservation against a situation where the service is withdrawn. The amounts specified were between £2/year (4p/week) and £25/year (50p/week). The individual was asked for his/her own valuation and a household valuation. Respondents who would pay the maximum amount in the trade-off question (£25 a year) were then asked to give the maximum amount that they would be willing to pay.

The area selected for the survey is characterised by large detached houses and semi-detached houses. All

household deliveries were introduced by saying "I am from the Institute for Transport Studies at the University of Leeds, We are conducting a survey in this area about the value and benefit of local public transport services. We are asking households in the area if they will help us by completing a questionnaire in their own time which will then be collected at a time and day that is convenient to you".

Protests that the individual or household do not use the bus were followed up by "We are interested both in the views of people who use the bus services regularly but equally the views of people who may be mainly car users but who may use the buses occasionally or who have views about the provision of public transport for other people in the household or for the local area generally". No further explanation appeared to be needed for the households called at although additional information/reassurances were given. In most cases individuals were happy to give a telephone number to be contacted to arrange a time/day to make a return visit.

The questionnaire forms were delivered by hand to a pre-determined set of houses in the Meanwood area served by two sets of bus services (38/39 and 52/53). The latter service runs to the City Centre, the former to a district Shopping Centre where bus-services to the City Centre could be picked up. The adult single fare to the City Centre was 45p (peak), 30p (off-peak) and 35p (peak), 25p (off-peak) to the District Shopping Centre. All members of the household above the age of 16 were invited to take part in the survey. A date and time was arranged for picking up the forms. Considerable effort was made to return to each household until a contact has been made. Each individual who completed a questionnaire was asked if they would take part in a later interview.

3.5.1 Findings

A total of 32 households were called at. The results of these household contacts are as follows:

Refusals	7
Not in (after 4 return calls)	8
Number of forms delivered (by hand)	41
Number of forms collected (by hand)	21
Number of forms returned by post	10
Forms not completed	10
Households with at least one participating respondent	16

Response Rate

Of the 32 households called on, contact was made at 24. Within this group of 24, 7 households refused to take an interview form. 4 of these refusals were by old people who would not open the door. Each of these refusals occurred during evening visits. In retrospect, this is likely to have been an important factor in the refusal to open the door to a stranger. Two refusals were by old people who were unwell. The final refusal was by a young(ish) couple who had "other things" on their mind when we called.

41 forms were delivered at the 17 households who agreed to take part in the survey. A further 4 forms were left with people who had completed the phase 1 questionnaire. 21 forms were collected by hand from households. A further 3 households were returning their forms by post (10 forms in total). One household could not find the forms when we returned and had not filled them anyway. One household returned 3 forms about 15 minutes after they had been delivered. 2 of these forms were not completed and 1 of the forms was only partly completed. Overall a final return of 31 forms or 75% of the original deliveries was achieved (see Table 1). A total of 15 households would then have returned at least one of

the forms delivered or about 50% of the households called at and about 90% of the households who accepted the forms in the first instance.

Collection of the forms was not entirely straightforward due to the different days on which the forms were delivered (less time for individuals to complete) and people not being in when calls were made. The table below gives a broad indication of the procedure which was required to ensure returns of the forms. This highlights the importance of persistent follow-up to ensure high response rate:

	<u>N° of households</u>
Call back - no prior telephone call, forms completed/returned	5
Call back - no prior telephone call, no answer	5
Call back - no prior telephone call, forms not completed	6
Call back - prior telephone call, forms completed	4
2nd call back - no telephone call, forms completed	2
2nd call back - prior telephone call, no answer	2
Telephone call - request for forms to be posted	3

As can be seen over half of the forms returned required at least 2 visits to the survey area and a telephone call although for the first collection we did not arrange times/days by phone but called on spec (because we were in the area doing interviews). From this it is evident that a high return rate can be achieved with a persistent call-back.

Valuation

A total of 31 respondents were interviewed at 16 households (see Table 1). One household provided 5 respondents, two households provided 3 respondents. Only one of these was a single person household. All but one of the respondents in the two person households was an OAP. Two of the households interviewed had children between the ages of 11-18. Two households did not own a car. Only one respondent did not have a driving license.

Sixteen respondents did not use the bus, on average, during a typical week of travel. Six interviews were at households where there was no bus use by any household member. Three respondents, were heavy bus users, making more than 10 trips/week. The weekly amount spent in fares by those who use the bus ranged between 35p and £3.30 during a typical week. Eight respondents spent more than £1.00/week on bus fares.

For those respondents who used the bus during a typical week, the most frequent reaction to the absence of a local bus service would be either to "get a lift" or else drive. Only one respondent claimed that they would not make the trip they currently made by bus. These results all suggest a level of "non-captivity" to public transport (i.e. other modes of travel could be found).

The responses to the questions about the indirect benefits of public transport highlighted a range of option and non-use benefit. Five respondents claimed they never make use of the local bus service either for an emergency or in the case of a car breaking down. Ten respondents who do not use the bus during the course of a typical week, use the bus sometimes in the event of an emergency, such as a car breaking down. Two respondents claimed to use the local service often as a standby.

Table 1: Summary of Survey Findings

Household	1	1	2	2	3	4	5	5	6	6	7	7	8	9	9	10	11
Person	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
N° bus journey/week	0	0	0	0	0	16	0	0	0	0	8	6	2	0	5	2	1
£/week on bus	0	0	0	0	0	0	0	0	0	0	0.85	0.85	0.70	2.70	2.75	0	1.25
Journeys to work if no bus	1	1	4	4	4	N/A	D/K	N/A	2	N/A	N/A	N/A	D/K	N/A	2	1	2
Shopping trip if no bus	1	2	4	4	4	4/5	-	4	2	2	5	5	2	4	N/A	1	2
Use bus if car breakdown?	2	N/A	1	1	2	2	2	2	2	2	N/A	N/A	2	2	2	2	2
Give a lift to friends	1	N/A	3	3	2	3	2	2	1	2	N/A	N/A	2	1	2	-	1
Should buses be kept	D/K	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Kept if unprofitable	D/K	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
WTP p/week	2	2	10	10	2	10	N/A	N/A	4	5	25	25	25	50	50	4	-
WTP £/week household	2	2	10	10	-	10	8	8	10	10	50	50	25	100	50	4	-
Income	N/A	N/A	N/A	N/A	N/A	1	2	2	3	3	1	1	1	3	3	1	N/A
Occupation	2	1	1/2	2	5	5	5	1/5	2	1	5	5	5	5	2	5	2

Journey to work if no bus

Journey to shops if no bus

Use bus if car breakdown

Give friend lifts

Income

Occupation

1 = Don't use bus
2 = Get a lift
3 = Use taxi
4 = Driven
5 = Walk
6 = No trip
7 = Other

1 = Lift
2 = No trip
3 = Walk
4 = Taxi
5 = Cycle
6 = Not applicable

1 = Never
2 = Sometimes
3 = Often
4 = Not applicable

1 = Frequent
2 = Occasional
3 = Rare
4 = Not applicable

1 = 5k
2 = 5-10

1 = Housewife
2 = Employed
3 = 10-20
3 = Student
4 = >20
4 = Unemployed

N/A = no answer
D/K = don't know

Table 1: Summary of Survey Findings (Continued)

Household	12	12	12	13	13	14	15	15	15	16	16	16	16	16	
Person		18	19	20	21	22	23	24	25	26	27	28	29	30	31
Bus journeys/week	0	0	2	8	6	2	4	0	0	1	1	0	0	7	
£ week/bus	0	0-20	0-40	3-30	2-80	0-40	1-80	0	0	1-00	0-35	0	0	1-90	
Journey work if no bus	4	N/A	0	2	1	1	N/A	1	1	1	2	4	4	2	
Shopping trip if no bus	4	4	2	2	2	4	4	1	1	2	6	4	4	3	
Use bus if car breakdown	1	1	N/A	N/A	N/A	2	3	1	2	2	2	2	2	2	
Give friend a lift		1	1	N/A	N/A	N/A	2	1	2	2	2	0	4	1	
Should bus be kept	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Kept if unprofitable		Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
Willing to pay/£ week		-	2	8	4	16	0	50	25	50	25	10	25	25	
Willing to pay/£ household	-	-	16	4	16	0	100	100	100	25	15	25	25	40	
Income		-	-	D/K	-	-	2	4	4	4	4	4	4	4	3
Occupation	2	1/4	3	3	2	-	2	2	2	2	3	2	2	2	4

Journey to work if no bus	Journey to shops if no bus	Use bus if car breakdown	Give friend lifts	Income	Occupation
1 = Don't use bus	1 = Never	1 = Lift	1 = Frequent	1 = 5k	1 = Housewife
2 = Get a lift	2 = Sometimes	2 = No trip	2 = Occasional	2 = 5-10	2 = Prudemp
3 = Use taxi	3 = Often	3 = Walk	3 = Rare	3 = 10-20	3 = Student
4 = Driven	4 = Not applicable	4 = Taxi	4 = Not applicable	4 = >20	4 = Unemployed
5 = Walk		5 = Cycle		5 = Retired	
6 = No trip		6 = Not applicable			
7 = Other					

N/A = no answer
D/K = don't know

Seventeen of the respondents, who answered the question, reported that they were frequently or occasionally asked to give lifts to other household members. Only three respondents rarely gave lifts to other people in their household. Four respondents gave frequent lifts, and a further ten respondents gave occasional lifts to people outside of their household.

When asked, all the respondents said that local bus services should be maintained. In a subsequent question three respondents felt that services should not be maintained if they were unprofitable. One respondent said he did not know whether such services should be maintained.

All but one respondent stated they were willing to pay something towards the maintenance of local services. Four respondents said they would pay up to £50 a year (£1/week) in addition to any fares they might pay to ensure the maintenance of the local bus services. The average willingness to pay across the entire sample was £18.29/year or 35p/week. Non-users valued the bus service lower than users, £13.90/year (26p/week) compared to £22/year (42p/week), although the former group included people who use the bus as a standby. Their valuations are therefore likely to include option values. We did not collect sufficient data to establish whether the values of non-users in households where other members used the bus were higher than in households where there were no users. The average willingness to pay of respondents who do not use the bus during the course of a typical week or in the event of emergencies was lower (£11.20) than for those who do not ordinarily use the bus but do in the event of an emergency. The values for the former are closer to pure non-use values.

Whilst these results have no statistical validity, they do confirm our concern over sampling and ensuring that bus-users are not over-represented in the sample.

Amongst those people who currently use the bus, it was evident from the interviews carried out that some trips were perceived as more important or valuable than others and accordingly there was a higher willingness to pay for certain classes of trip (say trips to work, or trips for children to school) than for others. The global willingness to pay figures therefore obscure an uneven set of trip valuations. This has importance for determining the value of local bus services and claims for subsidy. If people are willing to pay more for trips to work for example then this would suggest a greater value for those trips than other trips. Whether we could get at these trips by trip valuations via a lengthy and potentially laborious questionnaire seemed doubtful. Our final survey method in fact did involve asking the respondent about individual trips and classes of trips, rather than bus travel as a whole, although as shall be seen this required a radical shift in the methodological thinking.

Through the interviews it was found that many respondents' valuations of their local services extended to other bus services that they use, that is, some people used the local service to gain access to other services to reach a final destination. Where this occurs it is clearly important that when making a valuation they take account of the relationship between their local service and its connection to other bus routes (which they may or may not use) as well as to other services which they might use but which are not connected to their local service. In our surveys to date we had only focused on the preservation and value of the local service rather than the local service and the network. This was something which we ensured we examined in subsequent surveys.

The average expenditure by users on local public transport services was £1.16/week. There is no discernible relationship between willingness to pay and level of use however. A number of households would not supply their net monthly income levels making it difficult to determine any relationship between income and willingness to pay. Visual inspection indicated that those households with higher net household monthly incomes (above 20K/year) expressed higher average willingness to pay than lower income households. This indicated the importance of collecting net income levels in order to be

able to adjust valuations for the effect of income when comparing across areas.

In the majority of cases the household valuation was the same as the individual's own personal valuation or double their personal valuation (in several two-person households). Two households showed more complex additive formulations, with the household valuation by individuals being neither the same as nor doubling of the individuals own valuation.

The valuations obtained from the survey appear plausible. However, inspection of the forms and subsequent interviews indicated that seven respondents had ticked the £25/year box (the maximum specified) without indicating a maximum willingness to pay, suggesting an end-point bias. Moreover, few of the respondents had written in a more precise valuation, than those specified on the questionnaire, indicating that they may not have given as much thought to the questions as may have been desirable.

In responding to the questions posed, many respondents who currently use the bus were unclear as to whether the amounts being asked for were additional payments to their current fares, and if so why they were not simply expressed in terms of higher fares. This response had occurred in previous studies and led us to conclude that amongst people who actually use public transport on a regular basis that the fares they pay are the most natural form of payment mechanism. Moreover, the surveys, at the time, were being carried out during the period when the household rating system was being phased out to be replaced by the community charge.

This transition period was causing considerable uncertainty amongst households, as to their future levels of payment, and hostility to the change-over. On this evidence, it was therefore considered prudent to avoid both the rates and community charge as a payment mechanism.

Once again, the valuation question raised a number of interesting points of discussion. Many people believe that bus services should be maintained even if they are loss-making but have queries about the process of subsidising such services through the rates. Arguments voiced were:

- (1) why should we be subsidising privately operated services through the rates?
- (2) if we start to increase support through the rates, the bus operator will hold us to ransom in the future?
- (3) why are services loss-making?
- (4) how much do we need to find to support the service?
- (5) will everyone pay towards the support of the services?
- (6) is this a ploy to hike up the rates?
- (7) I do not use the buses very often so why should I have to pay through the rates (i.e. prefer higher fares, etc)?

Each of these points highlighted the problem of using a questionnaire approach to obtain valuations of local bus services. These queries represent some of the difficulties which valuation questions pose to people. The usual assumption is that if we ask a person a question they will be able to articulate a response or valuation. Questions, however, can and do trigger a whole range of reactions including suspicion, confusion, or a desire for further information. Questionnaires by their very nature cannot anticipate all these reactions or respond to the particular local difficulty. Such local difficulties can only be dealt with by face to face interaction, whereby the meaning of the question can be discussed or renegotiated and a meaningful valuation achieved. Without this renegotiation it is possible that the respondent will either not respond to the question at all, respond inaccurately or else respond to a question they would like to be asked.

3.5.2 Conclusions

The approach adopted in this survey showed that a high response rate, including both bus users and non-bus users can be achieved. Even where a person refuses to take part in the survey, it is possible to collect information about that respondent such as age, car-ownership and level of bus-use which enables the sample to be weighted accordingly. This was shown to be important where the valuations of bus users were higher than non-users. We did not attempt to measure whether the users' valuations included a non-use component. This might have been done by asking each user how much of the amount they had specified they would be willing to pay if they no longer used the local service (perhaps if they had moved away).

The questionnaire indicated that many people do value their local bus services, even where they do not currently use those services themselves, and are willing to pay towards the preservation of those services.

People seemed to find the stated preference questions easier than the iterative bidding question although there was some evidence from the questionnaires and from the interview discussions that people's final valuations were influenced by the range of values on offer. This required careful thought for subsequent designs. We did not attempt to measure separate use and non-use valuations, although the apparent success of the stated preference questionnaire led us to believe that this might be possible. Amongst users of the local bus service there was a general view that bus fares were the most relevant and meaningful way of ensuring the survival of their local services.

The major issue arising from the questionnaire however, was the level of detail and complexity with which different respondents wished to work. Amongst bus-users it was evident that different classes of trips were more valued or important than others, and that use-values were strongly influenced by such factors as the perception or availability of alternatives, the trip-end purpose and, how often they used the bus service. Whilst many of these points could be covered in a questionnaire, albeit a lengthy one, it was found in the interview that new considerations came to light during the course of the interview, and that people gave the issues much more thought via an interview discussion than they had when answering a questionnaire. Rather than seeing this as a potential bias or problem we felt that we should develop a methodology that enabled interaction at a high level of detail between a respondent and an interviewer.

3.6 The Travel Diary Approach

At this stage, two of the staff employed on this project had recent experience of using travel diaries as the basis for interviews in other projects.

The travel diary/interview approach had been found in these studies to provide the necessary detail with which to explore with respondents, complex behavioural and attitudinal reactions to various transport scenarios.

The merits of a travel/activity diary approach were considered to be sufficient to consider experimenting within this project. In particular, it was felt that by asking people to keep a diary of their travel for a week, this information would provide the focus for:

- (a)examining in detail the implications either of the withdrawal of local bus services (use-benefits of public transport) or the loss of car where this was the main mode of travel (option and non-use benefits).
- (b)examining the relationships between different household members as a result of one persons travel decisions and activities affecting another household members (e.g. giving lifts, sharing the car etc.)
- (c)determining the value of local transport in the context of their current actual use and expenditure on fares at a trip by trip level, trip class level or across a longer time frame (e.g. a week).

Using information from a travel diary means that individuals are commenting upon recent travel patterns and activities for a standardised time period. This information can be analysed prior to an interview and the interview tailored to meet the respondent's own unique circumstances. Where individuals display complex or variable travel patterns (as in fact most people do) this makes the interview both more manageable and productive.

Whilst the travel diary approach offered a potentially powerful technique for the measurement of use and non-use values, it remained to be answered how such an approach might work, given the findings from the surveys reported above. Accordingly, a survey was designed to test the likely success of such an approach.

3.7 Burley Travel Diary Survey

A letter was sent out to 17 households in the Burley area of Leeds, serviced by two bus services (41,50). The nearest alternative bus route from the area surveyed is a 400 metre walk, involving a steep climb. Calls were made at each of the 17 households. A travel diary was left at 13 households (see appendix 6) The diary asked respondents to record each trip they made during the course of a day and to record

- the origin of the trip
- the destination
- the time of departure and arrival
- mode of travel
- journey purpose
- whether any other people accompanied the trip (family, friends, relatives)
- the service number (for public transport trips)
- the method of payment

- the amount paid

Several designs of the diary form were developed. The aim was to make the forms as simple to fill in as possible and enable rapid coding of information for the interviews. Two early designs were found to be too small print for some individuals. All trips were asked to be recorded except walk trips of under 5 minutes duration.

The information from the travel diary was translated onto a chart (see Appendix 7) which clearly showed up the mode and times of travel, the trip end and the expenditure incurred on those trips made by public transport. The interview was then structured in the following way. Firstly, respondents are asked if the travel pattern shown is correct and whether it reflects a typical week. The respondent was left to decide what was meant by a typical week. For our purposes we were interested in whether the week included or excluded public transport trips which were made on a regular basis or unusual trips.

Secondly, for each trip made the respondent is asked what they would have done had their actual mode been unavailable. A record is made of all changes in behaviour. These questions help to focus the respondent's mind on public transport and their degree of dependency on it. This includes both bus users and non-bus users. This approach enables the respondent to assess the implications of not having a local bus service in the context of their own current travel patterns and dependencies. In this way the introduction of the benefits of public transport is done in a less directive way than in the various previous questionnaires.

Thirdly, bus users were then asked for their response to a fare increase, affecting only the service that they use most often. This was undertaken for each public transport trip recorded in the diary. This left them with various options, to continue to use the service, to switch to a different bus service (usually with a longer walk or wait element to the trip), switch to another mode, change the destination, or trip suppression. Fare increases proposed were, 10%, 20%, 50%, 100%, and where necessary a limiting question establishing at what fare they would no longer use the service. By working at the current level of expenditure on fares we felt that this would overcome the problems of start-point bias which had occurred on previous occasions. These questions were followed by similar fare increases proposed for the whole network. Thus, use values are obtained giving the marginal value of the most used service and the total value of the network to the respondent.

Fourthly, the next set of questions include all respondents and consisted of two ranking exercises. The first asks respondents to put themselves in the place of a transport planner and say which factors determine who would be provided with a subsidised bus service. A list of potential groups and facilities which might be serviced by public transport were displayed as a show-card. The second set of cards listed direct and indirect benefits that might arise from the presence of public transport. Respondents were asked to rank these in terms of importance to themselves, omitting any they felt to be unreal or irrelevant, while adding any which they felt to be significant yet not included.

Finally, all the respondents were asked whether they would be willing to pay to secure a bus-service for reasons other than their own immediate use. This question was presented in the form of a stated preference question.

3.7.1 Findings

Thirteen households took up diaries although only 3 households actually completed a travel diary. Interviews were obtained with only 3 of 13 households where contact was established. In two of these households car was the dominant mode, each household recording a solitary bus trip, a female shopping

trip into the city centre on a Saturday. Car was a perceived alternative for both trips but the hassle factor of congestion and parking militated against it. The reported consumer surplus values were 10p (walk instead) and 35p (possible car passenger or taxi). The remaining household consisted of two elderly ladies, dependent on public transport for most of their travel needs. Although operating under a severe income constraint, they were willing to pay 10p each way, but at 20p made severe cutbacks in their trips leaving only essentials.

Few problems arose with the questions on willingness to pay for use benefits where responses appear to be realistic. There were some difficulties with the ranking and the valuing of non-use benefits. The problems with these questions and other issues are discussed below:

(a)Low Response Rate - an initial agreement to participate was obtained from most households and diaries deposited, the drop out rate was then high. A number of reasons for the high drop out rate were hypothesised:

- (i) car users felt that the survey was not relevant to them,
- (ii) doorstep explanations were not adequate,
- (iii) lack of a follow-up contact during the diary phase.

It was considered that the low response rate could be tackled in a number of ways. The most important of these were:

- (i) an improved diary design, with clearer explanation and a sample page showing how to complete the diary,
- (ii) emphasis on explaining the purpose of the study on the doorstep,
- (iii) a few days into their diaries respondents will be phoned to check that no problems had arisen.

(b)Comprehension Problems - Generally people found the wording prior to the ranking exercise difficult to understand. They also found it difficult to think about benefits to different groups and access to facilities in the same exercise. These need to be separated out. The absence of a non-use or option value moreover should not be regarded necessarily as a problem. Not all respondents can be expected to give a value for a variety of reasons such as inability to pay or a true zero value.

3.7.2 Conclusion

The low response rate was again a problem. Despite this we found that the diary/interview approach surmounted many of the problems which we had experienced in the previous surveys. In addition the fares mechanism seemed realistic and plausible to people.

3.8 Travel Diary Survey II

The final pilot survey took place during February 1990, using the same area and bus service route as for the previous pilot study. A further 17 letters were delivered by hand to a random selection of households either side of the Burley Road, served by the 41/50 bus service. All the selected households were within 150 metres of the Burley Road. Household calls, on up to 3 occasions, were made to ask if people were willing to take part in the survey. These contacts were made by the two project officers and a recruited interviewer. The household calls were made no more than a week after the initial letter had been delivered.

3.8.1. Findings

Contact was made with 15 of the original 17 households. Of the 15 households, 5 declined to take part in the survey. Details of the number of people, the number of cars and the number of bus users were identified for each of these households. 10 households took a total of 20 diaries. A total of 16 diaries were collected from 9 households. Interviews were carried out at the 9 households, although not with all the individuals who had completed diaries. This represents a 66% response rate. All the households had at least one member who used the local bus service. Three of the four refusals to take part in the survey were at households where one or more household member used the local bus service. Three of the households interviewed did not own a car.

Trip Characteristics

Ten of the 17 respondents used the bus at least once during the diary period. Seven of the respondents made at least one journey by car, during the diary period. Eight of the 17 respondents are bus users who did not travel in a car that week and typically do not travel by car.

Only one taxi trip was recorded amongst all respondents and only one respondent used the rail service during the diary period. Four respondents who used a bus during the diary period also made at least one trip by car, either as driver or passenger during the diary period.

Most of the diaries recorded represented fairly typical routines and patterns of travel although as a number of respondents indicated it is difficult to state what a typical week is like. Many of the respondents indicated that they had used a local bus fairly recently, which did not show up in the diaries. In total 13 of the 17 respondents had used the bus at least once in the previous 3 months. We did not consistently track the amount of bus use per respondent or other forms of transport outside the diary week.

Most of the sample therefore either use the local bus service on a weekly basis or else use it occasionally.

Bus Travel

Forty-six of the sixty-eight bus trips recorded were made during peak periods. A total of 4 trips were made during the weekend period, and 2 evening trips were made. Again we did not track in a consistent

way the usage of local bus services at other times of the year although several respondents indicated they use the buses more at weekends and evenings during the summer months.

In the absence of a car being available, the majority of car users claimed they would get a lift or travel by bus as an alternative mode in the short term. The majority of bus users claimed they would walk if the bus were unavailable. In a limited number of cases, if the main mode had not been available the trip would not have been made at all.

Reactions to fares increases

Only those respondents who used buses during the diary period were asked for their responses to fares increases, thereby failing to obtain a consumer surplus value for those people who use the buses at other times.

A number of the respondents do not currently pay fares for their bus use. Here respondents were asked to imagine paying certain levels of fares rather than a percentage increase on their existing fare.

In most of the cases it was possible to measure a consumer surplus for the bus route currently used, and in fewer cases for the bus network. This surplus for the route ranged between 70p and £4.70. The percentage increase against current levels of expenditure on fares ranged between 12% and 400%. Four respondents who do not use the bus indicated a willingness to pay to preserve the local bus service of £1/week. Those who actually use the local services found the question about additional payment for other people difficult to understand suggesting either that they do not have any non-use valuation or that they had already subsumed benefits for other people in their initial valuations.

3.8.3 Conclusions

A high response rate was achieved on the basis of an intensive delivery and recruitment exercise. People reported little difficulty with the form although the expected problems of partial completion occurred on a number of occasions. This required that at the diary collection stage we went through the diaries and filled in any missing areas/days etc. The interviews generally proved successful in terms of working through with the respondents the implications of losing a bus service in their own terms. The ability to talk about individual trips adds a high level of realism and relevance to the interview and makes the valuation question that much easier to discuss. The valuations we obtained were plausible and based upon discussion about actual travel.

Whilst the method was intensive on resources we felt that the method developed offered the most valid approach to measuring separate benefit categories. We were concerned however that the method was extremely demanding on interviewers which meant that the technique might be open to many forms of interviewer bias. To overcome this and to ensure quality control over the data we spent considerable time and effort training the two recruited interviewers. Prior to each interview we went through the travel diary of each respondent, checked the travel/activity charts and discussed some of the potential difficulties or issues which might arise in the interview.

4. FINAL SURVEY METHOD

The final survey method used for the main survey involved the following stages:

1. Select Sample: e.g. households from a well defined community with only one bus service - thus

reducing the problem of trade-offs between different services;

2. Contact Letter: informing the household that a survey is being conducted and that someone will call on them - this should allay any fear or suspicions respondents may harbour for unexpected visitors;

3. Diary Placement: the first face to face contact with the household occurs when the seven day travel diaries are placed. Efforts are made to leave a diary for completion by each adult member of the household and any children of an age to make independent journeys. This also provides an opportunity to gain basic information on the household's size, number of children, car ownership and public transport use, which can be used to identify any non-response bias;

4. Collect diaries and arrange interview;

5. Conduct an interview with the household. This covers a number of issues. The main points are:

- (i) the existing travel patterns and how or indeed whether journeys would be made if the preferred mode was unavailable,
- (ii) where bus use is reported, the maximum fare individuals' are prepared to pay for each trip before ceasing to travel by bus is established. The implications to the individual and to the household are examined for each of the bus trips,
- (iii) non-use effects are introduced by a series of questions about the effects of a reduction of the local bus service. A priority ranking for different journey purposes, user groups and periods of operation is sought,
- (iv) respondents are then asked to allocate 100 points between 5 categories of non-use benefits: use by relatives or friends, environmental and congestion effects, use by other members of the community, standby cover and accessibility.
- (v) respondents are then asked how much they are willing to pay for non-use benefits. Bus-users are asked how much if anything they would be willing to pay on top of their own current use.

5 CONCLUSIONS

The survey method developed was based upon a number of experimental survey designs. These different designs threw up new issues and problems as well as helping us to an understanding of how people think about public transport and their abilities to answer the questions we were interested in. We began the project believing that a self-completion questionnaire could produce the information we needed. The exploratory interviews showed that this was not possible. By the end of the project we had moved towards a more detailed, interactive methodology which is tailored to the own unique circumstances of the individual yet in a structured and systematic way. As part of the development exercise we interviewed over 70 people, in interviews ranging between 20 minutes to over two hours. We also sent out or delivered over 300 questionnaires and received back or collected over 100. Results of the main survey using the approach developed are presented in Bristow et al (1991).

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Appendix 1. First Questionnaire.

Appendix 2. Second Questionnaire.

Appendix 3. Third Questionnaire.

Appendix 4. Fourth Questionnaire.

Appendix 5. Travel Diary Survey and Show Cards.

Appendix 6. Sample diary page - Burley Road Survey.

Appendix 7. Travel/Activity chart - Burley Road Survey.

