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# Multiple Switching Behaviour In Multiple Price Lists

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**Abstract**

A common mechanism to elicit risk preferences requires a respondent to make a series of dichotomous choices. A recurring problem with this mechanism is a frequently observed tendency to switch from the less to the more risky choice multiple times, multiple switching behaviour. We introduce an instructional variation which our evidence suggests practically eliminates such behaviour. We read a script emphasizing only one decision will determine earnings before providing written instructions. Emphasizing the incentive compatibility of the payment rule reduces observed multiple switching behaviour from 13.3% to 2.3% in one format and from 25.8% to 6.7% in another.

**Bruner, D.M.**, (2011). Multiple Switching Behaviour In Multiple Price Lists". *Applied Economics* Letters, 18(5): 417- 420 (March 2011). (ISSN: 1350-4851). [DOI: 10.1080/13504851003724242.]
Version Of Record Available At www.tanfonline.com

## INTRODUCTION

In many cases, the predictions of economic theory depend on the risk preference of the decision-maker. To address this issue, experimental economists have investigated several approaches to elicit preferences for risk. The most common approach, a Multiple Price List (MPL), requires respondents to make a series of dichotomous choices between two lotteries or a lottery and a guaranteed payoff. In such mechanisms, the expected lottery payout is increased as the respondent proceeds through the series so as to induce the respondent to switch from the less risky to the more risky choice. The decision at which the respondent switches produces an interval estimate of the respondent's risk preference.

Frequently a nontrivial number of respondents switch multiple times, exhibiting Multiple Switching Behaviour (MSB). MSB is problematic because of the inconsistency with economic theory. This article provides evidence to suggest that MSB is due, in large part, to the lack of salience. An instructional variation intended to emphasize the incentive compatibility of the payment rule in such mechanisms is shown to reduce observed MSB from 13.3% to 2.3% in one format and from 25.8% to 6.7% in another.

Recently, several studies have employed an MPL risk elicitation mechanism (Holt and Laury, 2002; Goeree et al., 2003; Eckel and Wilson, 2004; Andersen et al., 2006; Bruner et al., 2007). All of these studies report a concerning proportion of subjects that exhibitMSB.Holt and Laury (2002) reported 13.2%of their subjects exhibit MSB, which drops to 5.5% when their payoffs are scaled by a factor of 50 or 90. Eckel and Wilson (2004) reported 12.9% of their subjects exhibit MSB. Bruner et al. (2007) reported 20% of their subjects exhibit MSB. Most recently, Andersen et al. (2006) reported that they observe 5.8% MSB when they include an indifference option in the mechanism, which 24.3% of their subjects used.1 Rationally, there is no reason for the subjects to exhibit such behaviour because each subsequent lottery dominates the previous. Furthermore, such responses prevent the estimation of risk preference and reduce the legitimacy of the elicitation mechanism. As such, determining and correcting for the cause of this behaviour is essential to the validity of the MPL risk preference elicitation. This article presents evidence gleaned from

the laboratory that such behaviour is symptomatic of the lack of salience, which can be corrected with a simple instructional variation.

## II. EXPERIMENT

We compare data from control sessions to treatment sessions of our experiment. Both sets of sessions implement identical mechanisms to elicit individual risk preferences. The mechanism presents respondents with 10 decisions requiring a choice between a lottery and a guaranteed $5. Subjects are presented with two formats of the mechanism. In the Probability Variation (PV) format, the outcomes of the lottery are held constant, $0 and $10, although the probability of winning the high payoff varies from 0.10 to 1.0 in increments of 0.10 (see Table 1). In the Reward Variation (RV) format, the probability of a payout is held constant, 0.50, although the amount of the payout is varied from $2.00 to $20.00 in $2.00 increments. The other outcome to the lottery is held constant at 0 as in the PV format. All subjects completed both the PV and the RV format. The principle difference between the two sets of sessions is an instructional variation, the treatment variable. 2 In the treatment sessions, subjects were read aloud instructions from a script intended to reinforce the incentive compatibility of the payment rule; only one decision would be chosen to determine a subject's earnings.3 Specifically, before any instructions being displayed on the computer screen, subjects were read a script intended to emphasize the incentive compatibility of the payment rule.4 After listening to the verbal instructions, subjects proceeded through written instructions on their computer screens. Subjects in the control sessions proceeded directly to the written instructions. After reading the instructions, subjects entered their 10 decisions into the computer. Subjects were informed of their earnings upon completion of the experiment.

The subject pool consists of volunteer students. Subjects were recruited by e-mail via the lab's Online Recruitment System for Experimental Economics (ORSEE) (Greiner, 2004). The experiment was programmed and conducted with the software Z-Tree (Fischbacher, 2007). Experimental sessions lasted for approximately 35 minutes. Average earnings were $12 including a $5 show-up fee.

**Table 1. Decisions for PV and RV formats**

| | PV format | | RV format | |
|---|---|---|---|---|
| Row | Option A | Option B | Option A | Option B |
| 1 | 10% chance of $10 | $5 guaranteed | 50% chance of $2 | $5 guaranteed |
| 2 | 20% chance of $10 | $5 guaranteed | 50% chance of $4 | $5 guaranteed |
| 3 | 30% chance of $10 | $5 guaranteed | 50% chance of $6 | $5 guaranteed |
| 4 | 40% chance of $10 | $5 guaranteed | 50% chance of $8 | $5 guaranteed |
| 5 | 50% chance of $10 | $5 guaranteed | 50% chance of $10 | $5 guaranteed |
| 6 | 60% chance of $10 | $5 guaranteed | 50% chance of $12 | $5 guaranteed |
| 7 | 70% chance of $10 | $5 guaranteed | 50% chance of $14 | $5 guaranteed |
| 8 | 80% chance of $10 | $5 guaranteed | 50% chance of $16 | $5 guaranteed |
| 9 | 90% chance of $10 | $5 guaranteed | 50% chance of $18 | $5 guaranteed |
| 10 | 100% chance of $10 | $5 guaranteed | 50% chance of $20 | $5 guaranteed |

## III. RESULTS

We make comparisons across the baseline and treatment sessions for both formats.We construct a dummy variable to indicate MSB. Table 2 summarizes the proportion of subjects that exhibitMSB across the two sets of sessions and the two formats.

**Table 2. Summary of MSB format**

| | PV | RV |
|---|---|---|
| Baseline ($n$ = 31) | 0.133 (0.062) | 0.258 (0.079) |
| Treatment ($n$ = 45) | 0.023 (0.022) | 0.067 (0.037) |

*Note*: Proportions of MSB are reported with SEs in parentheses.

Notice that there is a large reduction in the proportion of MSB from the baseline to the treatment sessions for both formats. Additionally, there is a large reduction in the proportion of MSB from the RV to the PV format within a given set of sessions. We formally test the equivalence of these proportions. The baseline sessions are denoted by 0 and the treatment sessions denoted by 1. Table 3 presents the results from the formal tests of differences in proportions.

**Table 3. Hypothesis test for difference in proportions**

| Hypothesis | Test statistic |
|---|---|
| $H_0$: $MSB_{0PV} = MSB_{1PV}$ | 0.111* (0.059) |
| $H_0$: $MSB_{0RV} = MSB_{1RV}$ | 0.191** (0.087) |
| $H_0$: $MSB_{0PV} = MSB_{0RV}$ | –0.125 (0.102) |
| $H_0$: $MSB_{1PV} = MSB_{1RV}$ | –0.044 (0.044) |

*Notes:* The difference in the proportions of MSB is reported with SEs in parentheses. Test statistics are the ratio of the two.
Two-sided significance levels are indicated by asterisks: * and ** denote significance at 10 and 5% levels, respectively.

The hypothesis tests indicate that there is a statistically significant reduction in MSB by including the verbal instruction to subjects. The hypothesis tests fail to reject the null of no difference in proportions across formats within the sets of sessions. These results are supported by the probit estimation of MSB in Table 4. The probit estimation controls for possible order, format and instructional effects with dummy variables. The only significant coefficient is on the dummy variable for the treatment sessions.

**Table 4. Probit estimation of MSB**

| Variable | Estimation results |
|---|---|
| Intercept | –0.585** (0.261) |
| Verbal instruction | –0.737*** (0.286) |
| PV format | –0.345 (0.283) |
| Order (PV then RV) | –0.234 (0.283) |

*Notes*: The estimated coefficients are reported with SEs in parentheses. Estimates are based on 150 observations.
Two-sided significance levels are indicated by asterisks: ** and *** denote the significance at 5 and 1% levels, respectively.

## IV. CONCLUSION

The prevalence of MSB in the literature has been problematic for MPL mechanisms that elicit preferences for risk. The fact that we observe such a dramatic decrease in the proportion of MSB upon implementing the verbal instruction intended to reinforce

the incentive compatibility of the payment rule suggests that MSB is a symptom of failure to induce values (Smith, 1982). In particular, MSB appears to be the result of the lack of salience. Holt and Laury (2002) demonstrated a reduction in MSB when their payoffs were dramatically increased. However, this is a rather expensive means of increasing salience. We demonstrate that this same level of salience can be achieved through verbal instruction in addition to written instructions. This offers a less expensive avenue of increasing salience to the experimentalist on a budget.

**ACKNOWLEDGEMENTS**

This research was undertaken by the University of Calgary Behavioural and Experimental Economics Laboratory (CBEEL). I thank Mike McKee and Glenn Harrison for their encouragement and helpful suggestions.

**NOTES**

1 Goeree et al. (2003) only reported that 6.0% of their subjects exhibit an identical pattern of inconsistent responses.

2 Another difference between the two sets of sessions is the decision task separating the two formats. In the control sessions, subjects were asked their willingness-to-accept for the lottery in the PV format. However, this task was replaced in the treatment sessions by a task that required subjects to choose between the lottery in the PV format and the lottery in the RV format. We control for any possible influence this may have had on subject responses in the analysis.

3 The selection of the each subject's decision that determined their payoff was presented as a compound lottery; the computer first selected the stage of the experiment (each had 1/3 chance of being selected) and then the decision of the selected stage was chosen (each had a 1/10 chance of being selected). Thus, we assume that preferences conform to the Independence Axiom (Samuelson, 1952). The evidence in the literature suggests that 'random lottery selection' is incentive-compatible for simple choice sets (Starmer and Sugden, 1991; Wilcox, 1993; Ballinger and Wilcox, 1997).

4 The following script was read aloud to subjects. 'Before we begin with the instructions, I would like to bring one thing to your attention. As you will read in the instructions, you are going to make several decisions in this experiment. However, only ONE of these will actually determine your earnings for this experiment! So, it is important that you take each decision seriously since a single mistake can be quite costly!'

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