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Testing Contingent Valuation Responses for Payment Vehicle effects: Taxation v Charitable
Donations

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Abstract

The payment vehicle is a crucial part of the hypothetical market presented to respondents in a contingent valuation (CV) study. This paper considers the impact of the payment vehicle on respondents stated willingness to pay (WTP) for a national air ambulance service. The double bounded dichotomous choice (DBDC) CV approach was used, and data was collected from 1400 individuals across England, using a computer assisted telephone interview (CATI). Respondents were randomly split between two payment vehicles: increased taxation or a donation to a charitable fund. Both of these payment vehicles are currently used to finance air ambulance provision in England. Preliminary analysis indicates that respondents presented with increased taxation stated a higher WTP than those asked to value provision with charitable donation. The paper investigates possible explanations for payment vehicle effects, including acceptability of the payment vehicle and the prevalence of protest responses across payment vehicles.

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1. Introduction

The last 10 years have seen an increase in research into methods of eliciting a monetary valuation for the benefits of health care. This research agenda has in part been driven by the need for benefit assessment methodology that goes beyond health outcomes. Given the absence of a market for many health goods, stated preference methods, including the contingent valuation method (CVM), have been used to elicit willingness to pay (WTP) from respondents for specified changes in resource allocation (Diener et al 1998; Ryan et al, 2001). This method has also been widely used in environmental and transport economics to overcome similar non-market problems (Carson et al 2003).

In applications within health economics, the CVM attempts to resolve the non-market good problem by creating a hypothetical market for a healthcare good. The created hypothetical market contains several pieces of information, including a reason for payment, the method being used to collect payments for the good (the payment vehicle) and how decisions will be made regarding whether or not the good being valued will be provided (the provision rule).

This paper focuses on one aspect of the hypothetical market, the payment vehicle. Consideration is given to whether the choice of payment vehicle influences respondent's stated WTP. A payment vehicle effect is said to exist if the payment vehicle presented to respondents as part of the hypothetical CV market influences the mean value derived from the study. For example, individuals may state a lower WTP if the payment vehicle is a fee at the point of consumption, as opposed to increased taxation, if they object to paying in such a direct manner for something 'essential'. This effect has often been referred to as payment vehicle *bias*, however, judging whether these observed differences are a form of bias is more difficult in stated preference experiments where the respondents 'true' WTP is not known.

If payment vehicles do influence respondents stated WTP then there is the temptation to omit these details from constructed hypothetical markets. Carson, Flores and Mitchell (1999) caution against this, stating that respondents will then infer these details for themselves either by assuming a low probability of provision or payment or respondents may guess about the likely means of provision. The lack of detail in a hypothetical market reduces its credibility. Carson Flores and Mitchell (1999) state that the details of the market should

influence respondents' values and it is a misconception by CV critics that mean WTP should be unaffected by the payment vehicle presented in the hypothetical market.

The following section considers existing evidence of payment vehicle effects in CVM literature. The motivation is not on providing a systematic review of the issue but rather to focus on proposed explanations. Following this, section 3 presents the air ambulance survey that provided the test-bed for consideration of payment vehicle effects, and discusses possible tests of payment vehicle effects. Section 4 presents the results and Section 5 summarises, presents speculative conclusions and identifies further analysis that will be conducted on our data set.

2. Payment vehicles - evidence of and explanations for effects

Stated preference methods are widely used in the fields of environmental and transport economics (Carson et al 2003). Thus the general issue of constructing a hypothetical market for the good and payment vehicle effects in particular are not exclusive to health economics. Within the field of health economics there is limited discussion of, or research considering, payment vehicle effects in stated preference experiments. Smith (2003) provided a review of CVM studies used to value healthcare, finding that the most commonly used payment vehicles are out-of-pocket expenses (OOP), taxation and private insurance premiums. However, of the 111 studies identified, 82% used OOP as the payment vehicle. O'Brien and Gafni (1996) stated that studies using an OOP payment vehicle assumed a private goods market was appropriate for healthcare, thus focusing on user benefits. They recommend monetary payments be framed as an insurance contribution for future access to the programme. Clearly this is not a suitable payment vehicle in the context of a publicly funded healthcare system and in this context they recommend the use of increased taxation. Johannesson and Jonsson (1991) acknowledge that it cannot be assumed that individuals are indifferent to the choice of payment vehicle.

Within the context of healthcare one study has compared WTP elicited by two payment vehicles. O'Brien and Viramontes (1994) compared values elicited using OOP and

taxation for an IVF programme, and found that OOP resulted in higher estimated of WTP. This was explained by a negative attitude towards taxation, thus a form of protest response was hypothesised.

Much of the work considering payment vehicle effects in the context of stated preference experiments have focused on contingent valuation studies for environmental goods (Rowe, D'Arge and Brookshire, 1980; Greenley, Walsh and Young, 1981; Brookshire Randall and Stoll, 1980, Daubert and Young, 1981, Hayes, Tyrell and Anderson, 1992, and Morrison, Blamey and Bennett, 2000). In this context the most commonly applied payment vehicles are utility bills, entrance fees, taxes and higher consumer prices. Greenley, Walsh and Young (1981) tested for differences between the use of a general sales tax or a residential water sewerage fee as payment vehicles for the improvement in water quality and water based recreation opportunities in the South Platte river basin. The authors reported that sales taxes were superior in that they minimise free riding. The results of this study indicated that the resultant mean WTP was sensitive to the choice of payment vehicle, with valuations from the sewerage fee 25% of the valuations obtained from the sales tax vehicle.

Although much of the literature supports the presence of payment vehicle effects Brookshire, Randall and Stoll (1980) found no evidence of payment vehicle effects. They tested the hypothesis of payment vehicle effects in a CV study valuing Elk hunting, where respondents were asked to pay either through their utility bill or in the form of a permit. The authors rejected the hypothesis of payment vehicle effects at the 10% level. However, respondents were licensed elk hunters and already paid for the good, thus regardless of payment vehicle it is reasonable to assume respondents stated WTP would be anchored around their current payment level.

One explanation of payment vehicle effects is that of strategic overbidding (Posavac, 1998). Strategic overbidding occurs when respondents perceive they can influence the probability of a goods provision without having to pay more for the good. This behaviour is likely to be observed when respondents perceive that everyone will pay the same mean bid rather pay an amount corresponding to their response. Strategic overbidding is only likely to occur when respondents have a positive attitude toward the good in question, as was the

case in the air ambulance study where 52% of respondents were classed in the positive cluster (Johnson and Ryan, 2002).

Alternatively, Green and Tunstall (1999) suggested that payment vehicle effects arise due to the social norms associated with the payment vehicle and the good's provision. The authors state that when the payment vehicle is a charitable donation, the socially defined role of charities should be considered. Further Green and Tunstall (1999) suggest that the payment vehicle is likely to influence the motivations that are elicited in the CV study, however the authors provide no evidence of this hypothesis. However, this would imply that using a 'fee per use' payment vehicle may elicit use values, whereas a wider payment vehicle such as charitable donations or taxation would elicit non-use values in addition to use values for the good.

The impact of the payment vehicles' credibility on respondents' valuations was explored by Bateman et al (1999). Payment vehicle effects were considered through differences in responses to a CV study that used either taxation or charitable donations as the payment vehicle. The findings indicated that taxation was a more credible payment vehicle, where more respondents refused to pay through charitable donation than through taxation. A similar and well-documented issue in the application of CVM is that of protest responses thus Garrod and Willis (1999) recommend the payment vehicle should be viewed as 'fair and equitable' by respondents.

It is widely accepted that any payment vehicle used should have a plausible connection to the good being valued and should be neutral with respect to the good, except in cases where the study seeks to value the implementation of a new policy. The recommendation for payment vehicles is to use one that is used in practice to avoid controversial payment vehicles. Using the most widely applied payment vehicle should also increase the credibility of the hypothetical market. Pragmatically the choice should be study specific accordingly, Mitchell and Caron (1989) recommend that the payment vehicle used in CVM studies be that currently used for the good or a similar commodity.

3. An Experiment Testing for Payment Vehicle Effects in Health

3.1 Background to the Study

Currently in England there are a total of 14 air ambulances providing full national coverage, encouraged through the establishment of the National Association of Air Ambulance Services (NAAAS) in 1997 and commercial sponsorship by the AA Foundation amounting to £14 million over three years. This commercial sponsorship funded aircraft related costs and contributed to the financing of additional aircraft, whilst the NHS financed the provision of clinical staff. Although air ambulances have a recognised role in the provision of emergency care, recent research has questioned if they are an optimal use of NHS resource. This has become a greater consideration since January 2002 when AA Foundation sponsorship ceased with no alternative sponsor identified.

This study, funded by the Department of Health, sought public perceptions of and WTP for the provision of a national air ambulance service (AAS), to inform decision-making regarding the future funding of an air ambulance service. Between August and September 2002, a representative sample of 1400 members of the public were interviewed using computer assisted telephone interviews (CATI). For the general survey results see Johnston and Ryan (2002).

3.2 Awareness, perceptions and knowledge of air ambulances services

The study was concerned with the awareness, understanding, perceptions and value of a national air ambulance service. Thus prior to the CVM questions respondent were asked about a number of other aspects of the service. Respondents were asked about their awareness of air ambulances, and if they perceived that an air ambulance covered the area where they live. Respondents' understanding of the role of air ambulances was explored asking respondents their perceptions of when an air ambulance would be used. To examine respondents' perceptions of an air ambulance service they were presented with a number of statements such as, 'an air ambulance service would make me feel that help is always at hand', (HELPPATHAND) 'Air ambulances are an essential part of emergency services' and asked whether they agreed or disagreed on a Likert scale. Prior to the CVM experiment

respondents were also asked about how they perceived the air ambulance service was funded and how they thought that it should be funded. For more on this see Johnson and Ryan (2002).

3.2 Valuing air ambulances: the contingent valuation experiment

Following the awareness, understanding and perceptions questions, a CV experiment was conducted to elicit maximum WTP for an AAS. Individuals were provided with the following information:

'Okay, moving on now. Air ambulances can be used as an alternative to standard ambulances, and can be of particular benefit to patients with serious injuries, and to people in remote or isolated areas. Studies have shown that while each air ambulance can save around 7 additional lives a year, most people transported have the same chance of survival if a standard ambulance is used.

There is a debate about how the service might be paid for. If no future funding is provided there is a possibility that the service will not continue.

We are now going to complete an exercise to work out how much, if at all, you value and would therefore be personally prepared to pay for an air ambulance service. I am going to ask if you would pay a certain amount; if you say 'yes' I will ask you a higher amount and if you say 'no' I will ask you a lower amount.

The amounts are yearly amounts that would be collected through additional taxes. [statement 1]

OR

The amounts are yearly donations that you would be personally willing and able to give to an air ambulance charity. [statement 2]

(½ respondents should get statement 1, ½ should get statement 2)

Please remember that any money you spend on this will not then be available for other things that you might rather spend your money on.

A sample of respondents (n=697) were asked if they would be personally willing and able to pay anything in extra tax to help fund an air ambulance service and another sample (n=703) would you be personally willing and able to make any charitable donations to help fund an air ambulance service? Both these payment vehicles are currently used to fund AAS.

An attempt was made to distinguish non-demanders, who did not value the provision of a service, from protesters. Respondents were asked to explain why they would not be willing to pay extra tax/make a charitable donation, with possible responses: 'I can't afford'; 'government should pay out of existing budget/taxes'; 'government collects enough taxes

already'; 'I fund/support other charities'; 'general public should not have to pay'; 'not a tax payer/I am a pensioner'; 'this emergency service is of no value to me or my household'; 'should be part of NHS funding'; 'other services are as/more important'. Respondents who stated that they 'could not afford' to pay or that 'that service is of no value' were classified as genuine non-demanders, all remaining respondents were considered protesters. After respondents were asked why they were not willing to contribute towards funding the provision of an air ambulance service they were asked what would be an acceptable way, if any, for them to contribute.

When respondents stated 'yes' to the screening question, a Double Bounded dichotomous Choice (DBDC) elicitation format was used to elicit their maximum WTP. Respondents were randomly presented with one of five possible 'base bids': £25, £50, £100, £200, £300. If a 'Yes' ('No') response was given to the first dichotomous choice (DC) question, respondents were offered a higher (lower) follow up DC question. The follow up bid levels are as stated for each base bid level; £25 (with lower = £10 and higher = £50); £50 (with lower = £25 and higher = £100); £100 (with lower = £50 and higher = £200); £200 (with lower = £100 and higher = £300); and £300 (with lower = £200 and higher = £400). The bid levels were obtained from a CV survey of air ambulances conducted in the Grampian Region of Scotland (Ryan et al, 2004). Response monitoring for each bid level took place throughout the data collection period to ensure an equal split of respondents across bid levels.

3.4 Testing for Payment Vehicle Effects

The respondents were randomly assigned payment vehicles, however to be certain that there are no systematic differences between the payment vehicle sub-groups, Kolmogorov-Smirnov tests were conducted to consider socio economic variables such as; age, gender, income, education, whether respondents lived in a rural or urban location (URBAN) and attitudinal and awareness data such as; awareness of an air ambulance service (AWARE), if the respondent believed the area they live is covered by an air ambulance (AREA), an air ambulance makes the respondent feel that help is always at hand (HELPPATHAND), the respondent believe that an air ambulance was an essential emergency service (ESSENTIAL), if respondents perceived the government funded the national air ambulance service (P_GOV) and if the

respondents thought that the air ambulance service should fund the air ambulance service (S_NHS).

Following this we tested 3 hypotheses:

Hypothesis 1: Taxation is more credible than Charitable Donations as a payment vehicle.

The hypothesis that taxation is a more credible payment vehicle than charitable donations is tested using the observed refusal rate to the initial screening question. The difference in the proportion of respondents refusing to take part in the CV exercise was tested across payment vehicles using a chi-squared test. The effect of the payment vehicle upon the probability of respondents being willing to pay anything for air ambulance provision was also considered in a logistic regression model. Here the dependent variable took the value of 1 if respondents were willing to pay anything for the provision of a national air ambulance service and 0 otherwise. In addition to the payment vehicle other attitudinal variables were included in the regression, where a-priori these may be expected influence respondents attitude toward paying for the provision of an air ambulance service. These included (URBAN and AREA) where it is expected that where respondents live will affect their attitude to paying for an air ambulance, where if respondents live in a rural location they may perceive more benefit from and air ambulance. Further, if the area respondents lived in was covered they may view that maintaining the service is more important. A further regressor included respondents' attitudes to air ambulances where respondents with positive attitudes were hypothesised to be more willing to contribute.

Hypothesis 2: $Protest_{taxation} = Protest_{donation}$

Payment vehicle effects may occur in CV responses when the payment vehicle alters how respondents react to being asked to contribute towards financing the provision of the good. A payment vehicle may induce a higher proportion of protest responses than other vehicles, this is more likely if the vehicle is controversial, or respondents do not perceive the vehicle to be fair or appropriate means of payment. Following consideration of responses to the screening question, consideration was given to the number of 'protest bids' across the payment

vehicles, using the Chi-Squared test. When respondents do not view the proposed payment vehicle as acceptable this may result in an increased proportion of protest responses. Logistic regression analysis was again used to investigate the reason for protest bids, independent variables included the payment vehicle, respondents socio-economic characteristics and the perception and attitudinal data discussed in section 3.2. A-priori expectations are respondents' expectations and perceptions of how air ambulances are funded and their attitude towards air ambulances would influence their probability of protesting. It was hypothesised that respondents who perceived air ambulances to be funded by the government or thought the NHS should fund them may object to being presented with a charitable donation. When O'Brien and Viramontes (1994) consider payment vehicle effects in a CVM study looking at IVF treatment, they suggested that the taxation payment vehicle resulted in higher rates of protest responses as an explanation for the lower WTP observed with the taxation payment vehicle over the OOP payment vehicle.

Hypothesis 3: $WTP_{taxation} = WTP_{donations}$

The third hypothesis involved testing whether WTP values within the two samples were the same. Responses to the DBDC question were analysed using an interval data model (Hanemann et al, 1991). In general let t_1 be the first bid level and t_2 be the second. Then:

- A Yes | Yes response $\rightarrow WTP \geq t_2$
- A Yes | No response $\rightarrow t_1 \leq WTP < t_2$
- A No | Yes response $\rightarrow t_1 > WTP \geq t_2$
- A No | No response $\rightarrow WTP < t_1$

where

$$y_{i1}^* = X_{i1}\beta_1 + \tilde{\epsilon}_{i1}$$

$$y_{i2}^* = X_{i2}\beta_2 + \tilde{\epsilon}_{i2}$$

y_{i1} and y_{i2} are only observable through individuals responses to DC1 and DC2 respectively such that:

$$y_{i1} = \begin{cases} 1 & \text{if } y_{i1}^* > t_1 \\ 0 & \text{otherwise} \end{cases} \text{ and } y_{i2} = \begin{cases} 1 & \text{if } y_{i2}^* > t_2 \\ 0 & \text{otherwise} \end{cases}$$

The error terms $\tilde{\varepsilon}_{i1}$ and $\tilde{\varepsilon}_{i2}$ are unobservable individual specific and the same across equations ε_i . In the case of DBDC data, there are two discrete responses I_{i1} and I_{i2} . As the bid amount offered in DC2 is dependant on the response to DC1 the model must be developed in the context of the joint distribution of $(y_{i1}$ and $y_{i2})$. Here it is assumed that responses to both valuation questions, DC1 and DC2, are motivated by the same latent WTP value. Thus, the covariates and the errors when analysing both dichotomous choice questions are identical. Accordingly, individuals' valuations of the good are identical in DC1 and DC2 with any observed difference due to randomness in the underlying WTP.

Willingness to pay was first estimated for the entire group (not distinguishing between payment vehicles).

If no payment vehicle effects exist, the WTP valuation elicited using the taxation and charitable donation payment vehicles will be the same. Including the payment vehicle as a regressor in the bid function initially tested this. Following this, two bid functions were estimated, one for each payment vehicle, and the resultant mean WTP estimations are compared.

When estimating WTP functions respondents stating they were not willing to pay anything for the provision of an air ambulance service were treated in three ways. Firstly they are assumed to place a zero value on the service and enter the analysis as 'NO|NO' responses (Model I). Secondly, they are excluded from the analysis (model II) as they were not offered the DBDC CV questions. This treatment would result in 802 usable responses to the DBDC questions. Thirdly, respondents not willing to pay anything for a national air ambulance service maybe either genuine non-demanders or protest respondents this distinction is made using responses to the follow up questions. Protest respondents are then dropped from the subsequent analysis (Model III).

4. Results

The study found that the sample had a high awareness of the existence of an air ambulance service with 38% of the sample spontaneously mentioning the service as a specific way of reaching and dealing with emergencies. When respondents were asked if they believed the

area they lived in to be covered by an air ambulance service 54% stated yes. When respondents were asked how they **perceived** air ambulances were funded 54% believed funding came from sources other than the government or the NHS, however when asked how they thought the service **should** be funded 89% mentioned public sector sources (where these included, central/local government, NHS, local health authority). Respondents were also presented with statements to explore various benefits of air ambulances and asked to agree or disagree on a Likert scale. Respondents were asked if 'air ambulances were an essential part of an emergency service' 92% of respondents agreed with this statement, When respondents were asked if an air ambulance service made them feel help was always at hand 74% agreed with this statement.

The results of the Kolmogorov – Smirnov tests of significant difference between the sample of respondents asked their WTP through increased taxation or charitable donations indicated there was no difference according to gender (p-value=1.000), age (p-value=1.000), education (p-value=1.000), income (p-value=0.768), AWARE (p-value =0.971), AREA (p-value=0.306), P_GOV (p-value=0.996), S_NHS (p-value=1.000), HELPATHAND (p-value = 1.000), ESSENTIAL (p-value=1.000), URBAN (p-value = 0.998).

Table 1 presents response data for the DBDC questions. Intuitively expectations are, as the bid level increases the probability of acceptance (respondents stating 'yes') should fall. This pattern is observed in the data for both payment vehicles. From Table 1 it can be observed that the proportion of respondents stating 'yes' to the initial bid level is greater with the taxation payment vehicle.

Table 1: Responses to DBDC bid levels

'Base bid'	Yes	No	Upper bid	Yes (Upper)	No (Upper)	Lower bid	Yes (lower)	No (Lower)
Taxation								
£25	68	14	£50	29	39	£10	8	6
£50	65	18	£100	26	39	£25	13	5
£100	61	34	£200	15	46	£50	23	11
£200	40	41	£300	9	31	£100	22	19
£300	27	59	£400	6	21	£200	17	42
Donation								
£25	52	23	£50	13	39	£10	20	3
£50	38	29	£100	9	29	£25	18	11
£100	31	46	£200	5	26	£50	21	25
£200	16	54	£300	4	12	£100	20	34
£300	12	74	£400	2	10	£200	11	63

Hypothesis 1: Taxation is more credible than Charitable Donations as a payment vehicle.

Table 2 reports an initial simple test of the effect of the payment vehicle presented in the hypothetical market on respondents' probability of being prepared to pay anything toward the provision of a national air ambulance service. It can be seen that of the 697 respondents offered taxation as their payment vehicle, 61% were willing to contribute something, whereas, of the 703 respondents offered charitable donation as a payment vehicle 54% of respondents were willing to pay something. The results of the chi-squared test indicated that variation observed in respondents' willingness to contribute across payment vehicles was not due to chance ($p < 0.001$).

Table 2: Willingness to contribute across payment vehicles.

		Willingness to contribute towards Provision of a National AAS		
		Yes	No	Total
Payment Vehicle	Taxation	427	270	697
	Charitable Donation	380	323	703
	Total	807	593	1400

Table 3 shows the results of the logistic regression analysis. Amongst the significant determinants of respondents' willingness to pay for the provision of an air ambulance service is the payment vehicle TAXATION (coded 1 for an increase in taxes and 0 for a charitable donation). This variable has a significant and positive effect, suggesting that respondents are more likely to be willing to pay toward air ambulance provision if contributions were through increased taxes as opposed to charitable donations. This may be a result of taxation being the more acceptable method of payment in this case.

Table 3: Determinants of Respondents willingness to pay for AAS

	Co-efficient	T-Stat
Constant	1.8831	3.62
Age	-0.1258	-1.91
Education	-0.1246	-1.79
Income	0.1522	2.83
AWARE	-0.3923	-3.07
HELPTHAND	-0.1644	-2.31
ESSENTIAL	-0.3323	-3.43
URBAN	-0.374	-2.71
Taxation	0.2934	2.25
P_GOV	-0.3328	-2.43
S_NHS	-0.2246	-1.47
AREA	0.2608	1.91
Number of Observations	1124	
Log Likelihood	-684.0607	

Further evidence of that taxation is a more acceptable method may be inferred through dummy variables P_GOV and S_NHS these variables were obtain when respondents were asked their *perception* of how the air ambulance service was funded, 42% perceived the government funded the national air ambulance service (P_GOV). Further, when respondents were asked how an air ambulance service *should* be funded 85% stated the NHS should fund the service (S_NHS). P_GOV is significant where the negative co-efficient is interpreted as respondents who perceived that the air ambulance service was financed by the government were less willing to contribute to funding air ambulance provision.

Hypothesis 2: $Protest_{taxation} = Protest_{donation}$

Table 4 presents the proportion of ‘protest’ responses across payment vehicles. The results of a chi-squared test indicate that there is no significant difference in protest responses across payment vehicles (p=0.255)

Table 4: Protest responses across payment vehicles.

Payment Vehicle	Protest Response		
	Yes	No	Total
Taxation	129	141	270
Charitable Donation	150	173	323
Total	279	314	593

The logistic regression model considering determinants of protest responses in the study confirms the result of the chi-squared test (Table 5), this model was fitted using a step-wise regression technique. Whilst gender and income are significant determinants of protest responses, the payment vehicle offered to respondents does not affect the probability of protest responses. The results presented in tables 4 and 5 indicate that whilst payment vehicle effects are evident in the results presented in tables 2 and 3 these can not be explained by the protest behaviour observed in the study.

Table 5: Determinants of Protest Responses

	Co-efficient	T-Stat
Constant	0.078	-0.15
Gender	-0.469	-2.35
Income	0.436	5.83
Taxation	0.175	0.88
Number of Observations	468	
Log Likelihood	-249.471	

Hypothesis 3: $WTP_{taxation} = WTP_{donations}$

Table 6 shows the results from estimating WTP for all three models when no consideration is given to payment vehicle, and all respondents are grouped together and Table 7 shows the results when TAX is included as a regressor in the model.

Table 6: Welfare estimates from different models

	Model I All respondents Included	Model II No' Respondents Dropped	Model III Protest responses dropped
Constant	0.3585 (0.0728)***	1.6528 (0.1097)**	0.8551 (0.0844)***
Bid	-0.0126 (0.0006)***	-0.0158 (0.0008)**	-0.0137 (0.0006)***
Observations	1395	802	1089
Log Likelihood	-1660.0918	1224.4172	-1475.5081
Mean WTP	£28.45	£104.34	£62.41

*** and ** denotes significance at the 1% and 5% levels respectively, Standard errors are reported in parenthesis.

This payment vehicle dummy variable (TAX) has a significant positive impact on the probability of respondents stating 'yes' to the bid amounts offered. Given the coding of the variable, this implies respondents who were presented with the taxation payment vehicle were more likely to state 'yes' to the willingness to pay amounts than respondents presented with the charitable donation payment vehicle. Thus suggesting that respondents who were asked to contribute to the funding of an air ambulance service using a taxation payment vehicle were WTP more than those respondents who were asked using a charitable donation payment vehicle.

Table 7: Including payment vehicle in regression models

	Model I	Model II	Model III
	All respondents included	No respondents Dropped	Protest Responses Dropped
Constant	0.1320 (1.359)	1.2354 (9.625)***	0.5959 (5.509)***
Bid	-0.0161 (-21.51)***	-0.0163 (-20.37)***	-0.0143 (-20.75)***
Tax	0.6514 (5.561)***	0.8836 (-6.017)***	0.7645 (5.976)***
Observations	1395	802	1038
Log Likelihood	-1687.45189	-1203.15205	-1417.13861

This result is further investigated in Table 8 by splitting the sample by payment vehicle. Here we can see that in all estimated model WTP is lower for charitable donations than taxation. Further it was found that when the confidence intervals for the WTP estimates are compared across payment vehicles, regardless of the model considered, the 95% confidence intervals did not overlap, thus providing further evidence of a significant difference in the WTP elicited using an increase in taxation versus charitable donation as a payment vehicle (these results are available from the authors on request).

Table 8: Analysis of DBDC by payment vehicle

	Model I		Model II		Model III	
	Taxation	Charitable Donation	Taxation	Charitable Donation	Taxation	Charitable Donation
Constant	0.7052 (6.624)***	0.2367 (2.093)***	1.9573 (12.55)***	1.4174 (8.784)	1.2039 (9.608)***	0.7044 (5.419)***
Bid	-0.0150 (-16.14)***	-0.0179 (-14.24)***	-0.0149 (-15.25)***	-0.0185 (-13.42)***	-0.0162 (-15.71)	-0.0193 (-14.03)
Observations	697	698	427	372	547	542
Log Likelihood	-950.11870	-734.40326	-657.225	-542.078	-846.687	-659.4821
Mean WTP	£73.62	£45.50	£131.14	£76.61	£90.39	£57.17
(95% Confidence Intervals)	(£66.58 - £81.46)	(£40.42 - £51.25)			(£82.19 - £99.55)	(£51.32 - £64.73)

5. Discussion and Conclusions

Summary

This paper has provided preliminary analysis of payment vehicles effect within health care. The results presented suggest that in the case of air ambulance provision, taxation is a more credible payment vehicle than a donation to a charitable fund. Further work should consider payment vehicle effects in other healthcare settings. In this study both payment vehicles are currently used to finance air ambulance provision. Thus both should have been credible methods of payment.. Smith (2003) reported that 82% of contingent valuation studies used out of pocket expenses as the payment vehicle. Future work should build on that by O'Brien and Viramontes (1994) and investigate the credibility of the OOP payment vehicle, in comparison to taxation, the current funding method for many healthcare interventions.

Mitchell and Carson (1989) state that when payment vehicle effects are found in studies no misspecification or bias can be said to exist if the research understands the effects of the payment vehicle on WTP amounts. That said, payment vehicle effects would influence the generalisability of study results to other situations where the payment vehicle may differ.

Further analysis of data

Further work with our data will explore respondents' motives for willingness to pay, and how this may differ across payment vehicles, using responses to follow up questions that asked respondents why they were willing to pay for the provision of an air ambulance service. Consideration will be given to protest response rates across the payment vehicles to investigate why respondents are protesting, using the data collected on respondents' perceptions of how the air ambulance service is funded and beliefs about how it should be funded. This work will consider how protest rates differ if respondents' WTP is elicited using a payment vehicle that they don't perceive would be used or different from the one they believe should be used. This will provide more insight into how the credibility of the payment vehicle affects WTP elicited in a CVM study.

From the data collected prior to the CVM questions, it will also be possible to segment the sample into clusters; respondents will be grouped according to their attitude towards the air ambulance service. The clusters will be respondents with a positive attitude, a reserved attitude and negative attitude toward an air ambulance service. From this further explanations for the payment vehicle effects reported in this paper will be explored. It is hypothesised that respondents with a reserved attitude will be more likely to 'free-ride' than respondents with a positive attitude toward the good. Further, respondents in the positive cluster may be more likely to engage in strategic overbidding behaviour to ensure the provision of the service if they perceive that their individual WTP will not be collected.

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