Does the elicitation mechanism impact the endowment effect?*

Sarah Brebner[a] and Joep Sonnemans[a,b,c]
[a] CREED, University of Amsterdam
[b] Tinbergen Institute
[c] Corresponding author, j.h.sonnemans@uva.nl

January 2017

Abstract

The size of the endowment effect is compared using the Becker-DeGroot-Marschak (BDM) and the multiple price list (MPL) mechanisms. A robust endowment effect was found using both elicitation mechanisms. The MPL elicitation mechanism appears to result in a slightly larger endowment effect compared with the BDM mechanism, refuting claims that misconceptions of the BDM mechanism cause the endowment effect.

*Financial support from the Research Priority Area Behavioural Economics from the University of Amsterdam is gratefully acknowledged. We thank Michalis Drouvelis for his very useful comments.

1. Introduction

In this study we compare the size of the endowment effect (also known as the Willingness To Accept (WTA)/Willingness To Pay (WTP) disparity) using two different elicitation mechanisms: the Becker-DeGroot-Marschak (BDM) and the multiple price list (MPL) mechanisms. Both mechanisms, which are explained in detail below, are incentive compatible[1]. The motivation behind this study is threefold.

First, Plott and Zeiler (2005, 2011) argue that the endowment effect is not an effect of fundamental features of human preferences, but is caused by design issues and especially subject misconceptions of the BDM mechanism. Isoni et al (2011) are able to replicate the Plott and Zeiler (2005) findings for consumption goods (mugs) but not lotteries, concluding that differences in goods (money vs consumption goods) is most likely driving the difference between their results. Conversely, Fehr et al (2015) and Bartling et al (2015), find a statistically significant effect even in participants that demonstrate an understanding of the BDM mechanism, contradicting claims that the gap results from participant's misconceptions of the elicitation mechanism. In our study we employ a more direct test of the hypothesis that the endowment effect is caused by misunderstanding the BDM: we study whether the effect will be smaller or disappear if we use a much easier to understand MPL mechanism.

Second, a comparison of the BDM and the MPL mechanism is interesting because they represent different decision making processes, namely judgment and choice. In a judgment task the respondent has to report a value. Examples of judgment tasks are scoring on a rating scale; a bid in a closed bid auction; or reporting the willingness to pay or willingness to accept in a BDM context. In a choice task two or more alternatives are presented to the respondent who select the alternative that is preferred most. A MPL presents a series of such choices to the participant. A decision maker with well-defined preferences is supposed to make essential the same decisions in both response modes (procedure invariance). Preference reversals are well known valuations of procedure invariance (Grether and Plott 1979, Seidl 2002), and are typically explained as

[1] In this short paper we will not attempt to survey the enormous literature on the endowment effect. We refer to the recent overview of Ericson & Fuster (2014).

caused by different psychological mechanisms in judgment and choice. The two response modes may trigger different heuristics[2].

Third, a comparison of the BDM and the MPL mechanisms is of methodological interest. Both methods are used frequently, also in other contexts than the endowment effect, and it is therefore important to learn whether these elicitation methods may influence behavior.

We will now introduce the two elicitation methods we use in this study and discuss possible advantages and disadvantages.

The BDM mechanism is an incentive compatible value elicitation mechanism developed by Becker-DeGroot-Marschak (1964). Participants are asked to provide an offer for the good being valued. This is compared to a randomly draw fixed price which is used as the trading price. For example, if participants are making an offer to buy, they purchase the item only if their offer was higher than the fixed price. However, the price they pay is the randomly drawn fixed price, not their offer. A participant's dominant strategy is to offer exactly their value. Disadvantages of the BDM are that it is quite abstract and participants may misunderstand. For example, they may not realize that any transaction will be for the randomly drawn fixed price, and not their offer price. It is also possible that participants use heuristics based upon their bargaining experience from outside the lab and thus may believe that when you want to sell (buy) a good you should always start with a higher (lower) offer than your real valuation. Advantages of the BDM are, first, that (after a lengthy introduction and explanation) a single measurement does cost only little effort and time because the participant has only to report one number and second, the valuation can be very precise (e.g. up to single cents).

In the MPL participants are asked to make multiple independent decisions. In each decision, they are given a choice between a fixed amount and the good being valued[3]. The fixed amount varies in each decision and thus a

---

[2] Note that some heuristics, like anchoring and adjustment (Tversky and Kahneman 1974), are only relevant in judgment tasks, while others, like Salience Theory (Bordalo et al 2012) and the focusing model of Kőszegi and Szeidl (2013) are only applicable to choice tasks.
[3] The MPL mechanism is also commonly used in risk elicitation where participants are generally given a choice between two lotteries.

valuation can be obtained at the point where the participant changes, or switches, to the other option. One decision is randomly selected for payment (to avoid income effects). The main advantage of the MPL is the transparency and simplicity. The disadvantages are that it is much more time and effort consuming (for each measurement multiple decisions have to be made) and that the method elicits only a value range rather than a point estimate (Anderson et al 2007). However, as noted by Anderson et al (2007), given controversies over the ability to elicit precise valuations, an interval response may be more appropriate (p.676). A MPL valuation fails if the participant switches more than once[4]. This can be caused by a mistake, misunderstanding, or a participant who doesn't take the task serious.

To the best of our knowledge, there is only one direct comparison of the MPL and BDM elicitation mechanisms in relation to the endowment effect. This was undertaken by Kahneman, Knetsch & Thaler (1990). They find that the endowment effect was robust to elicitation mechanisms using consumption goods. The mechanisms they employed were the MPL and a simple open-ended question asking for a valuation. In another experiment reported in the same paper, they also employed a version of the BDM to address concerns regarding incentive incompatibility in the other experiments. They reported similar findings across each of the experiments. The experiment in this paper differs from the Kahneman et al (1990) paper in a number of key ways. Firstly, lotteries, not consumption goods, were used as the underlying good. Secondly, a test of the size of the treatment effect is included, not only a test of robustness of the endowment effect. Whilst a test of the robustness of the endowment effect will be undertaken, the existence of a treatment effect stemming from the elicitation mechanism can provide evidence regarding the causes of the endowment effect. Thirdly, the instructions are based on the Plott and Zeiler (2005) instructions to avoid subject misconceptions of the elicitation mechanisms. Finally, only incentive compatible elicitation mechanisms were used in a controlled laboratory situation, while some of the experiments in Kahneman et al (1990) are classroom experiments without incentives. Remarkably, Kahneman et al

[4] Bruner (2011) found that the inclusion of instructions emphasizing the incentive compatibility of the payment rule reduced observed multiple switching behavior from 13.3% to 2.3% in probability varied MPL and from 25.8% to 6.7% in reward varied MPL (p.417)

(1990) find endowment effects of an enormous size (WTA two to three times as large as WTP) while more recent experiments using lotteries find a more modest effect of typically between 10% and 50%.

The key findings of our experiment are that the endowment effect is found in both treatments. Contrary to expectations, the simpler MPL mechanism does not decrease the effect compared with the BDM mechanism, refuting the argument that misconceptions of the BDM mechanism cause the endowment effect.

2. Design

We employ a between-subjects comparison of the two treatments: BDM and MPL elicitation mechanisms. Participants were randomly allocated to a treatment. The experiment was computerized and programmed in PHP, MySQL and JavaScript. To ensure that sessions were comparable, all instructions to participants (other than verbal instructions regarding entry and seating procedures) were included in the computer program. All instructions are included in the downloadable Appendix. Instructions for the BDM treatment largely replicated the Isoni et al (2011) instructions which were, in turn, based on the Plott and Zeiler (2005) instructions with modifications to accommodate an electronic, rather than paper and pen. The MPL instructions were formulated to align to the BDM instructions as much as possible to ensure differences in the treatments were based only on the differences in the elicitation mechanisms themselves.

Participants were asked for their valuations of each lottery and were instructed that there were buying and selling tasks. In the buying task, they did not own the lottery and a WTP was elicited using the allocated mechanism. In the selling task, they were informed they did own the lottery and a WTA was elicited using the allocated mechanism. For each treatment, both WTP and WTA was elicited for each item from each participant. This enabled a within subject measurement of WTA/WTP.

The goods selected to be valued were lotteries as shown in Table 1. Only lotteries with strictly positive outcomes were included to ensure that lotteries had similar complexity. To enable a within subject measurement of WTA/WTP whilst avoiding participants being asked to value exactly the same lottery twice, pairs of lotteries were used. Each pair consisted of a WTP lottery (valued in the buying task) and a WTA lottery (valued in the selling task), with the outcomes in the WTP lottery differing from each of the outcomes in the corresponding WTA lottery by €1. In half the lotteries, each WTP outcome was €1 higher than the corresponding WTA outcome, in the other lotteries WTP outcomes were €1 lower than the WTA outcomes (the adjustment for each pair is also indicated in Table 1). Assuming constant absolute risk aversion, expected utility theory implies that for each lottery pair WTP – WTA = €1 where WTP outcomes are higher than the WTA outcomes or WTP – WTA = – €1 where the WTP outcomes are lower (Fehr et al 2015 p. 122). This approach has previously been used including by Isoni et al (2011), Fehr et al (2015) and Drouvelis & Sonnemans (2015).

Table 1: Lotteries used for value elicitation[5]

Lottery Number	WTA Lottery	Lottery Number	WTP Lottery	Relationship between WTP and WTA
1	(€2, 0.6; €4, 0.4)	12	(€1, 0.6; €3, 0.4)	WTP = WTA - 1
3	(€2.5, 0.8; €7, 0.2)	14	(€1.5, 0.8; €6, 0.2)	WTP = WTA - 1
5	(€2, 0.6; €6.5, 0.4)	16	(€3, 0.6; €7.5, 0.4)	WTP = WTA + 1
7	(€7, 0.5; €2, 0.5)	18	(€6, 0.5; €1, 0.5)	WTP = WTA - 1
9	(€1.5, 0.7; €3.5, 0.3)	20	(€2.5, 0.7; €4.5, 0.3)	WTP = WTA + 1
11	(€5, 0.7; €2, 0.3)	2	(€4, 0.7; €1, 0.3)	WTP = WTA - 1
13	(€2.5, 0.5; €0.5, 0.5)	4	(€3.5, 0.5; €1.5, 0.5)	WTP = WTA + 1
15	(€2, 0.7; €6, 0.3)	6	(€1, 0.7; €5, 0.3)	WTP = WTA - 1
17	(€5, 0.8; €2.5, 0.2)	10	(€6, 0.8; €3.5, 0.2)	WTP = WTA + 1
19	(€5, 0.6; €1, 0.4)	8	(€6, 0.6; €2, 0.4)	WTP = WTA + 1

Notes: The lottery number indicates the order that lotteries were displayed for valuation during the experiment. As indicated below, WTP and WTA lottery valuations were interleaved with corresponding WTA and WTP lottery valuations separated by a number of rounds. The notation (€2, 0.6; €4, 0.4) indicates a lottery with a 60% chance of winning €2 and a 40% chance of winning €4.

Similar to Drouvelis & Sonnemans (2015), WTP and WTA elicitation rounds were interleaved for a given treatment[6]. The order lotteries were shown ensured

---

[5] Lotteries 2, 4, 6, 12, and 13 were used in the experiment by Isoni et al (2011) albeit they used pounds rather than euros. However, most of their lotteries had one zero outcome for WTA so, rather than adding €1 to WTA to create WTP as per their experiment, €1 has been added to their WTP for the related WTA in this experiment (the exception is lotteries 13 and 4 which are the same as in Isoni et al (2011)).

[6] To avoid confusion and assist participants in differentiating the tasks, different colours were used to indicate the different tasks in the same way as in Drouvelis and Sonnemans (2015). See the downloadable appendix for example screen shots.

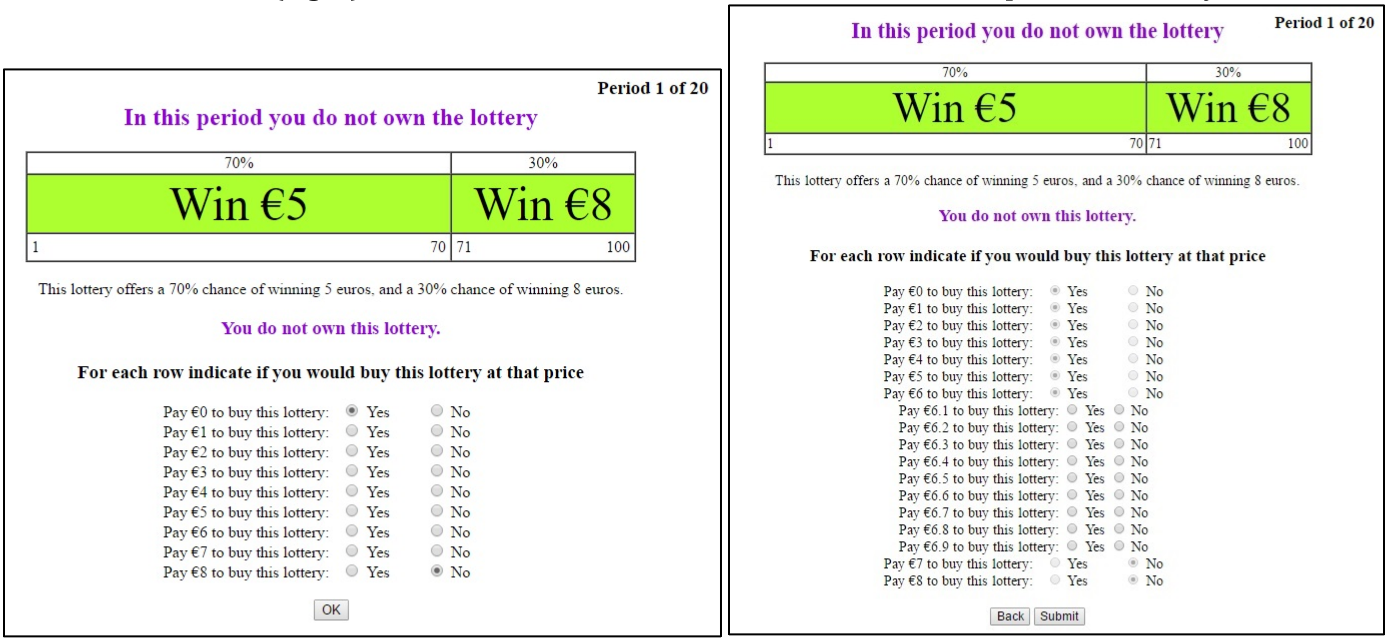
that there were at least 6 rounds between WTA and WTP elicitation for related lotteries. This was to reduce the likelihood that participants would recognise similarities between related lotteries, thereby impacting their valuations/choices. Lotteries were presented in the same order to all participants across both treatments.

In the BDM treatment participants were asked to enter either a WTP or a WTA into a text box. Offers were limited to the range €0 to €8 inclusive, with participants being able to specify prices to the nearest cent. To determine the outcome (in the event this decision was selected for payment), offers were compared to a fixed offer drawn from a uniform distribution over the range €0 to €8 (specified to the nearest cent). For WTP, participants who indicated an offer equal to or higher than the fixed offer bought the item at the fixed price. For WTA, participants who indicated an offer equal to or lower than the fixed offer sold the item and received the fixed price. Fixed offers and the results for each participant were announced only after the conclusion of the experiment to control for learning.

In the MPL treatment, participants were presented with a list of choices between the lottery and a fixed value (see Figure 1). For each price, the participant had to choose whether they would buy/sell the lottery at the stated price. Choices were elicited using a two-stage MPL. In the first stage, choices were made between €0 and €8 in €1 increments. This range was selected to ensure consistency with the BDM elicitation mechanism. The second stage choices depended on the participant's choices from the first stage and were used to increase precision without overly burdening participants. The second stage choices were 10₵ increments displayed between the prices were the user switched from "Yes" (i.e. willing to buy/sell) to "No" (i.e. not willing to buy/sell). See Figures 1 for example MPL screens and a basic explanation of functionality. To further reduce the burden on participants in the MPL treatment, the first and last options were pre-selected as defaults (although participants were able to change these selections). This was explained in the instructions to participants. The computer program did not allow multiple switching, raising an error message and indicating to users that their choices were not consistent and to ask for assistance if they did not understand. Only one user requested such an explanation.

The MPL elicitation mechanism results in an implied range for the participants' valuation. The mid-point of this range was used as the valuation in the subsequent analysis. The elicitation range of €0 to €8 was chosen so that participants valuations should fall within this range (all lottery outcomes were in the range €0.50 to €7.50) rather than on or above a boundary, thus leading to an unbounded valuation range.[7]

Figure 1: example screenshot for the initial screen (left) and the second stage decision (right) for the MPL elicitation mechanism for an example WTP lottery



Notes:
The first and last decisions have a default selection (which the user can change if desired). After making a choice for all decisions (i.e. every row), the "OK" button can be pressed to display the second stage decisions.
The second stage decisions depend on the selection in the first stage. In the example above, the participant switched between €6 and €7 so the second stage will show values between these two amounts.

The experiment was undertaken at the CREED laboratory in Amsterdam with 92 participants (37 female (40.2%), 55 male (59.8%)) who earned an average of €12.40 in approximately 1 hour. One participant was excluded from all analyses because she was aware of the topic and key research question of the experiment

[7] This appeared to be successful as there were no participants that indicated either that they would sell/buy at any price or that they would not sell/buy at any price (i.e. all participants had a switching point within the elicitation range). However, the preselection of default answers at either end of the range was also strongly suggestive against this behaviour.

(she was an intern at CREED). A further participant was excluded from all analysis as it did not appear that she correctly understood the task[8]. The BDM treatment group consisted of 44 participants (19 female and 25 male) whilst the MPL treatment group consisted of 46 participants (16 female and 30 male)[9].

3. Results

Table 2 shows the main results. In the BDM treatment group we find statistically significant higher WTA than WTP in 7 of the 10 lotteries (two-sided Wilcoxon p<.05) and no effect in the other three lotteries. In the MPL treatment we find significant higher WTA than WTP in all 10 lotteries.

For all lotteries the mean WTA (WTP) is somewhat lower (higher) in the BDM treatment than in the MPL treatment. Thus in all lotteries the average gap between WTA and WTP is larger when using MPL, however, this difference is not statistically significant for 6 of the 10 lottery pairs, marginally significant (p<.10) for two lotteries and significant for two lotteries (p<.05). Over all lotteries we find no difference between the two elicitation methods using a non parametric (Mann-Whitney) test; in a regression (clustered on participant) the effect of treatment is marginal significant (p<.10) in the direction of a larger effect when using the MPL[10].

Another way to analyse the data is to count how often the endowment effect occurs in both treatments. Note however that due to the precision of the MPL elicitation mechanism (to the nearest 10₵), we have to use ranges for this comparison. Thus, a subject was classified as displaying an endowment effect for a particular lottery if, for that lottery WTA > WTP + 0.10. Cases with WTA < WTP - 0.10 are coded as an anti-endowment effect, and all cases where WTA differed 10 cents or less from the WTP are coded as neutral. This coding was adopted for both treatments to make the comparison fair. Table 3 shows that the endowment

[8] She reported only extremely low WTP values of 0.05 (8 times) and 0.95 (2 times). She was in the MPL treatment.

[9] A second stage was added to the experiment in which we attempted to measure individual loss-aversion using a bisection method. These results are available in Sarah Brebner's master thesis, Brebner 2016.

[10] The significance is the same when we do or do not include gender as an independent variable; see Brebner 2016, table 9, column 5 and 6.

effect was statistically significant more common in the MPL treatment than in the BDM treatment[11].

Table 2: Mean valuations of the lotteries using the BDM and MPL

Lottery pair	BDM (N=44) WTA Mean (SD)	BDM (N=44) WTP Mean (SD)	BDM (N=44) p-value[a]	MPL (N=46) WTA Mean (SD)	MPL (N=46) WTP Mean (SD)	MPL (N=46) p-value[a]	p-value comparison EE in BDM and MPL[b]
1 & 12	2.87 (0.52)	2.55 (0.33)	0.001	2.94 (0.48)	2.44 (0.41)	0.000	0.2386
3 & 14	3.66 (1.00)	3.19 (0.55)	0.012	3.80 (0.93)	3.13 (0.67)	0.000	0.1393
5 & 16	4.92 (0.78)	4.42 (0.60)	0.000	5.22 (0.94)	4.15 (0.82)	0.000	0.1823
7 & 18	4.26 (0.80)	4.01 (0.85)	0.250	4.63 (0.96)	3.72 (0.97)	0.001	0.0940
9 & 20	3.04 (0.29)	2.98 (0.23)	0.619	3.28 (0.52)	2.82 (0.47)	0.001	0.0199
11 & 2	3.76 (0.74)	3.74 (0.64)	0.647	4.00 (0.69)	3.46 (0.66)	0.001	0.0153
13 & 4	2.46 (0.45)	2.23 (0.38)	0.017	2.59 (0.52)	2.05 (0.52)	0.001	0.1698
15 & 6	3.19 (0.65)	2.90 (0.55)	0.011	3.55 (1.02)	2.70 (0.61)	0.000	0.0830
17 & 10	5.19 (0.59)	4.82 (0.64)	0.000	5.28 (0.58)	4.71 (0.81)	0.002	0.9677
19 & 8	4.33 (0.71)	3.78 (0.73)	0.000	4.43 (0.79)	3.40 (1.09)	0.000	0.5684

Notes: a: two-sided Wilcoxon signed-rank; b: two-sided Mann-Whitney comparing WTA/WTP in both treatments. The p-values are practically the same if we test instead on the gap WTA-WTP.

Table 3: Occurrence of the endowment effect

	BDM (N=44)	MPL (N=46)	p-value
Endowment effect	42.7%	55.7%	.0428
Neutral	41.1%	31.3%	.0586
Anti-endowment effect	16.1%	13.0%	.2460

Notes: A pair of valuations is coded as an endowment effect is WTA-WTP>€0.1, anti-endowment effect if WTA-WTP<-€0.1 and as neutral in all other cases. Treatment effects are tested using a Mann-Whitney test with the individual data (averaged over the 10 lottery pairs) as observations.

4. Conclusion

This study was inspired by the suggestions in recent literature that the endowment effect may be attributed to confusion about the Becker-DeGroot-Marschak (BDM) procedure (Plott and Zeiler 2005, 2011). We measured the endowment effect using the BDM procedure and using a simple to explain

[11] We can compare the numbers in table 3 with the data of Isoni et al (2011). Using the same classification criteria we find 47.0% endowment effect, 34.7% neutral and 18.3% anti-endowment effect in their data.

Multiple Price List (MPL) procedure. With both elicitation methods we find an endowment effect, and this effect is even somewhat stronger in the MPL treatment. We can conclude that the endowment effect is apparently not caused by this often used elicitation method.

Finally, we note that although the MPL is easier to explain than the BDM procedure, it also has some disadvantages. Especially when many valuations have to be obtained in an experiment, the MPL is troublesome: in our setup participants had to click 16 times for each valuation, while the BDM only asks for typing in a number. The number of mouse clicks needed depends on the precision desired.

References

Bartling, B., Engl, F., & Weber, R. A. (2015). Game form misconceptions are not necessary for a willingness-to-pay vs. willingness-to-accept gap. *Journal of the Economic Science Association*, 2015, Vol.1(1), pp.72-85.

Becker, G. M., DeGroot, M. H., & Marschak, J. (1964). Measuring utility by a single-response sequential method. *Behavioral science*, *9*(3), 226-232.

Bordalo, P., Gennaioli, N., & Shleifer, A. (2012). Salience Theory of Choice Under Risk. *The Quarterly journal of economics*, *127*(3), 1243-1285.

Brebner, Sarah (2016). Does the elicitation mechanism impact the endowment effect? Master Thesis Economics, track Behavioral Economics and Game Theory, University of Amsterdam (http://www.creedexperiment.nl/creed/pdffiles/Brebner Sarah 11084677 MSc ECO.pdf)

Drouvelis, M., & Sonnemans, J. (2015). The Endowment Effect in Games. *Working Paper*. Retrieved from http://www.creedexperiment.nl/creed/people.php?name=sonnemans

Ericson, K. M., & Fuster, A. (2014). The Endowment Effect. *Annual Review of Economics*, 2014, Vol.61(1), pp.555-579.

Fehr, D., Hakimov, R., & Kübler, D. (2015). The willingness to pay–willingness to accept gap: A failed Replication of Plott and Zeiler, *European Economic Review*, 78 (2015) pp.120-128.

Ganzach, Y. (1995). Attribute scatter and decision outcome: Judgment versus choice. *Organizational Behavior and Human Decision Processes*, *62*(1), 113-122.

Grether, D. M., & Plott, C. R. (1979). Economic theory of choice and the preference reversal phenomenon. *The American Economic Review*, *69*(4), 623-638.

Isoni, A., Loomes, G., & Sugden, R. (2011). The Willingness to Pay-Willingness to Accept Gap, the Endowment Effect, Subject Misconceptions, and Experimental Procedures for Eliciting Valuations: Comment. *American Economic Review*, 2011, Vol.101(2), pp.991-101.

Kőszegi, B., & Szeidl, A. (2013). A model of focusing in economic choice.*The Quarterly Journal of Economics*, *128*(1), 53-104.

Plott, C. R., & Zeiler, K. (2005). The Willingness to Pay-Willingness to Accept Gap, the Endowment Effect, Subject Misconceptions, and Experimental Procedures for Eliciting Valuations. *American Economic Review*, 2005, Vol.95(3), pp.530-545.

Plott, C. R., & Zeiler, K. (2011). The Willingness to Pay-Willingness to Accept Gap, the Endowment Effect, Subject Misconceptions, and Experimental Procedures for Eliciting Valuations: Reply. *American Economic Review*, 2011, Vol.101(2), pp.1012-1028.

Seidl, C. (2002). Preference Reversal. *Journal of Economic Surveys*, Vol.16(5), pp.621-655.

Tversky, A., & Kahneman, D. (1975). Judgment under uncertainty: Heuristics and biases. In *Utility, probability, and human decision making* (pp. 141-162). Springer Netherlands.

Would she be willing to accept less than €1, say, €0.80? No, because if the fixed offer turns out to be, say, €0.90, she sells and gets €0.90. Had she not sold, she would have got at least €1.
She continues this process and decides that she would be willing to accept anything equal to or greater than €1.70. Therefore, she should offer €1.70. This value is entered in text box.
Before the beginning of the experiment proper, there will be two training rounds. These rounds will not be taken into account in determining your earnings.

Final instructions
The experiment will now start.
Remember that each screen will indicate if this is a buying or selling task based on whether you own the item.
An example screenshot for each task is shown below.

[Instructions for MPL treatment]

Buying task
The **buying task** works as follows. The experimenter will offer an item for sale. Your task is to make a series of decisions and record them on your computer.
For each item, you will be faced with a series of decisions regarding whether to buy the item at a given price. For each price, you should decide if you are willing to buy the item.
There is not necessarily a "correct" answer for each decision as personal values can differ from individual to individual.
Selling task
The **selling task** works as follows. The experimenter wishes to buy an item that you own. Your task is to make a series of decisions regarding whether you will sell the item at a given price and record them on your computer.
For each decision, you will decide whether you would rather sell the item at the given price or keep the item.

Please raise your hand if you have any questions.
Earnings
You will receive €8 for your participation in the experiments today.
In addition, one buying decision and one selling decision will be randomly selected for implementation and payment. Your results will be calculated and shown to you.
The lottery outcomes and the selected buying and selling rounds have all been randomly selected and have been recorded in the envelop at the front of the room. You may inspect this at the end of the session.

The items you will be buying and selling are lotteries.
All lotteries are displayed in a similar way. The prizes you can **win** are shown inside green boxes. The width of the boxes roughly reflects the probability of winning. Actual probabilities are reported above the boxes. The numbers along the bottom of the boxes (here 1, 70, 71 and 100) refer to the numbers on a set of plastic discs inside a bag. There are 100 discs in the bag, one with each of the numbers from 1 to 100. Lotteries are played out by drawing a disc from the bag. For the lottery on your screen, if the number is between 1 and 70 inclusive, the lottery will pay €5. If it is between 71 and 100 inclusive, it will pay €8.
You record your decision using the computer. Note that you will switch between the roles of buyer and seller. The computer will indicate the role you will play in each particular round at the top of the screen.

Worked Example: buying task
The following instructions will help you understand how to use the computer programme. Please refer to the image on the right of your screen.
The screen relating to each buying task is similar to the image on the right of your screen. The item for which you will be making your offer appears next. This is a lottery with a 70% chance of receiving €5 and a 30% chance of receiving €8.
For each row of decisions, you should decide whether you would buy the item at the stated price.
As a guide, the first and last rows have been preselected for you. This is because, since all lottery outcomes are positive, generally people want the lottery and thus are willing to buy the lottery for €0 (i.e. get it for free). In addition, since all lottery outcomes are below €8 people would generally not want to buy the lottery at this price as they would have to pay €8 and could only win less than €8; possibly, substantially less. Whilst these have been selected as default options, you can change them if you wish. However, remember that any choice could be selected for payment and may thus impact your earnings.
Once you have made your decisions, press the "OK" button. This will display a second set of decisions relating to the same item as described on the next page.

After you have pressed the "OK" button on the first screen, a second set of decisions relating to **the same item** will be displayed. This is indicated in the screenshot on the right of your screen.
The set of decisions displayed in the second set will be dependent on the choices you make in the first set of decisions. You will not be able to edit your earlier

decisions (from the first stage) at this point; however, you can use the back button to go back to stage one and edit your decisions.
Once you have completed the second set of decisions, you can submit your answers. You cannot change your answers once you have submitted.
Depending on your choices a second set of decisions may not always be displayed. You should still press the Submit button to submit your answers.
In all of the decisions, if you decide to buy the item and this decision is chosen for payment, you will pay the stated price and receive the item. Since the item is a lottery, if you buy the item your payment will be based on the outcome of the lottery. So your total payment for that decision will be:

payment = lottery outcome – price

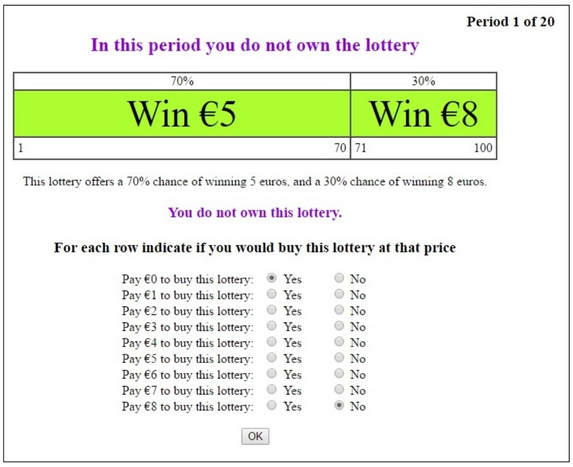
Depending on the price and the lottery outcome this payment may be negative. In this case, the amount will be deducted from your showup fee.
However, if you did not decide to buy the item and this decision is chosen for payment you will receive no payment for this decision as you have not bought the item so do not own the lottery.
Please raise your hand if you have any questions.

Worked Example: selling task
The screens that follow illustrate how to record decisions in the selling tasks.
Suppose the seller owns the lottery displayed on the screen. The lottery provides a 70% chance of receiving €2 and a 30% chance of receiving €1. She must decide which prices she is willing to receive in exchange for the lottery.
She starts high. Would she be willing to accept €8? Yes, she would. Would she be willing to accept €2? Yes. Would she be willing to accept €1? No, because she will earn at least €1 but may earn €2 from the lottery. Would she be willing to sell at €0 (i.e. give the lottery away)? No, because she will earn at least €1 by keeping the lottery.
In the second stage decisions: would she be willing to accept €1.90? She determines that she would. She continues this process, and once she has completed the second stage decisions, she submits her answers for that item.
In all of the decisions, if you decide to sell the item and this decision is chosen for payment, you will receive the stated price but you will not keep the item. Your payment will be the stated price. If decide to keep the lottery (i.e. you choose not to sell at the stated price), your payment for this decision will be the outcome from the lottery.

Before the beginning of the experiment proper, there will be two training rounds. These rounds will not be taken into account in determining your earnings.
Please raise your hand if you have any questions.

Final instructions
The experiment will now start.
Remember that each screen will indicate if this is a buying or selling task based on whether you own the item.
An example screenshot for each task is shown below.

Buying task:



Selling task: