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Applying the dissonance-minimising format to value cultural heritage in developing countries*

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We adapt the dissonance-minimising (DM) format proposed by Blamey *et al*. [*Land Economics*, **75** (1999) 126] in a dichotomous choice contingent valuation survey to estimate the economic benefits of preserving a cultural heritage site in Vietnam. We find that the DM format can be successfully applied to avoid biases because of yea-saying in a developing country context.

Key words: contingent valuation, developing countries, dichotomous choice, dissonance-minimising format, yea-saying.

1. Introduction

Yea-saying is defined as the respondents' tendency to agree with contingent valuation (CV) questions regardless of their true views. Yea-saying is known to occur in dichotomous choice (DC) formats of CV studies (Kanninen 1995; Ready and Hu 1995; Ready *et al*. 1996, 2001; Berrens *et al*. 1997; Blamey *et al*. 1999). Bateman *et al*. (2002) present two ways of explaining why yea-saying occurs. First, we can view yea-saying as a type of compliance bias where a respondent purposefully misstates his or her willingness-to-pay (WTP) by agreeing to pay the stated amount in an attempt to comply with some presumed expectation (Berrens *et al*. 1997). Compliance bias can be classified into interviewer bias and social desirability bias. Interviewer bias is where a respondent gives a WTP value that differs from his/her true value in an attempt to please the interviewer (see, e.g. Bateman and Mawby (2004)). Social desirability bias may be thought of as a tendency for respondents to say 'yes' to paying the amount the interviewer states because s/he sees it as the only socially acceptable answer. The second way of explaining yea-saying is related to strategic behaviour when a respondent provides a biased answer to influence the provision of the public good and/or the level of payment for the good (Mitchell and Carson 1989; Bateman *et al*. 2002).

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Two approaches have been proposed to tackle the presence of yea-saying in DC questions. The first approach is to include follow-up questions aimed at identifying the likely yea-sayers who then can be excluded from the analysis if necessary (Stevens *et al*. 1991; Spash and Hanley 1995; Ready *et al*. 1996). The second approach to minimise yea-saying is the use of a new elicitation format proposed by Blamey *et al*. (1999), referred to as the dissonance-minimising (DM) format. The DM format was designed to allow respondents to express multiple attitudes in the CV questions to reduce their dissonance, and thus their yea-saying.

The former is an *ex-post* approach, and these procedures may bias results. The latter identifies yea-saying at the same time that respondents are formulating their responses (Blamey *et al*. 1999).

The DM format is a special DC format, which avoids possible yea-saying by allowing respondents to support an environmental program without having to commit dollar values. In a standard DC format, respondents who favour the environmental good but face a higher bid amount than their true WTP may still say yes to register support for the environmental good (Blamey *et al*. 1999). The idea behind the DM format is to allow respondents to say 'no' to paying the stated bid, but still express support for the environmental good. Svedsater (2007) is inclined to view the DM format as a more inclusive response format which captures a wide array of attributes and dimensions of the public good and its provisions. Within the inclusive response format, the respondent has many options expressing his/her support for the public good, rather than exclusively stating their support through a single estimate. This is expected to reduce the presence of yea-saying.

Only three DM CV studies have been published to date (i.e. Blamey *et al*. 1999; Nocera *et al*. 2002; Svedsater 2007). These studies are all conducted in developed countries, and all of them concerns environmental goods (Blamey *et al*. 1999; Svedsater 2007) or health (Nocera *et al*. 2002).

Our study applies a similar type DM format in a developing country; by allowing respondents to select one among many reply options to a DC question about their WTP to preserve a cultural heritage site in Vietnam. Thus, our aim was to examine how a modified DM format can be used to value cultural heritage in a developing country context.

The paper is organised as follows. The next section discusses a modified DM format (i.e. the multiple response option format (MRO)), and our application to the preservation of the world heritage site of My Son in Vietnam. Section 3 presents the survey design and implementation of the surveys, section 4 describes the WTP question formats used in the surveys, section 5 reports the CV results and section 6 concludes.

2. Contingent valuation elicitation methods

The DC format is the most popular elicitation methods for CV studies because it mimics behaviour in the real markets and closely resembles

people's experience with political discussions and voting schemes (Hoehn and Randall 1987; FAO 2000). The DC format has also been shown to be potentially incentive-compatible if the choice has some consequences for the respondent (Carson and Groves 2007).

Unfortunately, the DC format may be inclined to yea-saying arising from respondent's tendency to agree with statements regardless of content, despite improvements in design standards (Kanninen 1995; Ready *et al*. 1996; Blamey *et al*. 1999). The yea-saying tendency may be more pronounced in developing countries where people are not routinely asked their opinions on political issues, and they traditionally respect the government and have a propensity to give socially desirable answers (Bell 2004; Zhongmin *et al*. 2006). This is likely to be the case in Vietnam, as the country is in the early stages of economic transformation from a centrally planed economy to a market-based economy, and people are therefore used to administered prices rather than prices determined in the market. In addition, the Vietnamese respondents are not familiar with the referendum format as no referendum has been conducted in Vietnam in the past 60 years (Binh 2006).

The DM format is an extension of the DC format which allows respondents to choose among multiple reply options, rather than the discrete option of yes or no to support the provision of a public good provided in the DC format. The DM format also allows respondents to object to particular aspects of the CV scenario. By allowing respondents to support a public good without having to commit paying, and allowing them to protest against any aspect of the CV scenario, the DM format is expected to reduce the presence of yea-saying (Blamey *et al*. 1999; Nocera *et al*. 2002; Svedsater 2007).

The elicitation format used in this study is adapted from the DM format proposed by Blamey *et al*. (1999). We use the MRO format which captures a wide range of aspects of the public good and its provision. The MRO format presented in section 4 is not exactly the same at the Blamey *et al*. (1999) DM format. Our MRO format provides multiple options and asks the respondent to select the one which most closely resembles his/her view. This MRO format reminds the respondent that there are many reasons why s/he may support (or oppose) the program.

To test the MRO format, we performed a CV survey of the preservation of a world heritage site; the My Son temples site in Vietnam. Despite its designation, the site is now in a poor state of repair and is in danger from ravages of the weather and from the tourism pressure. Therefore, it urgently requires preservation and conservation efforts, see Tuan (2006) for further details. This study applies the MRO elicitation format to estimates the social benefits of the My Son preservation program which would stop any further degradation of the site. The estimates can be compared to the social costs of the preservation plan to see whether the estimated benefits exceed the costs and justify the program (e.g. see Tuan and Navrud (2008) for detailed discussion of a cost–benefit analysis).

3. Questionnaire design and survey implementation

Three versions of the questionnaire were used for three groups[1] of Vietnamese respondents. They include (i) visitors to My Son, (ii) visitors to the area surrounding My Son[2] who do not visit My Son during the current trip (referred to as visitors to Hue/Hoian) and (iii) local residents.

The questionnaire was divided into six main sections. Section 1 consists of questions that map the general attitudes of respondents to My Son, their reasons for visiting My Son, their knowledge of My Son before visiting and their travel experiences.

Section 2 consisted of a clear description of My Son using text, maps and photos. The section described the good that the respondents were asked to value. We aimed at providing each respondent with the same set of information about the characteristics and the current condition of My Son. This current condtion was presented as the *status quo*, and the respondents were told that in this scenario the deterioration of My Son would continue due to insufficient resources for preservation. Then, the proposed preservation plan was presented. It was explained that the plan would improve the condition of My Son and preserve the site for the future; see Tuan and Navrud (2007, page 66) for further details of the CV scenario used in the survey.

Section 3 of the questionnaire described the DM-CV choice the respondents was asked: including the payment vehicle, elicitation method and bid amounts.

We used the following payment vehicles: (i) for visitors to My Son we used a one-off special fee (levied via an increase in the entrance fee), and (ii) for visitors to Hue/Hoian and local residents, we used a tax. This was based on pretests where several types of payment vehicles were assessed: including a fee (a cultural preservation fee, an electricity bill, a water bill or a departure fee that visitor to Hue/Hoian have to pay when they leave), a tax and a donation.

As the elicitation format, we adapted the DM format (Blamey *et al.* 1999) for all groups of respondents. Details of the DM format will be presented in the next section. The bid amounts were stated in local currency, equivalent to US$0.31, US$1.25, US$3.13 and US$6.25; and were the same for all groups of respondents.

Section 4 of the questionnaire included debriefing questions to detect the prevalence of embedding or strategic behaviour. Section 5 collected socio-economic data, which would eventually be used in a regression analysis. Section 6 contained interview evaluation questions, which were designed to provide feedback from interviewers about the interview situation.

[1] Four groups of respondents were surveyed; i.e. foreign visitors to My Son and three Vietnamese groups; see Tuan and Navrud (2007) for the description of questionnaire used to interview the foreign visitors.

[2] i.e. those visiting Hue (a city located 170 km north of My Son) and Hoian (a town located 60 km east of My Son). Hue and Hoian were selected, as they are two of the largest tourist destinations in Vietnam, and the places where most visitors stay during their trips to My Son.

Three surveys were carried out. The first survey was conducted at My Son to interview visitors to the site, the second was conducted in Hue and Hoian to interview visitors to these sites, and the third survey was administered among local households in the Quangnam province where My Son is located.

Face-to-face interviews were used to gather primary data for the study. The surveys were carried out in the summer of 2005 with a total of 724 interviews. The sample was divided equally among the three surveys, i.e. 245 visitors to My Son; 238 visitors to Hue/Hoian; and 241 local households were interviewed.

4. WTP question formats

Details of the elicitation formats used in the questionnaire are as follows. For visitors to My Son, the CV question was framed as in Table 1[3].

Many reply options were provided in the DM CV question, as shown in Table 1. These options can be interpreted as follows. Option (1) – 'yes' means that respondents favour the program and can afford the payment. Option (2) – 'no' can be interpreted as respondents derive no benefits from the preservation program, or they may not find any appropriate option in the list and have their own reasons for not being willing to pay. Respondents' stating this 'no' option were asked for their reasons for refusing to pay. From a series of reply options in the follow-up question (Table 2), respondents' answers were registered by the category which most closely resembled his/her view. Option (3) – 'yes, if I have money' can be inferred as the respondents' budget constraint kicking in. This means that respondents support the program but cannot afford the amount they are asked to

Table 1 The CV question to interview visitors to My Son

One way to help pay for it would be to have every adult visitor to My Son pay a one-time special fee via an increase in entrance fee.

If an increase of the entrance fee to your visit to My Son by —— VND for the preservation program of the My Son sanctuary is to be undertaken, would you pay for it? (Please choose the one option which most closely resembles your view).

(1) Yes
(2) No [*go to Q.IV1*]
(3) Yes, if I have money [*go to Q.IV1, select category 1*]
(4) Yes, but a lower price [*go to Q.IV1, select category 2*]
(5) Yes, if an acceptable method of paying is found [*go to Q.IV1, select category 3*]
(6) Yes, if other people agree to pay [*go to Q.IV1, select category 4*]
(7) Yes, if period of payment is extended [*go to Q.IV1, select category 5*]
(8) Others (specify)
(9) Don't know/Not sure

Q.IV1 is the follow-up question. Italic phrases are instructions to interviews.

[3] For visitors to Hue/Hoian and local residents, we use the same CV question as for visitors to My Son, but different payment vehicles.

Table 2 Categories used in the follow-up question

Q.IV1. If your answer is no. Why are you not willing to pay for preservation of the My Son? [Write down the answer and tick what is closest to respondent's answers]
(1) I have no spare income but would otherwise pay
(2) I think the cost is too high
(3) I would pay if there is an acceptable method of payment
(4) I would pay if other people agree to pay
(5) I would pay if payment period is extended
(6) There are other sites that I prefer to visit
(7) I feel the preservation of My Son temples is unimportant
(8) I do not believe paying will solve the problem
(9) I think it is the government's responsibility
(10) I do not trust the institutions that will handle the money for preservation work
(11) I oppose the preservation program regardless of costs
(12) Other reasons: (specify) …….
(13) Don't know/ Not sure

Italic phrase in bracket is instruction to interviews.

pay. Option (4) – 'yes, but a lower price' can be interpreted as respondents favour the program but may find the cost is too high. This can also be viewed as a reflection of respondents' budget constraints. Option (5) – 'yes, if an acceptable method of paying is found' means that respondents object to the payment vehicle but otherwise support the program. Option (6) – 'yes, if other people agree to pay' means that respondents need to know other people's opinion about the program before making their own decision to pay for it. This could be a type of collective decision making. The individual would like to be assured that the others will commit themselves to the provision of the public good as s/he does, i.e. the assurance issue of community commitment (Brubaker 1975). This could also reflect that respondents need more information about the program before they answer. Another possible interpretation of this option is the issue of fairness, e.g. respondents may think that it is fair that all households in their community should contribute, and only then will they themselves contribute to the provision of the public good. Option (7) – 'yes, if period of payment is extended' implies that respondents find the program important and the payment vehicle acceptable, but oppose a one-time payment.

Option (8) – 'others' captures other reasons, e.g. that respondents protest against a particular aspect of the CV scenario, but otherwise they find the preservation program important.

The CV question provides many options and asks respondents to select the one which most closely resembles their view. This way of framing the CV question reminds the respondents that there are many reasons why they may support (or not support) the program.

Respondents with options (3), (4), (5), (6) and (7) were asked their reasons for not being willing to pay. Their answers were recorded as one of the options listed in the follow-up question (Table 2).

5. Results

5.1 Bids and proportions of 'yes' responses

For visitors to My Son, the distribution of responses to the bid amounts is reported in Table 3.

The bottom row in Table 3 reports the total number (and percentage) of respondents that selected options in the DM-CV question.

For visitors to Hue/Hoian, the distribution of responses to the bid amounts is reported in Table 4. The last row reports the total number (and percentage) of respondents choosing each of the options of the DM-CV question.

For local residents, the distribution of CV answers to the bid amounts are reported in Table 5; the bottom line refers to total number (and percentage) of respondents select each option.

Compared to the first two surveys, the local residents survey has a large number of respondents saying 'yes, if other people agree to pay', 'yes, if payment period is extended', and 'don't know'. More specifically, 25 respondents said that they would pay if other people agree to pay for the preservation program. As we discussed above, the Vietnamese respondents have for a long time lived in a centrally planed economy, and are familiar with a tradition of collective decision making (following the majority opinion). This does not necessarily mean that they could not make their own decisions, but simply that they are affected by the old political system. Therefore, the collective arrangement may figure more prominently in local household survey compared to the first two surveys of visitor coming from all parts of the country. Eight respondents said that they would pay if the period of payment is extended. This might imply that respondents' WTP is constrained by the one-time payment. However, the interpretation of this option seems less certain than the responses related to budget constraints. Eight respondent selected the 'don't know/not sure' option.

5.2 Analysis of no-responses and protest responses

Respondents' refusing to pay were also asked about their reasons for their reply. A series of reply options in the follow-up question were provided to determine whether those unwilling to pay represent a real 'no' or protest towards some aspect of the CV scenario.

A common approach that the majority of CV practitioners apply to identify protest responses is to classify 'no'-responses into: (i) those associated with a rejection of the payment vehicle, (ii) 'no'-responses related to other reasons than lack of current or future use benefits and (iii) 'no'-responses linked to other reasons than ability to pay or budget constraints. These responses include the following: (i) government should pay; (ii) those who pollute should pay; (iii) I pay enough already; (iv) it is unfair to ask me to pay anything; (v) don't want to place a monetary value on the good; (vi) it's not

Table 3 Bids and proportion of CV-answers for visitors to My Son

Bids (US$)	CV answer									
	Yes	No	Yes, if I have money	Yes, but a lower price	Yes, if an acceptable method is found	Yes, if other people agree	Yes, if payment period is extended	Others	DK	Total
0.31	43 (69.4)	10 (16.1)	3 (4.8)	0	2 (3.2)	2 (3.2)	0	1 (1.6)	1 (1.6)	62 (100)
1.25	31 (50.8)	11 (18.0)	8 (13.1)	5 (8.2)	3 (4.9)	1 (1.6)	2 (3.3)	0	0	61 (100)
3.13	18 (29.5)	17 (27.9)	8 (13.1)	7 (11.5)	7 (11.5)	4 (6.6)	0	0	0	61 (100)
6.25	12 (19.7)	17 (27.9)	13 (21.3)	8 (13.1)	4 (6.6)	2 (3.3)	1 (1.6)	1 (1.6)	3 4.9	61 (100)
Total	104 (42.4)	55 (22.4)	32 (13.1)	20 (8.2)	16 (6.5)	9 (3.7)	3 (1.2)	2 (0.8)	4 (1.6)	245 (100)

Numbers in parentheses are percentages. Others are specified as 'I already paid enough'; 'the current situation is satisfactory'.

Table 4 Bids and proportion of CV-answers for visitors to Hue/Hoian

Bids (US$)	CV answer									
	Yes	No	Yes, if I have money	Yes, but a lower price	Yes, if an acceptable method is found	Yes, if other people agree	Yes, if payment period is extended	Others	DK	Total
0.31	49 (81.7)	6 (10.0)	2 (3.3)	0	1 (1.7)	0	0	2 (3.3)	0	60 (100)
1.25	32 (54.2)	12 (20.3)	7 (11.9)	6 (10.2)	1 (1.7)	1 (1.7)	0	0	0	59 (100)
3.13	28 (46.7)	15 (25.0)	5 (8.3)	7 (11.7)	3 (5.0)	2 (3.3)	0	0	0	60 (100)
6.25	8 (13.6)	27 (45.8)	6 (10.2)	10 (16.9)	2 (3.4)	1 (1.7)	0	4 (6.8)	1 (1.7)	59 (100)
Total	117 (49.2)	60 (25.2)	20 (8.4)	23 (9.7)	7 (2.9)	4 (1.7)	0	6 (2.5)	1 (0.4)	238 (100)

Numbers in parentheses are percentages. Others are specified as 'if I visit the site'; 'being far away from the site I feel paying anything is irrelevant to me'; 'I think that other temples are more important than My Son'; 'if the site is well preserved'.

Table 5 Bids and proportion of CV-answers for local residents

Bids (US$)	CV answer									
	Yes	No	Yes, if I have money	Yes, but a lower price	Yes, if an acceptable method is found	Yes, if other people agree	Yes, if payment period is extended	Others	DK	Total
0.31	43 (71.7)	6 (10.0)	4 (6.7)	1 (1.7)	1 (1.7)	4 (6.7)	0	0	1 (1.7)	60 (100)
1.25	30 (50.0)	10 (16.7)	6 (10.0)	0	1 (1.7)	9 (15.0)	2 (3.3)	0	2 (3.3)	60 (100)
3.13	28 (45.9)	11 (18.0)	7 (11.5)	1 (1.6)	1 (1.6)	8 (13.1)	4 (6.6)	1 (1.6)	0	61 (100)
6.25	8 (13.3)	20 (33.3)	14 (23.3)	6 (10.0)	0	4 (6.7)	2 (3.3)	1 (1.7)	5 (8.3)	60 (100)
Total	109 (45.2)	47 (19.5)	31 (12.9)	8 (3.3)	3 (1.2)	25 (10.4)	8 (3.3)	2 (0.8)	8 (3.3)	241 (100)

Numbers in parentheses are percentages. Others are categorised as 'there is not enough information'; 'I am too old to pay for it'.

my problem; (vii) there is not enough information; (viii) do not understand the question; (ix) do not provide any reason for their response or (x) fail to cite a reason at all (Sutherland and Walsh 1985; Edwards and Anderson 1987; Whittington *et al*. 1992; Jorgensen *et al*. 1999, 2001).

Our classification of genuine 'no' and protest responses are presented in Table 6. The follow-up question had 11 response categories plus an 'other reasons' category. The first two categories represent valid reasons for indicating that the respondent receives no benefits from the preservation program or faces budget constraints. The remaining 10 categories are classified as protest responses.

There is very little difference between the three groups of respondents. Table 6 shows that more than half of the respondents in all three groups answered 'no', and about half of them were protesters.

5.3 Benefit functions

In our case, given the classification between protest and valid 'no' responses, we will use the bivariate probit with sample selection model (Boyes *et al*. 1989; Jacobson and Roszbach 2003; Gonzalez-Caban *et al*. 2007) to examine the

Table 6 Respondents' reasons for not being willing to pay

Respondent's reasons for being not willing to pay	Visitors to My Son	Visitors to Hue/Hoian	Local residents
(1) I have no spare income	34 (25.0)	25 (21.0)	41 (33.1)
(2) I think the cost is too high	34 (25.0)	41 (34.5)	20 (16.1)
(3) If an acceptable method of paying is found*	19 (14.0)	11 (9.2)	4 (3.2)
(4) I would pay if other people agree to pay*	13 (9.6)	4 (3.4)	25 (20.2)
(5) I would pay if payment period is extended*	3 (2.2)	2 (1.7)	8 (6.5)
(6) There are other sites that I prefer to visit*	3 (2.2)	1 (0.8)	0
(7) The preservation of My Son is unimportant*	2 (1.5)	1 (0.8)	1 (0.8)
(8) I do not believe paying will solve the problem*	3 (2.2)	0	1 (0.8)
(9) It is the government's responsibility*	10 (7.4)	14 (11.8)	16 (12.9)
(10) I do not trust the institutions that will handle the money for preservation work*	5 (3.7)	1 (0.8)	2 (1.6)
(11) I oppose the plan regardless of costs*	1 (0.7)	0	0
(12) Other reasons*	9 (6.6)	19 (16.0)	6 (4.8)
Total respondents not being willing to pay	136	119	124
Total protest (cate 0.3–12)	68 (50.0)	53 (44.5)	63 (50.8)

Categories with * are protest responses. Numbers in parentheses are percentage.

construct validity of CV results. The model consists of two equations simultaneously, one equation for the binary choice of whether to pay the corresponding bid amount for the preservation program (y_{1i}), and the second equation for the binary choice to identify protest and valid 'no' responses (y_{2i}). Let * denote an unobserved variable and assume that y^*_{1i} and y^*_{2i} follow

$$y^*_{1i} = x_{1i}\beta_1 + \varepsilon_{1i}$$
$$y^*_{2i} = x_{2i}\beta_2 + \varepsilon_{2i} \quad \text{for} i = 1, 2, \ldots, \mathrm{N}$$

where the x_{ji}, j = 1, 2, are $1 \times k_j$ vectors of explanatory variables and the disturbances are assumed to be zero mean, bivariate normal distributed with unit variances and a correlation coefficient ρ. The variable y_{1i} takes value of 1 if the respondent is willing to pay and 0 if not

$$y_{1i} = \begin{cases} 1 & \text{if willing to pay}(\mathrm{y}^*_{1i} < 0) \\ 0 & \text{if not}(\mathrm{y}^*_{1i} \leq 0) \end{cases}$$

The second binary variable, y_{i2}, takes value 1 if a response is valid and 0 if protest.

$$y_{2i} = \begin{cases} 1 & \text{if response is valid}(\mathrm{y}^*_{2i} > 0) \\ 0 & \text{if protest}(\mathrm{y}^*_{2i} \leq 0) \end{cases}$$

There are three types of observations in a sample with the following probabilities.

$$\begin{aligned} &y_{1i} = 0 && \Pr(y_{1i} = 0) = \Phi(-x_{1i}\beta_1) \\ &y_{1i} = 1, y_{2i} = 0 && \Pr(y_{1i} = 1, y_{2i} = 0) = \Phi(x_{1i}\beta_1) - \Phi_2(x_{1i}\beta_1, x_{2i}\beta_2; \rho) \\ &y_{1i} = 1, y_{2i} = 1 && \Pr(y_{1i} = 1, y_{2i} = 1) = \Phi_2(x_{1i}\beta_1, x_{2i}\beta_2; \rho) \end{aligned}$$

The log-likelihood function takes the following form

$$\begin{aligned} \mathrm{LnL} = &\sum_{i=1}^{N} y_{1i}y_{2i} \ln \Phi_2(x_{1i}\beta_1, x_{2i}\beta_2; \rho) \\ &+ \sum_{i=1}^{N} y_{1i}(1 - y_{2i}) \ln[\Phi(x_{1i}\beta_1) - \Phi_2(x_{1i}\beta_1, x_{2i}\beta_2; \rho)] \\ &+ \sum_{i=1}^{N} (1 - y_{1i}) \ln \Phi(-x_{1i}\beta_1) \end{aligned}$$

where $\Phi(.)$ and $\Phi_2(.,.;\ \rho)$represent the bivariate and univariate standard normal cumulative distribution functions, the latter with correlation coefficient ρ. Simultaneous estimation allows for correlation between the two

equations, resulting in parameter estimates that are more efficient than those obtained from estimating the two equations separately. Further, possible sample selection bias is corrected for (Boyes *et al.* 1989; Gonzalez-Caban *et al.* 2007). The estimated parameters and their *P*-values are reported in Table 7.

Standard/binary probit regressions were used to determine significant variables affecting the WTP for each survey. We only included the significant variables from the full model for each survey (reduced model). Reduced models (only significant attitude and knowledge variables were maintained in the models) were used for sample selection equations also. Results shown that ρ is significant at the 1% level, indicating that sample selection bias is present in each survey. This means that real 'no' respondents are in some way systematically different from protest respondents. More specifically, real 'no' respondents were those who were less likely to be asked to pay high bid amounts, and those who were more likely to have higher income. For the survey of visitors to Hue/Hoian, real 'no' respondents were likely to have visited the site before (at 10% level) and be a female.

In the first probit equations (valuation equations), three sets of explanatory variables are included: the price the respondent is asked (*bid*), the respondents' socio-economic characteristics (i.e. *income* and *education*; *sex*

Table 7 Bivariate probit with sample selection model (*P*-value)

Variables	Visitors to My Son	Visitors to Hue/Hoian	Local residents
Bid	−0.011 (0.000)	−0.019 (0.000)	−0.025 (0.000)
Income	0.137 (0.000)	0.118 (0.034)	2.650 (0.000)
Education		0.853 (0.000)	1.136 (0.027)
Visit		2.440 (0.002)	0.781 (0.030)
Know		−0.182 (0.145)	
Importance	0.343 (0.082)	0.556 (0.074)	0.612 (0.051)
Fvisit	1.526 (0.000)		
Constant	−1.914 (0.000)	−2.526 (0.002)	2.835 (0.000)
Sample selection equation			
logbid	−0.320 (0.000)	−0.540 (0.000)	−0.408 (0.001)
Male	−0.113 (0.492)	−0.848 (0.000)	−0.208 (0.336)
Age	0.108 (0.142)	0.056 (0.552)	0.092 (0.306)
Income	0.074 (0.012)	0.064 (0.132)	1.430 (0.000)
Visit		0.783 (0.059)	
Constant	1.204 (0.002)	2.411 (0.000)	0.674 (0.227)
Summary statistics			
Log likelihood	−197.572	−117.395	−126.508
/athrho*	7.136	8.138	1.336
rho	0.999	0.999	0.870
Likelihood-ratio, $\chi^2(1)$	63.359	53.373	9.176
Test of $\rho = 0$, Prob > χ^2	0.000	0.000	0.002
Number of obs**	228	184	232

*The inverse hyperbolic tangent of rho.
**The differences between total numbers of observations in this table and those in Tables 3–5 are due to some cases missing values for independent variables used in the models.

and *age* were removed from the models because they were not significant), and the respondents' knowledge and attitudes towards the cultural heritage site (i.e. their knowledge about the site (*know*), if they have visited it before (*visit*), their awareness of the importance of the site (*importance*), and if they have plans to visit it again (*fvisit*)). The theoretical expectations are: (i) as price increases the probability of saying yes decreases; (ii) a respondent with higher income (and education) has higher probability of saying yes and (iii) if respondents have more knowledge about and positive attitudes towards the preservation of the site, they have a higher probability of saying 'yes'.

As expected, the *bid* variable is negative and significant in all models. *Income* is positive and significant in all models. *Education* is positive and significant in the survey of visitors to Hue/Hoian and local residents. *Visit* is positive and significant in models of visitors to Hue/Hoian and local residents. *Importance* is positive and significant in the surveys of visitors to My Son and visitors to Hue/Hoian (at 10% level). *Fvisit* is positive and significant in the model of visitors to My Son. The fact that many variables in these models have *a priori* expected signs and are statistically significant can be interpreted as evidence of construct validity.

5.4 Mean WTP estimates

Mean WTP estimates are affected by the decision on whether to include or exclude protest responses in the sample. While some authors argue that protest responses should be rejected from the analysis, other authors contend to include them. Jorgensen *et al*. (1999) argue that protest responses cannot be included in cost–benefit analysis because they do not represent true economic values.

Halstead *et al*. (1992) stated that the censoring of protest bids may bias aggregate WTP estimates in a manner that is not easily predicted, and that an alternative to censoring protest bids is to include them as legitimate zero bids (cited in Jorgensen *et al*. (1999)). McGuirk *et al*. (1989) suggested that protest bids in the referendum model should be considered as legitimate as the CV aims as measuring the values of a proposed policy rather than a commodity (cited in Raybould (2005)).

To estimate mean WTP, we follow the Blamey *et al*. (1999) coding approach: Option 'yes' is coded as 'yes' (category 1 in Table 1), and 'no' otherwise (categories 2–8). The 'don't know' option (category 9) is removed from the sample. The distribution of CV replies to the bid amounts of these groups are shown in Table 8.

Table 8 shows that 43% of visitors to My Son, 49% of visitors to Hue/Hoian, and nearly 47% of the local residents are classified as giving a 'yes' response to the CV question. Results show that the percentages of yes-response decrease monotonically as the bid amounts increase in all groups, as expected from economic theory.

Table 8 Bids and proportion of yes-answers

Bids (US$)	Visitors to My Son	Visitors to Hue/Hoian	Local residents			
	N	% yes	*N*	% yes	*N*	% yes
0.31	61	70.5	60	81.7	59	72.9
1.25	61	50.8	59	54.2	58	51.7
3.13	61	29.5	60	46.7	61	45.9
6.25	58	20.7	58	13.8	55	14.5
—	241	43.2	237	49.4	233	46.8

Next, we present mean WTP estimates for these three groups of respondents based on non-parametric and parametric approaches. The advantages of the non-parametric approach are that it is less complicated in estimation, and provide more robust results (Kristrom 1990; Boman *et al*. 1999; Vaughan and Rodriguez 2001; Haab and McConnell 2002). We report both Turnbull (Vaughan and Rodriguez 2001) and Kristrom (Kristrom 1990) estimators in Table 9.

With non-parametric approach, we calculate mean WTP both including and excluding protest responses. Table 9 shows that, if we include protest responses in the analysis, the WTP estimates are lower for all groups. Excluding protest responses increase mean WTP by about 40% on average.

It is well known that sample selection bias leads to biased WTP estimates (e.g. Whitehead *et al*. 1994; Harpman *et al*. 2004; Gonzalez-Caban *et al*. 2007). In this section, we present mean WTP estimates for the three surveys based on a parametric approach. It is worth noting that mean WTP estimates of parametric and non-parametric approaches are not comparable. For the parametric approach, we present mean WTP estimates using bivariate probit with sample selection models and standard probit models. In these models, mean WTP estimates are computed using the sample means of all variables in

Table 9 Parametric and non-parametric estimates of mean WTP (US$)

	Visitors to My Son	Visitors to Hue/Hoian	Local residents
Non-parametric approach			
Protest responses included			
Turnbull approach†	1.90 (0.21)‡	2.07 (0.20)	1.97 (0.20)
Kristrom approach	2.70 (0.28)	3.03 (0.38)	2.94 (0.36)
Protest responses excluded			
Turnbull approach	2.78 (0.29)	2.73 (0.27)	2.93 (0.24)
Kristrom approach	3.81 (0.36)	3.86 (0.45)	4.15 (0.52)
Parametric approach			
Standard probit models	1.76 (0.14)§	2.74 (0.32)	2.13 (0.10)
Bivariate probit with sample selection models	1.38 (0.22)	2.69 (0.19)	1.97 (0.13)

†Lower bound mean; ‡numbers in brackets are standard errors; standard errors for the parametric estimates are obtained by using the Krinsky and Robb (1986) bootstrapping procedure with 1000 draws.

the probit models. If we compare the mean WTP estimates of these two parametric models, bivariate probit with sample selection models provide lower results than standard probit models in all the surveys. This suggests that the sample selection models reduce the bias in benefit estimates. Our results are similar to those found by Whitehead *et al*. (1994) and Messonnier *et al*. (2000).

6. Conclusions

While the DC-CV method has been widely used in developing countries, the different cultural, political and institutional context of developing countries, lead us to believe that a new approach is needed here. This study adapts a DM format in a CV study to estimate the economic benefits of preserving the My Son cultural heritage site in Vietnam. Our modified DM format allows respondents to select one among many options of the preservation program for My Son, regardless of price, as opposed to a simple DC in the DC format (i.e. 'Yes' or 'No' to paying the stated amount in the standard DC format).

We use bivariate probit with sample selection models to examine the theoretical validity of CV results. The regression models show a high degree of construct validity.

We find that Vietnamese respondents (visitors to My Son, visitors to Hue/Hoian and local residents) on average are willing to pay about US$2 for preservation of the My Son cultural heritage site.

The DM format seems to work well in a developing country like Vietnam by avoiding yea-saying that could be a problem here due to a social desirability bias. Future studies should look closer at the treatment of protest responses as these have been shown to have an impact on the magnitude of the WTP estimates, and provide independent comparisons between the DM and DC formats using a split sample.

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