THE TIME FACTOR IN VALUE OF HEADWAY TIME STUDIES

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ABSTRACT

In stated choice studies, respondents' preferences are revealed by means of hypothetical choice situations. However, our preferences are affected by our recollection of prior experiences and evidence suggests that the amount of time having passed since an experience took place affects how it is recollected. When designing a stated choice study, a decision has to be made on where to approach the sample. This choice will affect how long it is since the respondents last experienced a situation similar to the hypothetical choice situations used in the survey and, as a consequence, how the respondents remember that experience. In turn, this can affect their stated preferences and the results of subsequent model estimations. The article applies a stated choice experiment distributed to two split samples differed only with respect to interview location. The aim is to assess whether the length of the time lag between respondents last travel experience with a transport mode influence their valuation of headway time. The results indicate that respondents value headway time higher when interviewed onboard ferries, shortly after experiencing the adverse effects of headway, i.e. prolonged waiting time, than they do when interviewed at home. A suggested implication is that the effect of interview location on calculated value of headway time should be taken into consideration when value of travel time studies are designed.

Keywords: Value of travel time savings, Stated choice, Headway time, Interview location

INTRODUCTION

The value of travel time savings (VoTT) is used as input in traffic forecasting models and cost benefit analysis (Shires and de Jong, 2009). Typically reduced time cost makes up 60 per cent of the quantified user benefit of transport projects (Hensher, 2001a) and it has been labelled the single most important number in transport economics (Fosgerau, 2006).

To estimate VoTT, stated choice (SC) data is commonly applied (e.g. Hensher, 2001b; Tseng and Verhoef, 2008). These data sets are generated from experimental designs in which respondents, typically, are confronted with a set of choice situations (Rose and Bliemer, 2008). Each choice situation has a finite number of alternatives described by some attributes and the respondents are asked to, in each choice situation, specify which alternative they prefer.

A considerable amount of research have been carried out to investigate how a SC survey should be designed, when the purpose is to estimate VoTT (e.g. Hess and Rose, 2009; Rose and Bliemer, 2008; Street et al., 2005). However, no universal agreement is reached as to how they ought to be designed, or how the design affects the result of a VoTT study (Arentze et al., 2003; Shires and de Jong, 2009; Wardman, 2004). A meta-analysis of UK VoTT found that the SC design, significantly affected the calculated VoTT (Abrantes and Wardman, 2009). Firstly, their analysis revealed that adaptive and telephone SC surveys produced time-value estimates that were, respectively, 33% and 42% higher than SC surveys that relied on pen and paper, cards or computers. Secondly, they found that internet based surveys produced VoTT estimates which were 84% higher than surveys based on more "traditional" methods. Thirdly, the hypothetical choice situation contexts used were also found to affect the estimated VoTT. Surveys with mode choice contexts generated 8% higher VoTT, than other choice contexts (e. g. within mode choices or route choices). Another meta-analysis (Shires and de Jong, 2009) found that pure SC, and joint SC and revealed preference (RP) studies, tend to generate lower VoTT than pure RP-studies, while Hensher (2004) found that more complex SC-designs gave higher estimated VoTT. In addition Wardman (2004) has argued that SC surveys suffer from a lack of realism related to time constraints and how cost and time values are presented, and that this lack of realism can affect the result of a VoTT study.

A researcher who designs a VoTT-study must decide where to approach his sample. Examples of places members of a sample can be approached includes their home, their workplace or onboard a transport vehicle. However, to reach a significant number of people who travel with a particular transport mode, it has been recommended that interviews, or at least the recruitment of respondents, are done onboard that transport mode (Stopher, 2008). Though, to complete a SC-survey is time consuming and, as a consequence, it can be difficult for respondents to complete them onboard transport vehicles, particularly on short trips. As a consequence, some researchers have interviewed respondents at different locations according to the length of the route they travelled when they were recruited (e.g. Ramjerdi et al., 1997). However, such a procedure may affect how long it is since the respondents last travelled by a particular transport mode and, as such, how they recollect that experience.

The travellers preferences, which are sought revealed in SC surveys, are influenced by our recollection of prior experiences (McFadden, 2003). However, our memories are subject to a positivity bias, i.e. that memories of "bad" experiences are minimized shortly after the experience (Baumeister et al., 2001; Taylor, 1991). This phenomenon was also identified by Sutton (1992) and Mitchell (1997) who, separately, found that travellers tend to evaluate a travel experience more positively in retrospect than they do during a trip. This "rosy retrospection phenomenon" was due to an increased number of negative thoughts, caused by distractions, disappointments and a less positive view of the self, during the trips. Though, the negativity was short-lived and after a few days, travellers began to evaluate their travel experience more positively.

Public transport, typically, follows a time table and the length of the time period between each departure, i.e. the headway time, affects travellers waiting time. Assuming that travellers arrive the point of departure at random, their average waiting time will equal half the headway time. Consequently, a reduction in headway time will reduce both average waiting-, and total travel-time. Given that travellers would like to reduce the travel time for a given trip and are willing to pay to attain such a travel-time reduction (Jara-Diaz, 2008), a value of headway time (VoHT) can be estimated (examples provided in Abrantes and Wardman, 2009). This VoHT is used to calculate the optimal frequency for public transport, in a welfare perspective. Consequently, testing and eliminating, possible sources of bias in VoHT-studies, improves the validity of VoHT estimates and makes the frequencies at which public transport operates more optimal from a welfare perspective and improve the allocation of the limited resources of society.

A stated choice survey seeks to reveal respondents preferences. However, preferences are affected by our recollection of prior experiences and evidence seems to suggest that an experience is evaluated more positively in retrospect than it is when the experience takes place. As such, it can by assumed that the preferences of respondents who participate in a VoHT study, based on a SC experiment, will be affected by how long it is since they experienced the consequences of headway time; i.e. waiting. Since respondents likely recollect waiting less negatively a couple of days after experiencing it, it can be hypothesised that respondents, on average, will have a higher willingness to pay for reduced headway time immediately after travelling by a frequency based public transport mode, than they will after a couple of days.

The aim of this article is to explore how one aspect of the design of stated choice surveys, the choice of interview location, affects the calculated value of headway time.

The structure of the article is as follows. Firstly, the theoretical framework is presented, before the design of the SC-experiments is presented. In section "The data sets" we briefly present the two data sets used in this article. The utility model is developed in the next section, together with the result of the model estimations. Finally, in the last section, conclusions are presented and possible implications are discussed.

THEORETICAL FRAMEWORK

Discrete choice models are based on random utility theory (RUT) as described by McFadden (1981; McFadden, 1986). RUT assumes that a decision maker chooses the one alternative that maximise his, or hers, utility (Chorus et al., 2008). Given that the decision maker has perfect information about the characteristics of the available alternatives, the following model of utility is applicable (Álvarez et al., 2007):

$$U_{in} = V_{in}(X_{in}, S_n, A_n) + \varepsilon_{in}, \tag{1}$$

where V_{in} is the utility observed by the analyst when decision maker *n* choose alternative *i*. V_{in} is, in this particular model, explained by the variables related to the chosen alternative (X_{in}), socioeconomic variables (S_n), and "other" variables (A_n). ε_{in} is a random term that includes unobserved evaluations by each decision maker (Espino et al., 2008). Given the previously mentioned assumption of utility maximisation, decision maker *n* will choose alternative *i* if, and only if, $U_{in} \geq U_{jn}$. That is if $V_{in} + \varepsilon_{in} \geq V_{jn} + \varepsilon_{jn}$, $\forall i \neq j$, or $V_{in} - V_{jn} \geq \varepsilon_{jn} - \varepsilon_{in}$. However, since $\varepsilon_{jn} - \varepsilon_{in}$ is unobserved by the analyst, the analyst is unable to perfectly observe the utility of a particular decision maker in a given choice situation (Chorus et al., 2008). Though, when V_{in} and the distribution of the random factor (ε_{in}) is known, the probability (P_{in}) that decision maker *n* will choose alternative *i* can be found through the following expression:

$$P_{in} = P\,[(V_{in} + \varepsilon_{in} \geq V_{jn} + \varepsilon_{jn})],\ \forall\, i \neq j = P\,[(V_{in} - V_{jn}) \geq (\varepsilon_{jn} - \varepsilon_{in})], \forall\, i \neq j. \qquad (2)$$

The probability will depend on the distribution of the random factor. If the random components of utility, ε_{in}, are independent and identically distributed (IID) with a type I extreme-value (or Gumbel) distribution, then the multinomial logit model (MNL) is applicable to estimate the probability, P_{in}, that individual *n* chooses alternative *i*:

$$P_{in} = \frac{\exp(V_{in})}{\sum_{j=1}^{J} \exp(V_{jn})} \qquad (3)$$

The MNL model is restricted by the independence of irrelevant alternatives (IIA) property. First introduced by Luce (1959), this property states that the ratio of choice probabilities is independent of any presence or absence of any other alternative in a choice set (Hensher et al., 2005) and it made experimental collection of data easier by allowing for multinomial choice probabilities to be inferred from binomial choice experiments (McFadden, 2003). However, Debreu (1960) proved that the MNL model may produce questionable forecasts if the IIA fail. This is often illustrated with the blue bus-red bus example (Billot and Thisse, 1999; McFadden, 2003). Let us assume that there is an equal (50%) probability that a person choose to travel by either a car or a red bus. If a third alternative, which is identical to the red bus except that it is painted blue, is introduced, the MNL model assumes an equal probability for each of the three alternatives to be chosen. However, the introduction of an alternative that is similar to one of the existing alternatives is more likely to take market shares from the similar alternative than from a “completely” different alternative. In our study, respondents were asked to choose between two unlabelled alternatives and it was emphasized that the alternatives should be considered equal on all attributes not included in the hypothetical choice situations. Therefore, the introduction of a third alternative should not have a bias towards reducing the probability of one of the existing alternatives being chosen and, as such, the IIA property should not be breached in this study.

The value of headway time represents the amount of money a traveller is willing to forfeit in order to obtain the benefit of reduced headway time, i.e. it is a measure of willingness to pay (WTP). Since discrete choice models are linear in the utility functions (Hensher et al., 2005), WTP can be calculated as the ratio of two parameter estimates, provided that the denominator is measured in monetary terms. As such, the value of headway time (VoHT) can be calculated as the ratio between the estimated headway time (HT) parameter and ticket price (TP) parameter, as illustrated in equation (4):

$$\text{VoHT}=\left(\frac{\beta_{HT}}{\beta_{TP}}\right), \tag{4}$$

where the two parameters, β_{HT} and β_{TP}, represents the marginal utility of headway time and ticket price, respectively.

DESIGN OF EXPERIMENT

To assess whether the length of the time lag between respondents last travel experience with a transport mode and the time they are interviewed influence their valuation of headway time, a stated choice experiment was distributed to two split samples differed only with respect to interview location.

The stated choice experiment was conducted in a ferry context due to the important role ferries play in several European countries transport systems, exemplified by Norway which has about 130 communities that are connected to the mainland by ferries (Mathisen and Solvoll, 2010). In addition, travellers typically spend more time onboard each trip with a ferry, than they do onboard other public transport modes, making onboard interviews more convenient for interviewers, as well as the interviewees.

The development of a stated choice experiment requires, in addition to choice of interview locations, that a decision must be made on whether to use unlabelled or labelled alternatives, how many alternatives to include in each choice situation, what characteristics to use to describe the alternatives and which values these characteristics should be given in each choice situation. Each of these steps of the design process is presented in the following paragraphs.

Labelling of alternatives

In stated choice experiments, respondents are asked to choose between alternatives in hypothetical choice situations. These alternatives can either be given generic labels (e.g. “Brand A” and “Brand B” or “Alternative 1” and “Alternative 2”) or names that provide decision makers, i.e. the respondents, meaningful information (e.g. “Ford” and “Toyota” or “Apple” and

"Banana"). Unlabelled experiments, which have generic labels, are often used to examine different configurations of a single alternative (Hensher et al., 2005).

Our study sought to examine different configurations of a ferry service and an unlabelled design was applied. The use of unlabelled alternatives also reduce the risk of IID violations (Hensher et al., 2005), i.e. that respondents use labels to conclude about the attributes not included in the design, conclusions that typically correlates with the random component of the utility model (Jaeger and Rose, 2008).

Number of alternatives

Traditionally it is recommended that the list of alternatives used in a choice situation should be derived from the universal, but finite list of alternatives available in the context studied (Hensher et al., 2005). However, how many alternatives to include in a choice situation are debated. Arentze et al. (2003) and DeShazo & Fermo (2002) have argued that to many alternatives leads to choice inconsistency, though Hensher et al. (2005) reports to have used as many as 20 alternatives in several projects. Carson et al. (1994) had success with four alternatives per choice situation. However to use only two alternatives have been criticised for being to simplistic and have little resemblance with reality (Caussade et al., 2005). It has also been indicated that the use of binary choices, compared to studies in which respondents are asked to choose between three alternatives lead to more frequent serial non-participation; i.e. that respondents choose an alternative consistently without regard for changes in the attribute levels (Rolfe and Bennett, 2009). However, an unlabelled experiment has no universal and finite list of alternatives to use as starting point when generating a list of alternatives. In addition, since our survey relied on pen and paper, the space available for describing the alternatives was limited. Therefore, the respondents were asked to choose between two unlabelled alternatives, "Alternative A" and "Alternative B", in each choice situation.

Attributes

This stated choice experiment was designed to generate coefficients that could be used to calculate the value of headway time for two samples. Given that VoHT is the ratio between a headway time coefficient and a monetary coefficient, one attribute had to represent headway time, while another attribute had to be measured in monetary units. The attribute used to estimate a monetary coefficient was ferry ticket price. To increase the realism of the choice situations, a third attribute, travel time across the strait (onboard time), was added. This third attribute also made the purpose of the study less apparent to the respondents.

Though respondents seem able to deal with relatively complex choice situations, limiting the number of attributes to three reduce the burden put on each respondent and, as such, increases the likelihood that they complete the questionnaire. The three attributes included in the choice set design, headway time, ticket price and onboard time, have all been identified as important service elements in the Norwegian ferry operations (Mathisen and Solvoll, 2010). One of the hypothetical choice situations used in the survey is shown in Figure 1.

Which of the following two alternatives do you prefer based on ticket price, time between departures and travel time across the strait:

Alternative A		**Alternative B**
153 NOK	**Ticket price (car and driver)**	**210 NOK**
68 min	**Time between departures**	**56 min**
54 min	**Travel time across the strait**	**45 min**
☐	← **I prefer** →	☐

Figure 1: Example of a choice situation.

Attribute levels

The attributes used to describe the alternatives in a SC study must be assigned at least two levels (Hensher et al., 2005). The set of attribute levels should be broad enough to allow a diverse set of combinations while at the same time being considered realistic (Hess and Rose, 2009) and feasible by the respondents (Hensher et al., 2005). To achieve this, the actual ticket price, headway time and onboard time on two Norwegian ferry services were used as base values for the two unlabelled alternatives. The other levels were calculated as percentages of these base values. The extreme values were 10% above and 25% below the base values. Table 1 illustrates how the four attribute levels were calculated.

Table 1: Attribute levels.

Attributes	Level 1	Level 2	Level 3	Level 4
Ticket price	Base value – 25%	Base value - 10%	Base value	Base value + 10%
Headway time	Base value – 25%	Base value - 10%	Base value	Base value + 10%
Onboard time	Base value – 25%	Base value - 10%	Base value	Base value + 10%

Based on the three attributes, four attribute levels and two alternatives, an orthogonal fractional factorial design with 32 choice sets were designed in SPSS. To reduce the number of choice sets given to each respondent, a blocking variable with four levels was introduced. As such, each block consisted of eight choice situations and four respondents were required for one complete design.

With each attribute level occurring 8 times for each attribute, the experimental design used in this study is balanced. This eliminates the risk, identified by Wittink et al. (1990), that unbalanced attributes in unbalanced designs can be found statistically significant because attention is drawn towards unbalanced attributes.

THE DATA SETS

Two data sets were gathered to assess whether respondents valuation of headway time is affected by how long it is between the last time they travelled by, in this case, ferries, and their participating in a VoHT-study. The data sets are briefly described in the following paragraphs.

Data gathered onboard ferries

This data set was gathered onboard the two ferries which on the 5th of February 2010 served the route between Bognes and Lodingen in the Norwegian county of Nordland. A total of 195 drivers of passenger cars were approached and asked if they were willing to participate in the study. A total of 161 responded positively, yielding a response rate of 83%. Since each decision maker chose between two alternatives in 8 hypothetical choice situations, a total of 1288 observations were obtained from this sample. As these respondents were interviewed onboard the ferries, they experienced the consequence of headway time, i.e. waiting for the ferry at the terminal, less than one hour before answering the survey.

Data gathered at home

This data set was collected in February 2010 when 595 individuals were invited via postal-mail to participate in the study. The addresses of 131 of these were gathered during the data collection which took place onboard the ferries the 5th of February. The addresses to the remaining 464 individuals were randomly selected from 17 coastal municipalities in Norway. 174 of those who were invited to participate filled out and returned the questionnaire in the pre-paid envelopes they received together with the questionnaire. As such, the response rate in this sample was 29%. With 8 observations per respondent, this sample generated 1392 observations. The members of this sample answered the survey, on average, 19 days after their last trip with a ferry.

Socio-demographic characteristics of the samples

To compare the samples, socio-demographic characteristics were gathered from the respondents. Table 2 displays the distributions of the samples with regard to gender, personal gross annual income in NOK (1 NOK=0.13 Euro as of May 2010) and employment status.

Table 2: Sample characteristics.

Characteristics	No. of respondents		Significance in χ^2-test
	Onboard	At home	
Gender			
Male	121	107	P<0.005
Female	35	67	
Personal gross income/year			
0-100 000	8	7	
100 000-300 000	37	47	
300 000-500 000	67	75	NS
500 000-700 000	28	28	
700 000-	10	13	
Employment status			
Employed	124	129	
Student/conscript	9	6	P<0.005
Retired/social security/other	23	39	

NS indicates no significant difference at 95% level.

The two samples differ significantly from each other with regard to gender and employment status. Regarding gender, women made up 22% of the onboard sample while they made up 39% of those interviewed at home (x^2=30.9, p<0.005). In the onboard sample 79% were employed (74% in the at-home sample), 6% (3%) were students or conscripts and 15% (22%) were retired, on social security or had another relation to the labour market (x^2=12.3, p<0.005). With regard to personal income, there is no significant difference between the samples.

THE MODEL

Let the observed components of the utility provided by alternative *i* to decision maker *n* (V_{in}) be represented by:

$$V_{in} = (\beta_{TP} * TP) + (\beta_{HT} * HT) + (\beta_{OT} * OT) , \quad (5)$$

where β_{TP} is the parameter associated with the ticket price attribute, β_{HT} is the parameter of the headway time attribute and β_{OT} is the parameter associated with the onboard time attribute. Since the three parameters in (5) are measures of disutility for the decision makers, their estimated coefficients are expected to have negative signs. As this is an unlabelled SC experiment, no alternative specific constant (ASC) is calculated.

Estimation results

A maximum likelihood procedure in the statistical software program NLOGIT 4.0 was applied to estimate model (5). The estimation results for the two samples produced the *a priori* expected (negative) signs and the results are summarised in Table 3.

Table 3: Estimation results.

Parameter	Onboard		At home		$\Delta VoHT$
	Coefficient	*VoHT*	*Coefficient*	*VoHT*	
Headway	-0.0473***	88.4	-0.0460***	67.5	20.9
Onboard time	-0.0456***		-0.0897***		
Price	-0.0321***		-0.0409***		
Model statistics					
Observations	1202		1334		
Skipped obs.	86		58		
Log likelihood	-632.26		-639.43		

***= p-value<0.01, **=p-value<0.05, *= p-value<0.1.

To calculate meaningful estimates for WTP, the coefficients used as input, in equation (4), should be statistically significant (Hensher et al., 2005). As is evident from Table 3, the six estimated coefficients were all statistically significant at 99% confidence level. Consequently, meaningful value of headway time estimates could be elicited from both samples.

In the onboard sample, the calculated VoHT was 88.4 NOK/hour, while it was 67.5 NOK/hour in the sample interviewed at home. As such, the numerical difference in VoHT is 20.9 NOK/hour. Taken at face value, this finding seem to support the hypothesis that the length of the time lag between respondents last trip with a transport mode and the time they are interviewed, affects the result of a VoHT-study.

However, as noted earlier, the two samples differed significantly with regard to gender and employment status. To ascertain whether a gender or employment status effect explain why the calculated VoHT is different in the two samples, model (5) was estimated on a gender-, and an employment status-specific level. The results of these analyses are reported in Table 4 and Table 5.

Gender-specific analysis

The proportion of females was 22% in the onboard sample and 39% in the at-home sample. Consequently, female respondents affect the calculated value of headway time more in the at-home sample than in the onboard sample. This could explain why the calculated VoHT, as reported in Table 3, was different in the two samples.

Table 4: Gender-specific estimation results.

Parameter	Onboard		At home		$\Delta VoHT$
	Coefficient	*VoHT*	*Coefficient*	*VoHT*	
Female					
Headway	-0.0550***	73.5	-0.0517***	69.1	4.4
Onboard time	-0.0563***		0.0991***		
Price	-0.0449***		-0.0449***		
Model statistics					
Observations	320		536		
Skipped obs.	35		10		
Log likelihood	-128.75		-247.28		
Male					
Headway	-0.0456***	92.1	-0.0432***	66.8	25.3
Onboard time	-0.0554***		-0.0847***		
Price	-0.0297***		-0.0388***		
Model statistics					
Observations	1008		856		
Skipped obs.	77		48		
Log likelihood	-503.42		-391.31		

***= p-value<0.01, **=p-value<0.05, *= p-value<0.1.

The estimation results of model (5), on a gender-specific level, are reported in Table 4. All estimated coefficients show the expected, negative, sign, are statistically significant at 99% confidence level and, as such, produce meaningful WTP estimates for reduced headway time.

As reported in Table 4, for both male and female respondents, the calculated VoHT was higher when interviews were conducted onboard ferries than when they were conducted at home. However, the numerical difference was smaller among female respondents (4.4 NOK/hour) than among male respondents (25.3 NOK/hour). As a consequence, the composition of the samples with respect to gender, affected the numerical value of ΔVoHT, reported in Table 3.

Females interviewed at home reported a VoHT of 69.1 NOK/hour, while men, interviewed at the same location, reported a VoHT of 66.8 NOK/hour. Consequently, had the proportion of females been smaller in the at-home sample, in which females were overrepresented, this would, ceteris paribus, have reduced the VoHT for the at-home sample and increased the numerical value of ΔVoHT, reported in Table 3.

To sum up, the finding, reported in Table 3, that ΔVoHT>0 is not due to the fact that the samples differ significantly with regard to gender. To the contrary, ΔVoHT would have been bigger if the proportion of females had been smaller in the at-home sample.

Employment status-specific estimations

The two samples also differ significantly from each other with regard to employment status. The composition of the samples, with regard to this characteristic, is presented in Table 5.

Table 5: Sample characteristics with regard to employment status.

Employment status	Interview location	
	Onboard	At home
Employed	79.5%	74.1%
Student/conscript	5.8%	3.4%
Retired/social security/other	14.7%	22.4%

Table 5 shows that the proportion of individuals who are “employed” and “student/conscripts” is higher in the onboard sample, than in the at-home sample. The at-home sample has a higher proportion of individuals who are either retired, on social security or have another relation to the labour market.

To ascertain whether an employment status-specific effect explain why $VoHT_{Onboard} > VoHT_{At\ home}$, model (5) was estimated on an employment status-specific level. The model estimation generated coefficients which all had the expected (negative) sign and the coefficients used to estimate VoHT were all statistically significant at 95% confidence level. The estimation results are reported in Table 6.

Table 6: Employment status-specific estimation results.

Parameter	Onboard		At home		$\Delta VoHT$
	Coefficient	VoHT	Coefficient	VoHT	
Employed					
Headway	-0.0468***	92.1	-0.0503***	76.4	15.7
Onboard time	-0.0565***		-0.0909***		
Price	-0.0305***		-0.0395***		
Model statistics					
Observations	992		1032		
Skipped obs.	28		26		
Log likelihood	-512.80		-485.94		
Student/conscript					
Headway	-0.0947***	115.5	-3.4328***	60.0	55.5
Onboard time	-0.0697*		-7.1908***		
Price	-0.0492***		-3.4338***		
Model statistics					
Observations	72		48		
Skipped obs.	8		0		
Log likelihood	-24.27		-33.27		
Retired/social security/other					
Headway	-0.0402**	66.6	-0.0301***	41.0	25.6
Onboard time	-0.0408**		-0.0827***		
Price	-0.0362***		-0.0441***		
Model statistics					
Observations	184		312		
Skipped obs.	24		32		
Log likelihood	-83.15		-130.72		

***= p-value<0.01, **=p-value<0.05, *= p-value<0.1.

The numerical difference in VoHT for the two samples (ΔVoHT), was in Table 3 reported to be positive, i.e. that ferry travellers valued reduced headway time higher when interviewed onboard a ferry than when they were interviewed at home. The same result, that ΔVoHT>0, is also found for each employment-status category. However, ΔVoHT is different for each category. Biggest numerical difference (ΔVoHT=55.5) is found for the category “student/conscript”, while the difference is smallest (ΔVoHT=15.7) for those who are employed.

Since all three employment status categories have a positive ΔVoHT, it can be concluded that the finding reported in Table 3, that $VoHT_{Onboard}$>$VoHT_{At\ home}$, is not due to the different composition of the samples with regard to employment status.

CONCLUSIONS AND IMPLICATIONS

This study has used data from a stated choice experiment distributed to two split samples, in order to assess how interview location affects the result of a value of headway time study. To avoid confounding effects, all aspects of the experimental design were held constant. The only intended difference between the samples was the location at which they were interviewed. One sample was interviewed onboard ferries and the other sample was interviewed at home. This difference in interview location affected how long it was since the members of the two samples, on average, last travelled by ferry. The onboard sample was interviewed while travelling and the members of the at-home sample last travelled by ferry, on average, 19 days before they were interviewed.

The results demonstrate that the calculated value of headway time is different in the two samples. Based on statistically significant coefficients, the calculated value of headway time was found to be 31% higher in the onboard sample (88.4 NOK/hour) than in the at-home sample (67.5 NOK/hour).

The study was designed so that the two samples only differed with respect to interview location. Nevertheless, they differed significantly from each other with regard to gender and employment status. As such, the composition of the samples could, theoretically, have explained why the calculated VoHT was different for the two samples. However, model estimation on gender-, and employment-status-specific levels, produced statistically significant coefficients. Based on these coefficients, the calculated VoHT was higher for both genders and the three employment-status categories, when interviews were conducted onboard the ferries, than when they were conducted at home.

This article demonstrates that the length of time between respondents last travel experience with a transport mode and their participation in a VoHT-study, may affect their valuation of headway time. However, we could not control the service levels on the ferry routes those interviewed at home last travelled before they were interviewed. As such, future research should address whether the last headway time experienced by respondents, influence how they value a headway time reduction. Another interesting topic for future research is whether there are seasonal fluctuations in how travellers value headway time. The presence of seasonal fluctuations would imply that, ceteris paribus, the frequency at which public transport operates should also have seasonal changes.

Nevertheless, our finding strongly suggest that planners of value of travel time studies should consider the effect of interview location on calculated value of headway time. If we assume that travellers typically decides on whether to travel by ferry while they are still at home, the argument can be made that the result will be more valid if respondents are interviewed at home, than if they are conducted onboard the transport vehicle. However, more research is needed to verify this assumption.

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