The Journal of Socio-Economics 47 (2013) 94–102

Contents lists available at ScienceDirect

The Journal of Socio-Economics

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

A cash effect in ultimatum game experiments

Junyi Shen [a,*], Hiromasa Takahashi [b]

[a] Research Institute for Economics and Business Administration, Kobe University, Japan
[b] Faculty of International Studies, Hiroshima City University, Japan

ARTICLE INFO

Article history:
Received 9 May 2013
Received in revised form
18 September 2013
Accepted 24 September 2013

JEL classification:
C72
C91

Keywords:
Cash effect
Ultimatum game
Cost-loss discrepancy
Experimental design

ABSTRACT

This paper reports two experiments involving an ultimatum game, conducted in Japan. There were two treatments in each experiment, which we call the cash session and the point session. The cash session involves introducing cash into the procedure of the experiments. In other words, in a cash session, subjects made decisions while holding cash in their hands, versus having points or tokens as in most prior experiments. We found that, compared to the point sessions, proposers offered more and responders rejected less frequently in the cash sessions. This is evidence that a cash effect exists in ultimatum game experiments.

1. Introduction

Standard economic models of human decision-making have typically minimized or ignored the influence of emotions on people's decision-making behavior, idealizing the decision-maker as a perfectly rational cognitive machine. However, in recent years this assumption has been challenged by social psychologists and behavioral economists, who have identified additional psychological and emotional factors that influence decision-making. One experimental game yielding very convincing evidence in this regard is the ultimatum game. In this game, one player (i.e., the proposer) proposes to a second player (i.e., the responder) the division of a sum of money. If the responder accepts the division, then both players earn the specified amounts. If the responder rejects it, they both get nothing.

The backward induction prediction of the ultimatum game is so simple that the proposer offers zero or the smallest allowable amount more than zero and the responder will accept. However, being encouraged by Güth et al. (1982), which is the first experimental study of the ultimatum game, many experimental studies have observed results that deviate from this theoretical prediction (e.g., Andersson et al., 2010; Bolton and Zwick, 1995; Cameron, 1999; Croson, 1996; Eckel and Grossman, 2001; List and Cherry, 2000; Rankin, 2003; Roth et al., 1991; Ruffle, 1998; Schotter et al., 1996; Slonim and Roth, 1998; Tompkinson and Bethwaite, 1995). In experiments, although average offers and rejection rates varied across studies, proposers typically offer an average of 40% of the money and responders reject small offers of 20% or so half the time. In a detailed survey of many studies on the ultimatum game, Camerer (2003) listed five types of variables that might be affecting the experimental results. These are methodological variables (e.g., repetition, stakes, and anonymity), demographic variables (e.g., gender, race, academic major, and age), culture, descriptive variables (e.g., labeling and context), and structural variables (e.g., identity, communication, competitive pressure, and information). However, we feel that in addition to these types of variables, another potential issue is the effect of creating a cash environment, which should also be taken into account. Creating a cash environment in an ultimatum game experiment refers to the situation that in the *procedure* of the experiments both proposers and responders see the real money (i.e., cash), rather than points or tokens written on paper or appearing on a computer screen. In other words, both proposers and responders hold cash in their hands when they make decisions.[1]

* Corresponding author at: Research Institute for Economics and Business Administration, Kobe University, 2-1 Rokkodai, Kobe, Hyogo 6578501, Japan. Tel.: +81 78 8037013; fax: +81 78 8037013.
E-mail address: shen@rieb.kobe-u.ac.jp (J. Shen).

[1] There were several studies (e.g., Eckel and Grossman, 2001; Rankin, 2003) asking the subjects to split a pie equivalent to a certain amount of money. However, even when the pie was in units of money (e.g., 10 USD), this was still not the same situation as physically holding cash.

1053-5357/$ – see front matter © 2013 Elsevier Inc. All rights reserved.
http://dx.doi.org/10.1016/j.socec.2013.09.005

Three potential reasons explaining why people may treat money in the form of tokens or points differently than cash they physically hold, cited below, have been documented in Reinstein and Riener (2012), as follows:

> "First, psychology experiments demonstrate that subjects given 'reminders of money' are both less helpful and less likely to ask for help in a variety of non-remunerated tasks (Vohs et al., 2006). . . . Second, using cash may cause subjects to more carefully consider the consumption they are sacrificing. Along similar lines, Oberholzer-Gee and Eichenberger (1999) argue that subjects do not fully consider the opportunity costs of the funds they give away in experiments, and Mazar et al. (2008) find that people cheat more when using exchangeable tokens than when they use cash. Finally, parting with cash may itself bring some disutility, perhaps through an attachment to this money similar to the "endowment effect" of Kahneman et al. (1991)." (Reinstein and Riener, 2012, p. 231)

Extending the second and third reasons cited above, in our view, introducing cash into ultimatum game experiments is important because the issue of cash versus points or tokens could be considered a case of cost-loss discrepancy.[2] Under this consideration, a split of a pie consisting of cash can be viewed as a direct loss for both the proposer and responder if the split is rejected by the responder. On the other hand, since an offer in points or tokens rejected by the responder is not a direct loss in cash, it can be viewed as a cost for both players to earn money in the next rounds or periods of the experiment. Therefore, we believed that in a cash environment, both proposers and responders would be more cautious in making an offer and rejecting an offer than in a point or token environment.

Despite the above reasons explaining a possible cash effect on subjects' experimental behavior, the economic literature seems to have so far ignored this effect. To the best of our knowledge, Reinstein and Riener (2012) is the first and only study examining such a cash effect on participants' experimental behavior.[3] Reinstein and Riener (2012) studied the windfall and tangibility effects in a dictator game experiment and found that the magnitude of the tangibility effect (i.e., what we have called the cash effect) appeared to be at least as strong as the windfall effect with regards to dictators' behavior. Concerning the direction of the tangibility effect, they documented that the dictators gave significantly less to the respondents when their endowment was in cash than when their endowment was only shown on a computer screen, indicating that holding cash physically cues subjects to be more self-interested. A recent paper describing an approach that is somewhat related to but distinctly different from that of Reinstein and Riener (2012) and our approach is Drichoutis et al. (2013), in which the authors studied the issue of money illusion. They investigated the effect of several different exchange rates between experimental currency units and cash through an induced value experiment. They found virtually no relationship between a stronger/weaker experimental currency and the ability of theory to predict observed outcomes. The only significant effect that was generated relates to the comparison of the cash-only condition to the 1-to-1 exchange condition, with the latter producing greater behavioral deviations from the theoretical predictions. It should be noted that although there was a cash-only treatment in Drichoutis et al. (2013), it did not involve having subjects hold cash in their hands as in Reinstein and Riener (2012) and experiments described in the current paper.

In the current study, we conducted two laboratory experiments to examine the cash effect in the ultimatum game. Based on the dictator game results of Reinstein and Riener (2012), if their finding that holding cash physically cues subjects to be more self-interested is broadly true, then proposers in the ultimatum game should offer relatively less and responders' rejection rate should be relatively lower when holding cash in their hands. However, the key difference between the ultimatum game and the dictator game is in whether receivers (i.e., responders) have the right to reject the offer provided by proposers. In particular, proposers in the ultimatum game face the uncertainty that their offers might be rejected by responders, while this can never happen in the dictator game. Acknowledging this difference helps us to make a two-fold prediction. First, for responders, receiving offers in cash rather than points or tokens may cause them to hesitate to reject an offer; therefore, rejection rates in a cash environment are expected to be lower than in a point or token environment. Second, for proposers, there are two effects of physically holding cash that exist. On the one hand, proposers anticipate responders' rejection rate being lower and become more self-interested when holding cash in their hands, which leads to offering less than when holding points or tokens. On the other hand, introducing cash into the procedure of the experiments may induce proposers to make relatively higher offers, because they are more afraid of being rejected by responders than in a point or token environment. Given that these two effects go in different directions, the net effect of cash on proposers' behavior depends on the magnitudes of these two effects.

The remainder of the paper is organized as follows. Section 2 describes the details of the experiments. The results of the experiments are presented in Section 3. Finally, Section 4 discusses the results and suggests several possible directions for future studies.

2. Experimental design

We conducted two ultimatum game experiments at Hiroshima City University. Sixty-four students participated in the first experiment (hereinafter, "Experiment 1") in December 2011 and sixty students joined in the second experiment (hereinafter, "Experiment 2") in May 2012. We confirmed in advance that all the subjects participating in Experiment 2 had not participated in Experiment 1. In each experiment, subjects were evenly divided into two sessions, which we refer to as the cash session and the point session. Each session consisted of six rounds. Each subject was randomly assigned to be either a proposer or responder for all six rounds of a given session. To maintain anonymity between proposers and responders, they were arranged in different classrooms when they arrived and stayed there during the experiment. In each classroom, subjects received written instructions, which were first read individually by the subjects and then read aloud by a Japanese-speaking experimenter. Experimental instructions for proposers and responders are provided in Appendix A.

In both sessions of Experiment 1, every proposer was matched with a *different* responder in each round, which is to say that no proposer was paired with a particular responder more than once.[4] In

[2] The cost-loss discrepancy suggests that there exists a discrepancy in people's preferences between costs and losses. For people with loss aversion preferences, a loss is evaluated higher than a cost. See Thaler (1980), Smelser and Gerstein (1986), and Tversky and Kahneman (1991) for more detailed discussions on this issue.

[3] One study (i.e., Hoffman et al., 1996) did apply cash in dictator game experiments. However, their design did not allow them to examine how introducing cash into the experiments affects subjects' behaviors, compared to those in a point or token environment. In addition, several studies have investigated the effects of credit cards and cash on spending behavior (e.g., Prelec and Simester, 2001; Raghubir and Srivastava, 2008). They found that credit card payments were associated with consumers' having a higher purchase likelihood and willingness to pay.

[4] Matching in each round was conducted according to the following steps. (i) Each proposer and responder was randomly assigned an ID number (e.g., in this description, A1, A2, . . ., A16 for the 16 proposers and B1, B2, . . ., B16 for the 16 responders in the cash session). (ii) In the first round, we had A1 pair with B1, A2 pair with B2, . . ., A16 pair with B16. (iii) In the second round, we had A1 pair with