Environment for Development

Discussion Paper Series

November 2010 ■ EfD DP 10-24

The Truth, the Whole Truth, and Nothing but the Truth

A Multiple-Country Test of an Oath Script

Fredrik Carlsson, Mitesh Kataria, Alan Krupnick, Elina Lampi, Åsa Löfgren, Ping Qin, Thomas Sterner, and Susie Chung

Environment for Development

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Abstract

Hypothetical bias is one of the main issues bedeviling the field of nonmarket valuation. The general criticism is that survey responses reflect how people would like to behave, rather than how they actually behave. In our study of climate change and emissions reductions, we took advantage of the increasing bulk of evidence from psychology and economics that addresses the effects of making promises, in order to investigate the effect of an oath script in a contingent valuation survey. The survey was conducted in Sweden and China, and its results indicate that an oath script has significant effects on respondent behavior in answering willingness-to-pay (WTP) questions, some of which vary by country. In both countries, the share of zero WTP responses and extremely high WTP responses decreases when an oath script is used, which also results in lower variance. In China, the oath script also reduces the average WTP, cutting it by half in certain instances. We also found that the oath script has different impacts on various respondent groups. For example, without the oath script, Communist party members in China are more likely than others to have a positive WTP for emissions reductions, but with the oath script, there is no longer any difference between the groups.

Key Words: oath script, hypothetical bias, willingness to pay

JEL Classification: D61, Q5

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Introduction

Stated preference methods are frequently used for valuing public and quasi-public goods. Indeed, for some types of public goods, such as those with expected high existence values, only stated preference approaches are available. One of the major concerns with stated preference approaches is to what extent survey responses are consistent with actual decisionmaking behavior, often called hypothetical bias.[1] While the empirical evidence is not conclusive, the majority of studies suggests that willingness-to-pay (WTP) estimates are higher in a hypothetical setting than the corresponding real setting. (See. e.g., Cummings et al. 1995; Cummings et al. 1997; and Frykblom 1997. Also see List and Gallet 2001; and Murphy et al. 2005 for meta-analyses. Additionally, Ehmke et al. 2008 found that the extent of hypothetical bias, for the same survey design, can differ across countries.)

In the contingent valuation literature, many studies have explored different methods for reducing the difference between real and hypothetical situations. One of the most successful and frequently imitated efforts has been the use of a cheap talk script, initially suggested by

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Financial support from the Adlerbertska Research Fund, Formas, Sida (through the Environment for Development Initiative), Jan Wallander and Tom Hedelius Foundation, and Clipore (Mistra's Climate Policy Research Program) is gratefully acknowledged.

[1] The term hypothetical bias is somewhat misleading because it suggests that one single real value exists with which we can compare the value obtained from a hypothetical situation. However, studies have shown that experimental situations involving real payoffs can also lead to biased estimates (e.g., Alpízar et al. 2008; List et al. 2004).

Cummings and Taylor (1999). The cheap talk script aims to reduce hypothetical bias by thoroughly describing and discussing the propensity that respondents have to exaggerate their stated willingness to pay. The underlying idea of the script is that, by raising the issue in the survey, respondents will not want to be part of such an ill-behaved group and will be less prone to hypothetical bias. The effect of the cheap talk script is varied and, among other factors, its success seems to depend on the characteristics of the good, the length of the script, and the valuation method (see Aadland and Caplan 2003; ibid. 2006; Carlsson et al. 2005; Cummings and Taylor 1999; List 2001; and Murphy et al. 2005). Given these limitations, it is too optimistic to expect cheap talk to completely mitigate hypothetical bias.[2] Furthermore, respondents may still be tempted to answer insincerely due to motives, such as projecting a "better" self-image, applying strategic behavior, or protesting against the survey.

A more recent approach to addressing hypothetical bias is the use of an oath script. With this approach, respondents are asked to swear (or promise) to answer truthfully, as if they were in a courtroom. An oath can be viewed as an active commitment, in contrast to a cheap talk script, which is only informative. Whereas a cheap talk script is likened to using "moral suasion," encouraging the respondents to behave better than others, an oath may induce more truthful answers by binding respondents to their answers.

The seminal paper on the effects of oaths is Jacquemet et al. (2009), which used an oath in a laboratory setting. Prior to participating in an incentive-compatible second-price auction, bidders were asked to sign an oath document and swear "on their honor" to give honest answers. The main result was that subjects who took the oath were, on average, less likely to either overstate or understate their bids; that is, the variance of bids was reduced. Furthermore, the study found that the hypothetical treatment with an oath outperformed hypothetical and treatments with monetary incentives without an oath, as well as treatments with monetary incentives with an oath.[3] Jacquemet et al. (2010) found, by comparing votes in a real and hypothetical setting with and without an oath script, that an oath script eliminated hypothetical bias in an election referendum.

[2] There are other suggestions for how to reduce hypothetical bias, for example, ex-post calibration of the WTP responses with follow-up questions on certainty (e.g., Champ et al. 1997; Champ and Bishop 2001) and time-to-think protocols (Cook et al. 2007; Whittington et al. 1992).

[3] Jacquemet et al. (2009) found that monetary incentives weaken the positive impact of taking an oath and discussed that as an extrinsic motivation. In other words, money may have a crowding-out effect on an intrinsic motivation, such as keeping one´s promises after taking an oath.

The aim of our study is to investigate the effect of an oath script in a contingent valuation survey concerning climate change, conducted outside a laboratory setting and with a relatively large sample size.[4] As far as we know, this has not been done before. Note that Jacquemet et al. (2010) did not estimate WTP, but instead looked at the share of yes-voters for a referendum with a fixed cost (bid). Outside the laboratory setting, for nonmarket goods, it is difficult to test whether or not the oath script leads to a closer match between hypothetical and real WTP, since one cannot generally observe real WTP. This is particularly true for our good in question, reductions in greenhouse gas emissions. What we can do, however, is investigate the differences in WTP across treatments with and without an oath. We also can relate our main findings to Jacquemet et al. (2009) to see if our subjects show similar behavior.

The contingent valuation survey elicited willingness to pay for reducing greenhouse gas emissions and was conducted with and without an oath script in China and Sweden. We analyzed the effect of the oath script on two decisions: first, whether the respondent is willing to pay anything to reduce greenhouse gas emissions; and second, how much the respondent is willing to pay. Each respondent answered WTP questions for three different levels of emissions reductions. In addition, we identified which sociodemographic groups of respondents are more likely to be affected by the oath script. By using identical surveys in China and Sweden, we were also able to test the commitment device in two different cultural contexts.

We found several notable results. First, respondents in both countries were less likely to state a zero WTP in the oath treatment, a result that is in line with the findings by Jacquemet et al. (2009). Second, the oath script raised the average conditional WTP in Sweden for one of three WTP questions asked. In the Chinese sample, the oath script reduced average conditional WTP substantially, in some instances around 50 percent. Third, the oath script had varying impacts on respondent groups with different demographic characteristics, and we found that the cultural context could be an important factor. Last, we found that, irrespective of the effect of the oath on average WTP, the variance of the WTP was reduced.

[4] What works in lab experiments does not necessary work outside the lab. There are many reasons for this. For example, differences in population profile (experiments in economics and psychology often use students as subjects) and demand effects (i.e., subjects want to comply with what the experimenter expects from them) are two well-known sources of possible divergence between lab and field behavior. Jacquemet et al. (2009) found evidence against the demand effect in their study. Furthermore, an auction-based value revelation mechanism may trigger different behavior and feelings (for example pleasure of winning), compared to a non-market valuation survey.

The paper is organized as follows. Section 1 describes the survey and the oath script, as well as hypotheses on the effect of the oath script. Section 2 gives the characteristics of the respondents. Section 3 presents the WTP results and econometric analysis, including an analysis of which groups of respondents are more likely to change their behavior due to the oath script. Section 4 provides overall conclusions.

1. Descriptions of the Survey and the Oath Script

The survey consisted of four sections. The first section elicited general attitudes about climate change. In the second section, the survey provided information on the effects of climate change, which was summarized from the Intergovernmental Panel on Climate Change (IPCC) reports. Respondents were told that a future temperature increase will depend on the amount of future global CO_2 emissions: specifically, if CO_2 emissions are reduced from current emissions levels by 30 percent, 60 percent, or 85 percent, then the temperature increase can be limited to 4°F, 3°F, or 2°F, respectively. If the world instead does not reduce emissions, but continues with "business as usual," the temperature is expected to increase by more than 4°F by 2050. We explained that this would most likely correspond to large changes in the global ecosystems and most countries would be negatively affected. An information screen (figure 1), that was shown to the respondents, summarized the effect of the temperature increases on harvests, flooding, storms, and ecosystems by the year 2050. Subsequently, questions about the respondents' attitudes on reducing global CO_2 emissions were included. (For a full description of the survey and the implementation, see Carlsson et al. 2010.)

Toward the end of section 2, a cheap-talk script was included. In the oath script treatment, the commitment device followed the cheap talk script, asking respondents to promise to answer the questions truthfully. (The oath script is described and further discussed in section 1.1). This section of the questionnaire concluded with the WTP questions for reducing CO_2 emissions.

Figure 1. Global CO_2 Emissions Reduction, Temperature Increases, and Their Effects as Described in the Survey

Global CO_2 emissions reduction	85% reduction	60% reduction	30% reduction
Temperature increase	2°F increase	3°F increase	4°F increase
Harvest	Harvests in countries near the equator decrease by 4%–6%. Harvests in countries in the northern hemisphere *increase* by 1%–3%.	Harvests in countries near the equator decrease by 10%–12%. Harvests in countries in the northern hemisphere are not affected.	Harvests in countries near the equator decrease by 14%–16%. Harvests in the northern hemisphere decrease by 0%–2%.
Increased flooding and storms	Small tropical islands and lowland countries, such as Bangladesh, experience increased flooding and storms.	Additional low-lying areas in the Americas, Asia, and Africa experience increased flooding and storms.	Populous cities face increased flood risks from rivers and ocean storms. Existence of small island countries is threatened.
Threatened ecosystems	Sensitive ecosystems, such as coral reefs and the Arctic, are threatened.	Most coral reefs die. Additional sensitive ecosystems and species around the world are threatened.	Sensitive and less-sensitive ecosystems and species around the world are threatened.

Information about WTP was obtained by using the payment card method, in which respondents choose a number from a matrix that represents their maximum WTP for the change presented in the question. The values in the matrix ranged between SEK 0 and SEK 2,000 in the Swedish survey, and between CNY 0 and CNY 740 in the Chinese survey.[5]

Respondents who stated a WTP higher than SEK 2,000 (CNY 740) had the option of stating their maximum WTP in a following open-ended payment question. Three WTP questions were asked. First, the survey asked for the WTP for a 30 percent emissions reduction, compared to doing nothing (no reduction). The second WTP question asked the respondents how much more they would pay for a 60 percent reduction instead of the 30 percent reduction. Finally, the third WTP question asked the respondents how much more they would pay for an 85 percent reduction instead of the 60 percent reduction.

In appendix A, we show the WTP question for the 30 percent reduction. The payment was expressed as a monthly cost for the household until 2050, and examples of the typical way

[5] SEK = Swedish kronor; CNY = Chinese yuan. For both countries, the currency figures correspond to PPP-adjusted US$ 0–$220. SEK 9.6 = PPP-adjusted US$ 1, and CNY 3.4 = PPP-adjusted US$ 1.

households would pay were listed, such as increased energy and gasoline prices.[6] Moreover, we asked the respondents to assume that the costs of reducing CO_2 emissions are shared among the countries according to their emissions today.[7]

When the respondents chose their WTP value, both the monthly payment and the corresponding annual cost for the household were shown on the screen. The purpose of this was to ensure that the respondents clearly understood how much they said they were willing to pay.

Section 3 of the survey was a choice experiment on rules for allocating the responsibilities for CO_2 reductions across countries and is not included in this paper. Finally, the fourth section asked questions about the respondent's socioeconomic characteristics.

1.1 The Oath Script

The surveys with and without the oath were identical except for the inclusion of the oath script. In the treatment without the oath, the WTP questions followed the cheap talk script. Otherwise, the oath script was placed immediately before the WTP questions. Since we wanted the respondents to be aware of what they were taking the oath for, the survey introduced the oath by informing the respondent that it would ask for their household's willingness to pay for CO_2 emissions reductions.

Both treatments included a shorter version of a standard cheap talk script. The script read as follows: "Before making your choices, please consider how an increased cost would affect your possibilities of buying other things. Previous studies of this kind have shown that people claim to be willing to pay more money than they actually would in a real situation. Given this, it is important for you to answer these questions as truthfully as possible."

[6] Wiser (2007) found that the WTP to support climate change policy depends on the payment vehicle used in the study. For example, with a collective payment mechanism, the elicited WTP is higher, compared to using voluntary payment mechanisms. In our study, we did not test for different payment vehicles, but rather made clear how the payments were made and kept this constant across countries.

[7] The text read: "We will now ask you about your household's willingness to pay for CO_2 emissions reductions. Reducing emissions will be costly for households, mainly because of increased energy costs, such as higher electricity and gasoline prices. Your household and your descendants will have to pay a monthly cost until the year 2050. Moreover, the cost will be adjusted for inflation over time. Also, assume that the costs of reducing CO_2 emissions are shared among the countries according to their emissions today."

In our oath design, respondents were first asked, "Do you feel that you can promise us to answer as truthfully as possible the questions that follow?" The alternatives were 1) "Yes, I promise to answer the questions in the survey as truthfully as possible," or 2) "No, I cannot promise this." From a practical viewpoint, such a commitment device is reminiscent of a common practice in Anglo-Saxon courts, where a witness is instructed to take an oath "to tell the truth, the whole truth, and nothing but the truth." However, asking the respondent to swear to tell the truth is not customary in Swedish or Chinese court systems. Respondents might also feel uncomfortable and regard it as strange to be forced to swear an oath in a survey. Therefore, we opted for a more neutral wording of the question, using "promise" instead of "swear."

The essence of an oath script is to increase the respondent's commitment and attention to the survey, diminishing the propensity of light-hearted or "insincere" responses. Theoretical support can be found in the theory of commitment in social psychology (Kiesler 1971; Jacquemet et al. 2009; Joule and Beauvois 1998). There is also evidence in economics research, suggesting that a promise can induce emotional commitments to fulfill the promise (Braver 1995, 69–86; Ostrom et al. 1992; Ellingsen and Johannesson 2004). Ellingsen and Johannesson (2004) proposed a model that includes preferences for keeping one's word. In a recent study, Vanberg (2008) examined whether people keep their promises because they have preferences for keeping their word or because they dislike letting others down. His results suggest that people have preferences for promise keeping per se. Jacquemet et al. (2009) tested whether their results changed when the respondents were first asked to read a warning that lying might cause negative consequences for other people. They found that the results of the oath are independent of this warning and concluded that the oath works through the intrinsic motives of a person to tell the truth. In our case, the respondents were anonymous survey participants, meaning that any effects of the oath would be through internal, not external, processes.

An oath script may also be seen as a signal that the topic of the study is important and that one's answers matter more than in a survey without an oath script. The oath can also be thought of as an emotionally charged version of the cheap talk script. We do not assume, however, that all people not telling the truth will admit it. What is crucial is that we emphasized to the respondents that it is important to tell the truth, and thus the answer to the oath question is

of secondary importance. In our study, most subjects chose to promise to tell the truth, so we only included these subjects in the analysis.[8]

1.2 Hypotheses on the Effect of an Oath Script

What is the expected effect of an oath script in a payment card setting? One might expect that an oath would shift the whole WTP distribution to the left (including a rise in the number of zero bids), which leads to a lower valuation in general and a lower average WTP in particular. This rests on the assumption that people will exaggerate their WTP in hypothetical situations, for example, due to warm-glow effects (Andreoni 1990) or moral satisfaction (Kahnemann and Knetsch 1992). However, an oath script could also affect the extent of strategic behavior (also known as strategic bias).

Strategic bias arises when the respondent provides a biased answer in order to influence a particular outcome. This can be prominent in hypothetical surveys. For example, respondents in favor of a project may be tempted to overstate their WTP in an open-ended or payment-card question, assuming that a favorable decision depends on whether or not the survey produces a sufficiently large average value. At the same time, respondents whose expected cost of a scenario is larger than their WTP may be tempted to act strategically and state a zero WTP.

In any case, the oath script can make strategic responses less acceptable to the respondent, and therefore result in a decrease in conditional WTP (i.e., WTP|WTP>0) and in the share of respondents stating zero WTP, leaving the effect on average WTP indeterminate, but the variance of WTP tighter. In addition, protest bids and insincere bids may also be affected by an oath. Because protest bids are usually thought to involve a zero bid, the oath script might result in fewer such bids. Insincere bidding, made less insincere by an oath, could result in either an increase or decrease in zero bids or WTP condition on WTP>0.

Jacquemet et al. (2009) found in their experimental study that taking an oath decreased both the frequency of zero bids (interpreted as a decrease in opting-out behavior) and extreme bids that violate the earnings budget constraint set in the experiment; thus, they found a tighter variance for WTP. Because of opposing forces influencing zero bids and conditional WTP, we are agnostic about the expected direction of results, including the size of the WTP variance.

[8] We also conducted an analysis that included the few respondents who answered no to the oath question, and our results remained robust.

The extent of hypothetical bias depends, as discussed in the introduction, on a number of factors. In particular, Ehmke et al. (2008) found that hypothetical bias could differ across different countries due to cultural differences. It is, of course, not clear that their results can be generalized, but their results suggest that the oath script could have different impacts on Chinese and Swedish respondents.

1.3 Administration of the Surveys

The two surveys were conducted in November and December 2009. The questionnaire was carefully designed and tested on several focus groups and pilot studies. The survey was designed to be self-administered on the computer to eliminate interviewer bias and strategic answering to please the interviewer. In China, the survey was conducted on laptops in special rooms with invited respondents. In Sweden, the survey was taken online. The survey yielded 2,406 responses in Sweden (1,230 for the version without an oath script, and 1,176 for the version with an oath script), and 550 responses in China (277 for the version without an oath script, and 273 for the version with an oath script). The Chinese survey was administered in one city, Nanning, the capital of the autonomous Guangxi region in southwest China.[9] Respondents were randomly selected to participate in the survey using a neighborhood-based sampling strategy that has been used in previous surveys (Krupnick et al. 2010). The respondents in the Swedish survey were reached using panel members of "Panel.se", Sweden's largest survey panel with around 100,000 members. Panel.se members are recruited by telephone via random digit dialing, as well as through online recruitment. Members between 18–74 years were randomly selected to participate in our survey.

2. Characteristics of Respondents

Descriptive statistics of the four samples are presented in table 1. Using a chi-square test (binary variables) and a t-test (remaining variables), we cannot reject the hypothesis of equal

[9] To develop a sample that was reasonably representative of the Nanning population, we randomly selected 277 respondents to take the survey without oath script, and 273 respondents for the survey with the oath script. Although samples within any community should ideally be stratified for income and education, there is no public information database in Nanning that includes education, income, gender, and other important demographic characteristics. Therefore, we randomly chose families through a population information network set up by the Nanning government. Specifically, the survey teams adopted a five-stage random sampling method to select respondents. (The primary sampling unit is the city district, the second sampling unit is the urban sub-district, the third is the neighborhood committee, and the fourth is households, and fifth is the individual.)

means/distributions for any of the socio-economic variables in Sweden, except for university education. In China, the same is true for all socioeconomic variables, other than members of the Communist Party. Thus, the two samples in the two different treatments are generally comparable to each other. Also note that a large fraction of the respondents in the oath treatment group promised that they would answer the survey truthfully. In the Swedish sample, 98 percent made this promise, and 95 percent in the Chinese sample. This is in line with Jacquemet et al. (2009), in which only one respondent elected not to sign the oath in one of the experiments, corresponding to a refusal rate of just over 5 percent.

Table 1. Descriptive Statistics

Variable (description)	Sweden				China			
	Without oath	***Std. dev.***	***With oath***	***Std. dev.***	***Without oath***	***Std. dev.***	***With oath***	***Std. dev.***
Female (1 if female)	0.483		0.490		0.484		0.440	0.497
Age (in years)	49.679	15.431	49.821	15.366	53.950	13.965	53.934	14.106
No. of adults in household (>18 years)	1.868	0.677	1.845	0.632	3.256	1.350	3.223	1.200
No. of children in household (<18 years)	0.522	0.911	0.526	0.946	0.596	0.809	0.531	0.697
Household members with university education	0.374		0.412		0.274		0.253	
Income	3.386	1.526	3.413	1.492	1.034	0.952	0.915	0.784
Household active in religious organization (1 if active)	0.064		0.065		0.025		0.011	
Left-wing party	0.315		0.305					
Green party	0.119		0.134					
Other party	0.154		0.150					
Center/right-wing party (ref. category)	0.413		0.411					
Communist					0.170		0.304	
No. in sample	1,230		1,176		277		273	

3. Willingness to Pay Results

Based on the responses to the three payment-card questions, we calculated a number of WTP measures. What we report in this paper is the WTP to reduce CO_2 emissions zero–30

percent, 30–60 percent, and 60–85 percent. Respondent WTP is set to the midpoint of the interval,[10] except for those respondents who stated a WTP that was outside the range of the bid vector. For these respondents, the WTP is set as the point values they gave in the open-ended payment question. In order to be able to compare the responses between the two countries, we report WTP in PPP-adjusted U.S. dollars.[11] Table 2 reports each country's monthly WTP and the share of respondents with zero WTP for each reduction level, with and without the oath treatment. For the treatments with the oath script, we only included respondents who agreed to answer the questions as truthfully as possible.[12] In the appendix, we present the full distribution of responses for the various reduction levels and treatments.

Irrespective of the treatment group, a number of regularities are apparent in table 2. Swedes have substantially higher WTP for reducing CO_2 emissions at all reduction levels, whether on a conditional or unconditional basis, implying, as can be seen in the table, that the share of respondents who are willing to pay nothing is much lower in Sweden. In addition, there is evidence in the Swedish sample for declining marginal utility as CO_2 reductions get larger; there is less evidence of this effect in the Chinese sample.

Turning to differences in the treatments, we had two opposing hypotheses about the effects of an oath on the share of respondents with zero WTP. We found some evidence supporting the hypothesis that the share of zero bids is lower for subjects taking an oath. Indeed, for every CO_2 reduction level in both countries, except for the 85 percent reduction in China, the share of subjects stating a zero WTP is relatively lower in the oath script treatment. However, proportion tests indicate that there are only significant differences between the shares of zero WTP for the 30 percent and 60 percent reduction in Sweden, and the 30 percent reduction in China.

[10] There are many ways to interpret a choice on a payment screen. The midpoint approach may be the most neutral. Furthermore, since the WTP for 60% and 85% reductions depend on the choices made in the preceding question(s), there will be a large number of intervals, which means that it is simpler to treat the data as continuous.

[11] SEK 9.6 = US$ 1 (PPP-adjusted); and CNY 3.4 = US$ 1 (PPP-adjusted).

[12] There are some differences between the respondents who agreed to answer truthfully and those who did not. In both the Swedish and Chinese samples, there is a larger fraction of zero WTP responses and lower WTP responses for those who did not agree to answer truthfully, but no significant differences. Given the small sample sizes for those who did not agree to answer, the comparisons and tests are not very reliable.

Table 2. Monthly WTP in PPP U.S. Dollars and Share of Subjects with Zero WTP

	SWEDEN					
	Without oath (1,230 obs.)			With oath (1,152 obs.)		
CO_2 reduction	*All* Mean (std. err.)	*WTP>0* Mean (std. err.)	*Share zero WTP*	*All* Mean (std. err.)	*WTP>0* Mean (std. err.)	*Share zero WTP*
0%–30%	24.08 (40.68)	26.49 (41.91)	0.091	28.12 (40.25)	30.16 (40.94)	0.067
30%–60%	19.79 (47.32)	23.48 (50.70)	0.156	20.96 (36.95)	24.10 (38.66)	0.130
60%–85%	17.14 (55.63)	23.55 (64.06)	0.272	16.09 (35.55)	21.89 (39.91)	0.265
	CHINA					
	Without oath (277 obs.)			With oath (259 obs.)		
CO_2 reduction	*All* Mean (std. err.)	*WTP>0* Mean (std. err.)	*Share zero WTP*	*All* Mean (std. err.)	*WTP>0* Mean (std. err.)	Share zero WTP
0%–30%	4.48 (8.43)	6.46 (9.48)	0.307	3.57 (3.97)	4.72 (3.93)	0.243
30%–60%	3.39 (9.90)	6.14 (12.68)	0.448	2.00 (2.46)	3.26 (2.51)	0.386
60%–85%	3.23 (11.25)	6.44 (15.24)	0.489	1.62 (3.17)	3.47 (3.86)	0.533

Ultimately, we estimated the effects of the oath script on the average WTP across the sample, which depends on the effect of the oath script on both the share bidding zero and the *conditional WTP*. We found that the *conditional WTP* decreases with the oath script in the Chinese sample, in which the treatment effect is significant for all reduction levels. In the Swedish sample, however, the *conditional WTP* is *higher* for the sample given the oath treatment, and we failed to reject the hypothesis that there is no significant difference for the 30 percent reduction using a two-sided t-test. The need for future empirical efforts is evident to understand such patterns and whether they are dependent on the commodity or cultural context.

Because we see that the oath decreases the share of zero-WTP responses and conditional WTP in China, the effect on the average WTP depends on which effect is stronger and more

pervasive. Our results indicate that the oath treatment results in a significantly lower *average WTP* for the 30–60 percent and 60–85 percent reductions, suggesting that the effect in terms of lower conditional WTP is stronger there than on the respondents with a zero WTP. In Sweden, the effect of the oath is the opposite, raising the average WTP, although this difference is only significant at the 30 percent level.

We now turn to the issue of variance reduction, owing to fewer zero bids and very high bids. In line with the results of Jacquemet et al. (2009), we see support for the oath's effect on variance reduction. This pattern is further supported when we take a closer look at the full distribution of WTP. The variance in WTP is consistently lower when an oath has been taken, even where the average WTP is higher in the oath treatment. Using an F-test, we can reject the hypothesis of equal variance between the two treatments for all reduction levels in the Chinese data, and for all but the first reduction level in the Swedish data.

3.1 Econometric Analysis

Because there are some differences in respondent characteristics between treatments, the next step is to estimate the effects of the oath treatment controlling for other variables. In addition, we will explore how the oath affects respondent groups with different demographic characteristics.

The decision of whether or not to state a positive WTP is modeled with a binary probit model. The decision of how much to pay is modeled with a regression model with multiplicative heteroskedasticity using only the positive responses (WTP > 0). Both models are estimated for each level of reduction. We chose this approach because of the small Chinese sample and the sensitivity of any selection model to how well the first decision can be explained.[13] The results of the probit models are presented in table 3.

[13] Because WTP is censored at zero, these decisions can be analyzed together using a Tobit type 1 model, but this model is somewhat restrictive because it does not allow for the possibility that the two decisions could be fundamentally different.

Table 3. Why People Bid More than Zero: Marginal Effects of the Probit Model

	Sweden			China		
Variable	***0–30%***	***30–60%***	***60–85%***	***0–30%***	***30–60%***	***60–85%***
Female	0.015	0.003	-0.014	0.073**	0.097**	0.069
	(0.010)	(0.014)	(0.019)	(0.037)	(0.045)	(0.046)
Age	-0.001	-0.001	-0.004***	0.004*	0.006***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Adults	-0.007	0.004	-0.023	0.001	-0.023	-0.003
	(0.009)	(0.013)	(0.016)	(0.014)	(0.017)	(0.018)
Children	0.012**	0.013	0.007	0.064**	-0.038	-0.030
	(0.006)	(0.009)	(0.011)	(0.027)	(0.030)	(0.030)
University education	-0.002	-0.022	0.007	0.044	0.042	0.015
	(0.011)	(0.015)	(0.019)	(0.048)	(0.059)	(0.058)
Income	-0.002	-0.001	0.020***	0.246***	0.238***	0.202***
	(0.004)	(0.006)	(0.007)	(0.030)	(0.033)	(0.029)
Religious	-0.001	0.008	0.076**	0.132*	-0.182	-0.067
	(0.020)	(0.028)	(0.033)	(0.080)	(0.178)	(0.174)
Left party	0.017	0.024	0.020			
	(0.011)	(0.016)	(0.022)			
Green party	0.068***	0.097***	0.145***			
	(0.009)	(0.016)	(0.024)			
Other party	-0.105***	-0.130***	-0.133***			
	(0.022)	(0.027)	(0.031)			
Communist party				0.085*	0.201***	0.076
				(0.044)	(0.052)	(0.058)
Oath	0.019**	0.025*	0.003	0.080**	0.059	-0.034
	(0.010)	(0.014)	(0.018)	(0.038)	(0.46)	(0.046)
Constant	1.495***	1.108***	1.123***	-1.310***	-1.209***	-1.384***
	(0.219)	(0.180)	(0.159)	(0.328)	(0.305)	(0.305)
No. of observations	2382	2382	2382	536	536	536
Pseudo R2	0.078	0.045	0.043	0.178	0.151	0.105

Notes: Dependent variable = 1, if WTP is positive. Standard error is in parentheses.

*, **, *** denote coefficient is statistically significant at 10%, 5%, and 1%, respectively.

The results of the probit models on the probability of stating a positive WTP confirms the results of the proportion and t-tests. Including an oath script increases the share of subjects stating a positive WTP. In the Swedish sample, the effect is significant for both the 0–30 percent

reduction and the 30–60 percent reduction, while for China the effect is significant for 0–30 percent reduction.

The results of the regression models with *conditional WTP* as the dependent variable are reported in table 4. Note that these models only include respondents who stated a positive WTP. Furthermore, we allowed for multiplicative heteroskedasticity, where $[\varepsilon_i] = \sigma^2 \exp(\gamma' Oath_i)$. Thus, the model allows for different variances in the two treatments (see Harvey 1976 and Greene 2003).

Table 4. Explaining Conditional Willingness to Pay: Marginal Effects Ordinary Least Squares Models

	Sweden			China		
Variable	***0–30%***	***30–60%***	***60–85%***	***0–30%***	***30–60%***	***60–85%***
Regression function						
Female	-6.349***	-7.620***	-9.942***	-0.609*	-01173	-0.095
	(1.728)	(1.916)	(2.322)	(0.365)	(0.358)	(0.699)
Age	-0.164***	-0.191***	-0.183**	0.016	0.027*	-0.041
	(0.061)	(0.068)	(0.082)	(0.014)	(0.014)	(0.028)
Adults	-2.976**	-0.986	-0.107	-0.054	0.025	0.207
	(1.481)	(1.662)	(2.033)	(0.150)	(0.152)	(0.281)
Children	-1.028	-1.537	0.495	0.345	0.139	0.242
	(1.012)	(1.124)	(1.328)	(0.253)	(0.287)	(0.569)
University education	11.057***	6.588***	6.148**	0.536	-0.048	0.182
	(1.811)	(2.013)	(2.418)	(0.438)	(0.423)	(0.844)
Income	5.891***	4.708***	3.208***	3.616***	1.274***	1.395***
	(0.687)	(0.772)	(0.930)	(0.213)	(0.204)	(0.400)
Religious	6.510**	-0.490	-3.714	-2.175	-1.590	-1.970
	(3.525)	(3.908)	(4.603)	(1.626)	(7.086)	(8.575)
Left party	-0.683	-0.472	3.075			
	(2.042)	(2.270)	(2.754)			
Green party	10.678***	9.419***	8.647**			
	(2.694)	(2.937)	(3.440)			
Other party	-3.466	-1.289	0.091			
	(2.761)	(3.077)	(3.748)			
Communist party				0.468	0.250	1.197
				(0.405)	(0.383)	(0.772)
Oath	3.134*	0.154	-2.025	-1.285*	-2.760***	-2.879**
	(1.696)	(1.946)	(2.503)	(0.608)	(1.007)	(1.304)
Constant	18.531***	20.008***	21.828***	1.112	2.880***	1.100
	(4.635)	(5.205)	(6.282)	(1.146)	(1.141)	(4.097)

Variance function						
Sigma	40.391***	49.545***	62.932***	7.964***	12.129***	14.617***
	(0.854)	(1.088)	(1.487)	(0.406)	(0.694)	(0.877)
Oath	-0.073	-0.553***	-0.944***	-2.293***	-3.452***	-2.728***
	(0.060)	(0.063)	(0.068)	(0.144)	(0.160)	(0.176)
No. of observations	2192	2039	1742	388	312	260
R2	0.084	0.048	0.029	0.357	0.168	0.152

Notes: The dependent variable = stated WTP. Standard error is in parentheses.

*, **, *** denote coefficient is statistically significant at 10%, 5%, and 1%, respectively.

Again, the results in table 2 are confirmed by the regression models. In the Swedish sample, those who agreed to answer the survey truthfully have a considerably higher *conditional WTP* for the 0–30 percent reduction, and the difference is statistically significant. For the Chinese sample, the effect is the opposite: the *conditional WTP* is significantly lower in the oath script treatment for all levels of reduction. Furthermore, the variance is consistently lower in the oath treatments for all reductions levels for China, and for two of the reduction levels for Sweden. Moreover, taking an oath seems to decrease the variance relatively more in the Chinese data than in the Swedish data. The decrease in variance is around 90 percent in the Chinese case, while the corresponding decrease in the Swedish data is only marginal, although statistically significant.

Finally, we turn to the effect of the oath script treatment on *unconditional WTP*. This effect depends on the two effects we already have reported, the effect on the probability of stating a positive response, $P[WTP > 0]$; and the effect on the conditional WTP, $E[WTP|WTP > 0]$. The effect on *unconditional WTP* of a change in a dependent variable *x* is thus (cf. McDonald and Moffitt 1980):

$$\frac{\partial E[WTP]}{\partial x} = \frac{\partial P[WTP > 0]}{\partial x} E[WTP|WTP > 0] + \frac{\partial E[WTP|WTP > 0]}{\partial x} P[WTP > 0]$$

See the effect on the *unconditional WTP* of the oath script treatment in table 5.

Table 5. Effect of Oath Script on Unconditional WTP

Sweden			China		
0%–30%	***30%–60%***	***60%–85%***	***0%–30%***	***30%–60%***	***60%–85%***
3.431***	-0.732	-1.406	-0.601	-1.331*	-1.643**
(1.586)	(1.700)	(1.877)	(0.512)	(0.627)	(0.708)

Note: Standard error is in parentheses.

*, **, *** denote coefficient is statistically significant at 10%, 5%, and 1%, respectively.

In the Swedish sample, the group that received the oath script has a considerably higher *unconditional WTP* for the 0–30 percent reduction (i.e., Swedes are willing to pay $3.43 more for a 0–30 percent reduction in the treatment with the oath script, compared to the treatment without an oath), and the difference is statistically significant. In the Chinese sample, the effect is the opposite. For all levels of reduction, the *unconditional WTP* is substantially lower in the oath script treatment, and the difference is significant for the 30–60 percent and 60–85 percent reductions.

3.2 Who Is Affected by the Oath Script?

Thus far, we have shown that the oath script does affect behavior in both Sweden and China, albeit in different directions. However, it is also interesting to determine if different respondent groups are more or less affected by the oath script. We investigated whether any differences are consistent across respondent groups and between the two cultural contexts. In order to examine the effect of the oath script, we estimated the same models as before, but included interaction terms between the oath treatment dummy variable and respondent characteristics; in other words, for each group of respondents, we estimated two sets of parameters. One set represents the main effect, while the other represents the change due to the oath script. Because we still included the treatment dummy variable for the oath treatment, these interaction terms show whether a certain group of respondents is more or less affected by taking the oath, holding other respondent characteristics constant. The results for the probit model analyzing the likelihood to state a positive WTP are shown in table 6.

Table 6. Marginal Effects for Probit Models with Interaction Terms

	Sweden			China		
Variable	***0%–30%***	***30%–60%***	***60%–85%***	***0%–30%***	***30%–60%***	***60%–85%***
Female	0.019 (0.015)	0.014 (0.019)	0.023 (0.026)	0.106** (0.047)	0.079 (0.062)	0.046 (0.065)
Female × oath	-0.006 (0.024)	-0.022 (0.030)	-0.075* (0.040)	-0.101 (0.085)	0.029 (0.092)	0.035 (0.094)
Age	-0.001 (0.001)	-0.0005 (0.001)	-0.004*** (0.001)	0.005*** (0.002)	0.009*** (0.002)	0.011*** (0.003)
Age × oath	0.001 (0.001)	-0.0001 (0.001)	0.001 (0.001)	-0.003 (0.003)	-0.007** (0.004)	-0.010*** (0.004)
Adults	-0.011 (0.012)	-0.004 (0.016)	-0.023 (0.021)	0.007 (0.018)	-0.024 (0.023)	-0.023 (0.024)
Adults × oath	0.008 (0.020)	0.018 (0.025)	0.001 (0.032)	-0.016 (0.028)	0.004 (0.036)	0.049 (0.037)
Children	0.009 (0.010)	0.019 (0.012)	0.018 (0.016)	0.041 (0.033)	-0.078** (0.039)	-0.010 (0.038)
Children × oath	0.010 (0.014)	-0.011 (0.017)	-0.020 (0.023)	0.046 (0.054)	0.115* (0.063)	-0.045 (0.064)
University education	0.009 (0.016)	-0.030 (0.021)	0.002 (0.028)	0.076 (0.057)	0.027 (0.079)	-0.061 (0.081)
University education × oath	-0.026 (0.028)	0.016 (0.028)	0.008 (0.039)	-0.079 (0.114)	0.053 (0.115)	0.162 (0.113)
Income	-0.001 (0.006)	0.004 (0.007)	0.028*** (0.010)	0.173*** (0.037)	0.160*** (0.039)	0.177*** (0.039)
Income × oath	-0.004 (0.009)	-0.011 (0.011)	-0.016 (0.015)	0.227*** (0.076)	0.267*** (0.082)	0.075 (0.061)
Religious	0.015 (0.028)	0.020 (0.036)	0.074 (0.046)	0.110 (0.084)	-0.066 (0.206)	0.038 (0.204)
Religious × oath	-0.042 (0.063)	-0.025 (0.065)	0.003 (0.078)			
Left party	0.017 (0.018)	0.028 (0.022)	0.009 (0.031)			
Left party × oath	0.004 0.027)	-0.012 (0.034)	0.020 (0.040)			
Green party	0.056*** (0.015)	0.063** (0.026)	0.105*** (0.037)			
Green party × oath	‡	0.097*** (0.029)	0.098* (0.053)			
Other party	-0.154***	-0.169***	-0.170***			

	(0.036)	(0.039)	(0.044)			
Other party × oath	0.040**	0.053*	0.064			
	(0.180)	(0.028)	(0.044)			
Communist party				0.107*	0.315***	0.257***
				(0.063)	(0.071)	(0.087)
Communist party × oath				-0.058	-0.263**	-0.297***
				(0.113)	(0.131)	(0.100)
Oath	-0.047	0.023	0.037	0.174	0.204	0.329
	(0.065)	(0.076)	(0.101)	(0.175)	(0.225)	(0.224)
Constant	1.726***	1.116***	1.072***	-1.570***	-1.512***	-1.865***
	(0.294)	(0.236)	(0.215)	(0.438)	(0.416)	(0.424)
Pseudo R2	0.067	0.050	0.047	0.199	0.182	0.125
No. of observations	2227	2382	2382	534	534	534

Dependent variable = 1, if WTP is positive. Standard error is in parentheses.

*, **, *** denotes statistically significant at 10%, 5%, and 1%, respectively.

‡ We dropped the interaction term between Green party voters and taking the oath from the 0%–30% regression. The reason is that all Green party supporters who took the oath had a positive WTP for the 30% reduction.

In the Swedish sample, most of the interaction terms, with a few exceptions, are insignificant, indicating that the effect of the oath script is generally not dependent on respondent characteristics. An exception is that supporters of "other party" have the highest probability of stating zero WTP without the oath script, but with an oath script, they are actually more likely than right-wing voters to state a positive WTP. All the parties in this group are small political parties in Sweden, usually formed in protest to the more established political parties. Common supporters of these parties are young males (Holmberg and Weibull 2009; Oscarsson and Holmberg 2008; SOM-Institute 2009).[14] It is possible, therefore, that supporters of these "other" parties are more likely to protest against the survey and state a zero WTP. This tendency seems to be reduced when the oath is taken. Additionally, Green party voters are more likely to offer a positive WTP with an oath, even though they already have a greater tendency than all other political groups to do so without the oath.[15]

[14] The shares of male sympathizers are between 65% and 85%.

[15] This result is rather puzzling because we would have expected most of the Green party voters to have a positive WTP from the beginning. One possible explanation is that some of them are protesting against the whole survey in the treatment without oath, for example, because they think that someone else should pay.

In the Chinese sample, a number of the interaction terms with the oath and respondent characteristics are significant. Older Chinese respondents are more likely than younger respondents to have a positive WTP. With an oath, however, this tendency is reduced. Those who earn more are more likely to have a positive WTP, and with an oath become even more prone to offering a positive bid. As in Sweden, the effect of an oath is not mediated or enhanced by age or income.

In China, the respondent group that shows the largest effect of the oath is Communist party members. Without the oath treatment, the probability of having a positive WTP is 11, 32, and 26 percentage points higher for the 30, 60, and 85 percent reduction levels, respectively, if a respondent is a Communist party member. However, when both Communist and non-Communist party groups are given the oath, for the 85 percent reduction level, Communist party members are actually less likely to state a positive WTP than non-Communist party members. Thus, being a party member increases the probability of paying something to reduce CO_2, but this result disappears with the oath treatment. One can only speculate why this result occurs. One explanation might be that the oath treatment reduces the propensity to be dishonest and preserve a self-image of being a Communist party member.

Turning to the conditional WTP (see results in appendix B), taking the oath has a stronger impact on those who vote for "other small parties" in both the 30 and 60 percent reduction levels. In the treatment without the oath, their WTP is around $8–$9 lower than for right-wing voters, while those who took the oath have an almost $11 higher WTP than right-wing voters. Thus, taking the oath both increases the probability of stating a positive WTP and the level of WTP for respondents who belong to these small political parties. The oath also has a clear and large effect on religious respondents in the Swedish sample. Willingness to pay increases by $14 per month for the 30 percent emissions reduction if the religious respondent takes the oath, compared to a non-religious person who took the oath.

For Chinese respondents with higher incomes, the oath treatment reduces the conditional WTP, although this group is also more likely to state a positive WTP with the oath.

In summary, because we see some clear differences on how the oath affects people in China and Sweden, we conclude that taking the oath has different impacts on different respondent groups in both countries. Furthermore, people with some specific political preferences are highly affected by taking the oath in both China and Sweden.

4. Conclusions

The aim of our study was to implement and investigate the effects of an oath script in a stated preference survey. One advantage of testing this protocol in a survey—besides the fact that it is the natural environment for non-market valuation—is that our relatively larger sample size allowed us to identify groups of respondents that are more likely to change their behavior in the oath treatment. Another advantage of our study is that we were able to test these effects in two different cultural contexts, in China and in Sweden. A further advance in this study was our decision to separately analyze the probability of bidding zero versus a positive bid, and the conditional WTP, given that a positive bid was offered. This disaggregation of average WTP revealed quite interesting, if complex, patterns.

We found a generally lower percentage of zero bidders with the oath than without it, but conditional WTP decreased with the oath in China and increased with the oath in Sweden, although not at all CO_2 reduction levels. Overall, the oath significantly lowered average WTP in China with substantial magnitude at all reduction levels, and significantly raised WTP in Sweden at the 30 percent reduction level. In addition, the oath treatment produced lower variances in WTP, which is in line with the results found by Jacquemet et al. (2009) in a lab environment. While the results of lower variance of WTP on the oath treatment for hypothetical valuation questions are encouraging, we are still aware that challenges remain regarding how an oath script can reduce hypothetical bias. Hence, those hoping that administering an oath will unilaterally work to reduce WTP in all situations and partly answer critics of hypothetical bias in stated preference surveys will not find much comfort in our results.

We cannot test why we observed such differences across these two countries, but can offer some ideas. One reason may be that Swedes (but not Chinese) are more used to participating in surveys and being asked for their opinions, causing them react to the oath in different ways than the Chinese. It is also possible that the Chinese respondents took the oath script more seriously than their Swedish respondents due to cultural factors. More research is clearly needed to investigate the effects of an oath in different cultural contexts and on taking an oath in different survey contexts, in other words, on issues other than global warming.

Disaggregating the oath effects by respondent characteristics opens another window to understand these results. The largest effects were seen for Communist party members in China and for those who vote for smaller “alternative” political parties in Sweden. Communist party members were more likely to have a positive WTP than non-members in the survey version without the oath, but a large part of the positive effect of being a Communist party member

disappears in the treatment with an oath script. In Sweden, taking the oath had a large effect on "other parties" voters. Without the oath script, this is the group with the highest probability of stating zero WTP; however, with an oath script, they become more likely to state a positive WTP than even right-wing party voters.

Appendixes

Appendix A. Contingent Valuation Question: 30% Reduction

Question 1: How much would your household pay for the 30% reduction?

Global emission reduction	No reduction	30% reduction
Temperature increase	More than 4°F increase	4°F increase
Amount your household is willing to pay per month until 2050	$0	**$__?__**

Click here to see the comparison table again**.**

To fill in the blank above, select the amount that is the highest monthly amount your household would pay.

$0	$1	$2	$3	$4	$5	$6	$7	$8
$9	$10	$15	$20	$25	$30	$40	$50	$60
$80	$100	$130	$170	$220	>$220			

You clicked on [X1] per month. This means that your household would be willing to pay [12 times X1] per year until the year 2050 to reduce emissions by 30 percent.

Appendix B.

Table B1. Distribution of Responses for Chinese Sample

	0%–30%		30%–60%		60%–85%	
Bid	***No oath***	***Oath***	***No oath***	***Oath***	***No oath***	***Oath***
0	30.69	24.32	44.77	38.61	49.82	53.28
4	19.49	17.76	17.33	22.01	16.97	15.06
7	1.44	9.65	2.17	10.04	3.25	10.04
11	17.33	10.81	14.08	6.56	13	5.41
15	5.42	11.97	3.97	10.81	3.25	8.11
19	5.42	5.79	6.14	3.09	5.78	1.93
22	1.08	5.02	1.08	5.41	0.36	2.32
26	0.72	1.54	0.00	0.77	0	1.16
30	6.86	6.95	5.05	2.32	1.81	1.93
33	0.72	0.77	0.00	0.00	0.00	0.00
37	1.08	0.77	0.00	0.00	0.36	0.39
45	4.33	1.54	1.44	0.00	1.81	0.00
55	0.72	2.32	1.81	0.39	1.08	0.00
75	3.61	0.77	0.72	0.00	1.08	0.00
130	0.36	0.00	0.36	0.00	0.36	0.39
165	0.00	0.00	0.36	0.00	0.00	0.00
210	0.00	0.00	0.36	0.00	0.36	0.00
270	0.72	0.00	0.00	0.00	0.00	0.00
350	0.00	0.00	0.00	0.00	0.36	0.00
445	0.00	0.00	0.36	0.00	0.36	0.00

Table B2. Distribution of Responses for Swedish Sample

Bid	0%–30%		30%–60%		60%–85%	
	No oath	*Oath*	*No oath*	*Oath*	*No oath*	*Oath*
0	9.11	6.77	15.69	13.02	27.24	26.48
10	5.77	4.77	6.5	6.34	8.29	6.34
20	3.74	3.04	5.45	4.77	6.91	5.9
30	2.11	1.91	3.9	2.08	2.76	3.13
40	1.06	1.3	1.38	1.56	1.63	1.48
50	12.03	9.81	14.07	15.36	13.33	13.98
60	0.49	0.78	0.81	0.95	0.81	0.52
70	0.73	0.35	1.06	1.22	0.41	1.04
80	1.22	0.87	0.98	0.95	0.57	0.61
90	0.41	0.09	0.57	0.35	0.24	0.17
100	22.85	22.83	15.77	16.23	13.17	14.93
125	0.89	1.3	2.03	2.43	1.79	1.82
150	3.41	3.21	5.69	6.6	4.07	4.17
200	14.15	16.75	8.86	9.03	6.26	6.16
275	2.03	1.39	2.36	3.13	1.06	2.17
350	4.07	6.6	3.74	3.39	2.76	2.08
450	5.61	5.12	3.17	3.56	1.95	1.74
575	3.01	2.43	2.11	2.34	1.71	2.00
725	0.89	1.65	1.79	1.39	0.65	1.04
950	2.52	4.08	1.06	1.56	1.54	1.39
1200	2.52	2.95	1.3	1.74	1.06	1.13
1550	0.08	0.35	0.81	0.78	0.57	0.61
2000	1.06	1.39	0.49	0.95	0.73	0.95
>2000	0.24	0.26	0.4	0.26	0.49	0.18

Table B3. Marginal Effects Ordinary Least Squares Models with Interaction Terms

	Sweden			China		
	0%–30%	***30%–60%***	***60%–85%***	***0%–30%***	***30%–60%***	***60%–85%***
Regression function						
Female	-5.351**	-5.257*	-7.874*	-2.013*	-1.395	-2.817
	(2.467)	(3.152)	(4.263)	(1.141)	(1.907)	(2.373)
Female × oath	-1.833	-3.716	-2.897	1.564	1.329	2.791
	(3.450)	(3.973)	(5.077)	(1.206)	(1.942)	(2.479)
Age	-0.272***	-0.275**	-0.419***	-0.004	0.039	-0.033
	(0.086)	(0.110)	(0.150)	(0.046)	(0.078)	(0.105)
Age × oath	0.197	0.121	0.318*	0.020	-0.011	0.082
	(0.123)	(0.141)	(0.179)	(0.048)	(0.079)	(0.108)
Adults	-2.208	-0.647	1.561	0.001	0.113	-0.367
	(1.963)	(2.492)	(3.304)	(0.432)	(0.735)	(0.887)
Adults × oath	-1.780	-0.718	-2.414	-0.065	-0.112	0.610
	(2.987)	(3.345)	(4.188)	(0.460)	(0.751)	(0.934)
Children	-1.385	-1.607	-0.656	0.136	0.628	1.489
	(1.456)	(1.841)	(2.459)	(0.652)	(1.377)	(1.530)
Children × oath	0.626	0.035	1.529	0.283	-0.491	-1.110
	(2.021)	(2.324)	(2.918)	(0.705)	(1.407)	(1.647)
University education	12.103***	10.425***	15.292***	2.052	2.381	4.940*
	(2.601)	(3.342)	(4.515)	(1.374)	(2.167)	(2.750)
University education × oath	-2.493	-6.375	-12.857**	-1.671	-2.518	-5.139
	(3.623)	(4.190)	(5.342)	(1.449)	(2.209)	(2.887)
Income	4.941***	4.558***	4.391***	4.696***	5.148***	5.182***
	(0.940)	(1.204)	(1.611)	(0.602)	(0.986)	(1.235)
Income × oath	1.875	0.269	-1.656	-1.263**	-4.043***	-4.203***
	(1.380)	(1.571)	(1.974)	(0.643)	(1.007)	(1.303)
Religious	-1.025	-3.963	-5.383	-0.309	1.773	-1.385
	(4.991)	(6.340)	(8.427)	(3.648)	(7.005)	(8.423)
Religious × oath	14.203**	5.711	2.755	-2.221	‡	‡
	(7.052)	(8.058)	(10.054)	(4.073)		
Left party	-0.252	-2.461	-2.516			
	(2.885)	(3.670)	(5.013)			
Left × oath	-0.955	3.271	8.026			
	(4.075)	(4.667)	(5.992)			
Green party	6.825*	8.787**	7.706			
	(3.909)	(4.963)	(6.609)			
Green party × oath	7.266	1.237	1.463			

	(5.382)	(6.153)	(7.732)			
Other party	-9.157**	-8.190*	-8.689			
	(4.020)	(5.186)	(7.043)			
Other party × oath	10.460*	10.914*	12.899			
	(5.527)	(6.444)	(8.314)			
Communist party				0.043	-1.823	1.245
				(1.511)	(2.326)	(3.034)
Communist party × oath				0.478	2.134	-0.132
				(1.569)	(2.358)	(3.136)
Oath	-11.107	-4.127	-6.156	-1.108	3.445	-2.880
	(9.130)	(10.460)	(13.111)	(3.310)	(5.687)	(7.286)
Constant	26.542***	23.282***	25.279***	0.899	-3.152	1.204
	(6.424)	(8.263)	(10.949)	(3.146)	(5.597)	(7.002)
Variance function						
Sigma	40.262***	49.427***	62.530***	7.773***	11.282***	13.521***
	(0.852)	(1.086)	(1.478)	(0.397)	(0.645)	(0.811)
Oath	-0.072	-0.551***	-0.937***	-2.251***	-3.313***	-2.589***
	(0.061)	(0.063)	(0.068)	(0.144)	(0.160)	(0.176)
Pseudo R2	0.001	0.003	0.010	0.085	0.145	0.162
No. of observations	2192	2039	1742	388	312	260

The dependent variable = conditional WTP. Standard error is in parentheses.

‡ We dropped the interaction term between religious person and the oath from the two last regressions because no religious persons who took the oath had a positive WTP for the 30%–60% and 60%–85% reduction in China.

*, **, *** denote coefficient is statistically significant at 10%, 5%, and 1%, respectively.

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