Economics Letters 120 (2013) 310–313

Contents lists available at SciVerse ScienceDirect

Economics Letters

journal homepage: www.elsevier.com/locate/ecolet

House money effects, risk preferences and the public goods game☆,☆☆

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HIGHLIGHTS

- House money effects and not loss aversion is present in the public goods game.
- Risk preferences and contribution in the public goods game are linked.
- Covered loss and Real loss treatments are statistically equivalent.

ARTICLE INFO

Article history:
Received 14 December 2012
Received in revised form
10 April 2013
Accepted 19 April 2013
Available online 9 May 2013

JEL classification:
C92
H41

Keywords:
Risk profile
Public goods experiment
House money effect
Real losses
Covered losses
Prospect theory

ABSTRACT

This paper investigates whether risk preferences inform the decision of how much to put into the public account in the public goods game under the three different frames (the two house money effect frames: the standard and covered-loss frames, as well as the real-loss frame). The main contribution of this paper finds that the covered loss and real loss treatments are statistically equivalent. This assures researchers that just introducing the notion of loss into an experimental treatment without the need for participants to realize a real loss is still a valid experimental instrument. We also find that the house money effect is a better explanation for the difference in contributions between gain and loss framing than loss aversion.

1. Introduction

The problem in distinguishing house money effects versus loss aversion in the traditional public goods game is the inability of experimenters to deliberately place subjects in a true loss setting. Partly it is also the issue of self-selection since participants who sign up who know beforehand of the potential of losing money (ethically responsible protocol) versus those who do not (unethical protocol) may be more risk-loving. This paper presents a public goods experiment using three frames: a gain frame (the normal game), a covered-loss frame (the current norm for a loss frame) and a real-loss frame which is the novelty of this paper. This is not the first paper to use real losses in risky choice experiments (see Etchart-Vincent and L'Haridon (2011); see Harrison (2007)).

Most of the public goods literature has also not considered the role that risk preferences play in this game, though Houser et al. (2010) has examined the effect of risk preferences on the outcome of the trust game. This paper also follows this vein of research by investigating whether peoples' risk preferences inform the decision of *how much* to put into the public goods game under the three different frames (the two house money effect frames: the standard and covered-loss frames, as well as the real-loss frame).

2. Methodology

In order to go about this exercise, we use three framing devices in the public goods game in order to control for possible house money effects which could exacerbate risk loving preferences:

(1) a gain frame (Gain)

☆☆ We would like to acknowledge the support received from the 2011 Shandong University Growth Centre Foundation Grant (Grant No: 2011JC003).

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http://dx.doi.org/10.1016/j.econlet.2013.04.037

Table 1
Number of participants under each risk profile in the different treatment.

Treatment	IRA									
	1	2	3	4	5	6	7	8	9	10
Gain[a]	0	0	0	0	6	5	5	1	1	2
C-L	1	0	1	2	13	1	2	0	0	0
R-L	1	0	1	2	5	2	1	4	3	1

[a] The two tailed t-test identifies that Gain and C-L are statistically different (p-value $= 0.0004$), Gain and R-L are not (p-value $= 0.586$) and C-L and R-L are statistically different (p-value $= 0.0247$).

(2) a covered loss frame (C-L),
(3) and a real loss frame (R-L).

Conceptually these are all the same game, however it is timing which we vary. In the gain frame, it is the classic public goods game where there is no notion of possible losses and players start with an endowment of 10 yuan; while in both loss frames, the players are told initially that they lose 20 yuan while the public goods game helps to offset their loss. In the covered loss version, players are told from the start that at the end of the experiment, players would be given an additional 30 yuan as a show-up fee for that day's experiment before they are informed of the 20 yuan loss associated with the experiment (there is no opt-out option), while in the real loss version, they are told that they would receive a show-up fee but are not told the exact amount they would receive until the very end of the experiment. This can be also interpreted as a covered loss frame with an uncertain initial endowment. We call this a real loss frame as a description of the state of mind of the decision-maker since he may fully expect to realize a real loss. In order to be ethically responsible, players involved in the real-loss frames who were recruited by emails were told that the game had a possible chance of loss and they were asked to bring 20 yuan (which would be the maximum they could potentially lose) with them but that there would also be a remuneration from the experiment as well as a show-up fee. We expect that this additional piece of information given to those participating in the two loss frame sessions to have self-selection biases.

We therefore use the Holt and Laury (2002) risk assessment protocol prior to participating in the public goods game (in all three frames) in order to be able to ascertain each players' risk preferences which we believe are different due to self-selection biases as a result of our modified call for participation in the real loss frame. Having unequal types of player profiles with different risk preferences in each of our samples does not hinder us from examining whether risk preferences affect giving behavior in the public goods game once we categorize giving behavior by risk profile. We sent emails and recruited from our database of 500 students. We selected the first 30 males and 30 females who replied. The rest who replied were involved in two other different experiments. We restricted each of our three sessions to 20 students (10 males and 10 females).

3. Determining risk profile

We follow the Holt and Laury (2002) test procedure and conduct a binary lottery to ascertain the risk profile of all our participants in each session. Following the literature, participants choose Lottery A over Lottery B over ten choices. Lottery A is usually preferred at the beginning and we look specifically at the switch of choice to lottery B to determine our risk profile. We follow the standard naming convention—Index of Risk Aversion (IRA) to denote the point of switching between Lottery A to Lottery B. Therefore an IRA of 6 means that they switched to Lottery B at choice 6 (see Table 1).

We can see that indeed there are more risk loving players in our pool of players in the two loss frames (IRA between 0 and 4) whereas these players are not present in the gain frame. The presence of more risk loving behavior in the domain of losses is a fairly standard result in the prospect theory literature especially dealing with decision-making under risk (see the seminal paper by Kahneman and Tversky (1979); for experiments dealing with Chinese students on prospect theory, see Sasaki et al. (2008)). There are no highly risk averse players in the C-L frame (IRA between 8 and 10) but there are in both the Gain and R-L samples. The weighted average IRA under the Gain, C-L and R-L frames are 6.6, 4.85 and 6.25 respectively. The literature using the Holt and Laury procedure is common (Eckel and Wilson, 2004; Houser et al., 2010).

4. Framing in the public goods game

In our gain frame, each subject received 10 Yuan at the beginning of the experiment, and s/he should make a decision on how much money (actually from 0 to 10 Yuan) to invest into the public account and then keep the rest as his/her private endowment. Each subject's payment is determined by the following formula:

$$10 - x_i + \frac{1}{N} * 2.4 * \sum_{i=1}^{N} x_i = 10 + \frac{2.4}{N} * \sum_{j \neq i}^{N} x_j - \frac{N - 2.4}{N} * x_i$$

where x_i means the amount of money that the i-th subject put into the public account, and N means the number of subjects in this frame.

In the loss frame, subjects suffer an initial loss of 20 Yuan at the outset of the experiment. Later each subject uses the public account to offset his/her loss. Subjects are shown that the total loss each subject would undertake is determined by the following formula:

$$x_i + \left(20 - \frac{1}{N} * 2.4 * \sum_{i=1}^{N} x_i\right) = 20 - \frac{2.4}{N} * \sum_{j \neq i}^{N} x_j + \frac{N - 2.4}{N} * x_i$$

where x_i means the immediate loss which is the money that the i-th subject puts into the public account from his/her own pocket. N is the same as before. Actually, in both our loss frames, the losses that subjects incur will be offset by the show-up fee which we provide, 30 yuan. So the final payment for each subject is 30 Yuan minus the total loss that s/he undertakes. Conceptually the gain frame and the loss frames are the same in terms of the expected returns.

5. Results

5.1. Mean contribution of each treatment

Table 2 shows us the mean and standard deviation of contributions under each treatment controlling for the risk type of subjects as we add fewer risk-loving players into the pool. This means that we start with the most risk loving players and slowly add into the pool more and more relatively risk averse players. The purpose is to be able to recognize how as we allow more risk averse players into the public good experiment, how much the contribution rate changes since an economy is usually made up of many different risk types.

We can see that in both loss treatments that more risk loving players (IRA $\leq$ 3 and possibly IRA $=$ 4) put low contributions into the group account and highly risk averse players (IRA $\geq$ 8) in the gain and real-loss treatments also put low contributions into the group account since the inclusion of these players reduces the