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Saliency of outside options in the lost wallet game

James C. Cox · Maroš Servátka · Radovan Vadovič

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Abstract This paper reports an experiment designed to shed light on an empirical puzzle observed by Dufwenberg and Gneezy (Games and Economic Behavior 30:163–182, 2000) that the size of the foregone outside option by the first mover does not affect the behavior of the second mover in a lost wallet game. Our conjecture was that the original protocol may not have made the size of the forgone outside option salient to second movers. Therefore, we change two features of the Dufwenberg and Gneezy protocol: (i) instead of the strategy method we implement a direct response method (sequential play) for the decision of the second mover; and (ii) we use paper money certificates that are passed between the subjects rather than having subjects write down numbers representing their decisions. We observe that our procedure yields qualitatively the same result as the Dufwenberg and Gneezy experiment, i.e., the second movers do not respond to the change in the outside option of the first movers.

Keywords Saliency · Outside options · Lost wallet game

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J.C. Cox (✉)
Experimental Economics Center, Georgia State University, P.O. Box 3992, Atlanta, GA 30302-3992, USA
e-mail: jccox@gsu.edu

M. Servátka
Department of Economics and Finance, University of Canterbury, Private Bag 4800, Christchurch 8140, New Zealand
e-mail: maros.servatka@canterbury.ac.nz

R. Vadovič
Center for Economic Research (CIE), Instituto Tecnológico Autónomo de México (ITAM), Av. Camino a Sta. Teresa 930, Col. Héroes de Padierna, Mexico City, D.F. 01000, Mexico
e-mail: rvadovic@itam.mx

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1 Introduction

In the lost wallet game (Dufwenberg and Gneezy 2000), the first mover (FM) can choose between the actions Take and Leave. If the FM chooses Take, her payoff is x and the payoff of the second mover (SM) is 0. Alternatively, if the FM chooses Leave then the SM can divide the amount π between the two players. So long as $\pi > x$, the FM's choice of Leave generates a surplus for the two players. The SM can choose any amount $y \in [0, \pi]$ for the FM's payoff and $\pi - y$ for himself. If the FM chooses Leave then she gains (resp. loses) money if the SM chooses $y > x$ (resp. $y < x$).[1] Arguably, the size of the FM payoff x in the Take option provides a measure of the trust and altruism exhibited by the FM, hence a reciprocal or altruistic SM will choose amounts for FM payoffs y that increase with x. Dufwenberg and Gneezy (hereafter DG) report that the size of the foregone Outside Option x does not affect SM choices of payoff amounts y for FMs. A similar observation was made by Brandts et al. (2006) in a pie-sharing game.

We find this behavior puzzling for the following reasons. If SM views the Outside Option x as FM's "investment" that is necessary in order for π to be made available to SM, then a higher forgone x implies that FM is willing to invest more, which should inspire SM to return more to FM. Our question about the robustness of the reported invariance of y with respect to x hinges on the perceived salience of the amount of the Outside Option. When making her choice, the SM must be aware of the amount of FM's foregone payoff x if she is going to respond to the size of x. However, in DG (and also in Brandts et al.) the responses of SMs were obtained via the strategy method which does not allow SMs to observe FM choices before making their decisions. Thus the monetary consequences of the FMs' actions, which are at the heart of this puzzle, have to be imagined by the SMs at the time of their decisions.

To try to make the money payoff implications of both players' actions in the lost wallet game more salient, we change two features of the DG protocol: (i) instead of the strategy method we implement a direct response method (sequential play) for the decision of the SM; and (ii) we use paper money certificates that are passed between the subjects rather than having subjects write down numbers representing their decisions. In our robustness check experiment, an FM receives a legal-size envelope containing x ($= 4$ or 7) one-dollar certificates. If FM keeps the legal-size envelope containing x one-dollar certificates then SM receives a large manila envelope containing blank pieces of paper, instead of one-dollar certificates, and has no decision to make. If FM does *not* keep the legal-size envelope containing x one-dollar certificates then the paired SM receives a large manila envelope containing: x one-dollar certificates in a legal-size envelope labeled "The Other Person's Certificates"; a second, *empty* legal-size envelope labeled "My Certificates"; and $20 - x$ additional one-dollar certificates paper-clipped to the outside of the two legal-size envelopes. The

[1] Traditional theory of self-regarding (or "economic man") preferences implies that, if given a choice, SM would choose $y = 0$, hence FM will choose Take.

SM then decides how many of the total number of 20 one-dollar certificates (s)he has received to allocate to the two envelopes labeled, respectively, "The Other Person's Certificates" and "My Certificates."

It is important to highlight that in some experiments sequential play and strategy method play are behaviorally equivalent; see, for example, Cason and Mui (1998), Brandts and Charness (2000), Sonnemans (2000), Oxoby and McLeish (2004), and Falk and Kosfeld (2006). However, in certain environments the qualitative results can be reversed just by changing the response elicitation method (e.g., Güth et al. 2001; Brosig et al. 2003; Cooper and Van Huyck 2003; and Casari and Cason 2009) or by changing the response elicitation method in combination with changing another factor such as context in which the game is played (e.g., Falk et al. 2003; Cox and Deck 2005). The difference in behavior is usually attributed to the hot (sequential play) versus cold (strategy method) effect. The strategy method combined with a within-subjects design has also been used by Charness et al. (2007) in a lost wallet game experiment conducted over the internet. Data from this experiment show a modest relationship between the size of the outside option available to the FM and the decision of the SM. Finally, Servátka and Vadovič (2009) report that degree of inequality of payoffs in outside options has no significant effect in lost wallet games.

To the best of our knowledge the literature does not include papers that investigate the effects of using real money or currency certificates instead of decision sheets. However, some conclusions can be drawn by comparing data from experiments with the investment game. Berg et al. (1995) used one-dollar bills (U.S. legal tender currency) in their experiment. Cox (2004) used one-dollar certificates and found similar behavior in the investment game to that reported by Berg et al. (1995). Servátka et al. (2008) ran the investment game using decision forms and did not find any significant differences from Cox's data (from the experiment using one-dollar certificates).

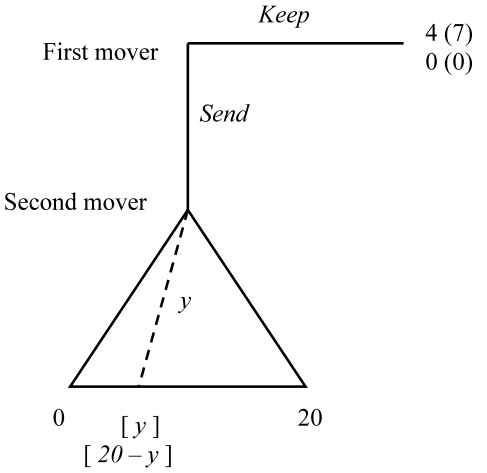
In addition to our use of one-dollar certificates and sequential play, there are a couple of additional noteworthy differences between our experiment and the DG experiment. First, DG used a monitor for each session who watched the experimenters match the subjects based on their "registration numbers." We had each SM select one envelope containing the implications of one FM decision from a box of indistinguishable manila envelopes. Each procedure was intended to convince the subjects that the experimenters did not determine the matching of individual FMs and SMs. Secondly, while DG conducted their study in the Netherlands and used Dutch guilders as currency, ours was conducted in New Zealand and hence the subjects were paid in New Zealand dollars.

2 Experimental design and procedures

The experiment consisted of two treatments, Outside Option = 4 (henceforth, Out 4) and Outside Option = 7 (Out 7) implemented in an across-subjects design.[2] In both

[2]The x values of 4 and 7 were chosen for the following reasons. A value larger than 7 for the high value of x would have encountered feasibility problems in obtaining a large enough number of first movers who would actually choose Leave, so that second mover behavior could be observed. See below for discussion

Fig. 1 The lost wallet game



treatments the subjects played the lost wallet game presented in Fig. 1. The FM had to choose whether to keep an envelope containing 4 or 7 one-dollar certificates or whether to send it to an anonymously paired SM. If the FM chose to keep the envelope then the game ended, the FM received 4 or 7 New Zealand dollars (NZD) and the SM received 0 NZD. If the FM chose to send the envelope then the game continued and the SM chose how to split 20 one-dollar certificates between the two of them. That is, the SM chose how many, y, of the 20 one-dollar certificates to give to the FM and how many, $20 - y$, of them to keep. The SM's choice determined the final payoffs. The following paragraphs explain the procedures used in the experiment in more detail.

We conducted twelve experiment sessions in July through September 2008 at the University of Canterbury in Christchurch, New Zealand. A total of 224 undergraduate subjects participated in the study. Some of the students had previously participated in economics experiments (including trust games), but none had participated in a trust game experiment within the 12 months prior to the study. On average, a session lasted about 60 min including the initial instruction period and payment of subjects. Subjects earned on average 19.82 NZD including the 5 NZD show up fee.[3] All sessions were hand run in a classroom.

Each session included an even number of subjects between 16 and 22, each of whom was randomly assigned to be a Group A person (a first mover) or a Group B person (a second mover). The assignment into these groups was done by asking each person to draw a piece of paper with a written letter A or B on it from a large envelope. The classroom was divided in half. Group A persons were asked to sit anywhere on the farther side of the classroom while Group B persons were asked to sit closer to the door.

of the increase from 39 subject pairs for Out 4 to 73 subject pairs for Out 7 needed with the present values for x. A value smaller than 4 for the low value of x would have provided little opportunity cost for the second mover to be concerned about. The values of 4 and 7 correspond to values used by DG, making direct comparison possible.

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

Before the Group A people made their decisions, the Group B people left the room and followed one of the experimenters to another classroom down the hallway. Each person in Group A picked up a legal-size envelope with 4 or 7 one-dollar certificates. Then, one at a time, Group A persons went to an adjacent decision room where they were asked to make their decision in complete privacy. Each Group A person had two options:

(1) to keep the legal-size envelope with all of her/his one-dollar certificates, in which case the Group B person with whom (s)he was paired did not get to split any money; or
(2) to send the legal-size envelope with ALL of her/his one-dollar certificates to the paired person in Group B, in which case the paired person in Group B got to split 20 one-dollar certificates between the two of them.

If the Group A person decided to keep the legal-size envelope, (s)he would put it in a large manila envelope which was provided in the decision room. If the Group A person decided to send the legal-size envelope to the paired person in Group B, (s)he would leave it on the table in the decision room and take only the manila envelope. If the legal-size envelope containing 4 or 7 one-dollar certificates was left in the decision room, it was collected by one of the experimenters before the next Group A person came to the room. This procedure ensured that Group A subjects did not learn each others' decisions.

After all participants in Group A made their decisions, the experimenters recorded them by subject identification code and put each legal size envelope which was to be sent to a paired person from Group B in a large manila envelope. If a Group A person sent an envelope with 4 or 7 one-dollar certificates, the experimenters would write on the envelope "The Other Person's Certificates," add an *empty* legal size envelope labeled "My Certificates" and paper-clip an additional 16 or 13 one-dollar certificates on the two envelopes. If a Group A person did not send an envelope with certificates, the experimenters would put in a replacement envelope containing blank sheets of papers (not worth anything) to make the manila envelopes indistinguishable and take all envelopes to Group B.[4] Then, one at a time, Group B persons went to the decision room. On their way to the decision room, Group B people drew from among the manila envelopes and the experimenters recorded the resulting random matching of SMs with FMs. Group B people were asked to open their envelopes once they were in the privacy of the decision room. If a manila envelope contained blank sheets of paper, it meant that the paired Group A person had kept the certificates and the Group B person had no decision to make. (S)he would then leave the manila envelope in the decision room. If the manila envelope contained 20 one-dollar certificates, the Group B person would decide how many of the certificates to give to the person in Group A and how many of them to keep. The certificates that the Group B person decided to give to the Group A person were to be put in the envelope labeled "The Other Person's Certificates." The certificates the Group B person decided to keep were to be

[4]This procedure implemented random matching of subjects. At the same time, it corresponds to the lost wallet game in the following sense. If the Group B person drew an envelope with certificates, the game continued with the second stage. If the envelope contained blank sheets of paper, the game was over.

Table 1 Fraction of first movers who did not choose the outside option

	Out 4	Out 7
Our data	31/39	35/73
DG data	12/12	6/12

put in the envelope labeled "My Certificates." Upon completion of the decision task, a Group B person left all of the envelopes in the decision room to be collected by an experimenter after the Group B person left the room. The experimenter also recorded the Group B person's decision. Upon completion of the experiment the subjects were paid privately and individually.[5]

3 Results

Thirty-nine subject pairs participated in our Out 4 treatment and seventy-three subject pairs in our Out 7 treatment. This provided thirty-one and thirty-five observations on the SM's behavior in the Out 4 and Out 7 treatments, respectively.

Table 1 reports FM choices in our experiment and in the DG experiment. The two experiments produced similar patterns of FM choices. Our data show 31 out of 39 FMs did *not* choose the outside option in the Out 4 treatment whereas 35 out of 73 did *not* choose the outside option in the Out 7 treatment. In comparison, DG reported that 12 out of 12 and 6 out of 12 subjects, respectively, did not choose the outside option in their Out 4 and Out 7 treatments. The difference between treatments is statistically significant for both our experiment and the DG experiment: Fisher's exact test p-value is 0.000 for data from both experiments.

Table 2 reports SM data from our experiment and the DG experiment. On average, our SMs who drew an envelope with 20 one-dollar certificates gave to their paired FMs 6.61 NZD in Out 4 and 6.00 NZD in Out 7. There is no significant difference between SM choices in our Out 4 and Out 7 treatments according to Mann-Whitney and Kolmogorov-Smirnov tests (the respective p-values are 0.71 and 0.60). Thus our experiment results are consistent with the DG finding that the size of the forgone outside option does not influence the decision of the SMs in the lost wallet game. Therefore, this finding is robust to our procedures intended to make the size of the outside option more salient.

4 Discussion

This paper reports an experiment designed to shed light on what has appeared to be an inconsistency with positive reciprocity, that the size of the foregone outside option by

[5]Two Group B subjects who participated in treatment Out 7 and left 7 one-dollar certificates in the "Other Person's Certificates" envelope said they wanted to keep all 20 but they never counted the certificates clipped on to the envelopes and just assumed there were 20 of them rather than 13. We have omitted their decisions in the statistical analysis of the data. Inclusion of the data for these two subjects would lower the amount given to FMs in the Out 7 treatment and therefore *not* change our conclusions.

Table 2 Behavior of the second movers in our experiment and the DG experiment

Data	Mean amount given to the FM	Median amount given to the FM	Mann-Whitney test	Kolmogorov-Smirnov test
Out 4	6.61 [3.19] {31}	7	–	–
Out 7	6.00 [4.09] {35}	7	–	–
Out 4 vs. Out 7	–	–	−0.38 $p = 0.71$	0.19 $p = 0.60$
DG Out 4	7.33 [3.55] {12}	10		
DG Out 7	4.83 [4.49] {12}	4.5		
DG Out 10	7.54 [4.71] {12}	10		
DG Out 13	6.13 [5.13] {12}	7.5		
DG Out 16	5.75 [4.67] {12}	6		

Notes: Standard deviations are in brackets. Number of subjects are in braces

the FM does not affect the behavior of the SM in a lost wallet game. Our conjecture was that the DG protocol may not have made the size of the forgone outside option salient to SMs. Therefore, we ran our experiment using a direct response method where a SM is presented with the x ($= 4$ or 7) one-dollar certificates the FM gave up in order for the SM to be able to split 20 one-dollar certificates between the two of them by choosing the amount y to allocate to the FM. We observe that our procedure yields qualitatively the same result as the DG experiment, i.e., the SMs do not respond to change in the amount of the outside option of the FMs.

The lack of a positive relationship between y and x in the lost wallet game seems to indicate the absence of significant positive reciprocity in this game. But there are some subtleties in the answer to this question. Comparison with the investment game

(Berg et al. 1995) is useful for exploring the question of reciprocity because this game shares a common feature with the lost wallet game and has a notable difference. In the investment game, each dollar sent to the SM by the FM is tripled by the experimenter, which enlarges SM's choice set. In the lost wallet game this is not the case—no matter how big is the outside option, the budget to be divided by the SM is always 20 dollars, i.e., the choice set of the SM is invariant to the size of the forgone outside option of the FM.

Many theories of unconditional other-regarding preferences operate on the size and the inequality of the available choice set of the SM (e.g., Fehr and Schmidt 1999; Bolton and Ockenfels 2000; Charness and Rabin 2002; Cox and Sadiraj 2007). These theories make no prediction about a difference between Out 4 and Out 7 (or other) lost wallet games because the feasible set of the SM is the same for all such games. In contrast, an increase in the amount sent by the FM in the investment game expands the feasible set of the SM, which gives rise to predictions of changed SM choices from the above theories due to an income effect. Revealed altruism theory (Cox et al. 2008) provides a theory of reciprocity. In this theory, choice by FM of a feasible set that is more generous than (MGT) an alternative feasible set causes the SM to become more altruistic. In the investment game, a larger amount sent by FM to SM creates a feasible set that is MGT the feasible set for a smaller amount sent; hence revealed altruism theory predicts an increase in the amount of money SM allocates to FM. In contrast, the feasible set of the SM is invariant to the size of the outside option in the lost wallet game, hence revealed altruism theory predicts no difference in SM behavior across such games.

The theory of psychological forward induction (Dufwenberg 2002; Battigalli and Dufwenberg 2009) can predict differences in SM behavior across lost wallet games with different amounts of the outside option. By giving up his outside option the FM reveals that he has high hopes and expects even more from the SM in return. Then, if the SM is guilt-averse, he will respond favorably to such updated belief. When the size of the outside option is higher, the updated belief of the FM may be higher, which can cause a guilt-averse SM to allocate more money to the FM. However, behavior in the DG experiment and in our experiment is inconsistent with this prediction.

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