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Survey sponsor effects on the willingness to pay for mortality risk reductions

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Abstract

This paper considers whether the answers to stated preference surveys (of the type used to monetise non-market goods) are affected by the survey's sponsoring institution. The sponsor is indicated to respondents by the logo used in the survey instrument, an online questionnaire. Survey respondents are randomly assigned to one of eight types of sponsor and whether stated willingness-to-pay for a product that reduces mortality risk is affected by the sponsor is observed. It is also considered whether sponsorship has an effect on measures of respondent engagement with the survey (survey completion rates, item response rates, time spent on the willingness-to pay question and on the survey as a whole). The analysis finds that respondents that believe the survey to be sponsored by an environmental ministry or a health ministry are willing to pay significantly less for the product than those that believe that the survey is sponsored by other types of institution. There are also apparent trade-offs between the different respondent engagement measures considered.

Keywords

Stated preferences; contingent valuation; willingness-to-pay; survey sponsor effects; context effects; cost-benefit analysis; participant engagement; response rates; time-to-completion; non-market goods.

1. Introduction

This study considers whether the type of entity sponsoring a stated preference survey affects its outcome. The results of analyses conducted on the basis of stated preference surveys can often take a central role in decision making processes in the public sector and, in some jurisdictions, can be used in law courts to calculate compensation for damages incurred. It is thus useful to understand whether there is evidence that the responses to stated preference surveys are influenced by who is sponsoring the survey, as if such effects exist and are significant they may have a bearing on these types of decisions.

A pre-existing questionnaire on the stated willingness-to-pay (WTP) for marginal reductions in the risk of death, which has been successfully implemented in several different countries over the past few years, is used. The study was conducted in Mexico using an online panel maintained by a professional surveying company and tested eight different types of survey sponsors (to which respondents were randomly assigned) [1]. The sponsorship of the study is disclosed to the respondents by a logo presented on each of the webpages shown.

The metrics of interest are:

- those that could affect the conclusions of a stated preference study, namely the stated WTP values ('item response values');
- those that reflect how well participants engaged with the survey task, namely (a) the survey completion rate; (b) the item response rate (whether respondents skip answering some questions); (c) how much time is spent on average on the willingness-to-pay questions; and (d) how much time is spent on average on the questionnaire as a whole (time-to-completion).

[1] A separate face-to-face study was run, using the same questionnaire, to determine a value-of-statistical life for Mexico using a representative sample of the population of Mexico City (forthcoming).

There is a body of literature on how survey sponsorship affects answers to questionnaires that goes back to the late 1970s and continues to this day. These studies have been conducted primarily in the fields of cognitive psychology and marketing research and have mainly focused on the effect of survey sponsorship on questionnaire response rates, with some attention also paid to item response values. Such studies have found that survey sponsorship can, in some cases, have an effect on both response rates and item response values. These effects have however not been investigated in the field of stated preferences of the type used for valuing non-market goods.

The main conclusion of the study is that a significant negative effect on WTP was found for sponsorship by government ministries (the Mexican Environment Ministry and the Mexican Health Ministry), when compared to other types of sponsor (a Mexican and a foreign university, three versions of a fictional international development bank, and a version of the questionnaire with no logo inserted, i.e. where sponsorship was not disclosed to participants). There are also apparent trade-offs between the participant engagement measures considered.

2. Literature background

2.1.Context effects on item response values and participant engagement

The survey sponsor effects literature falls into a broader context effects literature. This literature aims to establish whether there is evidence that survey context influences the cognitive processes by which respondents form their answers. Some such effects can be rationalised (for example they can be related to trust in the surveyor) or may be due to cognitive biases caused by seemingly irrelevant information (for example the background colour of a questionnaire).

Context effects can be conceptually separated into verbal context effects and visual context effects. In testing for verbal context effects there is evidence that responses can be framed by the use of language. Schuman & Presser (1981) report that answers to a question can be affected by the content of the previous question. Merolla, Ramakrishnan & Haynes (2013) find that support for immigrant

legalisation in the U.S.A. increases if 'path to citizenship' is used instead of 'amnesty' in the question wording. However, varying how immigrants were described in the questionnaire did not have an effect. Harzing, Søndergaard, & Piekkari (2005), in a cross-country study, find that using English language questionnaires reduces differences in the answers obtained across the countries when compared to using questionnaires in each of the local languages. They suggest this indicates that participants may be being nudged to use different value sets when answering questions that are in English. Testing for various visual context effects Tourangeau, Couper & Conrad (2004) find that the way the answer options are graphically presented in an internet survey affects responses. The authors explain this result to be due to the use of interpretative heuristics by the respondents, conscious or unconscious. Respondents search for reference points using the way options are visually displayed on which to compare the possible answers presented (rather than seeking conceptual reference points on which to contextualise their answers). Christian & Dillman (2004) show that the introduction of symbols with cultural significance in the graphic design (an arrow that suggests implication between items) or the positioning of response items on the answer page significantly affected answers in their survey.

The effect that colour use in paper questionnaires has on response rates has also been found to be significant in some studies (LaGarce & Kuhn, 1995, testing the effect of colour versus black and white questionnaires in a mail survey) but not others (Greer & Lohtia, 1994, testing the effect of different stationery colour; and Jobber & Sanderson, 1983, testing white versus blue questionnaire paper). Labrecque & Milne (2012) find that logo colour affects brand perception and respondents' stated propensity to purchase in a computer-based survey of university students.

The presence of context effects in surveys is, in of itself, perhaps not surprising: context also affects cognitive processes and choices in real life decisions. The question for the surveyor then is whether the context offered by the survey is coherent - or at least minimises differences - with the real-life decision making context for which the survey is aiming to provide insight: having knowledge of the

possibility of context effects occurring can aid the surveyor in the design of the survey instrument (Sudman, Bradburn, & Schwarz, 1996) and in the interpretation of its results.

2.2. Motivation: survey sponsor effects and non-market valuation

There is also a literature that considers the existence and consequences of several types of context effects on the results of stated preference surveys. These include: ordering effects (Cai, Cameron, & Gerdes, 2011; Day, Bateman, & Carson, 2012); interviewer effects (Gong & Aadland, 2011; Loureiro & Lotade, 2005); and priming effects (Bonini, Biel, Gärling, & Karlsson, 2002; Pouta, 2004). Proposals to mitigate unwarranted context effects follow from these lines of research, for example by randomizing question ordering or interviewer, by making explicit choices about question ordering (e.g., placing attitudinal questions before other questions), by providing increased levels of information to reduce ambiguity, or by explaining to respondents that context effects may influence their responses.

Several of the proposals in the literature however can only dilute the biases by making them non-systematic rather than seek to remove them, although this could be interpreted as an acceptance that the bias cannot be fully removed or that the nature of the bias is not fully understood although it is known to exist (e.g., question ordering randomisation), and that despite some bias being present the results still offer valid insights into the problem being considered.

The possible effects of the identity of the survey sponsors on stated preference outcomes is one area of research on the implications of context that has yet to be explored in the literature. The disclosure of survey sponsor is current practice in the administration of surveys, even while efforts are made to control for other types of potential context bias, often in line with the principle of full disclosure of information to study participants under survey ethics guidelines. As such it is possible that there is an introduction of a systematic effect (bias) on stated preference results due to survey sponsorship that is currently little understood.

For example, stated preference surveys on the willingness to pay for marginal reductions in the risk of death are primarily conducted by academic institutions or by government authorities (or both). The results of these studies are used to derive value of statistical life (VSL) measures, which are used to monetise the expected mortality risk reductions that result from various types of public policy interventions. Also, when government agencies want to agree on a VSL standard to be applied to a range of policies, they frequently make use of meta-analysis studies that aggregate several VSL measures and make recommendations that typically refer to some measure of central statistical representativeness (e.g., the mean of the VSLs), and perhaps to some sensitivity analysis (a range for the VSL around the mean). However, if there is an effect of survey sponsor on the values underlying the VSLs this may affect the recommended central value and possibly the sensitivity range (as such the type of survey sponsor could be a variable to be included in the meta-analysis regression).

Reasons to hypothesise that survey sponsor effects may exist in stated preference studies can be found in research done in other social sciences, primarily in the fields of cognitive psychology and marketing research. Several of these studies have found an effect of survey sponsor type (government, academia, NGO, private company) on *response rates*. University or government survey sponsors have been found to lead to higher response rates than commercial sponsors (Doob & Freedman, 1973; Fox, Crask, & Kim, 1988; Greer, Chuchinprakarn, & Seshadri, 2000; Jones & Lang, 1980). This is, however, not always the case. For example a meta-analysis by Manfreda, Bosnjak, Berzelak, & Haas (2008) does not find a systematic effect of survey sponsor on survey response rates.

There may also be an impact of survey sponsor on *response values* (i.e. the answers given), and more so if there is a perception by the respondent that the sponsor has a particular view on the survey topic or when the respondent has had prior involvement with the survey sponsor (Groves & Peytcheva, 2008). Galesic & Tourangeau (2007) find a survey sponsor effect on responses to questions on attitudes towards sexual harassment: responses vary with respondents' views on what is the position of the sponsor on the survey subject (neutral/research vs. active/advocacy). A study by Norenzayan &

Schwarz (1999) shows that the stated research focus of fictitious surveyors affects the focus that is taken by the participants when providing their answers: when asked about the causes for mass murder, participants stated mostly individual or social causes according to whether the surveyor was presented as focusing on individual or social issues, respectively. The study concludes that the respondents are seeking to make their answers relevant to the research goals of the researcher. Significant differences were found when researchers were both described as belonging to the same type of institution (academia) but coming from different research fields.

The research on survey sponsor effects has considered survey sponsors by broad types, such as 'government sponsor' or 'academic sponsor' but has only limited insights into whether there is a survey sponsor effect within these types (although the study by Norenzayan & Schwarz (1999) is an example of this type of refinement within academic sponsors). Hypothetically, in the context of stated preferences and associated VSL, it is possible that a survey on willingness to pay to mitigate health risks may be perceived differently should the survey be sponsored by the national health system (focus on medical risks or on personal behaviour and possibly a more frequent contact of the respondent with the survey sponsor) or by the national environmental agency (focus on environmental risks or collective behaviour and possibly only occasional contact with the survey sponsor).

Another possible effect of survey sponsor bias is that of the country origin of the institution doing the survey. This is particularly relevant in a developing country context, where often stated preference surveys are sponsored by foreign entities (international development banks, foreign international development agencies, or foreign research institutions). For example, there may be different levels of trust in a national and in a foreign university; the perceived credibility of the scenario being presented may vary by institution (for example the national university may be perceived to be more able to influence national government policy and thus its stated valuation scenario be seen as more credible than for a foreign university); or respondents may be inclined to please the interviewer (yea saying) or to 'present an ideal self' (for example to project a positive image of the country to outsiders).

This type of foreign interviewer bias was found by Henn (2000), where the same stated preference questionnaire on farming resulted in WTP amounts that were some 30% lower when the interviewer was local rather than foreign (although the sample size of interviewers was very small so it is possible that other distinguishing but omitted characteristics affected the results).

It is plausible that a similar effect to the one found in Henn (2000) for face-to-face interviews occurs for sponsoring institutions when the questionnaire is administered online. Online questionnaires are often presented as having the advantage of removing the interviewer bias that has been observed in face-to-face surveys (Duffy, Smith, Terhanian, & Bremer, 2005) and even in surveys conducted over the phone (Gong & Aadland, 2011). However, it is possible that, in the case of online surveys, such interviewer effects are transferred to the type of sponsoring institution, as respondents make a cognitive effort to contextualise their answers.

The literature review did not turn out research on how varying the language in which the sponsor is described might affect survey results, although this may be relevant in cross-country research (for example for international organisations that may have an official name in the local language that could be written into the survey logo)[2]. Finally, it should be noted that this chapter aims only to consider whether different types of survey sponsor effects can be observed in a stated preference survey, not to make a statement about which type of survey sponsor would most likely produce a survey result that would best match a comparable real market outcome. But if a survey sponsor effect is indeed observed this is an issue that could be considered further in future research.

3. Methodology

3.1. Testing for survey sponsor effects

[2] Even if, as was described in the previous section, language can have an effect on answers when the text of the questionnaire itself is in English or in a local language.

The broad research question to be answered is whether there is a statistically significant effect caused by the type of survey sponsor on variables of interest in stated preference surveys. And, if such an effect exists, for what type of survey sponsor does it occur and how significant it is. The tests on which the research question is evaluated here are generally derived from previous findings in the literature (where these are available), reviewed in the previous section, which showed that the some types of survey sponsor can affect survey results. The tests are each based on pairwise comparisons between two types of survey sponsor[3]. The previous findings in the literature can offer some guidance on what may be expected in terms of significance or signal in the pairwise tests for participant engagement measures, but in some instances there is a relevant research question to justify the pairwise comparison but no previous research that can aid in defining a hypothesis to be tested. Where previous research is not available possible interpretations for results have been set out for the various possible outcomes (should a significant difference be found).

Eight types of survey sponsor were used in the data collection:

- Mexican university (Universidad Iberoamericana Puebla - UIP)
- Mexican Environment Ministry (Secretaría del Medio Ambiente y Recursos Naturales)
- Blue international development bank (IDB) logo, in English
- Red IDB logo, in English
- Foreign university (London School of Economics and Political Science - LSE)
- Mexican Health Ministry (Secretaría de Salud)
- Blue IDB logo, in Spanish
- 'Blank' logo

Besides collecting data for the measurement of WTP for mortality risk reductions the online survey captures information useful to assess the effect of survey sponsor type on participant engagement,

[3] Using t-tests.

namely: survey completion rate (respondent drop-out rates); item response rates number of questions answered); time spent on the WTP question pages; and time to complete of the survey.

Although hypotheses are formulated for the participant engagement measures for each of the six tests, there is less research on the performance of response values in response to varying survey sponsorship, therefore the default hypothesis is that no survey sponsor effects exist on average WTP. The six main participant engagement tests are as follows:

- Test 1: universities vs government ministries vs international development bank

  It is hypothesised for participant engagement that: Test 1a: the university sponsors outperform other sponsor types (as previous research shows that, when an effect was found, the highest response rates were for university sponsors); Test 1b: the national government ministries outperform the international development bank (as ability to change policy is greater for the former).

- Test 2: foreign university vs national university

  The foreign university outperforms the national university on participant engagement due to 'pleasing the interviewer' effects. Alternatively, the foreign university underperforms due to the perception that it has less accessibility to decision-making than the national university. Similarly to Henn (2000) it is possible that the country of origin of the surveyor affects the survey results. There may be different levels of trust in national and foreign universities (for which data was collected); or 'pleasing the interviewer' or 'presenting an ideal self' effects may occur, for example to project a positive image of the country to outsiders.

- Test 3: Environment Ministry versus Health Ministry

  This test explores the possibility that a survey on WTP to mitigate health risks may be perceived differently should the survey be sponsored by the national Health Ministry or by

the national Environment Ministry. It is hypothesised that participant engagement is higher for the Health Ministry as health policy is perceived to be more immediate in terms of own-health outcomes than environmental policy.

It is unclear whether there are varying survey sponsor effects within the realm of government surveys. The survey that is used measures WTP to reduce marginal changes to the risk of death, which offers the opportunity to investigate this issue as the question is relevant to both environmental and health policies (and these types of stated preference surveys are often sponsored by these different types of government institution).

- Test 4: Spanish language logo versus English language logo

It is hypothesised that participant engagement is higher with the Spanish (local language) logo than with the English logo. The remaining logo elements (colour, composition, and placement) are essentially maintained across the two relevant survey subsamples for each language. A fictional international development bank (IDB) is used ('International Development Bank'; 'Banco Internacional para el Desarollo').

This is motivated by the World Bank having used the same basic survey instrument that is used in this study in non-English speaking countries: China (Krupnick et al., 2006; Krupnick, Hoffmann, & Qin, 2010) and Mongolia (Hoffmann et al., 2012)[4]. One possible route by which a logo language effect could happen is signalling the level of institutional expertise in the country of application, whereby a logo in the local language would indicate a higher level of local knowledge or engagement with local issues. This test may also assist in unpacking the elements affecting any potential differences between the national and foreign university.

- Test 5: blue logo versus red logo

[4] It was not possible to obtain information regarding the language used in the logo in these two surveys.

This is a visual context test in which the effect of logo colour on stated willingness-to-pay is observed. The expectation is that no effect on participant engagement is found.

- Test 6: no logo

  In addition, a version of the survey with no logo inserted was included (i.e. an unidentified survey sponsor, termed 'blank logo' in what follows) to assess how removing the survey sponsor as an anchor for participants would affect survey performance, when compared to the other logo versions.

3.2. Survey instrument

The stated preference questionnaire asks respondents for their willingness to pay (WTP) for a set of different products that reduce their personal risk of dying. The products are not defined, besides stating that they are for own use and that they reduce the risk of death. This is to avoid biasing responses on the basis of context. For example, if the product was linked to the effects of air pollution this might raise questions of responsibility to pay for the health damage by the polluter. Or context may suggest that the product might cause side effects, have varying effectiveness, or have benefits to others that go beyond the individual's private WTP for her own reduced risk of dying.

Two contemporaneous amounts (5 and 10 in 10,000) and one future amount (5 in 10,000) of risk reduction are offered to respondents through these products. These risk reductions are broadly in line with the typical values resulting from public policy interventions to reduce mortality risks (such as air pollution reduction policies). The associated payments needed for these products (risk reductions) would be made once a year over a period of ten years starting in the current period.

The survey elicits the WTP associated with these risk reduction values through the payment card approach, where respondents were presented with a list of several monetary values in Mexican Pesos (MXN) from which they can choose the value that is closest to their maximum WTP. The questionnaire is computer-based, which allowed displaying information to respondents that is specific to their age and gender (information on baseline risks of death per age and gender group, on leading causes of death for their age and gender, and on medical and non-medical measures to mitigate those risks of death, including an indication of the financial cost of those measures). Although the survey was originally developed for application in Canada and the USA, it has since then been applied successfully

in several countries, with varying incomes, local cultures and other social and economic characteristics[5].

The behaviour of the WTP predictions under the various survey sponsor types is tested by means of internal scope tests and construct validity tests. The scope tests are used to confirm that WTP for a 5 in 10,000 mortality risk reduction is lower than WTP for a 10 in 10,000 mortality risk reduction. The construct validity test is performed by regressing the WTP values on a set of explanatory variables to observe whether WTP results can be meaningfully explained by those explanatory variables and to establish whether the statistical relationships conform to what would be expected from theory. This latter theoretical validity test typically rests on confirming that the relationship between WTP and income is positive and significant, as income is the only independent variable in the stated preference models for which a clear theoretical relationship with WTP can be established.

The questionnaire was distributed online by a survey company to a target group of those living in the most populated metropolitan areas of Mexico. The panel of respondents was aged 40 to 50 years old. The respondents were randomly assigned to one of eight groups, each identified with a different survey sponsor type.

The questionnaire had previously been adapted to the Mexican reality (after being tested in focus groups changes were made to the original questionnaire that included the presentation of leading causes of death for males and females by age group in Mexico, relevant health insurance options available to Mexicans, etc.), augmented by a few questions (all placed at the end of the questionnaire,

[5] The countries where the survey instrument has been applied are: Canada and the U.S.A. (Alberini et al., 2003; Alberini, Cropper, Krupnick, & Simon, 2004; Krupnick et al., 2002), Japan (Itaoka, Krupnick, & Akai, 2007; Krupnick, Alberini, Simon, & Itaoka, 2005), the United Kingdom, France, and Italy (Alberini, Hunt, & Markandya, 2006), Brazil (Ortiz, Markandya, & Hunt, 2009), Mongolia (Hoffmann et al., 2012), and China (Krupnick, Hoffmann, & Qin, 2010). Further detail on the survey instrument can be found in these papers.

without the possibility of returning to change answers to avoid affecting results in unforeseen ways), and translated into Spanish[6].

Given the focus on testing survey sponsor effects the original survey was further adjusted to meet resource constraints. Most fundamentally this was done by dropping the previously employed study design of two 'waves' for the mortality risk reduction valuation questions, with the questionnaire used here keeping only one wave[7]. As inclusion in one of the waves in the original surveys was random (i.e. about 50% of participants would be assigned into each of the waves) this change allowed the testing of eight instead of four survey sponsor types under the available budget, but had the analytical cost of removing the ability to test for ordering effects and external validity under the different survey sponsor options (only internal validity scope tests are possible). Also, the age of the respondents was limited to 40 to 50 years old (in the original survey the age range had been 40 to 75 years old). This allowed a reduction of the overall sample size needed to do the analysis but reduced the possibility of analysing in more detail the effect of interactions between age and survey sponsor that might have been of interest. The final sample can be split along two age groups (from an original seven in the previous studies): 40 to 45 year olds, and 46 to 50 year olds. The participants were asked for their gender[8] and then randomly assigned to see one of the logos as a header on their survey, with the logos all of the same approximate size and placed in the same position on the page, as exemplified in figure 1[9].

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[6] This work was done with the assistance of staff in the Environmental Economics and Policy Research Unit at the Mexican National Institute of Ecology and Climate Change (INECC) and relates to a preceding study on the value-of-statistical life in Mexico, using a representative sample (forthcoming).

[7] The wave that was kept shows a contemporaneous 5 in 10,000 risk reduction WTP question followed by a contemporaneous 10 in 10,000 risk reduction WTP question and a latent 5 in 10,000 risk reduction WTP question.

[8] The questionnaire contains information that is age and gender specific (the leading causes of death per age group and gender, related medical and non-medical actions that can be taken to mitigate the risk of death and the baseline mortality risk for the respondent's profile).

[9] The seven logos used (i.e. excluding the 'blank' logo version, which shows no logo) can be found in Appendix 3.

Figure 1 – Example of questionnaire page and logo positioning on the page

4. Data and results

The questionnaire was sent out to an online panel of 8,500 individual respondents[10] in Mexico, with reminders sent to participate if the respondent had still not answered the survey. Of these, 4,175 unique respondents started the survey (49% of the panel), with 3,616 reaching the end (43% of the panel; 87% of those who started it) and 559 not (7% of the panel; 13% of those who started it)[11]. Table 1 shows the distribution of the sample by age and gender.

Table 1 - Distribution of the sample by age group, gender and logo version

4.1. Participant engagement

The first analysis of whether the different survey sponsor types affect participant behaviour is on their engagement with the survey. Participant engagement is defined as the amount of effort dedicated by the individual to the completion of the task of filling out the questionnaire. Four measures of participant engagement are considered:

- survey completion rates (percentage of individuals reaching the end of the survey);
- item response rates (share of respondents reaching the end who skip answering some questions);
- time spent on the WTP questions; and
- time spent on the questionnaire from start to end[12].

[10] Owned by Netquest, a surveying company with a large panel of respondents in Mexico. Several surveying companies were considered and a choice was made based on cost, panel quality controls (including incentivisation), and panel size.

[11] Also, several of the respondents that reached the end of the survey did not complete all of the questions in the survey (which gives us the item response rate). In the regression specifications responses with relevant missing data are dropped (differences between the item response rates are tested only using t-tests).

[12] Participant engagement statistics per survey type can be found in Appendix 1.

An assessment of the existence of statistical differences between the eight sponsor types for these four measures is performed for the six survey sponsor tests described in section 3 (universities vs government ministries vs international development bank; foreign university vs national university; etc.). The full results of the analysis can be found in Appendix 2.

- **Survey completion rate**

The survey completion rate can be interpreted as a measure of the average importance attached to the survey by participants. A survey considered as very relevant by the participants should result in a higher survey completion rate. The t-test results for this measure show limited evidence of differences between the survey sponsors (tests 2 to 6, as described in the previous section). The one exception is for the Mexican university, which attracts a higher completion rate than the Environment Ministry and the blank logo (at 5% significance), but does not outperform the remaining survey sponsor types. The higher completion rates for the Mexican university than for the Environment Ministry and the blank logo are consistent with the previous literature results underpinning the hypothesis in test 1A, namely that university sponsors attract higher response rates than other survey sponsor types. Perhaps more interesting here, however, is that the Mexican university did not, contrary to expectations, outperform the majority of other survey sponsor types. Equally, government sponsors did not outperform other sponsors in terms of survey completion rates, which indicates that ability to influence policy is not a strong determinant of completion rates (test 1b).

- **Item response rate**

The item response rate is also a measure of survey relevance to participants. The results in Appendix 2 show significantly higher missing data for the red logo IDB survey than the Environment Ministry, the Spanish logo IDB, the blue logo IDB (test 5; 5% significance) and the blank logo (test 6; 1%

significance)[13]. The expectation for test 5 was that no effect would be found for the pairwise tests on the colour logos for the various measures of participant engagement. In the few instances where colour has had an effect on response rates in the existing survey sponsor effects literature this effect has been interpreted through the lens of 'colour psychology', whereby different colours have different interpretations and evoke different emotional responses in individuals, either innate or learned (Crozier, 1999). In surveys of emotional response to colour, blue tends to be more likeable than other colours, including red, and is associated with calmness and peacefulness. Red tends to be seen as more emotional and active, and to stand out in meaning from other colours, which tend to be more clustered together in terms of emotional interpretation (Madden et al., 2000). Elliot et al. found in several studies that even limited participant exposure to the colour red impaired cognitive function, resulting in lower scores and less effort in a range of tests (Elliot & Maier, 2007; Elliot et al., 2007), which is consistent with the few instances here where red is linked to lower response rates than the immediately comparable blue (English and Spanish) and blank logos.

In addition, the blank logo survey had less missing data on average than the Mexican university, the Foreign university and the Health Ministry (10% significance), indicating some trade-off between survey completion rates and item response rates for the blank logo, which make it difficult to interpret directly its effect on effort made by respondents (test 6). The remaining pairwise tests showed no statistical differences.

- **Time spent on willingness to pay questions**

There were three WTP questions to be answered, in this order: WTP for a 5 in 10,000 contemporaneous risk reduction; WTP for a 10 in 10,000 contemporaneous risk reduction; and WTP for a 5 in 10,000 latent (future) risk reduction (a reduction from baseline risk at age 70 to 80 years old).

[13] A negative t-test for item response rates means that the average occurrence of missing data is lower in the first than in the second type of survey sponsor in the test.

A significant amount of text between the three questions is similar, as such it was expected that time spent on the WTP questions will go down from the first to the second and third questions, which was verified (there was little difference in general between time spent in the second and third question). As an approximation to respondent behaviour, an informal assessment is made of the minimum time needed to comprehend fully and answer the *first question* (WTP for a contemporaneous 5 in 10,000 mortality risk reduction) and this is set at a minimum of 25 seconds. Answers given after 2 minutes are considered to have taken unnecessarily long (possibly due to the participant doing other things while completing the survey, thus making it less clear whether sufficient attention was given to the WTP question). Answers given in less than 5 seconds indicate the participant did not attempt to understand the question. Answers between 5 and 15 seconds would have allowed for a very cursory understanding of the question. Finally, answers between 15 and 25 seconds are considered to have given enough time to read through the question but little time to consider the answer.

Testing was done on the statistical differences between the survey sponsor types for those spending between 25 seconds and 2 minutes on the first WTP question. Significantly more respondents spent this amount of time answering the WTP question for the blue logo IDB option than for the Environment Ministry option (1% significance level), the Mexican university sponsor, red logo IDB sponsor, blank logo sponsor (5% significance) and the foreign university sponsor (10% significance). Similar effects were also found, in some of the tests, for the Spanish language IDB (also in blue) and the Health Ministry (10% significance). Colour psychology could again be used as a possible way to interpret some of these results (test 5; see also previous point). Blue logos outperform red and blank logos on time spent on the WTP question, with blue being associated with a calmer state of mind and increased focus. In comparison, on the underperforming side, the universities and the Environment Ministry see a smaller proportion of participants spending 'sufficient' time on the WTP question (test 1 and test 3). A possible interpretation for the university and Environment Ministry results is that fewer participants are seeing these as representing credible agents for the mortality reduction product being offered. So although universities have a standard performance in other participant

engagement measures (or even, in some of the tests, outperforming, with the Mexican university showing stronger questionnaire completion rates than some of the other logos), when the crucial WTP question is presented respondents seem to not be as engaged as for other logos. The remaining pairwise tests showed no statistical differences.

- **Time to complete the survey**

The last measurement of participant engagement considered was time to reach the end of the survey per survey sponsor type. No statistically significant differences were found in any of the tests.

In general, and according to the tests conducted, there is limited evidence that varying the survey sponsor has a systematic effect on participant engagement for each type of survey sponsor (i.e. that a significant and consistent effect is found for the same survey sponsor tests across the participant engagement measures). It can be said that the question of how survey sponsor affects participant engagement is not a straightforward one. For the various participant engagement measures considered some logos may outperform others in some of the tests, but underperform in others. A conclusion is that care should be taken when conducting research on respondent effort to make a multi-dimensional assessment of effort, rather than focus on a single measure as fully representative of participant engagement.

A further question is whether these measurements of participant engagement are of consequence to WTP once other explanatory factors have been taken into account. This is considered further in the construct validity section below for the cases of time spent on the first WTP question and time to reach the end of the questionnaire[14].

4.2.Scope tests

[14] Inclusion in the WTP regressions is not possible for the other two participant engagement measures as the regressions drop observations with missing values.

Scope tests are typically used to establish whether the data perform in line with theoretical predictions. For example, it is expected that offering more of a good should lead to an increase in WTP for the new quantity. It is also generally expected that WTP for receiving a good in the future should be less than WTP for receiving that good in the present time, due to the general presence of positive discount rates in intertemporal choices. In addition, within the analysis of the effects of varying the survey sponsor on average WTP for mortality risk reductions, scope tests can also be seen as an additional measure of participant engagement: on the one hand if varying the survey sponsor has no effect on the outcomes of the scope tests this indicates that participants were equally engaged in the survey task across survey sponsor types. If, on the other hand, there is a significant effect of survey sponsor type on the behaviour of the data under the scope tests then this could indicate that common validity tests in the literature may be affected by survey sponsor type (for example if the scope tests are passed for some survey types but not for others)[15].

The scope tests for the various survey sponsor types are shown in tables 2 and 3. Three data cleaning procedures are considered that result in three sub-samples: (sub) sample A excludes observations where participants fail two tests on their ability to understand probability (this indicates a poor comprehension of the task or just clicking through the questions)[16]; sample C builds on sample A and further excludes observations where WTP for a 5 in 10,000 mortality risk reduction is greater than WTP for a 10 in 10,000 mortality risk reduction (i.e. illogical WTP responses if it is assumed people would prefer to receive greater risk reductions all else equal), as well as those that state that they do not understand probability well (indicating that they cannot understand the task sufficiently well, at least with the assistance offered in the questionnaire, to make an informed judgement); finally sample

[15] As mentioned above the survey design does not allow for external scope tests, only for internal scope tests.

[16] Participants are first shown a simple scenario describing two people, one with a higher and one with a lower probability of dying in the following ten years, and asked to identify the person with the higher risk. Then they are shown a similar scenario and asked which person they would rather be (where the answer for the lower risk of dying is expected).

Z, in addition to sample C, uses the participant engagement measures from the previous section as further data filters, also dropping those taking more than 1h30 to answer, those not answering 7 or more of the questions, and those spending less than 25 seconds or more than 2 minutes on the first WTP question[17].

Using the three subsamples reduces the overall sample size from 3,501 (those that reached the end of the survey and answered the WTP questions) to 3,241 observations for sample A (7.4% reduction); 2,957 observations for sample C (15.5% reduction); and 1,866 observations for sample Z (46.7% reduction). Moving from the full sampe to sample A and to sample C generally has a small effect on sample size and on average WTP. Moving from sample C to sample Z, however, has a large effect on sample size and leads to a larger average WTP.

Table 2 - Internal scope tests, contemporaneous risk (5 vs 10 in 10,000 risk reduction)

Table 3 - Internal scope tests, latent risk (present 5 vs future 5 in 10,000 risk reduction)

The internal scope tests for the contemporaneous risk reduction are passed comfortably for all survey sponsors and subsamples, indicating that respondents are willing to pay significantly more for the larger risk reduction. The doubling of the risk reduction offered does not, however, lead to a doubling of average WTP (a stricter version of the internal scope test). The increase is between 10% and 29%, with the Environment Ministry and the Health Ministry performing slightly less well than the other survey sponsor types on this measure.

The internal scope tests for the latent (future) risk generally fail to find statistically significant differences for the different survey sponsors and subsamples, with the exception of the Spanish IDB logo and the blank logo (5% significance). In these two cases they show a higher WTP for the latent risk reduction than for the contemporaneous risk reduction, indicating a negative discount rate.

[17] The names and associated filters for the samples (samples A, C and Z) are derived from the preceding (forthcoming) study on the value-of-statistical life in Mexico and are kept here for comparability purposes.

Negative discounting has been documented in the health choices literature. However, the previous studies that used the same questionnaire all found a (wide) range of positive discount rates. Still, in the related face-to-face study conducted in Mexico City to determine a value-of-statistical life for Mexico negative discount rates were found for most socio-economic groups and different data cleaning procedures employed[18].

Finally, there is little impact of dropping what were defined as 'low participant engagement' observations (i.e. sample Z) on the quality of the scope tests (i.e. whether behaviour is in line with theoretical expectations). However, dropping these observations does reduce the sample size significantly. As such, using sample Z is considered not to be beneficial and this sample is not considered further in the analysis.

4.3.Differences between WTP values

In terms of policy implications, the main question regarding the existence of possible survey sponsor effects is whether such effects substantially affect WTP estimates. If the disclosure of the survey sponsor to the participants significantly affects WTP measures then, by implication, that disclosure also affects impact assessments (and, in some jurisdictions, estimates of damages for use in legal decisions). No evidence was found in the literature that this issue has been previously considered suggesting that surveyors have previously assumed that respondents would not be affected by the nature of the publicised sponsor of stated preference surveys.

To assess the existence of survey sponsor effects on average stated WTP for mortality risk reductions a series of t-test comparisons were run for each of the tests described in section 3. The results of the

[18] Where negative discount rates in participants' health choices occur in the data these may be due to time-dependent adaptation effects, whereby respondents' choices for the future are made in relation to the expected baseline health at that future point in time – having a higher overall risk of dying at old age thus being associated with increased valuations for reductions in risk at that age (Loewenstein & Prelec, 1991), or to dread for outcomes more likely to occur in old age, for example by being WTP more to avoid cancer risks than for equally deadly illnesses that could occur with relatively higher probability earlier in life (Hammitt & Liu, 2004; Loewenstein, 1987; Sunstein, 1997).

t-test are presented in table 4. Most of the t-test comparisons result in no statistical differences having been found between survey sponsor types. Significant differences emerge more clearly between the Environment Ministry survey sponsor and several of the other sponsor types (all except the red logo IDB and the Health Ministry). Where a difference was found for the Environment Ministry, stated WTP values are consistently lower than the equivalent values for the other survey sponsor types. In addition, several of the t-tests also indicate that the use of the Health Ministry logo or of the red version of the IDB logo is associated with significantly lower WTP estimates.

Table 4 - t-tests for differences in mean WTP for different survey sponsor types

These t-tests do not, however, control for any possible differences in the composition of the various survey sponsor subsamples that may have arisen despite the randomised allocation of participants to each survey sponsor group. A test is conducted in the next section for whether these effects persist when other statistical effects that may influence WTP are accounted for in a regression framework.

4.4.Construct validity

The model includes a large number of variables[19], which can be divided into groups by their nature: socio-economic, health, survey sponsor type, participant engagement, understanding and acceptance of survey scenarios, and geographical location (metropolitan area). The results for the regression of stated WTP values on the explanatory variables are shown in table 5 (contemporaneous risk WTP, 5 and 10 in 10,000 reductions in mortality risk; and latent risk WTP, a 5 in 10,000 reduction). A Tobit regression with heteroscedasticity-robust standard errors was used, given the left-censored-at-zero nature of the data. The sample A and sample C filters were used in the analysis, as described in the previous section.

[19] There was no issue with multicollinearity, tested using Stata's `VIF` command. All variance inflation factors had a score below 2. This was confirmed by the low values in the post-estimation correlation matrix.

Table 5 - Construct validity tests (regression)

In terms of theoretically validity it can be observed that the income variable is positive and strongly significant in all specifications, which is in accordance with what would be expected: respondents with higher incomes are willing to pay more in absolute terms for mortality risk reductions than those with lower incomes. For the remaining socio-economic variables the most notable statistically significant effects were found for: the degree of religiousness of the respondent, with those stating to be 'very religious' willing to pay significantly less for mortality risk reductions; gender, with women generally willing to pay less than men; and whether respondents had their own private insurance policy (and no other form of insurance), in which case willingness-to-pay was higher[20]. The age range in the sample is narrow, from 40 to 50 years old, which limits the ability to draw meaningful conclusions on the relationship between age and WTP, but it was nonetheless interesting to find that WTP significantly increases with age for the contemporaneous and latent 5 in 10,000 mortality risk reduction measures but not significantly so for the contemporaneous 10 in 10,000 mortality risk reduction. The health history dummy variables were broadly non-significant, with only some evidence found for high blood pressure affecting (increasing) WTP, but with the effect not being present in several of the cases.

The survey sponsor effect found in the previous section (t-tests of differences) for the Environment Ministry sponsorship is also found here in the regressions for the different sampling filters and risk reduction measures (i.e. the survey sponsor effect persists even when other explanatory factors are accounted for). The Environment Ministry sponsorship is associated with a reduced WTP value (at least at 5% significance in all cases except one, where it was significant at 10%). In addition, the Health Ministry sponsorship effect also results in significantly lower WTP (10% significance) for all but one of the cases considered. For the other survey sponsor types there was no consistent effect on WTP (most notably for the red logo IDB sponsorship, for which an effect had been found when comparing mean

[20] These are similar result to the ones found in the face-to-face version of the survey.

values in the previous section, but when controlling for other factors becomes generally non-significant)[21]. A measure of trust in institutions was also used in interaction with the different survey sponsorship types to see whether stated trust in the Environment and Health ministries was associated with WTP, but no significant effect was found (results not reported here). This suggests that the survey sponsorship results are explained by other factors besides institutional trust.

Two of the 'participant engagement' measures were also included to see whether these have an effect on stated WTP: time spent on the first WTP question and time to complete the questionnaire[22]. Statistically significant effects are found only for the former: broadly speaking as time spent on the first WTP question increases the stated WTP for mortality risk reductions also increases, but as the participants progress through the different WTP questions in the questionnaire this effect first becomes less significant (second WTP question) and then essentially disappears (third, and last, WTP question). This is taken as suggesting evidence of respondent learning effects.

Significant negative effects are found for a few of the quality control questions included that check for understanding and acceptance of the scenarios set out in the survey: those that stated that they doubted the product would work as described; those that thought that their own risk of dying was higher than the baseline risk for the people of the same age and gender; and for those that thought that the product may deliver other benefits besides mortality risk reductions to themselves. The latter result is surprising as in previous studies, and in line with theory, people stating that there were additional benefits were willing to pay more than those who did not.

[21] The 'blank' logo version of the survey was used as basis for these comparisons and thus was omitted from the regression.

[22] The other two measures considered before, completion rates and item response rates, are not included in the regression as the associated observations are dropped due to missing data.

The geographical dummies find some evidence of a positive effect on WTP for the State of Mexico (10% significance), but this effect weakens as respondents progress through the questionnaire and is no longer found once an answer is given to the last WTP (latent risk question).

The intercept (constant term) value is negative: the intercept value would generally be interpretable as WTP for mortality risk reductions should all the explanatory variable values be zero (which, when taking a negative value, would indicate participants were not willing to pay any amount, if it is assumed that the truncation at zero is legitimate, or that they would be willing to take on additional mortality risks in exchange for increased income). Further analysis showed the negative intercept value is caused by the presence of the income variable in the regression: when income is removed from the equation the intercept is statistically not different from zero (i.e. the negative intercept is a projection to a non-existent state of zero household income from the average income value in the regression). As such the intercept was interpreted as having limited intrinsic meaning in the model.

4. Conclusions

This chapter describes the result of an experiment that involved varying the sponsor of a survey that asks individuals for their WTP for mortality risk reductions, and observing how this impacted participant engagement measures and WTP values. For most of the sponsorship types tested no statistical effect was found for these measures, with some meaningful exceptions.

Some evidence of lower participant engagement was found for the Environment Ministry and the blank logo version of the survey on survey completion rates but this seems to be somewhat counterbalanced by these types of survey logos being associated with having fewer questions left unanswered on average. Higher participant engagement was found for the Mexican university sponsorship in terms of the survey completion rate, but again this seems to be counterbalanced by more questions left unanswered. In some of the tests more respondents spent 'sufficient' time on the first WTP question for the English language blue logo IDB, Spanish language blue logo IDB and the

Health Ministry than for the other logos. Given the observed trade-offs it is recommended that studies assessing participant engagement in the future should try to capture several dimensions of engagement rather than drawing conclusions from a single measure.

A significant result was found for the WTP values for the two options that tested for an effect of a government ministry sponsorship (namely for an Environment Ministry sponsorship and for a Health Ministry sponsorship). The sponsorship effect was to reduce average WTP by between 22% and 25% in the case of the Environment Ministry, and by 13% and 17% in the case of the Health Ministry[23] (when compared to the average WTP of the other survey sponsor types).

To attempt to understand these results it is useful to first highlight some characteristics of the questionnaire that was employed. Firstly, the questionnaire states that the sponsor of the survey is not representing a private company, nor is it trying to sell a product. This has the aim of reducing strategic answering by the respondent, e.g. by stating an artificially low WTP to try to reduce the future offer price of the product (if it is made available in the market). Secondly the survey asks respondents for WTP for a product that can be purchased freely and consumed by the respondent herself to reduce her own baseline risk of dying. This is done to highlight to the respondent that the risk of dying can be reduced with low or no transaction costs, and that this is a fully private good.

Given these survey characteristics a possible interpretation for the lower WTP results found for the Environment and Health ministries is that government agencies are seen by the respondents as making a non-credible statement in the questionnaire that the survey sponsor is 'not trying to sell a product', as the intrinsic characteristics of the product could be seen to be aligned with the policy objectives of these two government ministries (i.e. mortality risk reductions). As such, the survey may not fully succeed in avoiding gaming by respondents trying to reduce future costs to themselves. In

[23] Figures for the sample C comparisons of regression estimates. A table with the effects on average WTP of the Environment Ministry and Health Ministry sponsorship can be found in Appendix 2.

addition, the respondents may also not see the description of the good as a fully private good as credible when the survey is sponsored by government ministries. Public healthcare systems and environmental protection programmes are mechanisms for the socialisation of risks, and respondents may feel that public authorities should take on part of the costs associated with the respondents' own mortality risk reductions.

Conversely, it is also possible that non-government ministry sponsor types are perceived as not being credible entities, in terms of holding an active interest in the type of product described, and as such WTP answers given may be inflated as they are seen to be of little practical consequence. So for example the universities could be perceived as having a predominantly theoretical interest in the WTP questions, and the international development bank to be too distant from the respondents in terms of decision making to be likely to affect them meaningfully. This would then make it more likely for behaviour such as presenting an ideal self to the surveyor to occur, which would increase WTP estimates.

In conclusion, the analysis showed that sponsor effects can exist in stated preference surveys. These sponsorship effects had not previously been identified in the literature. Sponsorship signalling may have previously affected the efforts of surveyors to construct questionnaires that mitigate behavioural bias, especially as under ethical good practice guidelines it is a common requirement that the sponsorship of the survey be disclosed to participants. However, further research would be needed to better understand the nature and direction of these effects.

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Appendix 1 - Statistical tables

Table 6 - Socio-economic and health statistics

	FULL SAMPLE n = 3,501	Mexican university n = 480	Foreign university n = 428	Environment Ministry n = 433	Health Ministry n = 458	Blue IDB n = 460	Red IDB n = 419	Spanish IDB n = 408	Blank logo n =415
Age									
40-45	69.4%	71.0%	72.2%	70.9%	68.1%	67.6%	69.9%	68.4%	67.0%
46-50	30.6%	29.0%	27.8%	29.1%	31.9%	32.4%	30.1%	31.6%	33.0%
Income	187,555	215,552	190,647	169,774	163,771	205,776	184,786	187,841	179,108
Male	50.4%	52.5%	56.3%	51.0%	52.2%	45.9%	53.5%	47.3%	50.8%
Married	59.4%	59.8%	59.6%	57.0%	55.7%	56.5%	59.4%	64.2%	63.6%
University education	60.9%	63.1%	61.9%	59.6%	60.5%	60.7%	60.4%	62.0%	58.8%
Health									
has bad health	2.1%	1.0%	1.2%	2.6%	2.6%	3.3%	2.2%	2.5%	1.7%
family illness	68.9%	64.8%	65.9%	68.1%	69.2%	74.6%	68.7%	71.3%	68.7%
family cancer	27.5%	27.5%	28.5%	26.6%	26.9%	30.4%	27.9%	27.9%	23.6%
own illness	20.8%	17.9%	18.0%	21.5%	21.2%	23.0%	22.9%	21.3%	20.7%
own cancer	1.5%	1.3%	1.4%	2.3%	1.5%	2.4%	1.2%	1.2%	0.7%
visited emergencies in last 5 years	6.1%	6.5%	7.0%	8.1%	5.0%	4.8%	7.9%	4.7%	5.3%
visited hospital in last 5 years	5.1%	4.6%	4.7%	7.6%	5.0%	5.4%	5.3%	4.2%	3.6%

Note: for those that filled in the WTP questions.

Table 7 - Acceptance and understanding of the questionnaire scenarios

	Total	Mexican university	Foreign university	Environment Ministry	Health Ministry	Blue IDB	Red IDB	Spanish IDB	Blank logo
Did not believe risk applied to them	32.7%	33.5%	33.1%	32.8%	34.4%	34.4%	32.7%	30.7%	29.7%
• thought own risks to be higher	13.3%	9.9%	12.6%	14.0%	10.1%	13.1%	17.7%	17.0%	12.9%
• thought own risks to be lower	86.7%	90.1%	87.4%	86.0%	89.9%	86.9%	82.3%	83.0%	87.1%
Thought there would be side effects	26.0%	23.8%	27.7%	29.2%	23.8%	25.2%	29.7%	23.3%	25.8%
Doubted product would work	30.0%	30.1%	29.4%	33.6%	30.0%	29.6%	29.2%	30.4%	27.3%
Thought there would be other benefits to the product	32.8%	32.0%	36.5%	31.3%	32.7%	32.5%	34.2%	34.5%	29.3%
Failed to consider whether they could afford the product	12.9%	12.1%	11.9%	13.7%	13.3%	11.1%	12.6%	14.1%	14.8%
Did not understand they would have to pay once per year over 10 years	12.2%	11.9%	12.5%	13.7%	11.9%	10.5%	11.3%	11.4%	14.5%

Table 8 - Participants reaching the end of the questionnaire, per sponsor

Logo	Total	Reached the end (%)	
		n	%
Mexican university	557	495	88.9
Foreign university	509	437	85.9
Environment Ministry	520	440	84.6
Health Ministry	538	473	87.9
Blue IDB	546	474	86.8
Red IDB	505	438	86.7
Spanish IDB	493	429	87.0
Blank logo	507	430	84.8
Total	4,175	3,616	86.6

Table 9 – Incidence of missing answers for respondents that reached the end of the survey

Logo	Total	missing at least one answer		missing at least four answers		missing at least seven answers	
		n	%	n	%	n	%
Mexican university	495	150	30.2%	68	13.8%	59	11.9%
Foreign university	437	130	29.7%	58	13.3%	53	12.1%
Environment Ministry	440	126	28.6%	47	10.6%	43	9.7%
Health Ministry	473	136	28.8%	59	12.4%	54	11.4%
Blue IDB	474	143	30.2%	55	11.5%	45	9.6%
Red IDB	438	144	32.9%	59	13.4%	57	13.1%
Spanish IDB	429	141	32.8%	49	11.5%	39	9.1%
Blank logo	430	124	28.9%	38	8.9%	33	7.7%
Total	3,616	1,094	30.2%	433	12.0%	383	10.6%

Table 10 - Time spent on first WTP question (5 in 10,000 mortality risk reduction)

Logo	Total	Under 5 seconds		5 to 15 seconds		15 to 25 seconds		25 seconds to 2		Over 2 minutes	
		n	%	n	%	n	%	n	%	n	%
Mexican university	480	11	2.3%	34	7.1%	88	18.3%	322	67.1%	25	5.2%
Foreign university	428	13	3.0%	35	8.2%	69	16.1%	295	68.9%	16	3.7%
Environment Ministry	433	11	2.5%	42	9.7%	78	18.0%	284	65.6%	18	4.2%
Health Ministry	458	12	2.6%	30	6.6%	62	13.5%	329	71.8%	25	5.5%
Blue IDB	460	10	2.2%	25	5.4%	71	15.4%	340	73.9%	14	3.0%
Red IDB	419	10	2.4%	35	8.4%	70	16.7%	281	67.1%	23	5.5%
Spanish IDB	408	5	1.2%	30	7.4%	64	15.7%	293	71.8%	16	3.9%
Blank logo	415	13	3.1%	38	9.2%	63	15.2%	276	66.5%	25	6.0%
Total	3,501	85	2.4%	269	7.7%	565	16.1%	2,420	69.1%	162	4.6%

Note: of the respondents that reached the end of the survey 115 did not reply to the first WTP question.

Table 11 – Time spent to reach the end of the questionnaire

Logo	Obs.	Length (mins.)	
		Avg.	Std Dev.
Mexican university	465	27.7	14.1
Foreign university	410	27.0	13.6
Environment Ministry	406	28.0	14.5
Health Ministry	445	27.7	13.5
Blue IDB	442	26.5	12.5
Red IDB	401	27.0	13.8
Spanish IDB	387	27.5	13.8
Blank logo	398	26.4	13.6
Total	3,354	27.2	13.7

Note: drops incomplete surveys and observations with missing WTP data or missing socio-economic information (missing income, missing insurance status).

Appendix 2 - Test results

Table 12 - participant engagement, comparison of means (t-tests)

	Completion rates	Item response rates	Time on WTP question	Time to end
Test 1				
Mexican Univ. Vs Health Min.	1.328	0.058	-1.458	0.204
Mexican Univ. Vs Env. Min.	2.035**	1.039	0.461	-0.123
Mexican Univ. Vs blue logo IDB	1.311	1.395	-2.547**	1.354
Mexican Univ. Vs red logo IDB	0.867	-1.053	-0.352	0.719
Mexican Univ. Vs Spanish logo IDB	1.355	0.906	-1.829*	0.183
Foreign Univ. Vs Health Min.	-0.600	0.064	-0.798	-0.432
Foreign Univ. Vs Env. Min.	0.690	1.022	1.058	-0.712
Foreign Univ. Vs blue logo IDB	0.983	1.370	-1.860*	0.684
Foreign Univ. Vs red logo IDB	-0.564	-0.965	0.3901	-0.010
Foreign Univ. Vs Spanish logo IDB	-0.085	0.938	-1.047	-0.533
Health Min. Vs blue logo IDB	0.692	1.326	-1.080	1.160
Health Min. Vs red logo IDB	0.047	-1.079	1.259	0.774
Health Min. Vs Spanish logo IDB	0.533	0.860	-0.216	0.232
Env. Min. Vs blue logo IDB	-0.619	0.328	-2.935***	1.410
Env. Min. Vs red logo IDB	-1.312	-2.041**	-0.318	0.978
Env. Min. Vs Spanish logo IDB	-0.831	-0.135	-1.746*	0.464
Test 2				
Mexican Univ. Vs Foreign Univ.	-1.328	0.007	0.627	-0.625
Test 3				
Env. Min. Vs Health Min.	-1.301	-0.974	-1.874*	0.317
Test 4				
Spanish logo Vs English logo (blue)	0.216	0.231	-0.700	0.950
Spanish logo Vs English logo (red)	0.186	-2.038**	1.516	0.485
Test 5				
Red logo IDB Vs blue logo IDB	-0.026	-2.326**	-2.259**	-0.440
Test 6				
Blank logo Vs Mexican Univ.	-2.329**	-1.875*	0.010	-1.180
Blank logo Vs Foreign Univ.	-0.983	-1.843*	-0.595	-0.560
Blank logo Vs Health Min.	-1.596	-1.805*	-1.397	-0.998
Blank logo Vs Env. Min.	-0.296	-0.830	0.454	-1.235
Blank logo Vs. blue logo IDB	-0.916	-0.518	-2.451**	0.075
Blank logo Vs. red logo IDB	-0.922	-2.766***	-0.193	-0.335
Blank logo Vs. Spanish logo IDB	-1.104	-0.732	-1.705*	-0.806

* significant at 10%; ** significant at 5%; *** significant at 1%.

Note: t-value for tests for difference in means, two-tailed, unpaired; a negative t-test for item response rates means that the average occurrence of missing data is lower in the first than in the second type of survey sponsor listed; item response rates - tests for at least 7 questions missing; time on WTP question - proportion of respondents spending 25 seconds to 2 minutes on the first WTP question; time to end - survey length in minutes for surveys taking less than an hour and a half.

Table 13 - Marginal effects for the Environment Ministry logo and the Health Ministry logo versus marginal effects for the other survey sponsor types

	Contemporaneous				Latent	
	WTP5		WTP10		WTP5	
	sample A	sample C	sample A	sample C	sample A	sample C
1. Without Environment and Health Ministry	2,522.7	2,348.6	2,975.0	3,014.7	2,508.1	2,487.7
2. Environment Ministry only	1,984.2	1,832.6	2,186.9	2,257.4	1,902.4	1,907.8
(difference to other sponsors)	*21.3%*	*22.0%*	*26.5%*	*25.1%*	*24.1%*	*23.3%*
3. Health Ministry only	2,210.8	2,036.6	2,557.8	2,543.0	2,145.4	2,063.9
(difference to other sponsors)	*12.4%*	*13.3%*	*14.0%*	*15.6%*	*14.5%*	*17.0%*

Note, dummies set as: 1. Environment Ministry= Health Ministry=0, others=1; 2. Environment Ministry=1, others=0; 3. Health Ministry=1, others=0.

Appendix 3 – Logos

Figure 2 – Survey sponsor logos tested (excluding the 'blank' logo)

List of captions

Figure 1 - Example of questionnaire page and logo positioning on the page

Table 1 - Distribution of the sample by age group, gender and logo version

Logo	Age group	Male	Female	Logo	Age group	Male	Female
Mexican university	**40 - 45**	205	185	**Blue IDB**	**40 - 45**	155	218
		72.4%	*67.5%*			*64.9%*	*71.0%*
	46-50	78	89		**46-50**	84	89
		27.6%	*32.5%*			*35.1%*	*29.0%*
	Total	283	274		**Total**	239	307
Foreign university	**40 - 45**	192	178	**Red IDB**	**40 - 45**	175	181
		72.2%	*73.3%*			*67.3%*	*73.9%*
	46-50	74	65		**46-50**	85	64
		27.8%	*26.7%*			*32.7%*	*26.1%*
	Total	266	243		**Total**	260	245
Environment Ministry	**40 - 45**	165	202	**Spanish IDB**	**40 - 45**	154	186
		66.5%	*74.3%*			*68.8%*	*69.1%*
	46-50	83	70		**46-50**	70	83
		33.5%	*25.7%*			*31.3%*	*30.9%*
	Total	248	272		**Total**	224	269
Health Ministry	**40 - 45**	175	198	**Blank logo**	**40 - 45**	163	171
		69.4%	*69.2%*			*65.2%*	*66.5%*
	46-50	77	88		**46-50**	87	86
		30.6%	*30.8%*			*34.8%*	*33.5%*
	Total	252	286		**Total**	250	257
Male	**40 - 45**	1,384		**Female**	**40 - 45**	1,519	
		68.4%				*70.6%*	
	46-50	638			**46-50**	634	
		31.6%				*29.4%*	
	Total male	2,022			**Total female**	2,153	

Table 2 - Internal scope tests, contemporaneous risk (5 vs 10 in 10,000 risk reduction)

		Sample A		Sample C		Sample Z				Sample A		Sample C		Sample Z	
		n	mean	*n*	mean	*n*	mean			*n*	mean	*n*	mean	*n*	mean
Mexican University	WTP_10	466	3040.8	423	3054.8	255	3314.2	Foreign University	WTP_10	394	3282.9	359	3279.0	226	3654.6
	WTP_5	466	2638.2	423	2394.5	255	2620.5		WTP_5	394	2752.7	359	2591.5	226	2973.6
	p value		0.00		0.00		0.00		*p* value		0.00		0.00		0.00
	ratio		*1.15*		*1.28*		*1.26*		*ratio*		*1.19*		*1.27*		*1.23*
		Sample A		Sample C		Sample Z				Sample A		Sample C		Sample Z	
		n	mean	*n*	mean	*n*	mean			*n*	mean	*n*	mean	*n*	mean
Environment Ministry	WTP_10	389	2317.2	353	2380.3	214	2383.2	Health Ministry	WTP_10	430	2653.6	390	2648.8	249	2822.5
	WTP_5	389	2113.6	353	1967.2	214	1953.9		WTP_5	430	2336.2	390	2168.3	249	2318.7
	p value		0.00		0.00		0.00		*p* value		0.00		0.00		0.00
	ratio		*1.10*		*1.21*		*1.22*		*ratio*		*1.14*		*1.22*		*1.22*
		Sample A		Sample C		Sample Z				Sample A		Sample C		Sample Z	
		n	mean	*n*	mean	*n*	mean			*n*	mean	*n*	mean	*n*	mean
International Development Bank - blue logo	WTP_10	426	3118.0	395	3166.7	272	3177.3	International Development Bank - red logo	WTP_10	380	2649.7	354	2753.9	214	3012.0
	WTP_5	426	2578.1	395	2454.6	272	2452.4		WTP_5	380	2234.4	354	2189.8	214	2439.0
	p value		0.00		0.00		0.00		*p* value		0.00		0.00		0.00
	ratio		*1.21*		*1.29*		*1.30*		*ratio*		*1.19*		*1.26*		*1.23*
		Sample A		Sample C		Sample Z				Sample A		Sample C		Sample Z	
		n	mean	*n*	mean	*n*	mean			*n*	mean	*n*	mean	*n*	mean
International Development Bank - Spanish logo	WTP_10	369	3031.2	341	3066.6	226	3048.7	Blank logo	WTP_10	387	3160.3	342	3204.1	210	3374.1
	WTP_5	369	2580.8	341	2428.9	226	2470.4		WTP_5	387	2822.4	342	2533.0	210	2641.8
	p value		0.00		0.00		0.00		*p* value		0.00		0.00		0.00
	ratio		*1.17*		*1.26*		*1.23*		*ratio*		*1.12*		*1.26*		*1.28*

Table 3 - Internal scope tests, latent risk (present 5 vs future 5 in 10,000 risk reduction)

		Sample A		Sample C		Sample Z				Sample A		Sample C		Sample Z	
		n	mean	*n*	mean	*n*	mean			*n*	mean	*n*	mean	*n*	mean
Mexican University	WTP_future	452	2665.4	410	2604.0	255	2730.5	Foreign University	WTP_future	394	2804.3	359	2712.9	226	2942.2
	WTP_5	452	2675.0	410	2425.8	255	2620.5		WTP_5	394	2752.7	359	2591.5	226	2973.6
	p value		0.94		0.15		0.52		*p* value		0.68		0.33		0.85
	ratio		*1.00*		*1.07*		*1.04*		*ratio*		*1.02*		*1.05*		*0.99*
		Sample A		Sample C		Sample Z				Sample A		Sample C		Sample Z	
		n	mean	*n*	mean	*n*	mean			*n*	mean	*n*	mean	*n*	mean
Environment Ministry	WTP_future	389	2132.8	353	2136.3	214	2084.1	Health Ministry	WTP_future	430	2381.8	390	2309.6	249	2490.6
	WTP_5	389	2113.6	353	1967.2	214	1953.9		WTP_5	430	2336.2	390	2168.3	249	2318.7
	p value		0.86		0.72		0.25		*p* value		0.68		0.21		0.21
	ratio		*1.01*		*1.09*		*1.07*		*ratio*		*1.02*		*1.07*		*1.07*
		Sample A		Sample C		Sample Z				Sample A		Sample C		Sample Z	
		n	mean	*n*	mean	*n*	mean			*n*	mean	*n*	mean	*n*	mean
International Development Bank - blue logo	WTP_future	426	2646.0	395	2657.3	272	2613.2	International Development Bank - red logo	WTP_future	380	2346.1	354	2348.1	214	2487.4
	WTP_5	426	2578.1	395	2454.6	272	2452.4		WTP_5	380	2234.4	354	2189.8	214	2439.0
	p value		0.64		0.14		0.36		*p* value		0.31		0.15		0.74
	ratio		*1.03*		*1.08*		*1.07*		*ratio*		*1.05*		*1.07*		*1.02*
		Sample A		Sample C		Sample Z				Sample A		Sample C		Sample Z	
		n	mean	*n*	mean	*n*	mean			*n*	mean	*n*	mean	*n*	mean
International Development Bank - Spanish logo	WTP_future	369	2825.3	341	2835.4	226	2843.8	Blank logo	WTP_future	387	2924.4	342	2952.6	210	3109.2
	WTP_5	369	2580.8	341	2428.9	226	2470.4		WTP_5	387	2822.4	342	2533.0	210	2641.8
	p value		0.09		0.00		0.03		*p* value		0.49		0.00		0.00
	ratio		*1.09*		*1.17*		*1.15*		*ratio*		*1.04*		*1.17*		*1.18*

Table 4 - t-tests for differences in mean WTP for different survey sponsor types

	Contemporaneous				Latent	
	WTP_5		WTP_10		WTP _5	
	Sample A	Sample C	Sample A	Sample C	Sample A	Sample C
Test 1						
Mexican Univ. Vs Health Min.	1.401	1.096	1.685*	1.670*	1.177	1.191
Mexican Univ. Vs Env. Min.	2.363**	2.008**	3.062***	2.708***	2.227**	1.886*
Mexican Univ. Vs blue logo IDB	0.406	-0.127	-0.154	-0.285	0.081	-0.217
Mexican Univ. Vs red logo IDB	1.878*	1.035	1.690*	1.263	1.329	1.044
Mexican Univ. Vs Spanish logo IDB	0.374	-0.013	0.179	0.089	-0.613	-0.861
Foreign Univ. Vs Health Min.	1.649*	1.655*	2.323**	2.208**	1.649*	1.528
Foreign Univ. Vs Env. Min.	2.584***	2.504**	3.618***	3.170***	2.644***	2.177**
Foreign Univ. Vs blue logo IDB	0.701	0.554	0.613	0.396	0.620	0.212
Foreign Univ. Vs red logo IDB	2.125**	1.615	2.322**	1.820*	1.797*	1.394
Foreign Univ. Vs Spanish logo IDB	0.655	0.618	0.874	0.700	-0.076	-0.427
Health Min. Vs blue logo IDB	-1.016	-1.221	-1.881*	-2.004**	-1.110	-1.423
Health Min. Vs red logo IDB	0.437	-0.091	0.016	-0.401	0.151	-0.159
Health Min. Vs Spanish logo IDB	-0.976	-1.044	-1.431	-1.513	-1.717*	-1.967**
Env. Min. Vs blue logo IDB	-2.000**	-2.146**	-3.318***	-3.084***	-2.186**	-2.131**
Env. Min. Vs red logo IDB	-0.539	-0.984	-1.376	-1.454	-0.923	-0.8777
Env. Min. Vs Spanish logo IDB	-1.916*	-1.914*	-2.769***	-2.520**	-2.609***	-2.714***
Test 2						
Mexican Univ. Vs Foreign Univ.	-0.307	-0.669	-0.742	-0.648	-0.538	-0.411
Test 3						
Env. Min. Vs Health Min.	-0.943	-0.851	-1.381	-1.046	-1.057	-0.705
Test 4						
Spanish logo Vs English logo (blue)	0.011	-0.107	-0.331	-0.365	0.696	0.670
Spanish logo Vs English logo (red)	1.444	0.993	1.447	1.126	1.871*	1.841*
Test 5						
Red logo IDB Vs blue logo IDB	-1.503	-1.169	-1.897*	-1.588	-1.273	-1.281
Test 6						
Blank logo Vs Mexican Univ.	0.590	0.452	0.313	0.412	1.018	1.325
Blank logo Vs Foreign Univ.	0.267	-0.227	-0.443	-0.255	0.444	0.853
Blank logo Vs Health Min.	1.952*	1.488	1.999**	2.079**	2.155**	2.459**
Blank logo Vs Env. Min.	2.916***	2.396**	3.414***	3.143***	3.182***	3.121***
Blank logo Vs. blue logo IDB	0.995	0.333	0.168	0.141	1.109	1.136
Blank logo Vs. red logo IDB	2.457**	1.457	2.02**	1.681*	2.317**	2.340**
Blank logo Vs. Spanish logo IDB	0.935	0.415	0.48	0.485	0.364	0.412

Table 5 - Construct validity tests (regression)

	Contemporaneous WTP_5				Contemporaneous WTP_10				Latent WTP_5			
	Sample A		Sample C		Sample A		Sample C		Sample A		Sample C	
	coefficient	s.e.	coefficient	s.e.	coefficient	s.e.	coefficient	s.e.	coefficient	s.e.	coefficient	s.e.
Age (years)	57.85 ***	21.02	50.58 **	20.70	35.87	22.14	32.70	23.36	69.74 ***	22.40	68.96 ***	23.23
Female (=1)	-254.19 *	129.83	-289.28 **	127.49	-331.39 **	136.72	-378.59 ***	143.85	-258.11 *	138.43	-262.00 *	143.15
Household pc income (MXN, log)	258.36 ***	42.97	250.52 ***	42.52	280.70 ***	45.24	254.27 ***	47.94	182.69 ***	45.76	156.63 ***	47.68
Married (=1)	-128.72	131.16	-152.11	129.15	-124.98	138.09	-169.83	145.69	-127.26	139.78	-125.81	144.96
University education (=1)	-126.85	134.87	-11.52	132.70	-6.34	142.05	-13.30	149.78	-126.44	143.79	-99.74	149.04
Very religious (=1)	-577.07 ***	170.15	-476.63 ***	166.29	-483.49 ***	179.14	-421.26 **	187.47	-915.24 ***	182.15	-832.23 ***	187.23
Smoker (=1)	182.46	135.82	213.95	132.90	254.94 *	142.99	266.79 *	149.94	232.35	144.74	268.31 *	149.21
Own insurance (=1)	238.20	159.92	282.31 *	156.15	443.09 ***	168.27	491.47 ***	176.13	321.13 *	170.51	358.93 **	175.35
Heart disease (=1)	-159.04	387.82	-258.69	382.50	-3.77	408.51	-5.12	431.96	-20.64	415.03	38.05	430.79
Bronchitis (=1)	496.86	326.46	613.93 *	319.92	549.64	344.17	686.29 *	361.40	250.69	349.41	402.00	361.01
Asthma (=1)	-33.19	367.18	-225.61	361.36	-64.42	387.18	-159.28	408.14	308.06	391.07	192.39	405.70
High blood pressure (=1)	394.31 **	183.84	289.32	181.22	386.33 **	193.48	453.36 **	204.39	52.74	195.87	72.85	203.25
Cancer (=1)	61.79	524.64	210.56	503.38	74.77	552.73	-25.08	568.69	411.60	556.36	354.77	562.56
Hospital admission (=1)	80.04	317.83	128.14	313.72	198.62	334.92	288.91	354.35	40.45	339.53	124.67	353.19
Emergencies admission (=1)	8.85	300.87	64.31	297.71	-116.45	317.33	-142.12	336.30	-191.70	321.42	-206.69	334.63
Mexican university (=1)	-143.18	245.30	-79.82	243.05	-95.70	258.46	-67.18	274.34	-220.26	261.76	-264.68	273.16
Foreign university (=1)	53.76	253.76	173.17	250.94	227.40	267.31	192.21	283.25	91.89	270.35	-8.75	281.58
Environment Ministry (=1)	-656.60 **	254.97	-483.86 *	252.79	-783.34 ***	268.51	-719.93 **	285.15	-681.63 **	271.84	-671.07 **	283.78
Health Ministry (=1)	-482.02 *	248.66	-371.04	246.40	-461.52 *	261.64	-517.45 *	277.84	-499.13 *	265.17	-603.16 **	276.75
Blue IDB (=1)	-247.93	249.00	-85.00	245.70	-47.21	262.09	-30.99	277.20	-215.61	265.45	-210.23	275.92
Red IDB (=1)	-514.82 **	255.77	-240.96	251.62	-400.99	269.21	-312.40	283.86	-404.26	272.52	-404.11	282.45
Spanish IDB (=1)	-184.71	257.88	-29.97	254.32	-52.11	271.42	-33.12	286.84	-9.30	275.06	7.26	285.64
Time on WTP5, 5 secs to 15 secs (=1)	989.56 **	481.67	1,024.37 **	502.68	553.87	502.97	434.04	561.53	307.61	508.12	473.47	558.12
Time on WTP5, 15 secs to 25 secs (=1)	336.06	448.89	270.57	470.49	-218.80	468.20	-348.40	524.72	-425.08	473.24	-306.15	521.85
Time on WTP5, 25 secs to 2 mins (=1)	1,085.49 **	428.68	1,176.89 ***	451.64	738.94 *	446.72	682.01	503.22	138.40	451.41	291.91	500.39
Time on WTP5, more than 2 mins (=1)	1,713.30 ***	527.31	1,831.58 ***	541.53	1,213.44 **	551.74	1,280.83 **	605.98	705.54	556.74	990.44	601.54
Time to completition (mins)	8.77 *	4.67	6.39	4.65	5.36	4.91	2.95	5.24	2.55	4.98	0.95	5.22
Doubted product would work (=1)	-378.66 ***	139.36	-423.10 ***	137.29	-491.82 ***	146.73	-519.25 ***	154.91	-564.45 ***	148.71	-576.06 ***	154.29
Risk doesn't apply to them (=1)	63.27	140.96	28.10	138.68	-5.22	148.41	3.88	156.44	214.15	150.07	241.73	155.47
Didn't understand payment timing (=1)	-50.75	193.53	-134.94	192.48	-5.06	203.85	0.21	217.26	116.20	206.25	110.51	216.15
Didn't think about ability to pay (=1)	-216.51	189.48	-415.81 **	189.71	-346.29 *	199.56	-338.46	213.89	-327.43	201.82	-287.51	212.74
Thought own risk of dying was higher (=1)	-1,019.39 ***	326.75	-1,016.94 ***	316.84	-1,149.47 ***	344.16	-1,200.79 ***	357.03	-1,086.65 ***	348.21	-1,108.95 ***	355.33
Thought about other benefits (=1)	-638.20 ***	132.73	-716.96 ***	129.46	-737.34 ***	139.74	-817.33 ***	146.05	-873.73 ***	141.75	-964.42 ***	145.63
Thought there would be side effects (=1)	-59.27	146.73	-111.95	145.23	-98.18	154.48	-83.34	163.83	-182.71	156.51	-111.68	163.12
Federal District (=1)	446.39	296.77	514.79 *	296.31	418.17	312.60	458.06	334.61	281.63	316.09	301.63	332.73
Mexico State (=1)	640.22 **	324.34	601.69 *	322.41	641.02 *	341.70	610.12 *	364.12	400.69	345.69	358.82	362.26
Jalisco (=1)	236.76	312.70	268.14	311.56	240.48	329.39	238.60	351.84	90.79	333.07	101.03	349.83
Nuevo León (=1)	339.91	337.37	496.16	336.51	271.55	355.41	336.79	380.04	-32.51	359.81	58.94	378.25
Puebla (=1)	423.51	558.31	447.54	543.87	421.44	588.37	571.00	613.21	566.95	595.55	728.78	610.00
Yucatan (=1)	-438.40	671.15	-219.50	636.48	-292.40	706.86	-328.38	718.94	-493.55	711.15	-468.31	710.97
Constant	-2,781.05 **	1,085.20	-2,708.22 **	1,078.28	-1,686.78	1,142.60	-1,196.98	1,216.47	-1,891.80	1,155.47	-1,623.19	1,209.18
Number of observations	3,224.00		2,942.00		3,224.00		2,942.00		3,224.00		2,942.00	