What Differences Do Certainty and Cheap Talk Make in Eliciting Willingness to Pay for Education?*

Brandon C. Koford
Department of Economics
John B. Goddard School of Business and Economics
Weber State University
Ogden, UT 84408
Email: brandonkoford@weber.edu

Abstract: Hypothetical estimates of willingness to pay tend to overstate real willingness to pay. Several methods to mitigate this so called hypothetical bias have been developed. This paper contributes by presenting the first simultaneous comparison of three common hypothetical bias mitigation methods as well as their interactions. In addition, the study represents the first use of the contingent valuation method to value higher education. The findings of the study suggest that models adjusting for certainty according to definitely sure yes responses are most similar to the model that adjusts for certainty at a level of 8 or higher. These calibrations yield point estimates of mean willingness to pay only a quarter to a third of estimates that do not account for certainty. Surprisingly the cheap talk treatment leads to yes respondents indicating responses with a higher level of certainty and higher mean willingness to pay.

Key words: Willingness to pay, hypothetical bias, certainty statements, cheap talk, returns to education

JEL classification: D61, I20

I. Introduction

Contingent valuation is a survey-based methodology used for placing monetary values on goods with external benefits or goods which are difficult to value in the marketplace (Carson, 2000). The method is often called a stated-preference method because it asks respondents to state what they would be willing to pay to obtain the good or service described in the survey. It overcomes the absence of ordinary markets by creating a hypothetical market within the survey in which respondents have the opportunity to purchase the good in question (Mitchell and Carson, 1989). Since the landmark study by Randall et al. (1974), the method has been refined and applied widely but faces criticism because of reliance on hypothetical, rather than real, economic commitment.

The criticism is based on the fact that several so called biases have been detected in the values elicited through the contingent valuation method. While research has shown that some biases can be avoided through careful study design and implementation (Carson et al., 2001), hypothetical bias has persisted in contingent valuation (Cummings and Taylor, 1999, List, 2001, List and Gallet, 2001, Little and Berrens, 2004). Hypothetical bias occurs when contingent valuation respondents state they are willing to pay more for a good than they would be willing to pay in an actual purchase situation and can arise when willingness to pay questions have no real monetary consequence (Whitehead and Cherry, 2007). Because no money changes hands, concern exists that the hypothetical responses are not reflective of what people would do if they actually had to pay money based on their decisions.

Because of the importance of obtaining accurate estimates of private values for public goods and services, researchers have devoted much attention to mitigating hypothetical bias. The purpose of this paper is to compare two of the most common mitigation strategies, cheap talk and certainty statements, in valuing the same good. The essential elements of cheap talk consist of an identification and definition of hypothetical bias along with an exhortation to avoid it when making willingness to pay decisions. The purpose of the cheap talk exhortation is to put respondents in a frame of mind similar to one in which a real expenditure takes place.

Certainty statements, on the other hand, are designed to elicit the respondent's certainty about willingness to pay in order to identify respondents who would actually do what they say. Certainty typically is measured on one of two scales: a Likert-style 10 point scale, with higher numbers indicating more certainty, and a "probably sure, definitely sure" scale. The certainty statements are used to adjust hypothetical willingness to pay responses based on the level of certainty elicited, the idea being that respondents with a high level of certainty are more representative of individuals making an actual purchase (Champ et al., 1997). Respondents who say they are definitely sure they would pay are more likely to behave in a way that is consistent with their stated intention.

Both mitigation approaches have been used to successfully mitigate hypothetical bias; however little is known about how cheap talk and the two certainty formats compare. This paper contributes by comparing each mitigation strategy. In addition, the paper uses contingent valuation for the first time to value higher education. The results indicate that accounting for certainty reduces willingness to pay to one quarter to one third of baseline estimates. In addition, the cheap talk treatment leads to yes respondents indicating responses with higher level of certainty.

II. Related Literature

In the game theory literature, cheap talk has been defined as any nonbinding communication that takes place between two players prior to any binding commitments (Cummings and Taylor, 1999). Similarly, in contingent valuation, cheap talk is a nonbinding communication that takes place before any hypothetical commitment is made. Cummings and Taylor (1999) used an eight paragraph, cheap talk script to explain hypothetical bias to respondents and exhort them to avoid it. They showed the effectiveness of the cheap talk script by first providing results indicating the existence of hypothetical bias in the absence of the script[1]. Next, they showed that cheap talk successfully mitigated the hypothetical bias for each of their experimental scenarios. After the cheap talk treatment, hypothetical willingness to pay was not statistically different from real willingness to pay. Subsequent attempts to use cheap talk have led to mixed results.

List (2001) found that cheap talk mitigated hypothetical bias only for some respondents. Cheap talk worked successfully for baseball card traders having little experience with the card being valued, but

2

did not work for experienced traders (dealers). Blumenschein et al. (2008) also found cheap talk to be ineffective for experienced respondents valuing a diabetes management program. Aadland and Caplan (2003) found that a short version of the cheap talk script partially mitigated hypothetical bias for a curbside recycling program. Brown et al. (2003) found cheap talk to work well for higher payment values but not for lower ones. The mixed results regarding cheap talk suggest that more research is necessary before a conclusion is reached concerning the usefulness of cheap talk in mitigating hypothetical bias.

While some researchers were investigating cheap talk, others sought different means to mitigate hypothetical bias. Champ et al. (1997) created a survey to value road removal on the north rim of the Grand Canyon. In developing their survey, the authors found that respondents in the hypothetical treatment who had stronger convictions regarding attitudinal questions were more similar to respondents in the real treatment who actually paid for road removal. This finding led the authors to create a question in which respondents could indicate the strength of their conviction regarding willingness to pay. The question took the form of a 10 point Likert-style certainty scale in which respondents could indicate how certain they were of their willingness to pay decision. The scale proved fruitful as the hypothetical willingness to pay for respondents indicating a certainty of 10 was not significantly different than respondents answering a real willingness to pay question.

Others also used the Likert-style certainty scale to mitigate hypothetical bias. Poe et al. (2002) found that willingness to pay for respondents indicating a certainty of 7 or higher was not significantly different than actual willingness to pay for a green energy program in New York. Champ and Bishop (2001) found hypothetical willingness to pay with a certainty of 8 or higher was most like real willingness to pay for wind generated electricity. While the research is clear that the Likert-style certainty scale has worked successfully, a drawback is the need to estimate a certainty value for which hypothetical willingness to pay most closely approximates real willingness to pay. In other words, it must be determined if the critical value of certainty is, say, 7, 8, 9, or 10. The choice of the critical value can be difficult if comparison with real behavior cannot be made.

Development of follow up certainty statements with two options also occurred during the late 1990s.[2] Johannesson et al. (1998) used an approach that obviated the need to estimate a cutoff by using a two point certainty scale. Johannesson et al.'s (1998) use of a "fairly sure, absolutely sure" (in Swedish) scale resulted in an underestimation of willingness to pay when only those that were "absolutely sure" of their hypothetical response were considered. Blumenschein et al. (1998) translated the two point scale to English as "probably sure, definitely sure" and found that willingness to pay of definitely sure respondents was not statistically different than that of respondents making real purchase decisions for sunglasses. Blumenschein et al. (2001) and Blumenschein et al. (2008) were also able to match hypothetical and real willingness to pay using the "definitely sure" follow-up responses to mitigate hypothetical bias. Another recent paper that illustrates the usefulness of identifying respondents with high levels of expressed certainty is Flachaire and Hollard (2007). They presented a model with follow-up certainty statements and uncertain willingness to pay. While the primary concern of the paper was related to starting point bias, the authors found that uncertain respondents tend to answer yes to willingness to pay questions. Taken together these results suggest that respondent certainty allows for separation of those individuals who have not decided about their willingness to pay, but still say yes, and those that have made up their mind concerning willingness to pay.

The current study contributes to the literature in two significant ways. First, it provides a comparison of cheap talk, the Likert-style certainty scale, and the "probably sure, definitely sure" certainty scale. The comparison will help researchers understand the relative performance of each mitigation approach and guide their implementation in future studies. Comparisons of the various approaches to mitigate hypothetical bias described herein have been rather limited. Blumenschein et al. (2008) compared cheap talk and "probably sure, definitely sure" certainty scales. Their results indicated that the "definitely sure" certainty statements effectively mitigated hypothetical bias while cheap talk was ineffective. Whitehead and Cherry (2007) compared the use of a budget constraint reminder and an exhortation to answer the willingness to pay question as if it were real with the Likert-style certainty scale. They found that willingness to pay was similar when either method of mitigation was used. Other comparisons of

4

various mitigation approaches exist (Welsh and Poe, 1998, Vossler et al., 2003, Blomquist et al., 2009a), but none provide the simultaneous comparison of the three approaches discussed here.

Second, the study represents the first use of certainty correction and cheap talk mitigation methods in valuing higher education. Though the contingent valuation method has found success in valuing societal or cultural institutions, it has not been extended to higher education. For example, Thompson et al. (2002) used contingent valuation to value the arts in Kentucky and found that contingent valuation was useful for analyzing the public's value for changes in funding for art agencies. Martin (1994) used contingent valuation to value a museum in Quebec and found that the social value of the museum exceeded its public subsidy. Noonan (2003) reviewed additional studies in which contingent valuation has been applied to cultural and societal institutions. These studies exemplify the versatility and utility of using contingent valuation for goods with possible social externalities. This study will expand on that theme by applying contingent valuation to a new application, that of higher education.

III. Survey Instrument Design

The context for the study is a survey designed to determine the value Kentuckians place on the Kentucky Community and Technical College System (KCTCS). The survey contained four main sections. The first section was designed to familiarize respondents with KCTCS. It included a short introduction and several questions asking respondents about their experience with and knowledge of KCTCS. In the second section, respondents were asked to allocate a fixed increment in state budget dollars to various state program areas to remind respondents that increased spending in one budget area is often accompanied by decreased spending in another area. In a final allocation exercise, the survey asked respondents to indicate their belief of how the benefits of education accrue to society.

The third section contained the valuation scenario along with questions regarding response certainty. To obtain valuations, the survey asked individuals to consider a change in the size of KCTCS. Four different questionnaires described the change in size. Two versions described a 10 or 25 percent expansion, while another two versions described a 10 or 25 percent reduction. The survey told individuals that the expansion of the system could be achieved through the payment of additional taxes. Similarly,

respondents were told that the payment of additional taxes would provide funding to avoid the reduction in the size of the system. In the last section of the survey, respondents were asked several demographic questions.

A. *Elicitation for the Education Good*

The survey described the expansion in terms of the number of programs offered through the community and technical college system. The proposed 10 percent expansion was said to increase the number of programs offered from 96 to 105 and be accompanied by an accommodating increase in the number of faculty, staff, and structures. The other expansion/reduction scenarios were created in a parallel manner. The survey was used to create a hypothetical referendum in which respondents had a chance to vote for or against the proposed expansion. The respondent was told that if the referendum passed, there would be a one-time increase in their taxes. The respondent was then asked the following question:

> "Would you vote for the referendum to expand the Kentucky Community and
> Technical College System by *10%* here and now if you were required to pay a one
> time *$T* out of your own household budget?"

where *T* was an amount from the following set: 400, 250, 200, 150, 125, 100, 75, and 25. Only one tax amount was presented to each respondent, but different amounts were presented to different individuals so that the value of KCTCS could be estimated. The values of the tax were chosen based on input from focus groups and from testing the survey on possible respondents.[3] While various valuation formats exist, the study follows Arrow et al. (1993) and uses the referendum format. The referendum format provides the respondent with a familiar scenario and has clear economic implications in so much as a yes vote increases the probability of the respondent having to pay something as a result of their choice (Mitchell and Carson, 1989).

B. *Cheap Talk*

After a short description of the referendum, those individuals receiving the cheap talk treatment were presented with the cheap talk script. The script read:

Before you decide on the referendum, consider a problem that typically comes up in studies like this one. This is a hypothetical purchase question—not a real one. If you say that you would vote for the referendum, you would not have to actually pay money if the referendum passed. But, we would like for you to respond to the question as though your response would involve a real cash payment. And this is the problem. On average, more people vote "yes" when the referendum is hypothetical than when it is real. In real referendums, when we are faced with the possibility of having to spend our money, we think about our options: if we spend money on the referendum, that's money we don't have to spend on other things.

So, when deciding on the referendum ask yourself, "If this were a real referendum and I had to pay **$T** if the referendum passed, do I really want to spend my money this way?" If you really do, vote yes; if you don't, vote no.

In any case, please vote just exactly as you would vote if you were really going to face the consequences of your vote, which is to pay money if the proposition passes.

The cheap talk script used in the survey can be considered of medium length. It is shorter than the script implemented by Cummings and Taylor (1999), but maintains its essential elements: an explanation of hypothetical bias, a statement of why real and hypothetical responses may be different, and a request to avoid hypothetical bias. The script is also somewhat longer than those used in Aadland and Caplan (2003) and Poe (2002). While some short cheap talk scripts have not been as effective as the script in Cummings and Taylor (1999) (Poe, et al., 2002, Aadland and Caplan, 2006), the idea here is that using a script containing the main elements of Cummings and Taylor may provide a better test of the effectiveness of shorter cheap talk scripts.

C. *Certainty of Willingness to Pay*

After the referendum question, the survey asks respondents to indicate their certainty with which they are willing to pay the tax amount. Certainty is assessed on two scales. The "probably sure, definitely sure" scale and the 0-10 Likert-style scale, with 0 indicating very uncertain responses and 10 indicating very certain responses. The scales read:

Are you "probably sure" or "definitely sure" that you would contribute $T for the expansion of the Kentucky Community and Technical College System?

7

| Probably Sure | ☐ | 1 |
| Definitely Sure | ☐ | 2 |

You answered YES to the referendum vote, on a scale from 0 to 10, how certain are you of your answer? Please select your answer on the scale below.

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

0   1   2   3   4   5   6   7   8   9   10

Very
Uncertain   *Very*
                                                              Certain

Respondents who answered no were asked parallel questions. Assessing certainty on two scales for the same individual allows for an intra-respondent comparison of the performance of each scale.

IV. The Survey and Data

Knowledge Networks, a privately owned survey research firm, administered the survey in June and July of 2007. The data were collected using two samples. The first sample consisted of respondents in Kentucky drawn from Knowledge Networks nationally representative web panel. The second sample was based on a white pages phone number (random) sample of Kentucky. Addresses were matched to phone numbers and the mail sample was distributed proportionally across the state.

Knowledge Networks invited 370 members of its web panel to participate in the web-based sample. Out of those 370, 275 responded, a response rate of 74 percent. The mail-based sample consisted of an initial mailing of 10,000 households. Of those 10,000, 804 were undeliverable and 9,196 were delivered. A total of 2,681 mail surveys were returned for a mail-based response rate of 29 percent (2,681 / 9,196). The response rate for the survey overall was 31 percent (2,956 / 9,566). Table 1 compares demographic information for survey respondents and for the U.S. Census Bureau's American Community Survey (ACS) 2007.[4] Demographic information for respondents to the KCTCS survey is very similar to that of Kentucky as a whole.

Table 2 reports definitions of the variables used in the analysis along with summary statistics. In addition to standard demographic information, the table also reports on variables indicating respondents'

experience with KCTCS. For example, 27 percent of respondents had taken a class from KCTCS, while roughly half of all respondents report as having a family member that had taken classes from the system. Another way in which people became familiar with KCTCS is through the knowledge of an employee of the system. Twenty-three percent of respondents indicate they knew someone working for KCTCS.

V. Econometric Methodology

Willingness to pay (WTP) can be represented as the difference in expenditure functions:

$$WTP = e(\, q, \, u) - e(\, q', \, u) \tag{1}$$

where q is the good under consideration and $q' > q$. In referendum style contingent valuation, the yes response to the willingness to pay questions depends on whether a respondent's willingness to pay is greater than T_i, where T_i is the proposed tax increase if the referendum passes.

Following Cameron (1988), begin by assuming that the unobserved continuous dependent variable is the respondent's true willingness to pay for the public good. Assume that willingness to pay is distributed logistically conditional on a vector of explanatory variables, x_i (with elements $j = 1, \ldots, p$), and has a mean of $g(x_i, \beta) = x_i'\beta$. Given the knowledge of T_i for each individual, it is possible to write

$$WTP_i = x_i'\beta + \eta_i, \tag{2}$$

where WTP_i is unobserved, but is manifested through the indicator variable I_i defined as

$$I_i = 1 \text{ if } WTP_i > T_i$$
$$= 0 \text{ otherwise,} \tag{3}$$

given the assumption that η_i is logistically distributed with mean zero and standard deviation b and alternative parameter[5] $\kappa = b\sqrt{3}/\pi$, then

$$\Pr(I_i = 1) = \Pr(WTP_i > T_i) = \Pr(\eta_i > T_i - x_i'\beta)$$
$$= \Pr(\eta_i / \kappa > (T_i - x_i'\beta)/\kappa)$$
$$= 1 - \Pr(\psi_i < (T_i - x_i'\beta)/\kappa), \tag{4}$$

where ψ is a "standardized" logistically distributed variable. Close inspection of the argument $(T_i - x'\beta)/\kappa$ reveals that it can be written as the inner product

$$- (T_i, x') \begin{bmatrix} -1/\kappa \\ \beta/\kappa \end{bmatrix} = -x^{*\prime}\gamma^{*}. \tag{5}$$

That is to say, in a standard logistic regression model with T_i on the right hand side along with the other explanatory variables, the coefficient on T_i is a point estimate of $-1/\kappa$ and the coefficients on the x_i are estimates of β/κ. It is then possible to solve for estimates of κ and β. Similar results are obtained when a normal distribution is assumed (Cameron and James, 1987). The parameters of interest may be obtained by maximum likelihood methods or by standard logistic estimation routines. Estimates of mean willingness to pay are calculated using the formula: $1 / b_{tax} \bullet ln(1 + e^{z})$ where b_{tax} is the coefficient on the variable associated with the amount of the tax, and z represents the constant in the logistic regression with the effect of all of the other covariates evaluated at their means and added to the constant.

VI. Empirical Results

A. *Yes Responses and Certainty*

Not all respondents are certain of their responses. Not all respondents who state that they would pay are sure they would pay. The mean certainty scale value for definitely sure respondents is 8.47 (standard deviation = 1.00) while the mean for probably sure respondents is 5.82 (standard deviation = 1.65). The Spearman correlation between definitely sure and certainty scale values is 0.7342.

Table 3 presents the percent of respondents answering yes to the willingness to pay at each price and over six definitions of yes. The first definition of yes is denoted "Baseline (All)" and treats all yes responses equally, regardless of the certainty of the respondent. The remaining five definitions of yes separate yes responses based on the expressed level of certainty of the respondent. Yes7 treats all yes responses with a certainty scale value of 7 or higher as yes, while all other responses are treated as no. Similarly, Yes8, Yes9, and Yes10 each separate responses based on certainty levels of 8, 9, and 10 respectively. The last definition of yes uses the probably sure-definitely sure scale and treats definitely sure responses as yes and all other responses as no.

Table 3 shows that for each definition of yes, the percentage of yes respondents tends to decrease with increases in the price level. This indicates that respondents are sensitive to price and provides

nonparametric evidence of a downward sloping demand curve. For the Baseline (All) definition of yes, 78 percent of respondents said yes at a price of $25. The percent of yes responses decreases to a low of 37 percent at a price of $400. If hypothetical bias is present, the Baseline (All) group is expected to have the highest percentage of yes respondents. This hypothesis is borne out in the table.

The percentage of yes respondents with respect to the cheap talk treatment exhibits an interesting pattern. Other studies that investigate cheap talk typically report a negative relationship between the cheap talk treatment and willingness to pay (Aadland et al., 2007, Cummings and Taylor, 1999, List, 2001, Lusk, 2003, Whitehead and Cherry, 2007). In contrast, Table 4 shows cheap talk has no significant effect in the Baseline group and, interestingly, a positive and significant effect on the percent of yes responses in the Definitely Sure group. The last row in the table focuses on the percent of yes responses and shows the effects of cheap talk in both the Baseline and Definitely Sure groups. For the Baseline group, cheap talk decreases the percent of yes responses by a statistically insignificant 1 percentage point, from 56 to 55 percent. For the Definitely Sure group, the effect is positive and much larger, with the percent of yes respondents increasing from 21 to 30 percent in the presence of cheap talk. This difference is significant at the 1 percent level. The results in Table 4 suggest that cheap talk interacts with certainty statements and that the two mitigation methods may not be complements with simple additive effects in the same direction. It is also important to note that certainty correction appears to still function to reduce the percent of yes responses, even in the presence of cheap talk. This can be seen by noting that the percent of yes respondents in the Definitely Sure with Cheap Talk group is lower than the Baseline with Cheap Talk group (30 percent < 56 percent).

B. *Logistic Estimation*

Table 4 examined the unconditional effect of cheap talk and certainty statements on the percent of yes responses. This section uses parametric analysis to investigate the role of cheap talk and certainty statements holding observable characteristics constant. Analysis using logistic regression is presented in Table 5. The independent variables include the amount of the tax, the presence of cheap talk, controls for the size of the expansion, income, education, age, number of years a respondent has lived in Kentucky, and

11

variables reflecting a respondent's familiarity with KCTCS. The dependent variable in all models is the response to the hypothetical referendum vote. The table presents five models with each model being denoted based on the definition of yes used for the dependent variable. Too few respondents answered yes with a certainty of 10 (1.79 percent) to allow for estimation of a Yes10 model (see Table 3).[6]

The effects of cheap talk found in Table 4 can also be seen in the logistic estimation results. In the Baseline model, the point estimate of the cheap talk coefficient is negative, but statistically insignificant.[7] With adjustment for certainty, however, the coefficient becomes positive and in some cases significant. This interesting finding indicates that cheap talk does not serve to mitigate hypothetical bias for the group as a whole and actually increases the probability of a yes response for respondents who exhibit greater certainty. The evidence seems to suggest that the cheap talk exhortation may cause those who answer yes to examine their preferences more carefully and give responses with greater certainty.[8]

VII. Comparisons of Willingness to Pay Estimates

Willingness to pay estimates based on the logistic regression models are presented in Table 6. The highest mean willingness to pay estimate comes from the baseline model without cheap talk (MWTP = $225) and the lowest estimate comes from the Yes9 model without cheap talk (MWTP = $39), a range of $186. The Yes9 model thus estimates mean willingness to pay to be 83 percent lower than the Baseline model.

The results concerning the effect of cheap talk reported in Tables 4 and 5 carry over to the estimates of mean willingness to pay. The baseline model with all yes responses treated equally and no cheap talk generates a mean willingness to pay estimate of $225 dollars per household. The estimated mean willingness to pay with cheap talk and no adjustment for certainty is $218. The difference is not significant (p-value = 0.7374), which is not surprising considering the cheap talk coefficient was small and insignificant in the corresponding baseline logistic regression.

The difference in mean willingness to pay between the cheap talk and no cheap talk treatments widens for the Yes7 model, though the difference is not statistically significant at the ten percent level (p-value = 0.1418). In the Yes8, Yes9, and Definitely Sure models, the differences are significant at the 11

percent level or lower (p-value = 0.0471, p-value = 0.1066, and p-value = .0323 respectively), with cheap talk increasing mean willingness to pay in all models.

Certainty corrected mean willingness to pay is also of interest as other studies have shown that these types of models produce statistically indistinguishable results when compared to real purchase behavior (Blumenschein, et al., 2008, Blumenschein et al., 1997, Blumenschein, et al., 1998, Champ, et al., 1997, Champ and Bishop, 2001, Poe, et al., 2002). Table 6 also compares certainty corrected and baseline mean willingness to pay and indicates that each certainty corrected model is statistically different from the baseline model (p-value < 0.001 in all cases).

With the success of the Definitely Sure model to accurately reflect real willingness to pay, it is also useful to compare the model's mean willingness to pay with the other certainty adjusted models. Table 6 shows that the estimate of mean willingness to pay for the Definitely Sure model is statistically different from the Yes7 and Yes9 model at the one percent level and not statistically different from the Yes8 model (p-value = 0.9595).

Given that other studies have found estimated willingness to pay from Definitely Sure and Yes8 certainty corrected models to be statistically indistinguishable from estimated mean willingness to pay based on real purchase decisions (Blumenschein, et al., 2008, Champ and Bishop, 2001), mean willingness to pay based on these models is selected as the best estimate. Using either the Yes8 or Definitely Sure model, the mean is a one time $61 per household in Kentucky for a 10% expansion in the size of KCTCS.[9]

VIII. Conclusion

Hypothetical bias continues to be one of the most investigated topics in the contingent valuation literature. Understanding its sources and finding methods of mitigation will help practitioners to accurately estimate benefits to environmental, health, and other public programs. This study contributes to the literature by examining three methods of hypothetical bias mitigation and their interaction. Data used to compare mitigation methods were obtained from a survey designed to estimate the total value of education. The results indicate that a cheap talk treatment produces an estimate of willingness to pay that is smaller, but not statistically different from the baseline, no treatment model in which all yes responses are treated

equally. Mean willingness to pay based on Definitely Sure yes responses is substantially (73 percent) smaller than the estimate based on the baseline, no treatment model and this difference is statistically significant. Further, the study indicates that cheap talk, in models adjusting for greater certainty, *increases* the probability of a yes response and the corresponding mean willingness to pay. This unique finding requires practitioners to further examine the interaction of cheap talk and certainty statements and their use as complements because their effects do not appear to be simply additive in reducing hypothetical bias.

In comparing the two forms of certainty statements, the Definitely-Sure model and the Yes8 model produced estimates of mean willingness to pay that were not statistically different. This result provided initial evidence of the inter-scale comparability between the Likert style certainty scale and the Probably Sure-Definitely Sure scale. The best estimate of willingness to pay for a 10 percent increase in the Kentucky College System for Kentucky residents is $61 per household, with a 95 percent confidence interval of $46 to $76.

Endnotes

[1] Evidence of cheap talk mitigating hypothetical bias was found in three out of four experimental scenarios. In the fourth, the difference between hypothetical and real behavior was not statistically different.

[2] Another distinct form of certainty elicitation incorporates the certainty scale directly into the valuation question (Alberini et al. 2003, Evans et al. 2003, Johannesson et al. 1993, Ready et al. 1995, Vossler et al. 2003, Welsh and Poe 1998). The current study uses a single form of elicitation, dichotomous choice, and focuses on mitigation methods that are separate from the elicitation question.

[3] Two professionally moderated focus groups consisting of Kentuckians were conducted to ensure that respondents' understanding and interpretation of the survey questions matched the intention of the survey authors. The first group consisted of eight members of the Donovan Scholar Program at the University of Kentucky. Donovan Scholars are individuals over age 65 that are attending classes at the University of Kentucky. The second group consisted of eight returning students of the Maysville Community and Technical College.

[4] For Table 1 and for all analysis, the web-based and mail-based samples have been pooled. A likelihood ratio test of the pooling restriction failed to reject the equality of coefficients across samples (p-value = 0.5685).

[5] For more on the alternative parameter κ, see Hastings and Peacock (1975).

[6] A simple test of starting point bias was performed for each model by regressing the predicted willingness to pay for each individual on the tax amount and all other independent variables. The coefficient on the Tax variable in these regressions was insignificant in each case suggesting no evidence of starting point bias.

[7] To investigate whether the effect of cheap talk varied across different levels of the tax amount, an interaction of the Cheap Talk and Tax variables was tested. In all specifications, the coefficient on the interaction variables was insignificant.

[8] One possible explanation for this result is that cheap talk encourages people to answer with greater certainty. To investigate this possibility a regression was run with the certainty scale value as the dependent variable and the same variables as presented in Table 5 as independent variables. Restricting the sample to those that voted yes and using ordinary least squares estimation, the coefficient associated with the cheap talk treatment was positive and significant at the 10 percent level (coefficient = 0.307, standard error = 0.162, p-value = 0.058). Interestingly, the coefficient turned negative and significant for respondents answering 'no' to the referendum vote (coefficient = -0.488, standard error = 0.231, p-value = 0.035). Looking at the full sample the coefficient was negative and insignificant (coefficient -0.056, standard error = 0.138, p-value = 0.686).

[9] For a comparison of the estimates of the returns to education using both survey and labor market methodologies, see (Blomquist et al., 2009b).

References

Aadland, David, and Arthur J. Caplan. 2006. "Cheap Talk Reconsidered: New Evidence from CVM." *Journal of Economic Behavior & Organization*, 60(4): 562-78.

____. 2003. "Willingness to Pay for Curbside Recycling with Detection and Mitigation of Hypothetical Bias." *American Journal of Agricultural Economics*, 85(2): 492-502.

Aadland, David M., Arthur J. Caplan, and Owen R. Phillips. 2007. "A Bayesian Examination of Information and Uncertainty in Contingent Valuation." *Journal of Risk and Uncertainty*, 35(2): 149-78.

Arrow, Kenneth J., Robert Solow, Paul Portney, Edward E. Leamer, Roy Radner, and Howard Schuman. 1993. "Report on the NOAA Panel on Contingent Valuation." *Federal Register*, 58: 4602-14.

Blomquist, Glenn C., Karen Blumenschein, and Magnus Johannesson. 2009a. "Eliciting Willingness to Pay without Bias Using Follow-up Certainty Statements: Comparisons between Probably/Definitely and a 10-Point Certainty Scale." *Environmental and Resource Economics*, 43: 473-502.

Blomquist, Glenn C., Paul A. Coomes, Christopher Jepsen, Brandon C. Koford, and Kenneth R. Troske. 2009b. "Estimating the Social Value of Higher Education: Willingness to Pay for Community and Technical Colleges." *IZA Discussion Paper*, 4086.

Blumenschein, Karen, Glenn C. Blomquist, Magnus Johannesson, Nancy Horn, and Patricia R. Freeman. 2008. "Eliciting Willingness to Pay without Bias: Evidence from a Field Experiment." *The Economic Journal*, 118(525): 114-37.

Blumenschein, Karen, Magnus Johannesson, Glenn C. Blomquist, Bengt Liljas, and Richard M. O'Conor. 1998. "Experimental Results on Expressed Certainty and Hypothetical Bias in Contingent Valuation." *Southern Economic Journal*, 65(1): 169-77.

____. 1997. "Hypothetical Versus Real Payments in Vickrey Auctions." *Economics Letters*, 56(2): 177-80.

Blumenschein, Karen, Magnus Johannesson, Krista K. Yokoyama, and Patricia R. Freeman. 2001. "Hypothetical Versus Real Willingness to Pay in the Health Care Sector: Results from a Field Experiment." *Journal of Health Economics*, 20(3): 441-57.

Brown, Thomas C., Icek Ajzen, and Daniel Hrubes. 2003. "Further Tests of Entreaties to Avoid Hypothetical Bias in Referendum Contingent Valuation." *Journal of Environmental Economics and Management*, 46(2): 353-61.

Cameron, Trudy Ann. 1988. "A New Paradigm for Valuing Non-Market Goods Using Referendum Data: Maximum Likelihood Estimation by Censored Logistic Regression." *Journal of Environmental Economics and Management*, 15(3): 355-79.

Cameron, Trudy Ann, and Michelle D. James. 1987. "Efficient Estimation Methods For "Closed-Ended" Contingent Valuation Surveys." *Review of Economics and Statistics*, 69(2): 269-76.

Carson, Richard T. 2000. "Contingent Valuation: A User's Guide." *Environmental Science and Technology*, 34(8): 1413-18.

Carson, Richard T., Nicholas E. Flores, and Norman F. Meade. 2001. "Contingent Valuation: Controversies and Evidence." *Environmental and Resource Economics*, 19(2): 173-210.

Champ, Patricia A., and Richard C. Bishop. 2001. "Donation Payment Mechanisms and Contingent Valuation: An Empirical Study of Hypothetical Bias." *Environmental and Resource Economics*, 19(4): 383-402.

Champ, Patricia A., Richard C. Bishop, Thomas C. Brown, and Daniel W. McCollum. 1997. "Using Donation Mechanisms to Value Nonuse Benefits from Public Goods." *Journal of Environmental Economics and Management*, 33(2): 151-62.

Cummings, Ronald G., and Laura O. Taylor. 1999. "Unbiased Value Estimates for Environmental Goods: A Cheap Talk Design for the Contingent Valuation Method." *American Economic Review*, 89(3): 649-65.

Flachaire, Emmanuel, and Guillaume Hollard. 2007. "Starting Point Bias and Respondent Uncertainty in Dichotomous Choice Contingent Valuation Surveys." *Resource and Energy Economics*, 29(3): 183-94.

Hastings, Nicholas, and Brian Peacock. *Statistical Distributions*. New York: Wiley, 1975.

Johannesson, M., B. Liljas, and P. O. Johansson. 1998. "An Experimental Comparison of Dichotomous Choice Contingent Valuation Questions and Real Purchase Decisions." *Applied Economics*, 30(5): 643-47.

List, John A. 2001. "Do Explicit Warnings Eliminate the Hypothetical Bias in Elicitation Procedures? Evidence from Field Auctions for Sportscards." *American Economic Review*, 91(5): 1498-507.

List, John A., and Craig A. Gallet. 2001. "What Experimental Protocol Influence Disparities between Actual and Hypothetical Stated Values?" *Environmental and Resource Economics*, 20(3): 241-54.

Little, Joseph M., and Robert P. Berrens. 2004. "Explaining Disparities between Actual and Hypothetical Stated Values: Further Investigation Using Meta-Analysis." *Economics Bulletin*, 3(6): 1-13.

Lusk, Jayson L. 2003. "Effects of Cheap Talk on Consumer Willingness-to-Pay for Golden Rice." *American Journal of Agricultural Economics*, 85(4): 840-56.

Martin, Fernand. 1994. "Determining the Size of Museum Subsidies." *Journal of Cultural Economics*, 18(4): 255-70.

Mitchell, Robert C., and Richard T. Carson. *Using Surveys to Value Public Goods: The Contingent Valuation Method*. Washington, D.C.: Resources for the Future, 1989.

Noonan, Douglas S. 2003. "Contingent Valuation and Cultural Resources: A Meta-Analytic Review of the Literature." *Journal of Cultural Economics*, 27(3): 159-76.

Poe, Gregory L., Jeremy E. Clark, Daniel Rondeau, and William D. Schulze. 2002. "Provision Point Mechanisms and Field Validity Tests of Contingent Valuation." *Environmental and Resource Economics*, 23(1): 105-31.

Randall, Alan, Berry Ives, and Clyde Eastman. 1974. "Bidding Games for Valuation of Aesthetic Environmental Improvements." *Journal of Environmental Economics and Management*, 1(2): 132-49.

Thompson, Eric, Mark C. Berger, Glenn C. Blomquist, and Steven Allen. 2002. "Valuing the Arts: A Contingent Valuation Approach." *Journal of Cultural Economics*, 26(2): 87-113.

Vossler, Christian A., Robert G. Ethier, Gregory L. Poe, and Michael P. Welsh. 2003. "Payment Certainty in Discrete Choice Contingent Valuation Responses: Results from a Field Validity Test." *Southern Economic Journal*, 69(4): 886-902.

Welsh, Michael P., and Gregory L. Poe. 1998. "Elicitation Effects in Contingent Valuation: Comparisons to a Multiple Bounded Discrete Choice Approach." *Journal of Environmental Economics and Management*, 36(2): 170-85.

Whitehead, John C., and Todd L. Cherry. 2007. "Willingness to Pay for a Green Energy Program: A Comparison of Ex-Ante and Ex-Post Hypothetical Bias Mitigation Approaches." *Resource and Energy Economics*, 29(4): 247-61.

Table 1. Demographics of KCTCS Survey vs. American Community Survey 2007 for Kentucky†

		KCTCS Survey	American Community Survey 2007
Gender	Female	54.56%	51.93%
Age	18-29	23.16%	21.69%
	30-39	16.12%	17.24%
	40-49	20.95%	19.56%
	50-64	26.32%	24.68%
	65 or over	13.45%	16.83%
Race	White	89.73%	90.37%
Education	Less than High School Diploma	13.38%	19.58%
	High School Diploma or Equivalent	33.47%	35.19%
	Some College	21.45%	20.71%
	Associate's Degree	9.40%	6.01%
	Bachelor's Degree	13.12%	11.43%
	Master's Degree or Beyond	9.18%	7.08%
Household Income	Under $25,000	34.27%	32.31%
	$25,000 - $39,999	19.74%	17.91%
	$40,000 - $59,999	20.02%	17.89%
	$60,000 - $99999	17.65%	19.96%
	$100,000 or more	8.32%	11.92%

†Both the KCTCS Survey statistics and the American Community Survey statistics are for those individuals 18 years old or over. KCTCS Survey statistics are based on the estimation sample n = 1900.

Table 2. Definitions of Variables and Summary Statistics

Variables	Mean	Description
Tax	165.91 [180.89]	Dollar amount individual would pay for change in KCTCS in 2007 dollars. Amounts were one of eight amounts: 25 (19%), 75 (22%), 100 (3%), 125 (2%), 150 (19%), 200 (2%), 250 (17%), 400 (16%).
Cheap Talk	0.74	1 if received cheap talk, 0 otherwise
Expansion 25%	0.28	1 if received 25% expansion scenario, 0 otherwise
Reduction 25%	0.12	1 if received 25% reduction scenario, 0 otherwise
Reduction 10%	0.11	1 if receive 10% reduction scenario, 0 otherwise
Income	45.44 [48.80]	Household Income in thousands of dollars
HS Diploma	0.33	1 if earned high school diploma, 0 otherwise
Some College	0.21	1 if attended some college, 0 otherwise
Associate's Degree	0.09	1 if earned associate's degree, 0 otherwise
Bachelor's Degree	0.13	1 if earned bachelor's degree, 0 otherwise
Master's Degree +	0.09	1 if earned master's degree or higher, 0 otherwise
Age	45.71 [26.95]	Age of respondent
Years in Kentucky	37.49 [27.49]	Number of years lived in Kentucky
Taken a Class	0.27	Taken a class from KCTCS, 1 if yes, 0 otherwise
Family Attended	0.51	Family member has attended KCTCS, 1 if yes, 0 otherwise
Know Employee	0.23	Knows someone that works for KCTCS, 1 if yes, 0 otherwise

Table 3. Percent Yes Responses to Willingness to Pay for Six Definitions of Yes

Price	Baseline (All)	Yes7	Yes8	Yes9	Yes10	Definitely Sure
$25	78%	55%	46%	34%	0%	48%
	--	[<0.001]	[<0.001]	[<0.001]	[<0.001]	[<0.001]
$75	63%	40%	29%	21%	3%	31%
	--	[<0.001]	[<0.001]	[<0.001]	[<0.001]	[<0.001]
$100	51%	49%	35%	18%	12%	24%
	--	[0.422]	[0.055]	[<0.001]	[<0.001]	[0.002]
$125	54%	49%	46%	23%	10%	26%
	--	[0.325]	[0.249]	[<0.001]	[<0.001]	[0.006]
$150	52%	34%	23%	16%	2%	25%
	--	[<0.001]	[<0.001]	[<0.001]	[<0.001]	[<0.001]
$200	36%	33%	28%	22%	14%	23%
	--	[0.402]	[0.224]	[0.097]	[0.015]	[0.153]
$250	46%	26%	17%	12%	0%	18%
	--	[<0.001]	[<0.001]	[<0.001]	[<0.001]	[<0.001]
$400	37%	19%	13%	9%	0%	15%
	--	[<0.001]	[<0.001]	[<0.001]	[<0.001]	[<0.001]
Overall	56%	36%	27%	19%	2%	28%
	--	[<0.001]	[<0.001]	[<0.001]	[<0.001]	[<0.001]

P-values for Baseline (All) proportions being greater than the corresponding cell of the certainty adjusted proportions are in brackets. For percentage of respondents receiving each price, see Table 2.

Table 4. Baseline and Definitely Sure Percent Yes by Cheap Talk

Bid	Baseline (All)	Baseline with Cheap Talk	Baseline without Cheap Talk	Definitely Sure with Cheap Talk	Definitely Sure without Cheap Talk
$25	78%	79%	76%	50%	42%
$75	63%	63%	63%	34%	21%
$100	51%	50%	54%	26%	15%
$125	54%	55%	50%	34%	0%
$150	52%	50%	57%	26%	23%
$200	36%	42%	20%	31%	10%
$250	46%	80%	46%	20%	13%
$400	37%	39%	32%	17%	8%
Overall	56%	56%	55%	30%	21%

Sub-sample sizes for cheap talk and no cheap talk treatments are 1,413 and 487 respectively. The p-value for the test of equality of proportions between cheap talk and no cheap talk treatments is 0.757 for Baseline and <0.001 for Definitely Sure definitions of yes.

Table 5. Logistic Regression Results for Six Definitions of Yes

	Baseline (All)	Yes7	Yes8	Yes9	Def. Sure
Tax	-0.0045***	-0.0045***	-0.0048***	-0.0046***	-0.0046***
	[0.0004]	[0.0005]	[0.0005]	[0.0006]	[0.0005]
Cheap Talk	-0.0485	0.2086	0.3190**	0.2911	0.3543**
	[0.1408]	[0.1460]	[0.1600]	[0.1822]	[0.1599]
Expansion 25%	0.0541	-0.0632	-0.0197	0.1643	0.1000
	[0.1421]	[0.1461]	[0.1564]	[0.1726]	[0.1538]
Reduction 25%	0.2583	0.2986*	0.3410*	0.2288	0.3194*
	[0.1767]	[0.1755]	[0.1836]	[0.2050]	[0.1829]
Reduction 10%	0.0852	0.2964*	0.2904	0.4115**	0.4425**
	[0.1786]	[0.1796]	[0.1902]	[0.2080]	[0.1868]
Income	0.0113***	0.0097***	0.0077***	0.0075***	0.0082***
	[0.0015]	[0.0014]	[0.0015]	[0.0016]	[0.0015]
HS Diploma	0.3804	0.2488	0.1248	0.2157	0.1886
	[0.2460]	[0.2884]	[0.3184]	[0.3607]	[0.3171]
Some College	0.8835***	0.7334**	0.7120**	0.7155**	0.6714**
	[0.2541]	[0.2915]	[0.3184]	[0.3605]	[0.3183]
Associate's Degree	0.9399***	0.8808***	0.7682**	0.8310**	0.7837**
	[0.2893]	[0.3230]	[0.3522]	[0.3962]	[0.3512]
Bachelor's Degree	1.0149***	0.8957***	0.6375*	0.4843	0.8143**
	[0.2669]	[0.3006]	[0.3291]	[0.3744]	[0.3272]
Master's Degree +	0.7706***	0.8183***	0.7430**	0.6714*	0.7514**
	[0.2741]	[0.3061]	[0.3326]	[0.3763]	[0.3322]
Age	0.0227***	0.0232***	0.0250***	0.0312***	0.0246***
	[0.0044]	[0.0044]	[0.0047]	[0.0052]	[0.0046]
Years in Kentucky	-0.0085**	-0.0077**	-0.0069**	-0.0065*	-0.0075**
	[0.0033]	[0.0033]	[0.0034]	[0.0037]	[0.0034]
Taken a Class	0.1352	-0.0083	0.0433	0.0669	0.0708
	[0.1340]	[0.1350]	[0.1439]	[0.1592]	[0.1421]
Family Attended	0.3002***	0.2795**	0.2574**	0.2897**	0.3117**
	[0.1127]	[0.1162]	[0.1250]	[0.1388]	[0.1237]
Know Employee	0.3673***	0.3752***	0.4797***	0.2963**	0.2908**
	[0.1198]	[0.1181]	[0.1244]	[0.1383]	[0.1243]
Constant	-1.5396***	-2.4900***	-2.9804***	-3.8244***	-3.0419***
	[0.3381]	[0.3764]	[0.4130]	[0.4737]	[0.4119]
N	1900	1900	1900	1900	1900
Pseudo R-sq	0.124	0.117	0.112	0.097	0.11
Proportion Yes	0.56	0.36	0.27	0.19	0.28

 Standard Errors are in brackets. *, **, *** denote significance of 10%, 5% and 1% respectively. Base groups for
 Education and Expansion/Reduction Scenario are Less than HS Diploma and Expansion 10% respectively.

Table 6. Mean Willingness to Pay for Five Definitions of Yes and Tests

	Baseline (All)	Yes7	Yes8	Yes9	Definitely Sure Yes
Without Cheap Talk	$224.91	$101.85	$60.60	$38.63	$60.88
	[19.84]	[11.29]	[7.55]	[5.70]	[8.25]
With Cheap Talk	$218.14	$120.00	$79.44	$50.28	$82.33
	[18.09]	[12.04]	[9.44]	[6.88]	[9.86]
P-Value†	0.7374	0.1481	0.0471	0.1066	0.0323

† P-values listed in the table are for the test of equality between mean willingness to pay with and without cheap talk. Testing the equality of Baseline versus certainty adjusted models yields p-values all less than 0.001 (not shown in table). The p-values for the test of equality of Definitely Sure versus other models are less than or equal to 0.001 except for Yes8 which is 0.9595 (not shown in table). Standard errors are in brackets. Tests and standard errors are based on 1,000 bootstrap replications.