Determinants of Attribute Non-Attendance in Discrete Choice Experiments: A Case Study in a Developing Country

1. Introduction

Discrete choice experiments (DCEs), a stated-preference (SP) technique, can be used to estimate the economic value of non-market goods and services. In a standard DCE exercise, goods and services are described by a number of attributes; and respondents are assumed to consider all presented attributes in choosing their preferred options. However, there is empirical evidence that some respondents may actually make their choices by using only a subset of the attributes (Hensher et al., 2005; Campbell et al., 2008; Carlsson et al., 2010). This situation is referred to as attribute non-attendance (ANA). It is suggested that if ANA is taken into account, potential biases in value estimates could be avoided (Hensher et al., 2005; Campbell et al., 2008; Carlsson et al., 2010).

While the DCE approach was originally developed and mostly applied in developed countries, there has been a growing interest in applying this approach to address developing country issues (Mangham et al., 2009; Bennett and Birol, 2010). This paper presents a case study highlighting the importance of ANA in a developing country context, using data from a DCE exercise eliciting households' preferences for improvements in cyclone warning services in Vietnam (Nguyen et al., 2013). Improvement alternatives were described using three cyclone warning attributes - accuracy of forecast information, frequency of updates and mobile phone short message service (SMS) warnings. To estimate the willingness-to-pay of Vietnamese households, a fourth (cost) attribute was defined as a one-off levy paid through the electricity bill. Four follow-up questions were used to investigate whether respondents had ignored any of the four attributes when making their choices.

To the best of the authors' knowledge, this paper presents the first study to examine respondents' self-stated ANA in the context of a developing country. In Section 2, we present the findings related to incidence of stated ANA in our Vietnam study and a comparison of the rate of stated ANA between our study and a number of ANA studies undertaken in developed countries. Determinants of the stated ANA in our study are analysed in Section 3 to provide a better understanding of reasons for ANA. Findings will help DCE practitioners to reduce ANA in their DCE applications in developing countries.

2. Incidence of attribute non-attendance

Most (58.7%) of the 1014 household representatives who responded in our Vietnamese study stated they considered all attributes in making their decisions. One or two attributes were stated to be ignored by 29.2% and 6.1% of respondents, respectively. When reaching their decisions, 4.4% of respondents stated that they ignored all attributes, and 1.6% of respondents used only one attribute.

To examine the stated ANA issue in the developing country context, all relevant published DCE studies in which ANA was reported by respondents were reviewed. Beside the difference in developing versus developed countries, other factors, e.g. choice task complexity, survey mode and respondents' familiarity with the goods under consideration, may also be expected to affect the stated ANA proportions. Four ANA studies which have a level of task complexity, defined by the number of attributes, attribute levels and choice tasks, similar to our study are summarised in Table 1. Comparison of the share of respondents reportedly ignoring at least one attribute shows that the share of 41.3% in our study is a little higher than the average equivalent share of 40.0% in the four studies undertaken in developed countries.

Table 1: Share of respondents reportedly ignoring at least one attribute in previous studies and this study

Study	Country of Study	Sample size	Share of respondents	Number of alternatives	Number of attributes (excluding cost)	Number of attributes' levels	Number of choice tasks	Survey mode	Goods or services under consideration
In developed countries (average)[a]			40.0%						
Balcombe et al. (2011)	Australia	1106	27.0%	3	3	2	8	Internet survey	Beef
Campbell et al. (2008)	Ireland	564	36.0%	3	4	3	6	Face-to-face	Rural landscape
Carlsson et al. (2010)	Sweden	955	53.2%	3	3-4	3-4	6	Mail survey	Environmental quality
Kragt (2013)	Australia	712	45.6%	3	3	4	5	Drop off/ Pick up	Coastal catchment management
This study	Vietnam	1014	41.3%	2	3	2-4	6	Face-to-face	Cyclone warning service

[a] The average rate was weighted for the sample sizes using the following formula: *the weighted-average* = $\Sigma_j(size_j/\Sigma_j size_j)share_j$, where $size_j$ is the sample size of study j, $share_j$ is the share of respondents reportedly ignoring at least one attribute in study j.

The following discussion focuses on examining the effect of the mode of survey and respondents' familiarity with goods and services on stated ANA. The Balcombe et al. (2011) and Campbell et al. (2008) studies have relatively lower shares of respondents reportedly ignoring at least one attribute. A possible reason is the advantage of internet surveys and face-to-face interviews in providing additional information to help respondents understand the attributes. In internet surveys, respondents can "click on links to access more information about attributes" (Balcombe et al., 2011), p.454; in face-to-face interviews, respondents can ask interviewers to clarify the attributes. The lowest rate of ANA is the Balcombe et al. (2011) study. A possible explanation is that the good under consideration, beef, is likely to be familiar to respondents.

Taking into account all of the above factors, the Campbell et al. (2008) study could be used to compare with our study, which has a similar level of task complexity and also used face-to-face interviews. As seen in Table 1, the share (41.3%) of respondents ignoring at least one attribute in our study is larger than the equivalent share (36%) in Campbell et al. (2008). The comparison between the two studies suggests that ANA presents at least an equal but potentially a more serious problem for the validity of DCEs in developing countries as in developed countries.

3. Determinants of stated ANA

To explore reasons for stated ANA in our study, we examined the characteristics of respondents who stated they ignored a certain attribute. Following Carlsson et al. (2010), we applied multivariate probit models with the dependent variables having two possible outcomes (1 if a respondent ignored a given attribute, 0 if otherwise). The multivariate probit models were estimated with 500 draws using the GHK simulator provided in the *NLOGIT 5.0* package. Table 2 presents an analysis of the models.

Table 2: Analysis of multivariate probit models by groups of respondents ignoring each attribute

Variables	Ignored Accuracy of Forecast	Ignored Frequency of Update	Ignored SMS warning	Ignored Cost	Interpretation	Possible reasons
Constant	– NS	– NS	– NS	– NS		
						Willingness-to-pay:
Certainty score[a,c]	– ***	– **	– *	– ***	Respondents having higher certainty score, higher household income and living in the Central region, which is more frequently hit by cyclones, are less likely to ignore the attributes.	These respondents could be more willing to pay for improvements in cyclone warning services; and their attendance to all the attributes may reflect their support. It has been shown in experiments that if respondents who were willing to pay for goods in a SP setting with hypothetical payment and who had higher stated certainty were more likely to pay for the goods in a real payment setting (Ready et al., 2010). Findings in Nguyen et al. (2013) also indicate that respondents having higher household income and living in the Central region of Vietnam were more likely to choose improvements in cyclone warning services over the status quo option.
Household income[a,d]	– **	– ***	– ***	– NS		
Central region residency[b]	– NS	– **	– ***	– NS		
						Simplifying strategy:
Choice questions are hard[a,e]	+ ***	+ **	+ ***	+ ***	If choice questions are hard to choose, it is more likely that respondents ignore attributes.	Each attribute in itself may be difficult to understand. To deal with the cognitive burden, respondents may use simplifying strategies when making decisions, and ANA can be an example of a simplifying strategy (Carlsson et al., 2010).
						Relevance of attributes:
Age[a]	+ NS	– NS	+ ***	+ NS		

Variables	Ignored Accuracy of Forecast	Ignored Frequency of Update	Ignored SMS warning	Ignored Cost	Interpretation	Possible reasons
Having children < 10 years old[b]	+ NS	– NS	+ ***	+ NS	A*ge, using mobile phone,* and *having children < 10 years old* are significant in the group of respondents ignoring SMS warnings. Older people and people with young children are more likely to ignore the SMS warning services, while people regularly using a mobile phone would less likely to ignore the SMS warnings.	Older people are more likely to ignore the mobile phone services, possibly because they are not comfortable with the technology. People with young children may not rely on the use of SMS warnings to inform their decision about evacuation, because evacuation of young children would be an option with high priority when a cyclone is approaching. People regularly using a mobile phone would less likely to ignore the SMS warnings.
Using mobile phone[b]	– NS	+ NS	+ ***	+ NS		
Education (above high school)[b]	+ NS	+ *	– NS	– NS	E*ducation* is significant in the group of respondents ignoring frequency of update. People with higher education are more likely to ignore the attribute of updating frequency.	Respondents with higher education may have better jobs which do not require a high level of exposure to cyclone risk relative to risky jobs (e.g. fishing). Therefore, they might be satisfied with the current number of eight updates per day.
Risk aversion[a,f]	– NS	– NS	+ NS	+ **	*Risk aversion* is significant in the group of respondents ignoring cost. The more risk averse a respondent is, the more likely it is that he/she ignored the cost attribute.	Risk averse respondents might not be willing to make a trade-off between money and cyclone related safety.
Male[b]	+ NS	– NS	+ NS	+ NS		
Number of respondents	63	90	368	127		

Standard errors are in parentheses; +, – indicate the sign of coefficients in the models; ***, **, * denote respectively significance level of 1%, 5%, 10%; NS denotes 'not significant'

[a] Continuous variables; [b] Dummy variables; [c] On a 10-point rating scale with 1 labelled "very uncertain" and 10 labelled "very certain", the certainty score shows how sure respondents were that they would actually pay the amount they had stated; [d] To avoid excluding 23 respondents not providing their income, mean income value was used to complete the missing information; [e] Respondents were asked whether they found the choice questions confusing. Respondents could choose: Yes (coded 2), Maybe (coded 1) and No (coded 0); [f] A risk aversion score was measured using factor analysis of respondents' answers to four statements reported in Nguyen and Robinson (2013). The four statements are related to the respondents' attitude toward cyclone risk. Higher scores show an increase in respondents' risk aversion.

4. Conclusions

In recent years, there is growing recognition that respondents in developed country contexts do not attend to all the presented attributes when making their choices in a DCE exercise. This case study suggests the share of respondents who stated that they ignored at least one attribute in a DCE implemented in Vietnam, a developing country, is comparatively higher than for similar studies undertaken in developed countries. Future research using the same questionnaire for split samples in developing and developed countries is needed to support this finding. Nevertheless, the preliminary results from our study suggest that it is important for ANA to be taken into account in DCE applications in developing countries.

Our examination of determinants of the stated ANA in the Vietnam case study finds that the ANA could be an example of a simplifying strategy of respondents who thought that the choice questions were difficult. Respondents also ignored certain attributes which were not relevant to their situation. The findings confirm that DCE practitioners should keep choice task design at a minimum level of complexity and pay close attention to the selection of relevant attributes in order to reduce the ANA and its potential threat to DCE validity in the developing country context.

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