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Uncertainty effect revisited using physical lottery format

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Abstract

We replicate three pricing tasks of Gneezy, List and Wu (2006) for which they document the so called *uncertainty effect*, namely that people value a binary lottery over non-monetary outcomes less than other people value the lottery's worse outcome. Unlike the authors who implement a verbal lottery description, we use a physical lottery format which rules out any misinterpretation of the lottery structure. Contrary to Gneezy, List and Wu, we systematically observe that subjects' willingness to pay for the lottery is significantly higher than other subjects' willingness to pay for the lottery's worse outcome.

Keywords: Risky choice, framing, experiments, task ambiguity

JEL classification: C81; C91; C93; D83

1. Introduction

This study is a continuation of our investigation of the so called *uncertainty effect* that we started in Ortmann et al. (2007). The *uncertainty effect* was introduced by Gneezy, List and Wu (2006, henceforth GLW) as an attempt to explain why subjects systematically value binary lotteries with intermediate probability mixes *less* than other subjects value the lotteries' worse outcomes. GLW obtain the result for various valuation goods (gift certificates, deferred payments, work effort and sports cards), elicitation modes (pricing and choice), and implementation variants (hypothetical and real-stakes, laboratory and field experiments). This result violates what GLW call the *internality axiom* (henceforth IA), i.e., that the value of any risky prospect lie between the value of that prospect's best and worst outcomes.

In Ortmann et al. (2007), we conjecture that GLW's experimental instructions – featuring a verbal and possibly ambiguous description of the lottery – might have contributed to IA violation. We show that rewording GLW's lottery instructions increases lottery valuations and essentially eliminates the possibility of IA violation. Nevertheless, our reworded lottery description is still only verbal and could in principle lead to misinterpretation. Keren and Willemsen (2008) share our concerns with GLW's lottery instructions and demonstrate that describing the lottery in terms of a coin flip or a spinner wheel (though still verbally) helps alleviate IA violation, though some subjects still fail a lottery understanding test.

The purpose of this paper is to provide the cleanest possible implementation for the study of the *uncertainty effect*. We replicate three GLW's tasks involving hypothetical and real-stakes pricing of gift certificates and hypothetical pricing of deferred payments. Unlike in previous studies, we implement a "physical" lottery format. Using equiprobable lotteries, we elicit subjects' willingness to pay for the opportunity of drawing a good (a gift certificate or a deferred payment form) from a closed bag containing two goods which are identical except for their face value. This lottery structure is physically demonstrated by the experimenter while reading aloud the instructions, which arguably rules out any misinterpretation of the lottery structure. Furthermore, unlike in previous studies except for Sonsino's (2008) web-based experiment, we provide subjects with complete information about the goods they are to value.

We find no evidence for the *uncertainty effect*. Contrary to GLW, and in line with the IA, we systematically observe that subjects' willingness to pay for the lotteries is significantly higher than other subjects' willingness to pay for the lotteries' worse outcomes.

2. Design and implementation

2.1 The valuation tasks and lottery implementation

We study three pricing tasks for which GLW document IA violation: hypothetical pricing of gift certificates, real-stakes pricing of gift certificates, and hypothetical pricing of one-year deferred payments. For each task, we run a *lottery treatment* eliciting subjects' willingness to pay for an equiprobable binary lottery featuring two gift certificates (deferred payments) with a face value of x and $2x$, and a *baseline treatment* eliciting other subjects' willingness to pay for the worse gift certificate (deferred payment) with a face value of x. The IA is violated whenever the lottery-baseline between-subjects treatment effect is negative, i.e., whenever the lottery is valued less than the lottery's worse outcome.[1]

Following our previous investigation (Ortmann et al., 2007), we use gift certificates for the Luxor Book Palace (Neoluxor), which is one of the largest bookstores in the Czech Republic located within walking distance of the experimental site. As explained in the instructions (see Appendix A-D), the certificates are valid within the next three months and enable in-store and online purchase of books (including CD and DVD format), maps, stationery, etc.[2] In all sessions (real-stakes or hypothetical), the experimenter circulates among subjects several gift certificates of the appropriate face value in order to ensure common knowledge and credibility. While reading the instructions aloud, the experimenter also mentions other conditions of use of the certificates, such as that no cash is returned if one's purchase falls below the certificates' face value.

In the hypothetical pricing of deferred payments, we use hypothetical payment forms guaranteeing cash payment one year from the date of the experiment. The instructions explain that the deferred payment would (in a real-stakes scenario) be guaranteed by the research

[1] Our design does not address the possibility that lotteries are valued *more* than their best outcomes, though Sonsino (2008) demonstrates this can happen in very rare cases (in 0.75% of observations).
[2] The three-month validity of the gift certificates is longer than in GLW and Ortmann et al. (2007) where certificates were valid for two weeks. The discrepancy is not our choice but rather due to the bookstore's current policy. For completeness, Sonsino's (2008) gift certificates were valid 6 months.

organization that finances the experiment (see Appendix E and F). In all sessions, we again circulate several (hypothetically filled out) payment forms of the research organization for subjects' inspection. While reading the instructions aloud, the experimenter also mentions that, in a real-stakes scenario, the deferred cash payment would be made by one of the experimenters at the experimental site.

In the hypothetical pricing of gift certificates, x=500CZK (about $25), which is identical to Ortmann et al. (2007) and roughly matching the (student) purchasing power of x=$50 used in GLW. In the hypothetical pricing of deferred payments, we again use x=500CZK to make our two hypothetical pricing tasks comparable (GLW used x=$100). In the real-stakes pricing of gift certificates, x=200CZK (about $10) and all subjects' decisions are played out, while GLW used x=$50 and the decisions of 5% (1 in 20) of subjects were played out. Note that x=200CZK is still a substantial amount of money: it would be sufficient to purchase just under half of all books and textbooks and a much larger proportion of stationery items currently sold at the Neoluxor online shop (and the certificates can of course co-finance purchases exceeding their face value).

We implement all lottery treatments (hypothetical or real-stakes) using a "physical" lottery format. While reading the instructions, the experimenter presents a bag into which he illustratively places the two gift certificates (deferred payment forms) and demonstrates how one certificate (form) is to be drawn from the bag without looking. The instructions explain that the two certificates (forms) are identical except for their value – which is also apparent to subjects when inspecting the circulated certificates (forms) – and thus the chances of drawing either the better or the worse certificate (form) are equal. Subjects are then asked to state their willingness to pay for the opportunity of drawing a gift certificate (deferred payment form) from the bag.[3]

Our reason for using the physical lottery format is to clear up any ambiguity regarding subjects' (mis)interpretation of the lottery structure. In Ortmann et al. (2007), we conjectured that GLW's lottery instructions – by making a conceptual divide between the lottery ticket (for which WTP is elicited) and the lottery outcomes (gift certificates) – might have led to

[3] For the real-stakes pricing of gift certificates, we were unable to obtain gift certificates worth 2x, so we used two identical table tennis balls marked x and 2x to represent the real gift certificates. Subjects were explained that if they would draw a ball marked 2x, they would receive two gift certificates worth x.

misinterpretation of the lottery structure and thereby contributed to IA violation. We reworded GLW's instructions in a way that assigns the lottery probabilities directly to the gift certificates' face values. While the rewording essentially eliminated IA violation in our subject sample, we admittedly cannot exclude the possibility that the rewording induced other types of misinterpretation of the lottery. To tackle this issue, we use here the physical lottery format which – even without explicitly mentioning the lottery at all – arguably makes any kind of lottery misrepresentation highly unlikely.

In a study that also replicates GLW's hypothetical pricing of gift certificates, Keren and Willemsen (2008) find that when the equiprobable binary lottery is described to subjects in terms of a coin flip or a spinner wheel (though only verbally), no IA violation is observed, whereas when the lottery is described purely verbally though quite explicitly, IA is violated.[4] Furthermore, a considerably higher proportion of subjects pass a lottery understanding test in the former implementation (69-87%) compared to the latter implementation (29-43%). In general, IA violation seems to occur only for the group of subjects who incorrectly answer a lottery understanding test. These findings are certainly illuminating, though one should note that GLW also use a (verbally described) coin-flip lottery implementation in their real-stakes gift certificates tasks but still observe IA violation. Also, Keren and Willemsen's lottery description retains the lottery ticket (or lottery participation) terminology and the lottery itself is not demonstrated to subjects physically, which could be a reason why the proportion of subjects failing the lottery understanding test is not negligible.

In another related but *within*-subjects study, Sonsino (2008) runs a web-based experiment in which subjects first value three goods with widely different market prices: a gift certificate for a luxurious weekend vacation, a gift certificate for a gourmand dinner, and a choice between a fine bottle of wine and a box of gourmand chocolate. Subjects then value binary lotteries over combinations of the three goods while observing their previous valuations of the goods themselves. The sequential valuations are elicited using six-bidder Vickrey auctions (the probability of an auction being played out is about 5%). The lotteries (involving various probability mixes) are described verbally using the lottery ticket terminology and pie charts. Subjects are invited to ex-post participate in the actual lottery draw where a volunteer

[4] The latter result is also observed by Simonsohn (2008) who implements the hypothetical pricing of gift certificates with an explicitly worded lottery as part of a series of surveys and experiments.

subject secretly chooses numbers that are compared to randomly generated numbers in order to determine the lottery outcome.

To the best of our knowledge, Sonsino (2008) is the first study to demonstrate that IA violation can occur in a within-subjects design. In almost 12% of cases, the lotteries are valued less than their lower-valued outcomes, and 27% of subjects produce at least one such IA violation. Contrary to the between-subjects studies where IA violation occurs only for lotteries with intermediate probability mixes, Sonsino's within-subjects IA violation gets more frequent as the probability of winning the lotteries' better outcome decreases. One may only speculate about the reasons behind these results, including the web-based nature of the experiment combined with the auction-based elicitation mechanism, the lotteries featuring different goods (rather than goods that are identical except for their face value), the sequential nature of the valuations possibly generating valuation order effects, or finally the "lottery aversion" explanation proposed by Sonsino (see footnote 6). Besides these possible reasons, it is once again possible that the verbal (though explicit) lottery description involving the lottery ticket terminology might have been misinterpreted by some subjects or might have at least made the valuation procedure hard to comprehend.

2.2 Eliciting willingness to pay (WTP)

In the hypothetical pricing of gift certificates and deferred payments, we follow GLW in that the instructions simply ask subjects to state the highest price they would be willing to pay (see Appendix A, B, E and F). One can of course imagine a procedurally more incentive-compatible mechanism for the hypothetical WTP elicitation, such as a hypothetical-stakes version of the elicitation mechanism we use for the real-stakes pricing task. However, for the sake of replication, we wished to retain the key features of GLW's hypothetical-stakes design for which the authors document IA violation. We hope – as implicitly do the previous hypothetical studies of the *uncertainty effect* – that the (potential) hypothetical bias does not interact with the lottery-baseline treatment in a way that biases the treatment effect towards or away from the occurrence of IA violation. In the light of this concern, we (*ceteris paribus*) view the real-stakes pricing of gift certificates as a more reliable test of IA violation.

In the real-stakes pricing of gift certificates, we use the multiple price list (MPL) mechanism for eliciting WTP (see Appendix C and D). In both the lottery and baseline treatments, subjects receive 2*x* for participating. They are asked to indicate (by circling either

Yes or No) their willingness to pay various prices listed in the MPL, where the prices range from 0.1*x* to 2*x* and rise in 0.1*x* increments. Subjects know that only one of their 20 decisions is payoff-relevant: after making all 20 decisions, each subject randomly draws a card from a box with cards numbered 1 to 20 to determine her payoff-relevant row. If she circled Yes in that row, she pays the price and (in the baseline treatment) gets the gift certificate worth *x* or (in the lottery treatment) randomly draws a certificate from a bag containing two certificates worth *x* and 2*x*. If she circled No in the payoff-relevant row, she earns the participation fee of 2*x*.

We use the above procedure for most subjects in the lottery and baseline treatments. We also run another baseline treatment with a smaller number of subjects where the participation fee is *x* and the MPL price range is 0.1*x* to *x*, so subjects make only 10 Yes-or-No decisions. This would normally be a standard MPL procedure for valuing the gift certificate worth *x*, but we wish to guard ourselves against the possibility of a "mid-table" effect. A potential caveat of the MPL method is that subjects may be naturally drawn towards the middle of the MPL. Other things equal, the mid-table effect could work against observing IA violation if the lottery treatment with the price range of 0.1*x* to 2*x* were only compared with the baseline treatment with the narrower price range of 0.1*x* to *x*. By running the main baseline treatment with the wide price range of 0.1*x* to 2*x*, we eliminate this problem as well as being able to assess whether the mid-table effect is actually present.

To further guard ourselves against the possibility of the mid-table effect, we also run another lottery treatment with a smaller number of subjects where, similar to Andersen et al. (2007), the MPL is asymmetric: it is "skewed low" in the sense that the mid-row price is well below the mean of the MPL (in fact below 0.8*x*; see Appendix C). If the mid-table effect is indeed present, the asymmetric MPL should (*ceteris paribus*) induce lower WTP valuations and hence favor the occurrence of IA violation. Furthermore, since the asymmetric MPL shares all prices up to 1.4*x* with the corresponding symmetric MPL, we are again able to directly assess whether the mid-table effect occurs (in the price region where most valuations can be expected to fall).

In sum, if the null hypothesis (statistically speaking) states that the distributions of lottery and baseline WTP valuations are identical, the alternative hypotheses entertained by the IA and the *uncertainty effect* (IA violation) of course run in the opposite directions. To provide

fair chances for finding IA violation in our data, we run the baseline treatment with the wide price range and the lottery treatment with the asymmetric MPL, both of which favor the occurrence of IA violation if the mid-table effect is indeed present. While one can think of other effects being induced by our variation of the lottery and baseline treatments, such as changing the effective power of financial incentives, we do not see a reason why any such effect should work against observing IA violation.

GLW used the Becker-DeGroot-Marschak (BDM) mechanism to elicit real-stakes WTP. We use the MPL elicitation mechanism as an alternative incentive-compatible elicitation mechanism. We do not wish to contrast the potential advantages and disadvantages of the MPL and BDM elicitation mechanisms. Our main goal is to assess the *direction* of the lottery-baseline treatment effect (i.e., the occurrence of IA violation or lack thereof) rather than obtaining WTP point estimates. Any incentive-compatible elicitation mechanism should serve that goal, *unless* the mechanism interacts with the lottery and baseline treatments in a way that biases the treatment effect towards or away from IA violation. In this respect, given the well-known concerns with the BDM mechanism (e.g., Karni and Safra, 1987, and Horowitz, 2006), and having explicitly accounted for the mid-table effect which potentially induces treatment interactions when using the MPL mechanism, we simply feel more confident using the MPL mechanism to study the lottery-baseline treatment effect.

There are of course refinements of the basic MPL procedure which, for example, allow subjects to express indifference in their willingness to pay, or iterated MPL procedures which permit eliciting more precise valuations by successively decreasing the MPL price increments (e.g., Andersen et al., 2007). Once again, however, given the focus on the direction of the lottery-baseline treatment effect rather than WTP point estimates, the benefits of such refinements in our view do not outweigh their potential costs associated with increased complexity of the elicitation procedure. Our MPL price increments of $0.1x$=20CZK (about $1) seem fine enough to lessen concerns related to the interval-censored nature of MPL responses, which we in any case address statistically (see footnote 9).[5] Also, our subjects can anytime make decisions in a nonmonotonic manner, which may well indicate indifference.

[5] There is also some controversy regarding whether subjects' WTP can actually be elicited as precisely as required by mechanisms that elicit point-estimate responses, such as the BDM mechanism or the simplistic hypothetical elicitation mechanism that we use in the hypothetical tasks. See, for example, Andersen et al. (2007) for further discussion.

We tackle these (very rare) cases by using wider price intervals to represent the concerned subjects' WTP, and we always do so in a way that favors the occurrence of IA violation.

2.3 Other design and implementation details

As already mentioned above, the lottery and baseline treatments for each pricing task were conducted in a between-subjects design. However, there is a within-subjects component in our design in that the hypothetical pricing of deferred payments was run as a "surprise" task following the real-stakes and hypothetical pricing of gift certificates. In particular, each lottery treatment (real-stakes or hypothetical) that priced gift certificates was followed by the lottery treatment pricing deferred payments, and each baseline treatment (real-stakes or hypothetical) that priced gift certificates was followed by the baseline treatment pricing deferred payments.

While the instructions for the deferred payments task reminded subjects that they faced a new task unrelated to the gift certificates task just finished (see Appendix E and F), the gift certificates valuation undoubtedly influenced the subsequent deferred payments valuation in some manner. However, given the variety of gift certificates (lottery and baseline) treatments preceding the deferred payments (lottery and baseline) treatments, we can study this influence in a systematic manner when assessing the lottery-baseline treatment effect for deferred payments, as outlined in section 3.3. For this reason, we do not view the deferred payments valuations as less informative than the gift certificates valuations.

The experiment was run in a pen-and-paper format as in GLW, and all sessions were conducted by the first author in Czech (the experimental instructions in Appendices A-F are translations of the original Czech instructions). All parts of the experiment were anonymous and the payments as well as lottery draws (if any) were done privately at the end of a session. Including an initial demographic questionnaire, hypothetical sessions lasted 20 minutes while sessions involving the real-stakes pricing task lasted slightly longer. Subjects earned 100CZK for participating in the hypothetical sessions, while the participation fee was 400CZK or 200CZK in sessions containing the real-stakes pricing task (see section 2.2).

The subjects were 150 students of Prague universities recruited online using ORSEE (Greiner, 2004). Just above a third were students from various branches of engineering, a quarter were students of finance, business, management or accounting, another quarter were

economists, and the remainder came from other fields. Subjects were 18 to 30 years old with the mean and median age of 23 years, and 65% of them were males.

3. Results

Before reporting our results, a (perhaps obvious) note of caution is in order. In any between-subjects study of this kind, one would hope that the subject pool is reasonably homogenous (or treatments properly randomized) in relevant aspects, in order to permit unconditional lottery-baseline treatment comparisons; or that observable demographic characteristics can account for relevant across-treatment differences in subject pool composition and hence permit conditional treatment comparisons. One should nevertheless be open to the possibility that, even if the *uncertainty effect* as described by GLW is nonexistent, genuinely lower gift certificates valuations (real-stakes or hypothetical) in the lottery treatment compared to the baseline treatment could *in principle* generate IA violation. By similar token, genuinely higher time discounting of the deferred payments in the lottery treatment compared to the baseline treatment could *in principle* generate IA violation. Also, high risk aversion of subjects in the lottery treatments could contribute to – though by itself not generate – IA violation.[6]

We report both unconditional tests for the lottery-baseline treatment effect (*t*-test, Wilcoxon rank-sum test and Kolmogorov-Smirnov test) as well as *t*-tests that condition on the collected demographic characteristics (age, gender, year and field of study, and a wealth proxy related to family car ownership).[7] However, we remain cautious that the reported treatment effects might be affected by across-treatment differences in gift certificates valuation, time preferences or other relevant individual characteristics that we do not account for. What gives us some confidence in our results is that, across all three pricing tasks, we observe a systematic lottery-baseline treatment effect in the direction of the IA (contrary to the systematic IA violation documented by GLW).

[6] Nevertheless, Sonsino (2008) argues that IA violation could be triggered solely by subjects' aversion to lotteries *per se*. In the author's post-experimental questionnaire, "aversion to lotteries" is the most frequently chosen explanation for IA violation. Subjects were presented with an example of within-subjects IA violation, and, if admitting to the (hypothetical) possibility of exhibiting such behavior, chose a favorite explanation for the behavior from a list of three options, the other two being "noise distraction" and "other explanations."

[7] Some of the tests may be deemed more appropriate than others depending on how one views the nature of the data – see also footnote 5.

Since the stakes (real or hypothetical) are substantial across the three pricing tasks, we report all WTP figures as percentages of *x*, i.e., the face value of the worse gift certificate or deferred payment. This permits a clearer comparison of WTP valuations across tasks and vis-à-vis previous studies. Any such between-subjects comparison should naturally be interpreted with the above cautionary note in mind.

3.1 Hypothetical pricing of gift certificates

Table 1 displays summary statistics and beneath them statistical tests for the hypothetical pricing of gift certificates.[8] Here and elsewhere, treatments are numbered for ease of exposition as well as having a verbal description in accordance with the earlier discussion. Since this study complements the hypothetical pricing of gift certificates we conducted in Ortmann et al. (2007), we reproduce the previous lottery treatments in columns (1) and (2) while columns (3) and (4) contain results for the current study.

Focusing first on the three lottery treatments, WTP valuations are very similar in the current treatment T3 and in the Replication treatment T1 where we closely replicated GLW. On the other hand, WTP valuations are considerably higher in the Rewording treatment T2 (and significantly so, as the first three test rows show). This difference may be due to the different presentation of the lottery structure in the Rewording treatment, but as noted above, it may just as well be due to across-treatment differences in subject pool composition that we do not account for. For further comparison, all three of our lottery treatments have higher WTP valuations compared to GLW where the corresponding 95% confidence interval for WTP mean is merely (18.83, 45.66)*x*, and also compared to the corresponding 95% confidence interval of (50.00, 94.80)*x* in Keren and Willemsen (2008; Experiment 2, taking only subjects passing their lottery understanding test).

Turning next to our baseline treatment T4, the 95% confidence interval for WTP mean is (59.18, 79.22)*x*, while GLW's corresponding confidence interval is (41.38, 63.02)*x* and Keren and Willemsen's (2008; Experiment 2) confidence interval is (45.20, 60.00)*x*. Although our sample size in T4 is relatively small, this comparison of baseline treatments

[8] In the OLS estimation yielding the conditional *t*-test statistics, the collected demographic characteristics are jointly significant at the 5% level and subjects' year of study is individually significant at the 5% level (other controls including session dummies are individually insignificant at the 10% level). We omit the wealth proxy from the final estimation since it could be viewed as a controversial indicator of subjects' wealth and is in any case highly insignificant.

seems to indicate higher "genuine" (though hypothetical) valuations of gift certificates in our study compared to the other two studies. Other things equal, this would work in favor of us finding IA violation, but we observe even higher WTP valuations in the lottery treatments, as detailed next.

In particular, the most appropriate lottery-baseline comparison is between T3 and T4 which share the implementation features of the current study (see section 2.1). The treatment effect is clearly in the direction of the IA: as the fourth test row shows, WTP valuations are significantly higher in the lottery treatment T3 than in the baseline treatment T4. Not reported in Table 1, comparing the baseline treatment T4 to Ortmann et al.'s lottery treatments (T1 and T2) yields statistically even stronger support for the IA.

3.2 Real-stakes pricing of gift certificates

Table 2 displays summary statistics and beneath them statistical tests for the real-stakes pricing of gift certificates.[9] Out of the 109 subjects completing the task, we detect three clear cases of misunderstanding the MPL valuation procedure (one in a lottery treatment and two in a baseline treatment) and consequently exclude these subjects from the analyzed sample. Further, we observe two subjects entering a nonmonotonic response: a single No response with Yes responses before and after that. We treat these one-off cases of nonmonotonicity by recoding the nonmonotonic No responses as Yes responses, which favors IA violation since both subjects happen to be in a baseline treatment.

We start by assessing the extent of the mid-table effect. The lottery treatment with the asymmetric MPL (T6) has slightly lower WTP valuations compared to the lottery treatment with the symmetric MPL (T5), which is in the direction of the mid-table effect. However, the across-treatment differential is small and far from significant, as shown in the first test row. There is a stronger evidence for the mid-table effect in the baseline treatments, where the treatment with the narrow MPL price range (T8) has considerably lower WTP valuations than

[9] The parametric treatment comparisons for this section were initially performed by estimating an "interval regression" model, taking into account the interval-censored nature of the WTP data. Unsurprisingly (given the simple nature of the estimation), this yielded qualitatively identical results to the OLS estimation yielding the conditional *t*-test statistics reported in Table 2. In either type of estimation, the collected demographic characteristics are jointly significant at the 10% level and subjects' age is individually significant at the 5% level (other controls including session dummies are individually insignificant at the 10% level). We again omit the wealth proxy from the final estimation for reasons explained in section 3.1.

does the treatment with the wide MPL price range (T7). The across-treatment differential is statistically significant, as shown in the second test row. As discussed in section 2.2, the mid-table effect works in favor of IA violation since our main baseline treatment (with majority of baseline subjects) is in fact T7.

We next turn to the lottery-baseline treatment effect, which can be evaluated in several ways. One of them is to pool the lottery treatments T5 and T6 and the baseline treatments T7 and T8, as we do in columns (5) and (6) of Table 2, respectively. This yields 95% confidence intervals for WTP mean of (74.83, 92.91)*x* for the lottery treatments and (56.57, 69.85)*x* for the baseline treatments. Hence the treatment effect is clearly in the direction of the IA, as also confirmed in the third test row. Alternatively, one can make stricter treatment comparisons which favor IA violation, for example by excluding the baseline treatment T8 with the narrow MPL price range (see the fourth test row), or by comparing only the lottery treatment T6 with the asymmetric MPL with the baseline treatment T7 with the wide MPL price range (see the fifth test row). Even these stricter comparisons provide clear support for the IA.

For comparison, GLW's lottery treatment yields much lower WTP valuations compared to ours: the corresponding 95% confidence interval for WTP mean is (40.34, 71.66)*x*. On the other hand, GLW's baseline treatment yields a 95% confidence interval for WTP mean of (66.77, 85.23)*x*, which is higher than in our case but not so much higher than in our main baseline treatment T7. This latter comparison seems to suggest comparable "genuine" valuations of gift certificates in our and GLW's study.

Bearing in mind the design and implementation differences, one can further compare the hypothetical and real-stakes WTP valuations in our Table 1 and Table 2, respectively. Casual comparison suggests that there is a minor upward hypothetical bias in both the lottery and baseline treatments (excluding the exceptionally high valuations in the Rewording treatment). By contrast, similar comparison of GLW's hypothetical and real-stakes WTP valuations suggests a downward hypothetical bias in both the lottery and baseline treatments.

3.3 Hypothetical pricing of deferred payments

Table 3 displays summary statistics and beneath them statistical tests for the hypothetical pricing of deferred payments.[10] As explained in section 2.3, the lottery (baseline) treatment of this task always followed a lottery (baseline) treatment of the gift certificates pricing tasks. The treatments in Table 3 are numbered according to the treatments in Tables 1 and 2, so that for instance TP3 denotes the deferred payments baseline treatment which followed the gift certificates baseline treatment T3. Spearman's rank correlation coefficient between WTP valuations in the gift certificates and deferred payments treatments ranges between 0.27 and 0.60. The correlation is generally higher for the lottery treatments than for the corresponding baseline treatments, which is likely due to subjects' risk preferences affecting both of their valuations in the lottery treatments whereas the baseline treatments lack this common valuation factor.

The lottery-baseline treatment effect can again be evaluated in several ways. One can pool all lottery treatments and all baseline treatments, as done in columns (1) and (2) of Table 3, respectively. This yields 95% confidence intervals for WTP mean of (70.28, 87.66)*x* for the lottery treatments and (41.62, 54.89)*x* for the baseline treatments. Hence the overall treatment effect is clearly in the direction of the IA, as confirmed in the first test row. Alternatively, one can evaluate the treatment effect separately for the treatments following the real-stakes gift certificates treatments (as done in columns (3) and (4) and tested in the second test row), and for the treatments following the hypothetical gift certificates treatments (as done in columns (5) and (6) and tested in the third test row). These separate comparisons both provide clear support for the IA.

For comparison, GLW's lottery treatment yields much lower WTP valuations compared to ours: the corresponding 95% confidence interval for WTP mean is merely (19.51, 45.49)*x*. GLW's baseline treatment yields a 95% confidence interval of (34.02, 53.18)*x*, which is only marginally lower than in our case (see columns (2), (4) and (6) of Table 3). Thus "genuine" valuations of deferred payments are quite comparable in our and GLW's study.

[10] In the OLS estimation yielding the conditional *t*-test statistics, the collected demographic characteristics are jointly significant at the 10% level and subjects' field of study is individually significant at the 5% level (other controls including session dummies are individually insignificant at the 10% level). We again omit the wealth proxy from the final estimation for reasons explained in section 3.1.

We next address in more detail how subjects' WTP valuations in the deferred payments task are influenced by their previous gift certificates valuations. Comparing column (3) with column (5) and column (4) with column (6), and inspecting the fourth test row, one can see that WTP valuations of deferred payments are significantly higher when preceded by hypothetical rather than real-stakes gift certificates valuations. This could indicate a kind of anchoring effect related to the upward hypothetical bias of the gift certificates valuations reported in section 3.2. Alternatively, it could also indicate a "disciplining" effect of the real-stakes gift certificates elicitation mechanism, which is fully incentive compatible and thus may give subjects who experience it a better idea of how to approach the subsequent hypothetical pricing of deferred payments.

To further investigate this issue, we compare WTP valuations in the deferred payments lottery treatments TP5 and TP6 that were preceded by the real-stakes gift certificates lottery treatments with the symmetric and asymmetric MPL, respectively. The fifth test row shows that WTP valuations in TP5 are only slightly higher than in TP6, which matches the results for the preceding gift certificates treatments T5 and T6. We further compare WTP valuations in the deferred payments baseline treatments TP7 and TP8 that were preceded by the real-stakes gift certificates baseline treatments with the wide and narrow MPL price range, respectively. As the sixth test row shows, WTP valuations in TP7 are only slightly higher than in TP8, which contrasts with the much larger difference between the preceding gift certificates treatments T7 and T8. This last result suggests that the anchoring effect is not so strong and that the disciplining effect (or some such alternative effect) may play a role.

4. Discussion and conclusion

In this study, we systematically observe that the internality axiom is *not* violated. Subjects' willingness to pay for an equiprobable binary lottery is significantly higher than other subjects' willingness to pay for the lottery's worse outcome, regardless of whether the valuation is real-stakes or hypothetical and whether the outcomes are gift certificates or deferred payments.

We do not wish to draw any overreaching conclusions about the existence of IA violation (and hence the *uncertainty effect*) systematically documented by GLW. As noted in section 3, under between-subjects design, across-treatment differentials in genuine valuations of gift certificates and deferred payments could in principle produce IA violation even if the

uncertainty effect as described by GLW is nonexistent. Nevertheless, we observe that, with our implementation of the pricing tasks and in our subject pool, IA violation is (statistically) extremely unlikely.

Our implementation rests on, first, using a physical lottery format that arguably rules out any misinterpretation of the lottery structure and, second, on providing subjects with complete information about the goods that they are to value. Either of these features could have contributed to our results differing systematically from GLW's. The physical lottery format likely plays a role, given Keren and Willemsen's (2008) finding that verbally presenting the lottery in terms of a coin flip or a spinner wheel helps alleviate IA violation (though 13-31% of subjects still misunderstand the lottery structure). Providing complete information about the to-be-valued goods is unlikely to play a critical role, given that Sonsino (2008) uses this implementation feature but observes IA violation even in a within-subjects design. Other design and implementation features of Sonsino's and our study differ too widely to draw any firm conclusions about the discrepancy in their and our results.

Our results could of course be specific to our subject pool – Prague students with varied academic background and other demographic characteristics (see section 2.3). Nevertheless, accounting for the characteristics when evaluating the lottery-baseline treatment effect leaves our results qualitatively unchanged (see sections 3.1-3.3). While it is difficult to judge whether our subject pool differs from that of GLW (University of Chicago students), we observe that the two subject pools mostly have comparable genuine (baseline-treatment) valuations of gift certificates and deferred payments. Naturally, replicating our implementation features for other subject pools would be informative for assessing external validity of our results.

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References

Andersen, S., Harrison, G.W., Lau, M.I., and E.E. Rutstrom (2007). "Valuation Using Multiple Price List Formats." *Applied Economics*, 1-8.

Gneezy, U., List, J.A., and G. Wu (2006). "The Uncertainty Effect: When a Risky Prospect Is Valued Less Than Its Worst Outcome." *The Quarterly Journal of Economics*, 121.

Greiner, B. (2004). "The Online Recruitment System ORSEE 2.0 – A Guide for the Organization of Experiments in Economics." University of Cologne, Working Paper Series in Economics 10.

Horowitz, J.K. (2006). "The Becker-DeGroot-Marschak Mechanism Is Not Necessarily Incentive Compatible, even for Non-Random Goods." *Economics Letters*, 93.

Karni, E., and Z. Safra (1987). "Preference Reversals and the Observability of Preferences by Experimental Methods." *Econometrica*, 55.

Keren, G., and M.C. Willemsen (2008). "Decision Anomalies, Experimenter Assumptions, and Participants' Comprehension: Revaluating the Uncertainty Effect." *Journal of Behavioral Decision Making*, in press.

Ortmann, A., Prokosheva, S., Rydval, O., and R. Hertwig (2007). "Valuing a Risky Prospect Less than Its Worst Outcome: Uncertainty Effect or Task Ambiguity." Jena Economic Research Paper 2007-038 and CERGE-EI Working Paper 334, 07/2007.

Simonsohn, U. (2008). "Direct-Risk-Aversion: Evidence from Risky Prospects Valued below Their Worst Outcome." *Psychological Science*, forthcoming.

Sonsino, D. (2008). "Disappointment Aversion in Internet Bidding-Decisions." *Theory and Decision*, 64.

Table 1: Willingness-to-pay in the hypothetical pricing of gift certificates [a]

Column	(1)	(2)	(3)	(4)
Treatment	**T1(lottery Replication)**	**T2(lottery Rewording)**	**T3(lottery)**	**T4(baseline)**
Number of subjects	32	32	26	15
Mean WTP (standard deviation)	90.31 (32.89)	111.03 (25.87)	88.22 (34.00)	69.20 (18.09)
Median WTP	100.00	105.00	98.90	70.00
95% C.I. for WTP mean	(78.46, 102.17)	(101.70, 120.35)	(74.49, 101.95)	(59.18, 79.22)
95% binomial exact C.I. for WTP median	(60.00, 100.00)	(100.00, 130.00)	(80.00, 100.00)	(60.00, 84.00)
Null hypothesis tested	*t*-test	*t*-test with controls	Wilcoxon rank-sum test	Kolmog.-Smirnov test
H_0: T1-T3=0	t = 0.24, p = 0.8135	t = -0.07, p = 0.945	Z = 0.31, p = 0.7575	M = 0.11, p = 0.980
H_0: T2-T1=0	t = 2.80, p = 0.0068	t = 2.93, p = 0.004	Z = 2.56, p = 0.0105	M = 0.34, p = 0.045
H_0: T2-T3=0	t = 2.90, p = 0.0053	t = 2.21, p = 0.030	Z = 2.91, p = 0.0036	M = 0.38, p = 0.020
H_0: T3-T4=0	t = 2.34, p = 0.0247	t = 2.47, p = 0.015	Z = 2.25, p = 0.0243	M = 0.47, p = 0.018

[a] The top part of the table displays summary statistics for various treatments while the bottom part displays tests for across-treatment differences (H_0 and the corresponding tests to the right of it). All WTP figures are percentages of x=500CZK. All tests are two-sided. Test statistics are rounded to 2 decimal places and *p*-values are left at the precision reported by *Stata*. *t*-tests with demographic controls are based on heteroskedasticity-robust standard errors. Exact *p*-values are reported for the Kolmogorov-Smirnov test.

Table 2: Willingness-to-pay in the real-stakes pricing of gift certificates [b]

Column	(1)	(2)	(3)	(4)	(5)	(6)
Treatment(s)	**T5(lottery sym MPL)**	**T6(lottery asym MPL)**	**T7(baseline wide MPL)**	**T8(baseline narrow MPL)**	**T5,6(lottery)**	**T7,8(baseline)**
Number of subjects	35	18	39	14	53	53
Mean WTP (standard deviation)	86.57 (36.21)	78.61 (24.96)	66.67 (23.32)	53.57 (24.37)	83.87 (32.80)	63.21 (24.08)
Median WTP	100.00	90.00	70.00	55.00	100.00	60.00
95% C.I. for WTP mean	(74.13, 99.01)	(66.20, 91.02)	(59.11, 74.23)	(39.50, 67.64)	(74.83, 92.91)	(56.57, 69.85)
95% binomial exact C.I. for WTP median	(80.00, 100.00)	(60.00, 100.00)	(50.00, 80.00)	(30.00, 80.00)	(75.00, 100.00)	(50.00, 70.00)
Null hypothesis tested	*t*-test	*t*-test with controls	Wilcoxon rank-sum test	Kolmog.-Smirnov test		
H_0: T5-T6=0	$t = 0.83$, $p = 0.4080$	$t = 0.94$, $p = 0.351$	$Z = 1.40$, $p = 0.1625$	$M = 0.23$, $p = 0.485$		
H_0: T7-T8=0	$t = 1.78.$, $p = 0.0808$	$t = 1.43.$, $p = 0.156$	$Z = 1.67$, $p = 0.0950$	$M = 0.28$, $p = 0.322$		
H_0: T5,6-T7,8=0	$t = 3.70.$, $p = 0.0004$	$t = 3.94.$, $p = 0.000$	$Z = 3.90$, $p = 0.0001$	$M = 0.45$, $p = 0.000$		
H_0: T5,6-T7=0	$t = 2.94$, $p = 0.0042$	$t = 3.33$, $p = 0.001$	$Z = 3.18$, $p = 0.0015$	$M = 0.43$, $p = 0.001$		
H_0: T6-T7=0	$t = 1.76.$, $p = 0.0843$	$t = 1.91$, $p = 0.059$	$Z = 1.87$, $p = 0.0613$	$M = 0.30$, $p = 0.165$		

[b] The top part of the table displays summary statistics for various treatments while the bottom part displays tests for across-treatment differences (H_0 and the corresponding tests to the right of it). All WTP figures are percentages of x=200CZK. All tests are two-sided. Test statistics are rounded to 2 decimal places and *p*-values are left at the precision reported by *Stata*. *t*-tests with demographic controls are based on heteroskedasticity-robust standard errors. Exact *p*-values are reported for the Kolmogorov-Smirnov test.

Table 3: Willingness-to-pay in the hypothetical pricing of deferred payments [c]

Column	(1)	(2)	(3)	(4)	(5)	(6)
Treatment(s)	**TP3,5,6 (lottery)**	**TP4,7,8 (baseline)**	**TP5.6(lottery post real)**	**TP7,8 (baseline post real)**	**TP3 (lottery post hypo)**	**TP4 (baseline post hypo)**
Number of subjects	80	70	54	55	26	15
Mean WTP (standard deviation)	78.97 (39.04)	48.25 (27.83)	75.65 (38.94)	44.70 (27.57)	85.87 (39.10)	61.27 (25.60)
Median WTP	80.00	50.00	80.00	40.00	85.00	70.00
95% C.I. for WTP mean	(70.28, 87.66)	(41.62, 54.89)	(65.02, 86.28)	(37.25, 52.16)	(70.07, 101.66)	(47.09, 75.44)
95% binomial exact C.I. for WTP median	(60.00, 99.00)	(40.00, 60.00)	(60.00, 99.00)	(36.00, 60.00)	(60.00, 120.00)	(50.00, 80.00)
Null hypothesis tested	*t*-test	*t*-test with controls	Wilcoxon rank-sum test	Kolmog.-Smirnov test		
H_0: TP3,5,6-TP4,7,8=0	t = 5.60, p = 0.0000	t = 6.65, p = 0.000	Z = 4.97, p = 0.0000	M = 0.43, p = 0.000		
H_0: TP5,6-TP7,8=0	t = 4.78, p = 0.0000	t = 5.37, p = 0.000	Z = 4.29, p = 0.0000	M = 0.43, p = 0.000		
H_0: TP3-TP4=0	t = 2.18, p = 0.0357	t = 3.17, p = 0.002	Z = 1.95, p = 0.0515	M = 0.43, p = 0.037		
H_0: TP3,4-TP5,6,7,8=0	t = 2.50, p = 0.0137	t = 2.30, p = 0.023	Z = 2.35, p = 0.0190	M = 0.21, p = 0.108		
H_0: TP5-TP6=0	t = 0.47, p = 0.6414	t = 0.73, p = 0.467	Z = 0.72, p = 0.4724	M = 0.22, p = 0.577		
H_0: TP7-TP8=0	t = 0.46, p = 0.6455	t = 0.30, p = 0.764	Z = 0.42, p = 0.6755	M = 0.14, p = 0.953		

[c] The top part of the table displays summary statistics for various treatments while the bottom part displays tests for across-treatment differences (H_0 and the corresponding tests to the right of it). All WTP figures are percentages of x=500CZK. All tests are two-sided. Test statistics are rounded to 2 decimal places and *p*-values are left at the precision reported by *Stata*. *t*-tests with demographic controls are based on heteroskedasticity-robust standard errors. Exact *p*-values are reported for the Kolmogorov-Smirnov test.

Appendix A: Experimental instructions for the hypothetical pricing of gift certificates, lottery treatment (T3)

Instructions for the experiment

In this experiment, we will ask you a hypothetical question. Regardless of your answer, you will earn 100CZK for participating. Please read the instructions carefully and then write your answer at the end of the instructions. If you have any queries, please raise your hand. The experimenter will come to you and answer your query privately.

Your task is as follows. The bag on the table in front of the experimenter contains two gift certificates for purchase of goods at the Luxor Book Palace (Neoluxor) at the Wenceslas square. **The two gift certificates are identical, except that one of them has a value of 500CZK while the other has a value of 1000CZK.** Each certificate is valid within the next three months and entitles the owner to purchase goods for up to the value of the certificate, for example various kinds of books including CD and DVD format, maps, stationery, and so on. The certificates can also be used to make purchases in the Neoluxor internet shop.

Now imagine you had an opportunity to draw **one** gift certificate from the bag. You would not be able to look into the bag while drawing, and since the two certificates in the bag are identical (except for their value), you would have equal (50-50) chances of drawing either the 500CZK or the 1000CZK certificate.

Our question is as follows: **What is the highest price (in CZK) you would be willing to pay for the opportunity of drawing one certificate from the bag?** Please write your answer here:

_____

Appendix B: Experimental instructions for the hypothetical pricing of gift certificates, baseline treatment (T4)

Instructions for the experiment

In this experiment, we will ask you a hypothetical question. Regardless of your answer, you will earn 100CZK for participating. Please read the instructions carefully and then write your answer at the end of the instructions. If you have any queries, please raise your hand. The experimenter will come to you and answer your query privately.

Your task is as follows. The experimenter will show you a **500CZK gift certificate for purchase of goods at the Luxor Book Palace (Neoluxor) at the Wenceslas square**. The gift certificate is valid within the next three months and entitles the owner to purchase goods for up to 500CZK, for example various kinds of books including CD and DVD format, maps, stationery, and so on. The certificates can also be used to make purchases in the Neoluxor internet shop.

Our question is as follows: **What is the highest price (in CZK) you would be willing to pay for this certificate?** Please write your answer here:

_____

Appendix C: Experimental instructions for the real-stakes pricing of gift certificates, lottery treatment with an asymmetric MPL (T6)

Instructions for the experiment

In this experiment, we give you **400CZK for participating**. How much you earn in total will depend on your decisions. Please read the instructions carefully and then make your decisions in the attached ANSWER SHEET. If you have any queries, please raise your hand. The experimenter will come to you and answer your query privately.

Your task is as follows. The bag on the table in front of the experimenter contains two gift certificates for purchase of goods at the Luxor Book Palace (Neoluxor) at the Wenceslas square. **The two gift certificates are identical, except that one of them has a value of 200CZK while the other has a value of 400CZK.** Each certificate is valid within the next three months and entitles the owner to purchase goods for up to the value of the certificate, for example various kinds of books including CD and DVD format, maps, stationery, and so on. The certificates can also be used to make purchases in the Neoluxor internet shop.

Now imagine you have an opportunity to draw **one** gift certificate from the bag. You would not be able to look into the bag while drawing, and since the two certificates in the bag are identical (except for their value), you would have equal (50-50) chances of drawing either the 200CZK or the 400CZK certificate.

Our question is as follows: **What is the highest price (in CZK) you are willing to pay for the opportunity of drawing one certificate from the bag?**

Please answer our question by filling out the attached ANSWER SHEET. In the ANSWER SHEET, we are asking you to make 20 decisions. In each row, we are asking you whether you are willing to pay the displayed price for the opportunity of drawing one certificate from the bag. In Row 1, for example, we are asking you whether you are willing to pay 20CZK for the opportunity of drawing one certificate from the bag. If you circle YES, you are saying that you are willing to pay 20CZK, whereas if you circle NO, you are saying that you are not willing to pay 20CZK. You will make similar decisions in all the remaining rows, except that the displayed price increases as you move down the ANSWER SHEET. Thus by circling YES or NO in each row, you will indicate the highest price you are willing to pay for the opportunity of drawing one certificate from the bag.

As we said at the beginning, we give you 400CZK for participating. You can use this amount to pay for the opportunity of drawing one certificate from the bag. Note that the 400CZK would be enough to pay even the highest price displayed in the last row of the ANSWER SHEET.

After you will have made all 20 decisions, we will collect your ANSWER SHEET. At the end of this experimental session, the following procedure will follow:

1. The experimented will invite you individually to another room and will find your ANSWER SHEET based on your anonymous ID number.

2. Then you will select randomly (without looking) one card from a box with 20 cards numbered 1 to 20. The number on the selected card will determine the row in your ANSWER SHEET, the only which will be relevant for your earnings in this experiment. You of course do not know which row you will select, but you know that each row is equally likely to be selected. It is therefore important that you make a careful decision in **each** of the 20 rows.

3. Depending on your decision in the selected row, one of the following two situations, A or B, will happen:

> A. If you circled YES in the selected row, you will pay us the price displayed in that row. We will simply subtract the price from the 400CZK you get for participating. The remainder of the 400CZK (after subtracting the price) will be paid to you by the experimenter in cash. Then you will have the opportunity of drawing one certificate from the bag, as described above. The experimenter will place a 200CZK and a 400CZK certificate in the bag and you will draw one of them (without looking into the bag). The certificate that you draw will be yours to keep.
>
> B. If you circled NO in the selected row, you are saying that you are not willing to pay the price displayed in that row. Thus you will not pay us anything, but you will also not have the opportunity of drawing a certificate from the bag. The 400CZK for participating will be paid to you by the experimenter in cash.

Now please fill out the attached ANSWER SHEET.

ANSWER SHEET

Please circle either YES or NO in each row. This will indicate whether you are willing to pay the displayed price for the opportunity of drawing one certificate from the bag. As explained above, the bag contains two gift certificates for purchase of goods at the Luxor Book Palace. The certificates are identical except that one of them has a value of 200CZK while the other has a value of 400CZK.

Row 1	I am willing to pay **20CZK**	YES	NO
Row 2	I am willing to pay **40CZK**	YES	NO
Row 3	I am willing to pay **50CZK**	YES	NO
Row 4	I am willing to pay **60CZK**	YES	NO
Row 5	I am willing to pay **80CZK**	YES	NO
Row 6	I am willing to pay **90CZK**	YES	NO
Row 7	I am willing to pay **100CZK**	YES	NO
Row 8	I am willing to pay **120CZK**	YES	NO
Row 9	I am willing to pay **140CZK**	YES	NO
Row 10	I am willing to pay **150CZK**	YES	NO
Row 11	I am willing to pay **160CZK**	YES	NO
Row 12	I am willing to pay **180CZK**	YES	NO
Row 13	I am willing to pay **200CZK**	YES	NO
Row 14	I am willing to pay **220CZK**	YES	NO
Row 15	I am willing to pay **240CZK**	YES	NO
Row 16	I am willing to pay **260CZK**	YES	NO
Row 17	I am willing to pay **280CZK**	YES	NO
Row 18	I am willing to pay **320CZK**	YES	NO
Row 19	I am willing to pay **360CZK**	YES	NO
Row 20	I am willing to pay **400CZK**	YES	NO

Appendix D: Experimental instructions for the real-stakes pricing of gift certificates, baseline treatment with MPL range of 0.1*x* to 2*x* (T7)

Instructions for the experiment

In this experiment, we give you **400CZK for participating**. How much you earn in total will depend on your decisions. Please read the instructions carefully and then make your decisions in the attached ANSWER SHEET. If you have any queries, please raise your hand. The experimenter will come to you and answer your query privately.

Your task is as follows. The experimenter has at his disposal **200CZK gift certificates** for purchase of goods at the Luxor Book Palace (Neoluxor) at the Wenceslas square. Each certificate is valid within the next three months and entitles the owner to purchase goods for up to 200CZK, for example various kinds of books including CD and DVD format, maps, stationery, and so on. The certificates can also be used to make purchases in the Neoluxor internet shop.

Our question is as follows: **What is the highest price (in CZK) you are willing to pay for the gift certificate?**

Please answer our question by filling out the attached ANSWER SHEET. In the ANSWER SHEET, we are asking you to make 20 decisions. In each row, we are asking you whether you are willing to pay the displayed price for the gift certificate. In Row 1, for example, we are asking you whether you are willing to pay 20CZK for the gift certificate. If you circle YES, you are saying that you are willing to pay 20CZK, whereas if you circle NO, you are saying that you are not willing to pay 20CZK. You will make similar decisions in all the remaining rows, except that the displayed price increases as you move down the ANSWER SHEET. Thus by circling YES or NO in each row, you will indicate the highest price you are willing to pay for the gift certificate.

As we said at the beginning, we give you 400CZK for participating. You can use this amount to pay for the gift certificate. Note that the 400CZK would be enough to pay even the highest price displayed in the last row of the ANSWER SHEET.

After you will have made all 20 decisions, we will collect your ANSWER SHEET. At the end of this experimental session, the following procedure will follow:

1. The experimented will invite you individually to another room and will find your ANSWER SHEET based on your anonymous ID number.

2. Then you will select randomly (without looking) one card from a box with 20 cards numbered 1 to 20. The number on the selected card will determine the row in your ANSWER SHEET, the only which will be relevant for your earnings in this experiment. You of course do not know which row you will select, but you know that each row is equally likely to be selected. It is therefore important that you make a careful decision in **each** of the 20 rows.

3. Depending on your decision in the selected row, one of the following two situations, A or B, will happen:

A. If you circled YES in the selected row, you will pay us the price displayed in that row. We will simply subtract the price from the 400CZK you get for participating. The remainder of the 400CZK (after subtracting the price) will be paid to you by the experimenter in cash, and you will also receive the 200CZK gift certificate.

B. If you circled NO in the selected row, you are saying that you are not willing to pay the price displayed in that row. Thus you will not pay us anything, but you will also not receive the gift certificate. The 400CZK for participating will be paid to you by the experimenter in cash.

Now please fill out the attached ANSWER SHEET.

ANSWER SHEET

Please circle either YES or NO in each row. This will indicate whether you are willing to pay the displayed price for the gift certificate. As explained above, this is a 200CZK gift certificate for purchase of goods at the Luxor Book Palace.

Row 1	I am willing to pay **20CZK**	YES	NO
Row 2	I am willing to pay **40CZK**	YES	NO
Row 3	I am willing to pay **60CZK**	YES	NO
Row 4	I am willing to pay **80CZK**	YES	NO
Row 5	I am willing to pay **100CZK**	YES	NO
Row 6	I am willing to pay **120CZK**	YES	NO
Row 7	I am willing to pay **140CZK**	YES	NO
Row 8	I am willing to pay **160CZK**	YES	NO
Row 9	I am willing to pay **180CZK**	YES	NO
Row 10	I am willing to pay **200CZK**	YES	NO
Row 11	I am willing to pay **220CZK**	YES	NO
Row 12	I am willing to pay **240CZK**	YES	NO
Row 13	I am willing to pay **260CZK**	YES	NO
Row 14	I am willing to pay **280CZK**	YES	NO
Row 15	I am willing to pay **300CZK**	YES	NO
Row 16	I am willing to pay **320CZK**	YES	NO
Row 17	I am willing to pay **340CZK**	YES	NO
Row 18	I am willing to pay **360CZK**	YES	NO
Row 19	I am willing to pay **380CZK**	YES	NO
Row 20	I am willing to pay **400CZK**	YES	NO

Appendix E: Experimental instructions for the hypothetical pricing of deferred payments, lottery treatment

Instructions for the experiment

In this part of today's experiment, we will ask you a hypothetical question which is in no way related to the part just finished. Your answer will not affect your earnings in today's experiment but is a precondition for completing the whole experiment. Please read the instructions carefully and then write your answer at the end of the instructions. If you have any queries, please raise your hand. The experimenter will come to you and answer your query privately.

Your task is as follows. The bag on the table in front of the experimenter contains two cheques which guarantee a payment in cash one year from now. **The two cheques are identical, except that one of them guarantees a payment of 500CZK one year from now, while the other one guarantees a payment of 1000CZK one year from now.** For both cheques, the payment is guaranteed by the Max-Planck-Gesellschaft – a research organization that finances this experiment.

Now imagine you had an opportunity to draw **one** cheque from the bag. You would not be able to look into the bag while drawing, and since the two cheques in the bag are identical (except for their value), you would have equal (50-50) chances of drawing either the 500CZK or the 1000CZK cheque.

Our question is as follows: **What is the highest price (in CZK) you would be willing to pay for the opportunity of drawing one cheque from the bag?** Please write your answer here:

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Appendix F: Experimental instructions for the hypothetical pricing of deferred payments, baseline treatment

Instructions for the experiment

In this part of today's experiment, we will ask you a hypothetical question which is in no way related to the part just finished. Your answer will not affect your earnings in today's experiment but is a precondition for completing the whole experiment. Please read the instructions carefully and then write your answer at the end of the instructions. If you have any queries, please raise your hand. The experimenter will come to you and answer your query privately.

Your task is as follows. The experimenter will show you a **cheque which guarantees a payment of 500CZK in cash one year from**. The payment is guaranteed by the Max-Planck-Gesellschaf t – a research organization that finances this experiment.

Our question is as follows: **What is the highest price (in CZK) you would be willing to pay for the cheque?** Please write your answer here:

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