Multiple Switching Behavior 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 behavior. We introduce an instructional variation our evidence suggests practically eliminates such behavior. 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 behavior from 13.3% to 2.3% in one format and from 25.8% to 6.7% in another.

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1 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 behavior (MSB). MSB is problematic because of the inconsistency with economic theory. This paper provides evidence to suggest that MSB is due, in large part, to a 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 25.8% to 6.7% in another.

Recently, several studies have employed a MPL risk elicitation mechanism (Andersen et al., 2006; Bruner et al., 2007; Eckel and Wilson, 2004; Goeree et al., 2003; Holt and Laury, 2002). All of these studies report a concerning proportion of subjects that exhibit MSB. Holt and Laury (2002) report 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) report 12.9% of their subjects exhibit MSB. Bruner et al. (2007) report 20.0% of their subjects exhibit MSB. Most recently, Andersen et al. (2006) report that they observe 5.8% MSB when they include an indifference option in the mechanism, which 24.3% of their subjects used.[1] Thus, they conclude observed MSB is a signal of indifference. If subjects are truly indifferent, then an instructional variation should have no effect.

[1] Goeree et al. (2003) report 6.0% of their subjects exhibit an *identical* pattern of inconsistent responses. We view this as an outlier since they do not report any instructional variation.

This is the premise of this paper.

2 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, while the probability of winning the high payoff varies from 0.10 to 1.0 in increments of 0.10 (See Figure 1). In the reward variation (RV) format, the probability of a payout is held constant, 0.50, while 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 zero as in the PV format. All subjects completed both the PV and the RV format.

INSERT FIGURE 1 HERE

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 to determine a subject's earnings.[3] Prior to any instructions being displayed on the computer screen, subjects were read the script included in the Appendix. 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

[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 experimental sessions by a task that required subjects to choose between the lottery in the PV format or the lottery in the RV format.

[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 a $\frac{1}{3}$ chance of being selected) and then the decision of the selected stage was chosen (each had a $\frac{1}{10}$ 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 (Ballinger and Wilcox, 1997; Starmer and Sugden, 1991; Wilcox, 1993).

instructions, subjects entered their ten decisions into the computer. Subjects were informed of their earnings upon completion of the experiment.

The subject pool is composed of volunteer students at the university. Subject's were recruited by email 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 approximately 35 minutes. Average earnings were $12 including a $5 show-up fee. 31 subjects participated in the control sessions. 45 subjects participated in the treatment sessions.[4]

3 Results

We make comparisons across the control and treatment sessions for both formats. We construct a dummy variable to indicate MSB. Table 1 summarizes the proportion of subject's that exhibit MSB across the two sets of sessions and the two formats.

Table 1: **Summary of Multiple Switching Behavior**

	Format	
Sessions	**PV**	**RV**
Control	0.133	0.258
$N^* = 31$	(0.346)	(0.445)
Treatment	0.023	0.067
$N^* = 45$	(0.151)	(0.252)

$*$ One observation was dropped from each set of sessions for the PV format for choosing Choice B for option 10.

Notice that there is a large reduction in the proportion of MSB from the control 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

[4] 106 subjects participated in the treatment sessions. However, the experiment was designed to test the consistency of *several* formats of the MPL mechanism. The order in which the formats are presented is varied. Thus, we only use the data from the sessions that match the formats in the control sessions.

proportions. We treat the control sessions as the baseline, denoted by 0, since they exhibit similar proportions of MSB as in the literature. The treatment sessions denoted by 1. Table 2 presents the results from the formal tests of differences in proportions.[5]

Table 2: **Hypothesis Tests of Difference in Proportions of MSB**

Hypothesis	**Test Statistic**
$H_0 : MSB_{0PV} = MSB_{1PV}$	0.111^{*}
	(0.066)
$H_0 : MSB_{0RV} = MSB_{1RV}$	0.191^{**}
	(0.087)
$H_0 : MSB_{0PV} = MSB_{0PV}$	-0.125
	(0.100)
$H_0 : MSB_{1PV} = MSB_{1PV}$	-0.044
	(0.043)

Significance levels : $*$: 10% $**$: 5% $***$: 1%

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 3. We control for possible order, format, and instructional effects. The only significant coefficient is on the dummy variable for the control sessions.

Table 3: **Probit Estimation of MSB**

Variable	**Coefficient**	**(Std. Err.)**
control	0.875^{***}	(0.304)
format	0.483	(0.305)
order132	-0.352	(0.297)
Intercept	-2.311^{***}	(0.571)

[5]This is essentially a t-test. However, the standard error is different for binary data.

4 Conclusion

The prevalence of MSB in the literature has been problematic for MPL mechanisms that elicit preferences for risk. It has been proposed that MSB is due to indifference (Andersen et al., 2006). However, if this were true, an instructional variation would not effect the proportion of MSB. 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 not a signal of indifference. Rather, it suggests that MSB is a symptom of a failure to induce values (Smith, 1982). In particular, MSB appears to be the result of a lack of salience. Holt and Laury (2002) demonstrate a reduction in MSB when their payoffs are 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.

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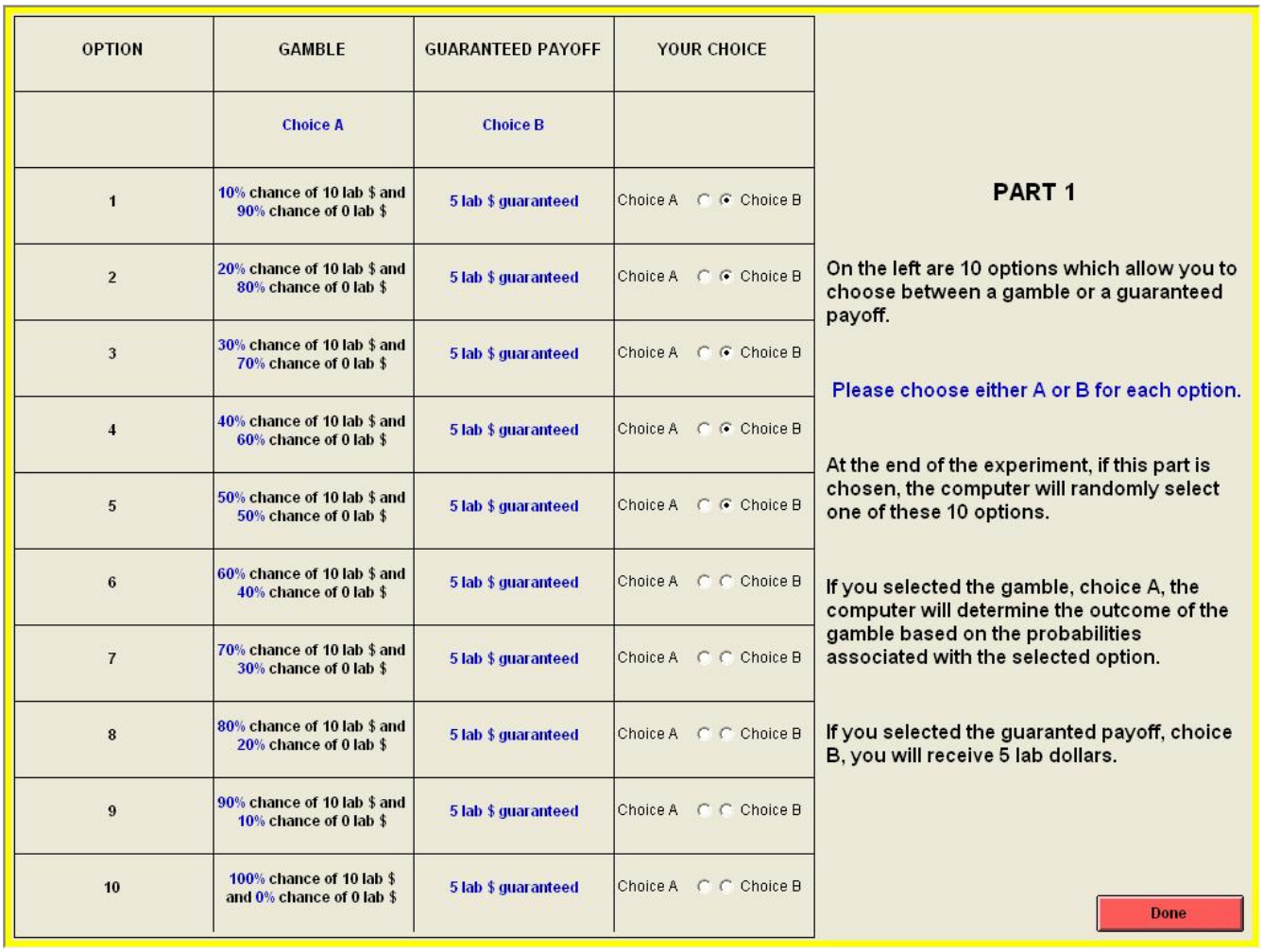
Appendix I - Verbal Instruction Script

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!"



OPTION	GAMBLE	GUARANTEED PAYOFF	YOUR CHOICE
	Choice A	Choice B	
1	10% chance of 10 lab $ and 90% chance of 0 lab $	5 lab $ guaranteed	Choice A ○ ◉ Choice B
2	20% chance of 10 lab $ and 80% chance of 0 lab $	5 lab $ guaranteed	Choice A ○ ◉ Choice B
3	30% chance of 10 lab $ and 70% chance of 0 lab $	5 lab $ guaranteed	Choice A ○ ◉ Choice B
4	40% chance of 10 lab $ and 60% chance of 0 lab $	5 lab $ guaranteed	Choice A ○ ◉ Choice B
5	50% chance of 10 lab $ and 50% chance of 0 lab $	5 lab $ guaranteed	Choice A ○ ◉ Choice B
6	60% chance of 10 lab $ and 40% chance of 0 lab $	5 lab $ guaranteed	Choice A ○ ○ Choice B
7	70% chance of 10 lab $ and 30% chance of 0 lab $	5 lab $ guaranteed	Choice A ○ ○ Choice B
8	80% chance of 10 lab $ and 20% chance of 0 lab $	5 lab $ guaranteed	Choice A ○ ○ Choice B
9	90% chance of 10 lab $ and 10% chance of 0 lab $	5 lab $ guaranteed	Choice A ○ ○ Choice B
10	100% chance of 10 lab $ and 0% chance of 0 lab $	5 lab $ guaranteed	Choice A ○ ○ Choice B

PART 1

On the left are 10 options which allow you to choose between a gamble or a guaranteed payoff.

Please choose either A or B for each option.

At the end of the experiment, if this part is chosen, the computer will randomly select one of these 10 options.

If you selected the gamble, choice A, the computer will determine the outcome of the gamble based on the probabilities associated with the selected option.

If you selected the guaranteed payoff, choice B, you will receive 5 lab dollars.

Done

Figure 1: Decision Screen for PV format