

Stated Preference Surveys on the Internet – an Effective Method for Finding Passengers’ Preferences?

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Abstract

This paper summarises our experiences of using Stated Preference surveys on the Internet to find passengers preferences. The Institute of Transport Economics has carried out analyses to establish whether the data collection methods used affect the results. The analyses identify whether those who choose to use the Internet have preferences which are different to those who choose pen-and-paper or home-based interviews, or whether it is the form of the interview which affects the results. In addition, we present key characteristics of those who choose the Internet and those who choose pen-and-paper/ home-based interviews.

1 Introduction

Traditionally, hypothetical evaluation methods such as Stated Preference analyses (SP analyses) have been used to identify the preferences of various passenger groups for non-market goods such as travel time and comfort. Evaluations from SP analyses are used in the planning and decision-making process in the transport and communications sector, for example in cost-benefit analyses. Correct evaluations are therefore important in order to make the right planning decisions.

This paper summarises some experiences from Internet-based SP analyses carried out at the Institute of Transport Economics and explains some of the analyses which have been carried out in order to look at the differences between data collected through self-administered Internet surveys and data from paper forms or home interviews. The analyses are limited to stated choices where the aim is to explore passengers' preferences and is based on Nossur 2005 and Nossur et al 2005.

2 About the SP method

The Stated Preference (SP) method is based on hypothetical choices between different alternatives. Sælensminde (1995) distinguishes between three types of SP methods:

- contingent valuation method
- transfer price method
- conjoint analysis
 - stated choice
 - rank
 - rate

The advantage of the conjoint analysis in relation to the transfer price questions is that a number of goods can be evaluated at the same time (Sælensminde 1995).

In the stated choices sequences, the respondent can choose between different "packages" where each package contains a number of different characteristics. The choice of package forms the basis for mapping passengers' relative priorities of various alternatives.

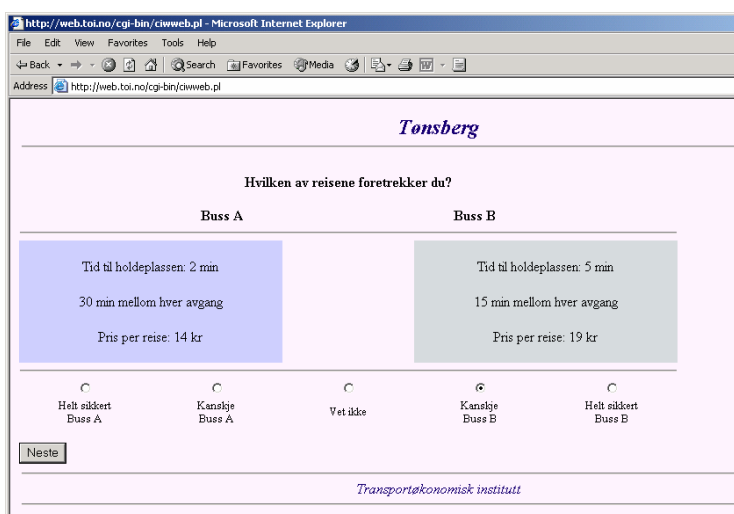


Figure 1: Example of screen picture with stated choice.

Figure 1 shows an example of a stated choice from an Internet-based SP survey. The respondent chooses between two different bus journeys. The attributes of each journey vary, and the levels are tailor-made to suit each respondent. Each sequence consists of a number of choices. In order to make the choices as realistic as possible, the starting point is often a journey that the respondent knows well. Based on the choices made, we can calculate, for example, how much the fare and travel time affect the choice of journey.

3 Description of some SP surveys on the Internet

This chapter provides a summary of Internet-based Stated Preference surveys carried out by the Institute of Transport Economics (TOI) where the purpose was to find passengers' preferences through stated choice.

3.1 Safe public transport

In 2003, TOI carried out an Internet-based SP survey in Sweden. The purpose was to find out what makes passengers feel unsafe when using public transport, what could be done to reduce this fear and which measures could be implemented to increase safety and to strengthen the accessibility of public transport (Stangeby and Nossun 2004). The Internet-based survey was supplemented with paper forms. In this way we could ensure that we did not miss respondents who would not or could not reply using the Internet. A random sample was chosen from the National Population Register and a letter with an Internet address for the survey and a personal user name and password was sent by mail. The response rate was 44%, whereof 24% used the Internet and 21 % used pen-and-paper. The dropout rate was highest amongst elderly people. The survey contained two stated choice sequences, one for attributes at the bus stop and one with attributes on board the bus. The attributes in the first stated choice sequence were safety, bus stop design and fares. The second sequence contained attributes such as information, safety, fares and contact with the driver.

The forms on the Internet were tailor made to each individual respondent. The opportunities for customised design with paper forms are limited, so the choices on paper were somewhat simpler than on the Internet. This survey is referred to as the "Safe" survey.

3.2 Value of time for public transport in the Oslo region

In 2002 TOI carried out an Internet-based SP survey in the Oslo region in Norway. The purpose was to analyse people's preferences and evaluations of the quality of public transport services in the Oslo region (Nossum 2003). Respondents were recruited in the same way as in the Safe survey. The Internet survey was supplemented with a similar pen-and-paper questionnaire, though the Internet survey was tailor made to a greater extent than the pen-and-paper version.

The response rate was 29.4 per cent. 13.6 % used pen-and-paper and 15.7 % used the Internet. The survey contained contingent valuation questions and four stated choice (SC) sequences. In the three public transport SC-sequences the attributes were fares, walking time to bus stop, headway, travel time, interchange, comfort and delays. The attributes in the car versus public transport sequence was price, travel time and headway.

In order to make the trade off as realistic as possible, the respondent was given questions that were linked to a familiar journey. On the Internet this can be done by using the respondents' previous answers in the construction of new questions. This is not possible on paper and therefore the respondent must use an imaginary journey, and the paper version is adapted to an average journey. This survey is referred to as the Oslo survey.

3.3 Value of time in the city of Tønsberg

In 2003, TOI carried out an Internet-based SP-survey in the city of Tønsberg in Norway. The purpose of the study was to develop concrete proposals for changes in public transport services in the city of Tønsberg. In order to describe the optimal public

transport provision, an SP analysis was carried out to find passengers' preferences for different quality aspects of journeys by bus, car and bicycle (Vibe et al. 2004).

Recruitment was carried out by telephone. Respondents could choose between self-administered or assisted Internet interviews. Those who choose a self-administered Internet interview received an Internet address and personal password / user name by e-mail. The home interviews were carried out using a laptop computer connected to the Internet via a mobile telephone. In this way we included those who could not or did not want to answer over the Internet without help. At the same time, all the data was collected in the same way so we avoided having to combine different data sets. We carried out a total of 1105 interviews, of which 59 % were self-administered and 41 % were home interviews.

The introductory questions in the survey were used to divide the interviewees into three groups. In this way we defined three unique groups, where each person could only be in one of the groups:

1. **Bus passengers:** Those who use the bus monthly or more often.
2. **Cyclists:** Those who travel by bicycle monthly or more often.
3. **Car users:** Those who travel by car monthly or more often.

This division was made to ensure an even distribution across the three different transport modes (bus, bicycle and car). The focus in this survey is on equal distribution in the three target groups and not on a representative sample of the population.

Each of the three groups was given suitable stated choice questions. Bus passengers had stated choices where they chose between different bus journeys. Cyclists had stated choices where they were to choose between different bicycle trips. Car users were given

stated choices where they were to choose between different journeys by car. In addition, all were given a pair of sequences with choices where they were required to choose between different modes, for example bus and car. The stated choices included attributes such as the cost of the journey, travel time, delays, transfer, walking time to the bus stop, parking and separated bicycle lanes. This survey is referred to as: Tønsberg survey.

3.4 Travellers' valuations of traffic information

In 2002, TOI carried out an Internet-based SP-survey that focused on the use of and need for information connected to the car users' journey to work in the morning rush hour (Killi and Samstad 2002). The survey looked at car users' preferences for information on their journeys to and from work. The purpose was to find the type of information car users prefer, in which format, and the way they will make use of improved information. The target group was car users on their way to work who experience queuing problems. The respondents were recruited by handing out cards to car users on the main roads into Oslo city centre in the morning rush hour. The card contained the Internet address for the survey and an individual user name and password. The cards were already stamped, and by sending in the card with some information, a tailor-made paper-based questionnaire would be sent in return. The response rate was 17.5 %. The majority chose the Internet study and very few asked for the paper questionnaire.

We found that $\frac{3}{4}$ of the respondents were men and that there was a lower response rate in the age groups "20-29" and "60 and above" than in the other age groups. The target

group in this survey was car users on their way to work who experience queuing problems. When these figures were compared with data from The Norwegian National Travel Survey (NTS) and the distribution according to gender and age for those working in Oslo and using a car as their main form of transport to work, it appeared that the sample corresponded well with the figures in the NTS, with regard to both age and gender. Thus there was little to indicate that use of the Internet produced bias in the sample with regard to gender and age.

The questionnaire was tailored to each respondent, based on questions about the respondent's normal journey to work. The study contained contingent valuation questions and three stated choice sequences. The sequences with stated choices contained attributes concerning anticipated journey time, the cost of the journey, variations in arrival time measured by anticipated delay, time spent queuing and the type of traffic information. This study is referred to as the Traffic-info survey.

3.5 IBIS Logitrans – user evaluations of real-time route information

The purpose of IBIS Logitrans (Integrated payment and information system) was to study how the use of new technology can contribute to an increased use of public transport both generally and in situations with specific needs. The study identified user needs and preferences and evaluated the information measures in the project from a user perspective. This was done partly through a self-administered Internet survey amongst users of a SMS warning system (Kjørstad and Lodden 2003). The respondents were recruited by e-mail with a hyperlink to the survey on the Internet and a personal password/user name sent directly to the target group, who were registered users of the SMS service. The response rate on Internet was 72 %. The target group was easily

accessed by e-mail, and had easy access to the Internet, which is indicated by the high response rate. The survey contained one stated choice sequence with attributes dealing with price, information and delays. This survey is referred to as the IBIS survey.

3.6 Response rate varies from survey to survey

The response rate probably depends on the target group and how they react to various different recruitment strategies. Combinations of different methods can contribute to an increased percentage of replies, but make major demands when different sets of data are to be combined. The target group, and its accessibility, will need to be taken into account when considering whether self-administered Internet data collection should be supplemented with other methods in order to increase the percentage of response rate.

4 Characteristics of respondents and method for data collection

Since there are two ways of collecting data, self-administered Internet interviews and pen-and-paper/home interviews, it is interesting to see which respondents choose a self-administrated Internet survey and which prefer pen-and-paper or the Internet with the help of an interviewer. The characteristics of the respondents in the different samples may be correlated. In order to identify isolated effects, we have analysed the effect of each individual factor on the choice of method controlled by the effect of other factors. Employment, age and gender have significant isolated effects on the choice of method (pen-and-paper vs. Internet) in the Oslo and Safe surveys. Use of public transport, holding a driving licence and access to a car cannot explain the choice of method beyond that which is explained by employment.

In the Tønsberg survey, all five factors – employment, frequency of journeys by public transport, driving license, gender and age – have significant isolated effects on the choice of method.

The conclusions we find for age and gender, and to a certain extent for employment, reflect the general use and access to the Internet in the different groups.

5 Analyses of the stated choice sequences

In order to see whether the preferences of those who choose self-administered Internet are different from those who choose pen-and-paper/home interviews, or whether it is the collection method in the interview which affects the results, we have run analyses which calculate separate estimates for each method. These estimates are then compared to see whether the different methods give different estimates which, in turn, lead to different valuations. We have also carried out calculations where we have taken into account the proven sample bias in age, gender and employment by weighting the data material with regard to these factors. This is done to see whether we can find an isolated method effect.

Self-administered Internet interviews have been compared with interviews on paper or home interviews on the Internet. We have concentrated on the stated choice where the choice is between journeys with the same transport mode.

5.1 Internet compared to paper results in greater differences than Internet compared to home interview

24% of the estimates have significantly different signs (prefixes) on “pen-and-paper” and on the Internet, and 82% of these estimates have a significantly larger estimate for

paper when compared to the Internet. The few estimates that do not follow this pattern and have a higher Internet effect than paper effect are all estimates in the same sequence in the Oslo survey.

One possible conclusion is that if there are significant differences between paper and the Internet, then paper gives the greatest effect, but it is reasonable to believe that the reason for this is linked to the major challenges in designing choices on paper and not necessarily a weakness of using the Internet as a method. Another possible explanation is that those who choose paper are older and less likely to be in employment; this group may have other preferences and thus the estimates will be different for those who choose the Internet and those who choose paper.

If we look only at the differences between the home interviews and self-administered interviews in the Tønsberg study, it appears that there is a tendency for home interviews to have larger estimates than self-administered interviews, but the difference is not significant. It appears that self-administered Internet and paper surveys result in greater differences than self-administered Internet surveys in relation to home interviews on the Internet.

Only 2% of the estimates have signs that differ significantly from what was originally anticipated.

5.2 Paper surveys can give estimates which are not significantly different from zero

Only pen-and-paper surveys give estimates that are not significantly different from zero in the Oslo and Safe surveys. This may be due to the fact there are fewer opportunities for tailor-made design with stated choices on paper compared to the Internet. Another

possible reason may be that those who choose paper surveys are older people who are less likely to be in employment. It is possible that this group values time differently than the younger age groups do. A third possible cause is that the oldest age group may not be able to make the advanced trade-offs that are required in a sequence with stated choice. Without these trade-offs, the choices do not function satisfactorily.

In Tønsberg, both home interviews and self-administered interviews give estimates with signs that are not significantly different from zero. Travel time for both bus and car are not significantly different from zero for home interviews. This may be due to the fact that this group is similar to the group that chose paper interviews in the Oslo and Safe surveys and thus may put a lower value of time. This group has had the help of an interviewer and made the choices on the Internet, so the degree of difficulty or the combination of two different data sets should not play any major role here.

In both Oslo and Tønsberg, estimates for the walking time to the bus stop are not significantly different from zero in some cases. The time it takes to walk to the bus stop can be seen as a benefit, both with regard to health, in the form of fresh air and exercise, and with regard to access, in that a more frequent service may be available by walking a bit further. In the pen-and-paper survey, walking time does not appear to be seen as a burden and this may be due to the fact that those who choose pen-and-paper are more likely to be older people who may have other preferences regarding the time it takes to walk to the bus stop than younger age groups.

Thus, the Internet as a method is not the reason why some of the estimates have a different sign than might have been expected, or why some of the estimates are not significantly different from zero.

5.3 Is there an isolated method effect?

In order to find out whether the collection method has an independent effect on the estimates, we have calculated separate estimates for this effect. The method estimate expresses the isolated effect that the choice of method has on the respective characteristics. The model is designed to calculate the effect of choosing self-administered Internet surveys.

If such method effects are found, it is possible that they can be reduced by weighing up for any sample bias. Some sample bias has been demonstrated with regard to gender, age and employment. In order to take this bias into account, we have weighted the data material in several rounds, with different weighting in each round. For each round, a new characteristic is added in the weighting. The data are weighted with regard to gender, age and employment.

5.3.1 A number of significant method effects when choosing between the Internet and paper

In the two studies where people chose between the Internet and pen-and-paper surveys (Oslo and Safe), about half of the calculated method effects are significantly different from zero. Weighting the data material does not appear to change this distribution significantly.

In the study where the choice was between two Internet solutions (Tønsberg survey), the proportion of significant method effects is somewhat lower, and it appears that weighting the data material with regard to gender and age reduces the amount of significant method effects to some extent.

5.3.2 No reduced method effect when weighting for employment

By weighting for employment in addition to gender and age, the number of significant method effects in both the Oslo and Tønsberg surveys increases significantly. In the Safe survey there is almost no change.

In the Tønsberg survey, the weighting affects half of the method effects and weighting for gender and age results in the fewest significant method effects.

Weighting has greater effects on surveys where the choice is between two Internet methods than when the choice is between pen-and-paper and the Internet. Furthermore, we see that none of the method effects change significantly through weighting and that the absence of the oldest age group does not significantly diminish the method effect.

5.3.3 Fewer differences when two Internet solutions are combined

The design for the public transport choices in the Tønsberg survey was done based on the design of the Oslo survey, which in turn was based on previous experiences (Norheim 1993). Several of the results from the two studies can therefore be directly compared. The findings can be summarised in these points:

- The Tønsberg survey has fewer significant method effects than the Oslo survey
- The effect of weighting appears to be greater in the Tønsberg survey than in the Oslo survey, i.e. there are fewer significant method effects with weighting.
- The effect of weighting for employment does not appear to reduce the number of significant method effects
- There does not appear to be any pattern regarding the direction of the method effects in the two surveys.

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