Testing the effectiveness of the oath script in reducing the hypothetical bias in the Contingent Valuation Method

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Abstract: The objective of the study is to investigate the effect of the oath script (HO) in an hypothetical Contingent Valuation survey in a Mediterranean country (e.g. Italy). Hence, there were conducted the CE surveys with three treatments: (1) CV without a cognitive task, (2) CV with a CT script, and (3) CV with a HO. The findings showed that the effectiveness of the HO script depends on the participants' socio-demographic characteristics. For instance, it was found that the HO script could help to reduce the hypothetical bias for people who possess a high educational level in contrast with those people with low education and low income. Hence, the findings suggest that the oath script not only does not a guarantee the reduction of the hypothetical bias, but it also does not explain the mixed results found in the previous studies.

Keywords: cheap talk script, Contingent Valuation, oath script, Willingness-To-Pay

The Contingent Valuation (CV) method is currently the most commonly used value-elicitation method for determining the consumer's preferences and willingness to pay for nonmarket products. The hypothetical bias, however, still represents a challenging issue for the CV. It is well known that the hypothetical bias occurs when the individuals overstate their willingness to pay (WTP) in the hypothetical settings due to, among others, the lack of economic incentive to reveal their true valuations (List and Gallet 2001; Murphy et al. 2005). List and Gallet (2001) conducted a meta-analysis of 29 experimental studies which revealed that the subjects in average overstate their preferences by a factor of 3 in hypothetical settings. They also reported that the effect of the hypothetical bias was considerably lower for private goods compared to public goods. By the same token, Murphy et al. (2005) also carried out a meta-analysis of 28 studies and reinforced the findings of List and Gallet (2001) by showing that the mean ratio of the hypothetical to actual values is around 1.35 and that the bias increased when public goods were valued.

Two approaches have been used, so far, to alleviate the problem of the hypothetical bias at least. The first method consisted of using the incentive compatible mechanisms (e.g. experimental auction, real choice experiment). The incentive compatible mechanisms use real money and products and are designed in a way that the participant incurs a monetary cost if she/he deviates from her/his true preferences or/ and willingness to pay (WTP). The second approach consisted of using the ex-ante correction method that incentivizes the participants to reveal their true preferences and the WTP without imposing any monetary cost (i.e. the cost is rather moral). Few papers tested the effectiveness of the first approach, and they found mixed results. For instance, while Carlsson and Martinsson (2001) and Cameron et al. (2002) failed to reject the hypothesis that the marginal WTPs from both hypothetical and non-hypothetical value-elicitation methods (VEM) are equal, other studies such as Johansson-Stenman and Svedsater (2008) and Loomis et al. (2009) have found a substantial hypothetical bias in hypothetical VEM. Finally Chang et al. (2009) also found that the non-

hypothetical choices are a better approximation of true preferences than the hypothetical choices based on a comparison between the hypothetical and non-hypothetical CEs as well as a comparison between the predicted market shares from these experiments with the actual market shares.

Regarding the second approach, Cummings and Taylor (1999), in their seminal paper, proposed the cheap talk (CT) script as a non-monetary technique capable of reducing the hypothetical bias in the hypothetical valuation methods. It consists in explaining to the participants, prior to the administration of the valuation questions, what are the possible negative implications that overstating their preferences and the WTP may lead to. Several studies assessed the effectiveness of CT in reducing the hypothetical bias and found mixed results. For example, List (2001) used a cheap talk in a field experiment of a private good (e.g. sport card) and concluded that experienced card dealers did not change their WTPs based on the cheap talk scripts. However, the cheap talk was able to eliminate the hypothetical bias for inexperienced consumers. Moreover, Brummett et al. (2007) found that the cheap talk script was not able to remove the hypothetical bias. Finally, de-Magistris et al. (2013) and de-Magistris and Pascucci (2014) found that the CT was not able to reduce the hypothetical bias in CE. On the other hand, Tonsor and Shupp (2011) reported that the cheap talk provided in CEs, conducted online, could reduce the absolute value of the average WTP. Nevertheless, Silva et al. (2011) found that the use of the cheap talk was effective in eliminating the hypothetical bias in a retail setting.

Given the non-conclusive results on the effectiveness of the CT in mitigating vhypothetical bias, Jacquemet et al. (2011, 2013) proposed the use of another ex-ante non-monetary correction technique taken from the social psychology and called the "solemn oath". They argued that the solemn oath can be used as a truth-telling commitment device, by asking the bidders to swear on their honor to give honest answers prior to participating in a non-hypothetical experimental setting (i.e. second-price auction). Their results suggest that the solemn oath improved the revelation of the true WTP both in the real and hypothetical auction.

The findings of Jacquemet et al. (2011) with a solemn oath are promising. However, given that a solemn oath involves participants who have to make a commitment, there is a possibility that some subjects may not take it seriously due to the religious (e.g. in some religious, it is permitted to swear only in the name of God and, hence, they do not feel committed to fulfil their promise if they swear on their honor) or cultural background. Furthermore, since the participants' cultural and religious background is likely to change from one sample to another, assessing the effectiveness of the oath scripts in different contexts (e.g. various countries with different cultural backgrounds) is necessary to at least check the robustness of Jacquemet et al. (2011)'s findings.

As far as we know, there are just two other empirical studies, by Carlsson et al., (2013), and de-Magistris and Pascucci (2014) that tested the effectiveness of the oath scripts in reducing the hypothetical bias. Carlsson et al. (2013), examined the effect of the oath scripts on the consumers' WTP reported in a contingent valuation conducted in China and Sweden. They found that in both countries, the shares of zero WTP responses and extremely high WTP responses decreased when an oath script was used de-Magistris and Pascucci (2014) assessed the effect of the oath script on the participants' WTP in the hypothetical choice experiments conducted in the Netherlands. They found that the use of the oath scripts decreased the participants' WTP.

In our study, we investigate the effect of an oath (HO) script in a hypothetical Contingent Valuation survey in a Mediterranean country (e.g. Italy) known by its very different cultural background compared to the aforementioned countries. Furthermore, our study stands out by comparing the WTPs obtained in a: (1) CV proceeded by a HO script, (2) CV proceeded by a CT script, (3) CV not preceded by neither HO script nor CT scrip. This comparison will allow us to investigate which of the two non-monetary incentives (i.e. HO and CT scripts) can better reduce the effect of the hypothetical bias).

MATERIAL AND METHODS

The Contingent Valuation Method (CV)

Similar to the choice experiment (CE), the CV is a value-elicitation method that is consistent with a random utility theory. In difference with the CE, the CV, however, consists of asking the consumers directly to reveal their willingness to pay (WTP) for a given good.

In our CV survey, each respondent was identified by a unique ID number to guarantee his/her anonymity before beginning the CV survey. The

participants were then given information about the product and the contingent valuation instructions, and they were asked to read them. In particular, the interviewees were briefed about the objective of the project titled "Blu" which consists in using part of the profits from the sales of wines with the Corporate Social Responsibility (CSR) certification[1] to build water wells in Africa.

The respondent was asked to answer three Yes/No questions. The first CV question was if the consumers were willing to pay 1.35 € for a bottle of Vivace Frescello, knowing that 35 cents of the 1.35 € are used for building water wells in Sierra Leone, while 1 € is for Cielo & Terra? In the second CV question, the interviewees were asked whether they are willing to pay 1.55 € for a bottle of Vivace Frescello, knowing that 0.70 € of the price would be used to build water walls in Sierra Leone, while 0.85 € is for Cielo & Terra. Finally, the last question asked the respondent whether they are willing to pay 1.65 € for a bottle of Vivace Frescello, knowing that 1 € of the 1.65 € would

be used to build water wells in Sierra Leone, while 0.65 € goes to Cielo & Terra.

Treatments

To test the effectiveness of the oath script in reducing the hypothetical bias in the hypothetical CV, we randomly assigned subjects to three treatments. In the first treatment (HB), the participants completed the questionnaire as well as responded to three-WTP dichotomous questions without receiving an HO or a CT script.

The second treatment (CT) consisted of a hypothetical CV with a CT script that the participants read before responding to the CV questions. We used a generic, short, and neutral CT, similar to the one used by Cummings and Taylor (1999), which was later modified by Silva et al. (2009)[2]. Finally, the third treatment (HO) consisted of a CV survey with a "solemn" HO script, which was placed immediately before the CV questions. The HO script was quite

Table 1. Definition and means of the exogenous variables

Variable definition	Name (type)	HB	CT	HO
Gender				
Male	GENDER	39.4	35.7	37.8
Female	(dummy 1=female; otherwise)	60.6	64.3	62.2
Age	AGE (continuous) (dummy 1= age more than 60 years; 0 otherwise)	47.0	48.9	45.4
Education of respondent	EDUCATION (dummy 1 = university; 0 otherwise)			
Elementary		28.3	24.6	21.1
High school		40.0	49.1	40.8
Degree		31.7	26.3	38.0
Average household monthly income	INCOME (dummy 1 = more than 3500 €; 0 otherwise)			
Below 600 €		6.5	0	4.05
Between 600 and 1500 €		27.9	28.6	24.3
Between 1501 and 2500 €		29.5	30.4	35.1
Between 2501 and 3500 €		31.1	32.1	21.6
More than 3500 €		4.9	8.9	14.9

[1]According to the European Commission, the corporate social responsibility is "a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis" (European Commission 2001). The CSR could be identified by two key issues: the environment and social responsibility. The former mainly relates to corporate activities protecting the natural environment, whereas the social responsibility comprises initiatives that protect the social welfare of key stakeholders (Lockett et al. 2006; Lindgreen and Swean 2009).

[2]The cheap talk script appeared as "Studies show that people tend to act differently when they face hypothetical decisions. In other words, they say one thing and do something different. For example, some people state a price they would pay for an item, but they will not pay the price for the item even when they see this product in a grocery store. There can be several reasons for this different behaviour. It might be that it is too difficult to measure the impact of purchase in the household budget. Another possibility is that it might be difficult to visualize themselves getting the product from a grocery store shelf and paying for it. Do you understand what I am talking about? We want you to behave, in the

similar to the one used by Jacquemet et al. (2009, 2013). In fact, before responding to the CV questions, each respondent was first asked to sign a truth-telling oath. Then, she/he was requested to swear on her/his honour that while answering the CV questions, she/he would tell the truth and always provide honest answers. Finally, the subjects were told that signing was free and that their participation in the survey was not conditional upon signing. They were also thanked, regardless of their decision.

A total of 62 subjects participated in the HB treatment, 58 consumers in the CT treatment, and 75 individuals in the HO treatment. As shown in Table 1, the Pearson chi-square tests suggest that there are no statistically significant differences between the treatments by gender (p-value = 0.69), age (p-value = 0.68), education (p-value = 0.36), or income (p-value = 0.43), meaning that we were able to equalize the characteristics of the participants and compare the results of the three treatments.

Data gathered

Data were collected from a contingent valuation survey carried out during summer 2013 in three major metropolitans in the North of Italy: Padova, Vicenza and Piacenza (in the Region of Veneto and Emilia Romagna, respectively).

We used a convenient sample of real consumers instead of students to be able to expand the empirical results to the population level and also to reduce the sample selection bias (Chang et al. 2009). The target population of our study consisted of the primary food buyers in the household. Furthermore, at least one member of the household should be consumer of the product of interest. In order to include consumers with different purchasing habits and socio-economic characteristics, the surveys were conducted in different retail stores during the weekdays. A number of representative supermarkets and hypermarket were selected in each city, and food shoppers were randomly selected inside these shops. The questionnaire also contained questions about the socio-demographic characteristics (i.e. gender, family size and composition, age, education level, income) and lifestyles.

RESULTS AND DISCUSSION

To investigate the effect of the HO and CT scripts we first compared the percentages of YES/NO answers (Table 2) for each question in each one of the three treatments. The results displayed in Table 2, show that the percentage of NO (YES) answers is lower (higher) in the treatment HO than in the treatments CT and HB. For instance, only 8% of participants in the treatment HO revealed to be not willing to pay 1.35 € for the wine compared to 23% and 28% in the treatment HO and CT, respectively. Furthermore, the results show that the percentage of NO answers in the three treatments increases as the price of the wine increases. For instance, in the case of price 1.35 €, the percentages of NO answers were 8%, 23% and 28% in the treatments HO, HB, and CT, respectively. These percentages increased further to 12%, 31% and 36% in case of price 1.55 € and to 17%, 39% and 36% when the price of the wine was set equal 1.65 €. To sum up, it seems that the HO script is less effective in reducing the hypothetical bias, if any, than the CT script. Furthermore, it appears that the effectiveness of the HO and CT scripts depends on the level of the price offered to participants.

To check whether the differences found in the results displayed in Table 2 are statistically significant, we carried out a two-tailed z-test for independent – proportions. The results of the z-test are presented in Table 3. The results show that the percentages NO (YES) answers are statistically similar in the treatments CT and HB. These findings seem to confirm that the use of the CT script cannot help in reducing the hypothetical bias in the hypothetical CV. Interestingly, the results show that the percentage of NO (YES) answers are significantly lower (higher) in

Table 2. Percentages of NO and YES answers

Prices		HB	CT	HO
Price 1 (1.35 €)	NO	23	28	8
	YES	77	72	92
Price 2 (1.55 €)	NO	31	36	12
	YES	69	64	88
Price 3 (1.65 €)	NO	39	36	17
	YES	61	64	83

same way that you would if you had to pay for the product and take it home. Please take into account how much you really want the product, as opposed to other alternatives of fresh-cut products that you like or any other constraints that might make you change your behaviour, such as taste or your grocery budget. Now could you please tell me what price you are willing to pay for each of the following products? Please try to put yourself in a realistic situation."

Table 3. Treatments' effect on NO and YES answers

Prices	Treatments	*p*-value	
		NO	YES
Price 1 (1.35 €)	HB vs.. CT	0.52	0.52
	HB vs. HO	0.016	0.016
	CT vs. HO	0.002	0.002
Price 2 (1.55 €)	HB vs. CT	0.52	0.52
	HB vs. HO	0.07	0.07
	CT vs. HO	0.00	0.00
Price 3 (1.65 €)	HB vs. CT	0.77	0.77
	HB vs. HO	0.00	0.00
	CT vs. HO	0.00	0.00

the HO treatment that in the CT and HB treatments. This finding suggests that the participants in the HO treatment were more willing to accept the offered price than the participants in the HB treatment, who were not incentivized to reveal their true WTP. One explanation for these unexpected results is that the participants, after being asked to swear to say the truth (HO treatment), might have felt no trust. Hence, they complained by doing the opposite than they were requested to do. However, since we did not have any evidence that the unexpected effect of the HO script is a result of a complaint behavior, our explanation should be treated with caution and further research should be undertaken to check whether the protest behavior is the actual cause of the ineffectiveness of the HO script in reducing the hypothetical bias.

To investigate whether the effect of the CT and HO varies in function of the WTP values, we tested the statistical significance of the variation in the percentages of NO answers, reported in each treatment, when the price of the wine varies. To carry out this analysis, we also used the two-tailed *z*-test for independent sample proportions. The results are displayed

Table 4. Sensitivity of the effect of the CT and HO scripts to the variation of price

Treatments	Prices	NO	YES
HB	Price1 vs. Price2	0.31	0.31
	Price1 vs. Price3	0.05	0.05
	Price2 vs. Price3	0.34	0.34
CT	Price1 vs. Price2	0.31	0.31
	Price1 vs. Price3	0.32	0.32
	Price2 vs. Price3	1.00	1.00
HO	Price1 vs. Price2	0.30	0.30
	Price1 vs. Price3	0.08	0.08
	Price2 vs. Price3	0.34	0.34

in Table 4. The results show that the percentage of NO answers in the treatments HB and HO significantly decreased (increased) when the price of wine passed from 1.35 € to 1.65 €. Interestingly, the percentages of NO answers in treatments CT, however, do not seem to be affected by the variation of the price. In other words, it appears that the effect of the CT script is less sensitive (hence more stable) to the variation of the price that the consumer is asked whether she/he is willing to pay. Nonetheless, this result should be interpreted and used with caution since the variation of the price was not sufficient to draw any definitive conclusion about the insensitivity of the effect of the HO script to the variation of prices.

To check the robustness of the aforementioned findings and to investigate whether the unexpected effect of the HO script can be explained by the participants' socio-demographic characteristics, we estimated a robust probit model for each of the three offered prices to respondents.

The dependent variable WTP takes the value 1 (0) if the participant accepts (does not accept) to pay the offered price. We also considered the dummy variable *CT* with a value of 1 if the subjects participated in the CT treatment and 0 otherwise. In the same manner, we took into consideration the dummy variable *HO* with a value of 1 if the subjects participated in the HO treatment and 0 otherwise. Moreover, we take into consideration the explanatory socio-demographic variables by introdutiong *gender*, a dummy variable equal to one if the subject was female, *age* as a dummy variable defined as equal to one if the individual is older than 65 years, 0 otherwise., *education* as a dummy variable equal to one if the participants possessed a degree, and *income* as a dummy variable equal to 1 if the participants had a monthly income more than 3,500 euros. Finally, we consider also the interaction terms of the socio-demographic variables with the CT and HO treatments, respectively.

The probit model is specified as follows:

$$
\begin{aligned}
WTP_t = {} & b_0 + b_1(CT)_{it} + b_2(HO)_{it} + b_3 gender_i + \\
& b_4 education_i + b_5 age_i + b_6 income_i + \\
& b_7(CT \times gender)_{it} + b_8(HO \times gender)_{it} + \\
& b_9(CT \times education)_{it} + b_{10}(HO \times education)_{it} + \\
& b_{11}(CT \times age)_{it} + b_{12}(HO \times age)_{it} + \\
& b_{13}(CT \times income)_i + b_{14}(HO \times income)_i + \varepsilon_i
\end{aligned}
$$

We estimated the model defined by the equation (1) using a tobit model to take using the STATA 11 software.

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The results of the estimations are displayed in Table 5.

The results confirm the aforementioned findings of the effect of the CT and HO scripts. In fact, the results from the estimation of the robust probit models show that the use of HO scripts increases the probability that the participant will accept to pay the offered price. Notice that the estimates obtained in the three Probit models is quite similar. More interestingly, we found that the effect of the CT and HO scripts is affected by the participants' socio-demographic characteristics. In fact, the results show that when an HO script is used, participants with a low income (income less than 1500 €) are more likely to accept the offered price compared with participants with a higher income. Nonetheless, the results indicate that when an HO script is used, the participants with a high level of education are less likely to accept to pay the offered price. Similarly, the results show that participants with a high education level and who were provided with a CT script are less likely to accept the proposed price. Thus, if we assume that being less likely to pay the offered price (compared with the

Table 5. Results from the estimation of the three robust Probit models

Variables	Price 1 (1.35 €)	Price 2 (1.55 €)	Price 3 (1.65 €)
Constant	0.394	0.007	−0.511
HO	1.039**	1.045**	1.134**
CT	0.351	0.126	0.483
Gender	0.388	0.738	1.090**
Income	−0.599	−0.849*	−1.077**
Education	1.270**	1.462***	2.021***
Age	−0.631	−0.529	−0.142
HO*gender	−0.229	−0.301	−0.860
HO*income	1.414**	1.777***	1.401*
HO*Education	−1.873***	−2.058***	−2.141***
HO*age	0.227	−0.051	−0.066
CT*gender	0.544	−0.117	−0.462
CT*income	−0.227	0.347	0.480
CT*education	−1.006*	−1.001	−1.262*
CT*age	0.844	0.963	0.621
Log likelihood	−72.51	−85.30	−92.80
Wald chi2	45.35	41.52	50.15
Prob > chi2	0.00	0.00	0.00
Number of observations	191	191	191

*** (**) (*) Statistically significant at 1% (5%) (10%) level

results in the HB treatment) is a sign of being less prone to the hypothetical bias, we can conclude that the HO script seems to be effective in reducing the hypothetical bias for participants with a high level of education. However, the HO script seems to increase the hypothetical bias for the participants with a low level of income.

CONCLUSION

In this paper, we investigated the effectiveness of the CT and HO script in incentivizing participants in a hypothetical contingent valuation to reveal they true WTP which, in turn, can help in reducing the negative effect of the hypothetical bias. We conducted a contingent valuation where one third of participants was incentivized by a CT script, another third of participants was stimulated to report their true WTP through a HO script and the rest of members did not receive any non-monetary incentive.

The results of this study are interesting for two reasons. Firstly, the effect of the oath script on the hypothetical bias seems to be exactly the contrary of the expected effect. A possible explanation is the presence of social desirability. Secondly, the effectiveness of the HO and CT scripts to reduce the hypothetical bias depends, among other, on the participants' socio-demographic characteristics. This might be the explanation of the mixed results found in previous studies about the effect of the CT and HO scripts. In fact, the composition of samples varies from one study to another. For instance, our results show that a sample with a majority of highly educated and well-paid people is likely to be affected by the HO script in the expected direction and vice versa. Therefore, our findings suggest that the use of the oath script does not a guarantee the reduction of the hypothetical bias and partially it explains the mixed results found in the previous studies. This is the reason further research studies are needed, especially to identify what makes the HO and CT scripts effective in reducing the hypothetical bias and to assess the role of social desirability when an oath script is used. Furthermore, we recognize that the use of a home-grown-value survey constrained our ability to quantify the effect HO and CT scripts on the participants' WTP since their true WTP is unknown. Therefore, it will be interesting for the future research to investigate the impact of the CT and HO scripts on the participants' WTP in a contingent valuation conducted in induced value

settings which allow the researcher to measure the exact effect of these scripts on the hypothetical bias.

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