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### Does prompting for revision influence subjects' offers in willingness to accept – willingness to pay lab experiments?

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#### Abstract

The willingness to accept – willingness to pay disparity raises questions about accepted economic theory. Plott and Zeiler (2005) have suggested that the disparity is the result of subject misconception about experimental procedures and, in an experiment designed to control for subject misconception, they show that the disparity can be turned on and off. This paper investigates a single feature of their experimental procedure—the prompt for subjects to consider revising their offers. Using the post-prompt and revision offers, we, like Plott and Zeiler, are unable to reject equality between WTA and WTP. However, using the pre-prompt and revision offers the disparity between WTP and WTA is shown to be significant. Results suggest that the prompt and revision opportunity systematically influences offers. Future research must determine whether the pre- or post-prompt offers more accurately reflect underlying preferences.

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## 1. Introduction

Economic theory suggests that given small income effects and available substitutes, an individual's willingness to pay (WTP) for a good will be roughly equivalent to his or her willingness to accept compensation (WTA) for the good (Hanemann, 1991; Randall and Stoll, 1980; Willig, 1976). Despite this theoretical expectation, a significant disparity between WTA and WTP is usually observed in lab experiments (Horowitz and McConnell, 2002).<sup>1</sup> A common explanation for the disparity, the *endowment effect*, suggests that an asymmetry exists in individual preferences and that valuations depend, in part, on the perceived ownership of the good. If the endowment effect were found to be a fundamental aspect of individual preferences, it would undermine the validity of the commonly used (Hicksian) model of consumer preferences that underpins the use of benefit cost analysis to inform public policy (Knetsch, 2010).

Not all WTA-WTP lab experiments report a significant disparity. Plott and Zeiler (2005) show that procedural controls and subject misconceptions concerning those controls can have substantial influence on subjects' behavior. Their experimental procedures were designed to control for subject misconceptions and were, by and large, motivated by concerns raised in the literature. These include subject anonymity, an incentive compatible elicitation mechanism, and explicit training and practice. Their research suggests that the value disparity can be turned on and off in the lab using a set of procedural controls and, thus, may not be a fundamental aspect of preferences.<sup>2</sup>

While the Plott and Zeiler (2005) procedures represent a considerable contribution to our understanding of the value disparity, their procedures include an important step that is not motivated by the literature. After initial offers were recorded in the auction of interest, subjects were prompted to consider whether the offer chosen was their actual non-strategic value and were then allowed to revise their offer before committing to it. Being unaware of any theoretical or empirical motivation for including such a prompt, and having found no discussion of prompts in the literature, we sought to measure the impact of the prompt and revision opportunity on offers elicited in a carefully implemented WTA-WTP disparity experiment. Like Plott and Zeiler we are unable to reject equality between WTA and WTP based on the post-prompt and revision offers. However, using the pre-prompt and revision offers the data reveal a significant value disparity. Results indicate that the prompt and revision opportunity here has a substantial impact, systematically increasing WTP and decreasing WTA offers.

## 2. Experimental Design and Results

Plott and Zeiler (2005) hypothesized that the observed WTA-WTP disparity was the result of subjects' misunderstanding of the incentives implicit in the bidding mechanism they were instructed to use, or of unintended cues given to subjects. Using what they term a "revealed theory methodology" that accounts for all identified sources of subject misconception, they

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<sup>1</sup> Whether behavior observed in a lab is of interest to economists who are primarily interested in how individuals behave within functioning markets is a relevant question first posed in Binmore (1999).

<sup>2</sup> Using similar procedural controls in an experiment valuing lotteries, Isoni et al. (2011) found that the disparity persisted, suggesting that the disparity is sensitive to the nature of the good being traded.

designed an experiment to control for these concerns. These procedures included the following: subject anonymity to assure that the subjects ignore the social implications of their choice, such as a desire to impress others; use of an incentive-compatible random price auction to elicit actual values; and explicit training procedures to ensure that subjects understand that stating offers that represent their actual value is the optimal strategy when participating in a random price auction.<sup>3</sup> Importantly, and of particular interest here, during the binding round all subjects recorded an initial offer, either a WTA or a WTP depending on their assigned role, and were then prompted to “consider whether the offer chosen was the actual non-strategic value” and were allowed to change the offer before committing to it.

The experimental design used here incorporates many of the procedures implemented by Plott and Zeiler in their Experiment 2, although we do not completely replicate the analysis of Plott and Zeiler (2005).<sup>4</sup> Each subject received a \$10 show up fee and was given a mug whose (unannounced) market value was \$7.95. Each subject was also handed an instruction packet and a recording packet to ensure anonymity. The instruction packet explained the procedures and provided explicit training with the elicitation mechanism (an open-ended Becker-DeGroot-Marschak random price auction)<sup>5</sup>. This training included numeric examples and explanations illustrating that it is in the subjects’ best interest to state their actual valuations during the binding mug round. Like Plott and Zeiler (2005), our design suggested to the subjects how they should determine their individual valuations. Subjects were encouraged to use an iterative valuation approach wherein the subjects begin the determination of their WTP (WTA) with some low (high) dollar amount and then ask themselves whether they would be willing to buy (sell) the item at this amount. If the answer is yes they are then to consider increasing (decreasing) that amount. This process is to continue until subjects come to a dollar amount that makes them indifferent between buying (selling) the item and the dollar amount. Thus, each subject was instructed to iteratively increase their WTP or decrease their WTA upon introspection of their respective values.

To ensure understanding of the procedures and to demonstrate how the auction would take place, each subject participated in practice buying and selling tasks [Rounds 1 and 2]. The items in each practice round had determined values such that subjects were effectively buying and selling dollar amounts. Finally, in the paid mug round [Round 3] each subject acted as either a buyer or seller depending on the pre-determined assignment indicated in their recording packets. After offers were collected all subjects were asked “Before you commit to your Round 3 offer and we reveal the fixed offer, consider whether your offer reflects your actual, non-strategic, value of the mug. Round 3 will be discarded”. All subjects were required to resubmit

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<sup>3</sup> The set of experiments performed by Plott and Zeiler also included paid lottery rounds to provide additional practice with the elicitation mechanism. However, it is demonstrated, in their Experiment 2, that this paid practice is not essential to their results as it took place after the paid mug round of interest.

<sup>4</sup> Our experiment differed from Plott and Zeiler’s Experiment 2 in the following ways: (1) some minor differences in wording and values used in the instructions, (2) we used a larger show up fee (\$10 rather than \$5), (3) our mug had a slightly higher (unannounced) market value (\$8.50 as opposed to \$7.95), (4) our binding mug round was not followed by paid lottery rounds, and (5) in our design each subject was given a random ID number but was paid, anonymously, after the experiment by the experimenter, whereas in the Plott and Zeiler design each subject was given a random ID card and instructed to bring this card to a third party who simply exchanged each ID card for an envelope containing the subject’s earnings.

<sup>5</sup> Exact experimental instructions and materials are available upon request from the authors.

an offer on Round 4, although they were informed that they were not required to alter their offers.

Table 1. Individual Offers and Descriptive Statistics by Condition<sup>a</sup>

|             |                                                                                         | Mean | Median | Std. Dev. |
|-------------|-----------------------------------------------------------------------------------------|------|--------|-----------|
| Pre-Prompt  |                                                                                         |      |        |           |
| WTP (n=26)  | 0, 0, 0, 0, .01, 1, 1, 1, 2, 2, 2, 2, 2, 2, 3, 3.5, 3.5, 3.5, 4, 4, 4.25, 5, 6, 6, 7.5  | 2.59 | 2.00   | 2.06      |
| WTA (n=27)  | 0, 2, 2, 2, 2.4, 2.5, 3, 3, 3, 3, 3.5, 4, 4, 5, 5, 5, 5, 5, 6, 6, 6.99, 7, 8, 8, 10, 15 | 4.87 | 5.00   | 3.02      |
| Post-Prompt |                                                                                         |      |        |           |
| WTP (n=26)  | 0, 0, 4, 0, 2, 1, 2, 4, 2, 2, 3, 2, 2, 2, 3.25, 2, 4.5, 3, 4, 4.5, 4, 4.3, 5, 7, 6, 7.5 | 3.12 | 3.00   | 1.98      |
| WTA (n=27)  | 0, 2, 2, 3, 2.4, 2, 2, 2, 3, 3, 3.5, 4, 2, 4, 5, 5, 5, 5, 5, 6, 5, 6, 5, 8, 6, 8, 10    | 4.22 | 4.00   | 2.25      |

<sup>a</sup> Pre-prompt (Round 3) offers are listed in ascending order. This initial order is maintained for the post-prompt (Round 4) offers.

A total of 53 subjects participated in the experiment, with 26 randomly assigned as a buyer and 27 as a seller. The individual pre- and post-prompt offers are listed in order of ascending pre-prompt offers in Table 1. Note that subject order is maintained across pre- and post-reporting such that the third WTP offer recorded indicates that this subject initially offered \$0 but revised his or her offer to \$4 when given the opportunity. The Round 3 (pre-prompt) offers yield a mean (median) WTP of \$2.59 (\$2) and WTA of \$4.87 (\$5). In comparison, the Round 4 (post-prompt) offers yield a mean (median) WTP of \$3.12 (\$3) and WTA of \$4.22 (\$4).<sup>6</sup> The Wilcoxon Rank-Sum and Median tests are used to test the hypothesis of equality between WTP and WTA. Like Plott and Zeiler (2005), we are unable to reject equality between WTP and WTA of the post-prompt offers (Table 2). However, using the pre-prompt offers, the data indicate a statistically significant value disparity. Further, from Round 3 to Round 4, 11 of the 26 WTP offers increased while only two decreased and 11 of the 27 WTA offers decreased while only one increased. Thus, 25 of the 53 subjects (47%) revised their offers, with 88% of these revisions in the direction implied by the iterative valuation approach.

Table 2. Results

|             | Wilcoxon Rank-Sum Test<br>(null hypothesis: identical distributions) |         |                               | Median Test <sup>a</sup><br>(null hypothesis: populations have identical medians) |         |                               |
|-------------|----------------------------------------------------------------------|---------|-------------------------------|-----------------------------------------------------------------------------------|---------|-------------------------------|
|             | z                                                                    | p-value | Conclusion ( $\alpha = .05$ ) | Pearson $\chi^2$                                                                  | p-value | Conclusion ( $\alpha = .05$ ) |
| Pre-Prompt  | 3.08                                                                 | .0021   | Reject null                   | 4.4                                                                               | .036    | Reject null                   |
| Post-Prompt | 1.9                                                                  | .06     | Cannot reject null            | .48                                                                               | .49     | Cannot reject null            |

<sup>a</sup> Pearson  $\chi^2$  statistics are corrected for continuity.

<sup>6</sup> For reference Plott and Zeiler, Experiment 2, post-prompt results were reported as follows: among the 14 subjects assigned to the WTP condition, mean (median) offers were \$7.88 (\$6.50); and among the 12 subjects in the WTA condition, mean (median) offers were \$5.71 (\$5.10). Using both a Wilcoxon Rank-Sum test and a Median test Plott and Zeiler are unable to reject equality between WTA and WTP.

### 3. Discussion and Conclusion

Our results indicate that subjects respond to the prompt and revision opportunity and that these revisions tend to be in the direction implied by the iterative valuation approach, systematically increasing WTP and decreasing WTA.<sup>7</sup> The process through which the prompt would act is unclear; however, we speculate, that, coming as it does after the instructions to iteratively arrive at one's offer, the prompt is akin to *Cheap Talk* in the contingent valuation literature—albeit a much milder form than that of the original script used by Cummings and Taylor (1999). Using a cheap talk script is a well known method for reducing hypothetical bias in contingent valuation surveys. A cheap talk script urges the respondent to avoid hypothetical bias by increasing WTP to the maximum or lowering WTA to the minimum. In a similar fashion, the prompt, in combination with the suggestion to use an iterative valuation procedure, may suggest to subjects that they have not gone far enough in iteratively reaching maximum WTP or minimum WTA. Importantly, in one experiment comparing hypothetical and actual payments, cheap talk was found to over-correct for bias (Morrison and Brown, 2009). While the effectiveness of cheap talk has been shown for some situations, there is no consensus on its proper form or efficacy across a broad range of contingent valuation methods and researchers have urged caution in its use (List et al., 2006; Murphy and Stevens, 2004).

In the absence of a clear benchmark from which to evaluate subjects' offers, we cannot say whether the pre- or post-prompt offers more accurately reflect underlying values. In light of the evidence that the prompt does affect offers, in the implied direction, use of the prompt rests on the assumption that some subjects will fail, prior to being prompted to revise their offers, to reach their maximum WTP or minimum WTA, and, importantly, that subjects cannot be pushed by suggestion beyond their true maximum WTP or minimum WTA. Another unknown is the robustness of the prompt and revision to the experimental procedures. For example, would these results be maintained in the absence of the iterative valuation approach described in the instructions?

Given the lack of discussion of such prompts in the literature and the possibility that the prompt may systematically influence offers, further research on the use of prompts is warranted.

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<sup>7</sup> As stated, our design does not completely replicate the procedures implemented by Plott and Zeiler (2005). Thus, we cannot speculate whether a significant disparity would have been observed had Plott and Zeiler analyzed their pre-prompt offers.

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