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Unequal outside options in the lost wallet game

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Abstract

Experimental evidence suggests the size of the foregone outside option of the first mover does not affect the behavior of the second mover in the lost wallet game. In this paper we experimentally compare the behavior of subjects when they face an outside option with unequal payoffs, i.e., the first mover gets 10 and the second mover gets 0, and when they face an outside option with equal payoffs, i.e., both get 5. Consistent with the most of the literature we do not find a significant difference in behavior of second movers.

1. Introduction

The experimental studies of Dufwenberg and Gneezy (2000) and Brandts, *et al.* (2006) have produced unexpected and counterintuitive results which demonstrate that the size of the foregone outside option by the first mover does not affect the behavior of the second mover in the lost wallet and pie sharing games. Some of the prominent reciprocity models predict a different outcome. For example, in Dufwenberg and Kirchsteiger (2004) and Falk and Fischbacher (2006) the first mover is perceived to be kinder if he forgoes a larger outside option because he bears a potentially higher cost. If the second mover is reciprocal, this should be sufficient to induce him to return a higher amount of money to the first mover. Similarly, the theory of psychological forward induction (Battigalli and Dufwenberg (2009)) predicts that the second mover will believe that the first mover expects to receive more the higher the forgone outside option is. On the top of that if the second mover is also guilt-averse (Battigalli and Dufwenberg (2007)) he will return a higher amount of money as well.

The absence of a behavioral effect of the alternative that has not been chosen is puzzling. This is exaggerated by the fact that the same behavior is not observed uniformly across games. For example, Charness and Rabin (2002) observe that the second mover's behavior is influenced by the alternatives available to the first mover in a sequential game involving an element of trust, similar to the lost wallet and pie sharing games. In a slightly different experimental setting of a mini-ultimatum game Brandts and Solà (2001), Falk, *et al.* (2003), and Cox and Deck (2005) find that the reference point significantly affects the negatively reciprocal behavior of subjects. Brandts, *et al.* (2006) conjecture that the lack of effect is due to the outside option in their setting being perceived as *unfair* because everything is given to the first mover. This is also the case in the implementation of outside options in the Dufwenberg and Gneezy (2000) study. Because *fairness* is a relative term which could be contextual, in this paper we replace the notion of fairness with the notion of payoff inequality and explore whether it has implications for subjects' behavior in the lost wallet game. [1]

2. Inequality of Outside Options

Brandts, *et al.* (2006) raise a potentially important point that the relative payoff inequality of the outside option might play a role in the decision-making process of the second mover. Consider the lost wallet game in which the first mover decides to either choose IN, allowing the second mover to split a surplus between himself and the first mover; or to choose OUT and collect the outside option (x_1, x_2), where x_1 is the payoff to the first mover and x_2 is the payoff to the second mover. If people care strongly about equality of payoffs then they may consider actions leading to equal outcomes more strongly than those leading to unequal outcomes. Based on this reasoning one could imagine that if the outside option payoffs are

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[1] See Fehr and Schmidt (1999) and Bolton and Ockenfels (2000) for fairness based models of behavior and Kahneman, *et al.* (1986) for context dependence.

unequal then the second mover may not consider them to be forgone by the first mover and strike them from his own considerations when called upon to play. On the other hand, an outside option with equal payoffs may appear as a more reasonable way to end the game for the first mover and therefore the second mover might take it into account when making his decision.

Unequal outside options may be responsible for some of the intriguing results reported in the literature (Dufwenberg and Gneezy (2000), Brandts, *et al.* (2006), Cox, *et al.* (forthcoming)). Take Dufwenberg and Gneezy as an example. In their lost wallet game experiment they vary the outside option, x_1, of the first mover to be 4, 7, 10, 13, and 16, while keeping the outside option payoff of the second mover, x_2, to be 0. Because in all of their treatments the outside option payoffs are unequal, then the second mover could perceive all outside options in the same or similar way. Indeed, Dufwenberg and Gneezy do not find any correlation between x_1 and the amount given to the first mover. Moreover, the amount given to the first mover does not vary between treatments.

However, it is important to note that not all evidence from lost wallet game experiments supports invariance to outside options. Charness, *et al.* (2007) find a modest relationship between the size of the outside option available to the first mover and the decision of the second mover in an experiment conducted over the internet using a within subjects design and the strategy method. Due to their choice of procedures it remains unclear as to how the combination of the strategy method and a within subjects design impact upon the results.[2] We think that in this particular scenario such a combination can be prone to producing a monotonic relationship between the variables of interest. Hence, we avoid using a within subjects design in our experiment.

3. The Experiment

Our experiment consists of two treatments implemented in an across-subject design. In both treatments the subjects play the lost wallet game presented in Figure 1. The first mover chooses IN or OUT. If he chooses OUT, the game ends. The first mover receives $10 ($5) and the second mover receives $0 ($5). If the first mover chooses IN, the game continues. The second mover then chooses how to split $20 between the two of them. That is, the second mover chooses how much of $20 to give to the first mover, *y*, and how much of it to keep, *20 – y*. The second mover's choice determines the final payoffs. In the experiment we keep the total outside option pie constant at 10 in order to avoid a possible confounding effect causing subjects to behave differently because there is a different amount of money on the table.

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[2] Cox, *et al.* (forthcoming) demonstrate that the use of strategy method (and the saliency of the outside option) is not responsible for the second mover's split being independent of x_1.

Figure 1. The Lost Wallet Game
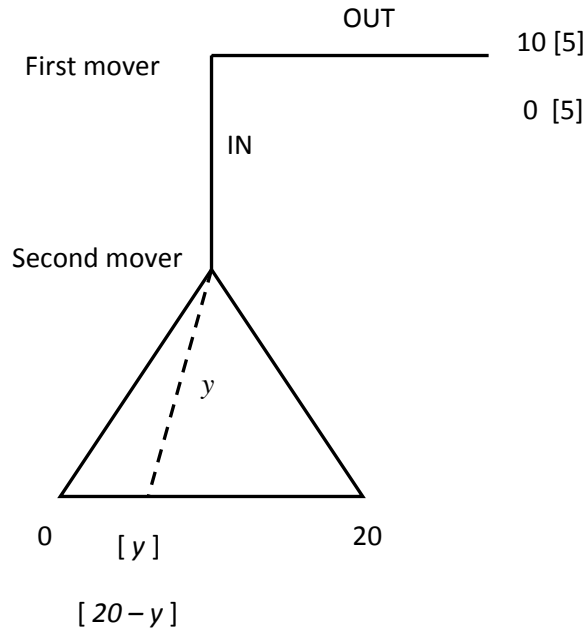
The predicted behavior can vary between the two treatments for a number of already mentioned reasons and we do not want to favor any of them. However, let us use the notion of psychological forward induction to illustrate the possible effect of inequality of the outside option payoffs in our experiment. If the first mover forgoes his outside option x_1 this indicates to the second mover that his opponent expects $y \geq x_1$ in the chosen subgame. If the second mover cares about the first mover's expectations, e.g., if he is guilt-averse, then he should return at least x_1. This implies that the second mover would return more in the 10,0 treatment than in the 5,5 treatment. On the other hand, if the inequality of the outside options is an important consideration for the second mover then he could return less in the 10,0 treatment than in the 5,5 treatment.

3.1 Procedures

Four sessions were conducted in August 2009 at the University of Canterbury in New Zealand. A total of 26 subject pairs participated in each treatment. Most of the students had previously participated in economics experiments, but not in any type of trust games. On average, a session lasted about 35 minutes. Subjects earned on average 12.60 New Zealand

dollars (NZD) including a 5 NZD show up fee.[3] All sessions were run manually under single blind protocol using the strategy method.

The participants were randomly and anonymously matched into pairs that consisted of a Group A person (the first mover) and a Group B person (the second mover). The assignment into the two groups was done according to the following process. The classroom was segmented in half such that all subjects from a given group would be located in the same half of the room. The desks for each type were arranged in two rows facing the wall, and thus neither group would be able to see the other when making decisions. The subjects were free to choose any seat upon entering the classroom. Once everyone was seated, a coin was publicly flipped to determine which side of the room was to be which group. The matching of subjects to a particular pair was done by the experimenter according to a preassigned seating protocol. This was unknown to the subjects.

Each subject was provided a hard copy of instructions and decision sheets all of which were also read aloud and projected on a screen. The subjects were encouraged to ask questions. All questions were asked and answered privately. At no time during the experiment was there direct interaction. Subjects recorded their decisions on the provided decision sheets. In order to transfer information between matched pairs, the experimenter collected all decision sheets, copied the decisions from one sheet to another, and then redistributed the sheets to the subjects to inform them about their experimental payoffs. Upon completion of the experiment all subjects were paid privately and individually.

3.2 Results

Figure 2 presents the summary of data for both treatments. Treatment 10,0 is displayed on the left and treatment 5,5 on the right. Not surprisingly, 19 out of 26 (73%) first movers chose OUT when the outside option was 10,0 in comparison to 6 out of 26 (23%) when the outside option was 5,5. The 2-sided Fisher exact test detects that the difference in behavior of first movers is statistically significant ($p = 0.001$).

Turning to decisions of the second movers in our data, we observe that the second movers chose on average $y = 6.12$ and $y = 5.19$ in 10,0 and 5,5 treatments, respectively. In order to assess the qualitative difference in the data, we test a hypothesis that the choices of y are the same in both treatments. The 2-sided Wilcoxon rank-sum test reports that the difference in second movers' choices is not significant ($p = 0.49$). The result that the two samples do not differ is also supported by the 2-sided Median test ($p = 0.267$). Hence, we conclude that the inequality of outside option payoffs did not affect the behavior of second movers in the lost wallet game.

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[3] The adult minimum wage in New Zealand at the time of the experiment was 12 NZD per hour.

Figure 2. Subjects' Behavior in the Experiment

Median = 8
Standard deviation = 5.48

Median = 5
Standard deviation = 4.11
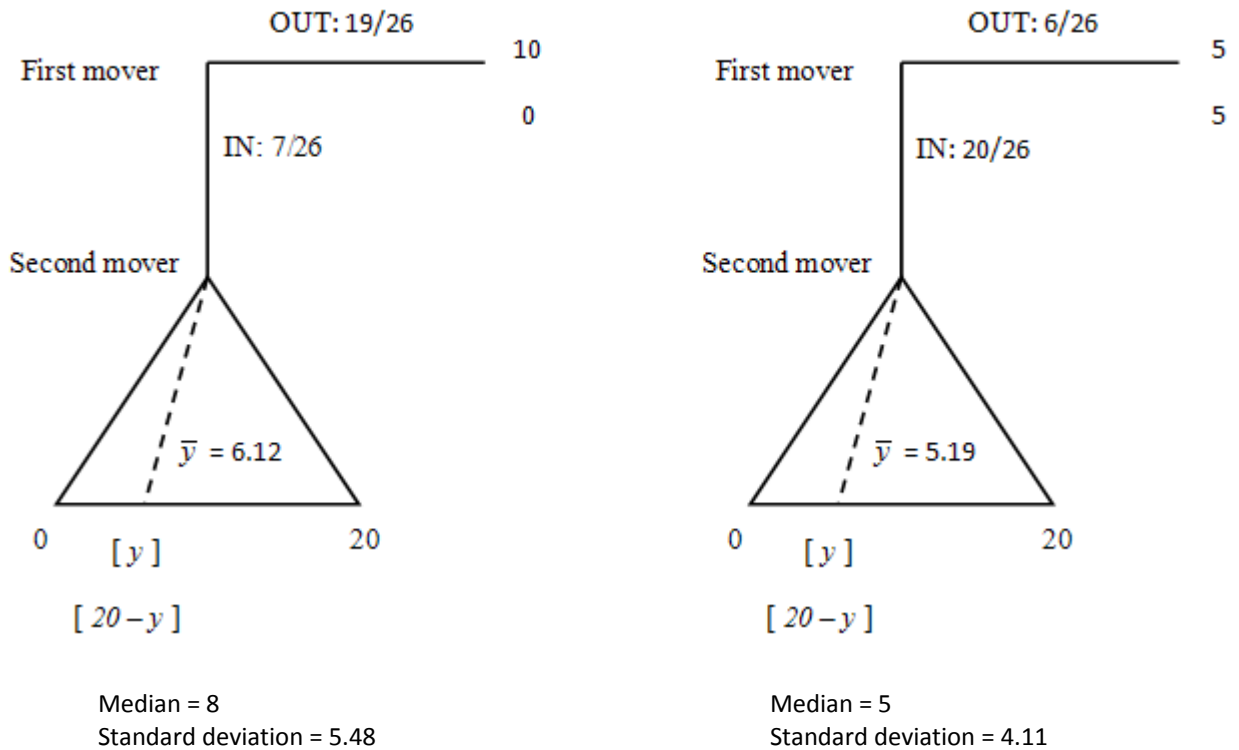
4. Discussion

In this paper we try to address the question of whether the second mover regards the forgone outside option by the first mover differently when it gives everything to the first mover and zero to the second mover. Based on our data we conclude that it is not the inequality which could be responsible for this effect and support the previous findings of Dufwenberg and Gneezy (2000) and Cox, *et al* (forthcoming). The result is consistent with Cox, *et al*. (2007) and Cox, *et al*. (2008) who model reciprocity based on what is the maximal available payoff to the second mover following the first mover's action. From that perspective, the size of the forgone outside option is irrelevant, as observed in our experiment.

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No Talking Allowed
Now that the experiment has begun, we ask that you do not talk. If you have a question after we finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private.

Show up Fee
Every participant will get $5 as a show up fee, and in addition you may earn money in the experiment. All the money will be paid to you in cash at the end of the experiment.

Two Groups
You will be divided randomly into two groups, called Group A and Group B.

Anonymity
Each person in Group A will be randomly paired with a person in Group B. No one will learn the identity of the person (s)he is paired with. You will be paired with the same person for the entire experiment.

Pairing
Your ID number will be written at the top of your decision sheet. The experimenters will keep track of your decisions and your paired person's decisions by your ID numbers.

The Group A Decision Task
Each Group A person will indicate whether (s)he wishes to choose IN or OUT. If (s)he chooses OUT, the Group A person receives $10 and the paired Group B person receives $0.

The Group B Decision Task
If the Group A person chooses IN, then $20 will be made available to split between the two paired persons. The split will be determined by the Group B person. Each Group B person will be asked to decide how much money out of $20 to give to the Group A person with whom (s)he is paired. The Group B persons are asked to write their decisions on Group B decision forms. Note that this decision by the Group B person will be relevant only if the Group A person chose IN.

Payment of Show up Fees and Experiment Earnings
Once all participants have made their decisions, the experimenters will collect the decision forms and calculate the payoffs. Then you will be asked one by one to approach the experimenters in the hallway for the payment of show up fees and your earnings from the game. Because your decision is private, we ask that you do not tell anyone your decision nor your earnings either during or after the experiment. We also ask you to leave using the stairs and not gather in front of the elevator after you receive your payment.

Are there any questions?

GROUP A PERSON DECISION FORM

The Group A person makes his/her decision by circling (1) or (2):

(1) I choose OUT

(i.e., the Group A person receives $10 and the paired Group B person receives $0.

OR

(2) I choose IN

(i.e., $20 will be made available to split between the two paired persons. The split will be determined by the Group B person.)

GROUP B PERSON DECISION FORM

The Group B person makes his/her decision how much money out of $20 to give to the Group A person with whom (s)he is paired.

I choose to give $_____ to the paired Group A person.

No Talking Allowed
Now that the experiment has begun, we ask that you do not talk. If you have a question after we finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private.

Show up Fee
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GROUP B PERSON DECISION FORM

The Group B person makes his/her decision how much money out of $20 to give to the Group A person with whom (s)he is paired.

I choose to give $_____ to the paired Group A person.