GIVING IT NOW OR LATER: ALTRUISM AND DISCOUNTING*

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WP-AD 2008-10

Editor: Instituto Valenciano de Investigaciones Económicas, S.A.
Primera Edición Julio 2008
Depósito Legal: V-2996-2008

* I am especially indepted to Giovanni Ponti and Paul Calcott for helpful comments and suggestions. I also benefited from discussion with Lola Collado, Iñigo Iturbe Ormaetxe, Hubert János Kiss, Friederike Mengel, Luis Moreno Garrido, Marco Piovesan, and seminar participants in Alicante. Usual disclaimers apply. Financial support from the Spanish Ministry of Education and Science (AP-2002-1893) and the Generalitat Valenciana (GV06/275) is gratefully acknowledged.

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ABSTRACT

We experimentally study the effect of time on altruism. By postponing payments in a standard Dictator game, subjects allocate a future payment between themselves and others. Since both the payoffs of the Dictator and the Receiver are delayed until the same time, standard intertemporal utility maximization would predict that waiting time should not affect the Dictator's choice. In this respect, we observe that Dictators'decisions are not affected, as long as the time interval between the decision and payment is not large. On the other hand, for large time gaps, subjects become more self-interested.

Keywords: Altruism, Discounting, Dictator game, Intertemporal choice.

JEL Classiffication: C91, D64, D90.

1 Introduction

There are two classes of models that explain altruistic behavior. Apparently, altruistic behavior may arise as a by-product of the intertemporal structure of the model. Individuals act as if they were not selfish, with the ultimate goal of maximizing their own well-being (Trivers, 1971, Axelrod and Hamilton, 1981, Kreps *et al.*,1982). Social preferences, on the other hand, assume that people are directly interested in both their own and others' material gains (Camerer, 2003, Sobel, 2005).

The reasons why these two types of model may predict non-selfish behavior are fundamentally different. In the first type of model, non-selfish behavior disappears if time horizon is short. Only the latter type of model really views humans as non-selfish. Little is known, though, about what happens if we combine social preferences with the intertemporal structure of the first type of model. Can the time structure affect the decisions of individuals if others' well-being is involved?

This study analyzes this issue in the framework of the classic experimental protocol of the Dictator game. In this game, a player, the Dictator, is given an initial endowment, S, which she can either keep for herself, or share with another player, the Receiver. The Dictator can give to the Receiver any amount $c \in [0, S]$, which we call "gift". The Receiver cannot but accept the proposed payoff distribution. Positive giving in Dictator game has been found to be an extremely robust phenomenon (Camerer, 2003, Eckel and Grossman, 1996, Hoffman *et al.*, 1994), which is interpreted as evidence of altruistic behavior.

A common feature of Dictator game experiments is to pay the experimental subjects right after the end of the experiment. Time-proximity of payment might enhance people's feelings of guilt, the warm glow of giving, or, on the other hand, the temptation to keep the endowment for oneself.

The first question, then, is: Does it matter if payments are executed *not* the same day, but rather in few days? And does it make any difference whether payment is after 2 or 6 days, or even later? To provide a robust answer to this question, we experimentally test how Dictators' decisions change as the time interval between the moment of decision and payment widens. In this respect, we observe that the median gift does not differ, as long as the time gap between decision and payment is small enough. For large time gaps, however, subjects tend to behave more selfishly. This evidence notwithstanding, our data also show that the average gift does not converge to zero. Rather, it stays significantly above zero, even for the largest gap.

2 Experimental Design

The experiments were conducted in May 2007 at University of Alicante, using the experimental software z-Tree (Fischbacher, 2007). Subjects were University students from various fields. The game played was a standard Dictator game

with an initial endowment of 1000 *Spanish pesetas* (worth € 6).[1] The novel aspect of our experiment was to postpone the payment, thus creating a time gap between the time of decision (the experiment) and the time of payment (our treatment variable). Denote t the difference in days between the experiment and the payment time. We performed 6 treatments, with $t = 2, 6, 10, 14, 18, 22$. There were 24 subjects per session - 12 Dictators and 12 Receivers. This provided us with 12 completely independent observations per session, 72 for the whole experiment. The Dictator game lasted around 15 minutes and the questionnaire around 10 minutes. The stake chosen, 6€, corresponds to 24€ per hour what exceeds more than twice the average hourly wage a University student can earn.

In order to pay subjects, we asked for their bank account numbers, and the payoffs were paid via bank transfers to their respective accounts. We aimed to make the postponed payment as smooth as possible for the experimental subjects, so that to avoid any potential influence of issues related to the availability of such a small quantity on their decisions.

In each session, the experimental instructions were read aloud and the experimental subjects were given time to ask questions.[2] When there were no questions left, subjects were randomly assigned to their roles, before the experiment started. Afterwards, one round of the Dictator game, without any time limit for the decision, was played. After the Dictators made their decisions and everybody learnt their payoffs, we asked the subjects to fill in a questionnaire, which we used to control for individual fixed effects.[3]

3 Results

3.1 Descriptive Statistics

Figure 1 plots the median Dictators' gifts for the 6 treatments. The x-axis reports the time difference between the decision and payment, t; the y axis reports treatment medians. For $t = 2$ and 6, we observe medians above 150. The means are slightly lower than 20% of the stakes, reproducing standard experimental results.[4]

[1] It is standard practice, for all experiments run in Alicante, to use Spanish ptas. as experimental currency. The reason for this design choice is twofold. First, it mitigates integer problems, compared with other currencies (USD or Euros, for example). On the other hand, although Spanish pesetas are no longer in use (substituted by the Euro in the year 2001), Spanish people still use Pesetas to express monetary values in their everyday life. In this respect, by using a "real" (as a opposed to an artificial) currency, we avoid the problem of framing the incentive structure of the experiment using a scale (e.g. "Experimental Currency") with no cognitive content.

[2] The translation of the experimental instructions can be found in Appendix.

[3] The translation of the questionnaire questions can be found on http://merlin.fae.ua.es/iturbe/Questions.pdf.

[4] See Chapter 2 in Camerer (2003) for a survey of Dictator game experiments.

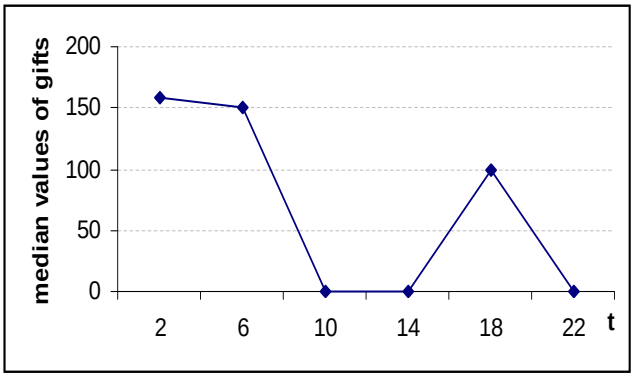

Figure 1. The median gifts.

A more interesting pattern unfolds for $t > 6$. The median gift jumps from 150 in $t = 6$ to 0 in $t = 10$ and stays low in 3 out of the 4 cases. The only treatment with non-zero median is $t = 18$ where it equals 100, which is considerably higher than the medians of $t = 10, 14$ and 22, but also considerably lower than the medians corresponding to $t = 2$ and $t = 6$. We attribute this high median to presence of few altruistic Dictators. Such individuals can easily drive descriptive statistics up.

Interestingly, even though more selfishness emerges as the gap between the decision and payment increases, there still remains some positive giving which does not vanish as delay grows large. The average gift is 75 for $t = 10$, 71 for $t = 14$, it jumps up for $t = 18$, and stays at 69 for the last treatment. Thus, it seems that the average gift and the level of altruism, on general, do not converge to zero (at least, within the time span considered in this study).

Figure 2 provides a detailed view of the distribution of Dictators' gifts for each treatment. To this purpose, we divide Dictators into 3 categories: "selfish" for $c \leq 100$, "fair" for $c \in (100, 400)$, and "hyper-fair" for $c \geq 400$. In each diagram of Figure 2, the first bar plots the absolute frequency of selfish Dictators, the second corresponds to fair Dictators and the third graphs the number of hyper-fair Dictators, respectively.

Figure 2 allows us to appreciate the evolution of Dictators' behavior as t increases, uncovering patterns not detectable in Figure 1.

Selfishness is the modal behavior in all treatments and its frequency rises with t. Over t, the number of hyper-fair individuals steadily decreases, while the frequency of selfish behavior increases. In 2 of last 3 treatments, we observe no hyper-fair gift. There is an average of 25% (6 out of 24) of individuals giving nothing for $t \leq 6$, while there is an average of more than 58% of zero-giving Dictators for $t \geq 10$.

Although the median gift for $t = 18$ looks somehow higher than the other $t > 6$ treatments, Figure 2 shows a considerable skewness toward more self-interest, compared to both $t = 2$ and $t = 6$. In fact, 42% (5 out of 12) of individuals give nothing, compared to average 25% for $t \leq 6$.

Figure 2, thus, leads to two conclusions. First, behavior tends to be more self-interested, the longer the time between the experiment and the day of payment, confirming the pattern visible from Figure 1. Second, the $t = 18$ treatment is not as atypical as Figure 1 may initially suggest. This is confirmed by the regression analysis below.

3.2 Regression Analysis

In what follows, we normalize the stake divided, S, to 1. We use the traditional intertemporal utility function[5]

$$V_i(c_i) = \sum\nolimits_t \delta^{t-1} u_{it}(c_i) \tag{1}$$

[5] See Mas-Collel *et al.* (1995), Chapter 20.

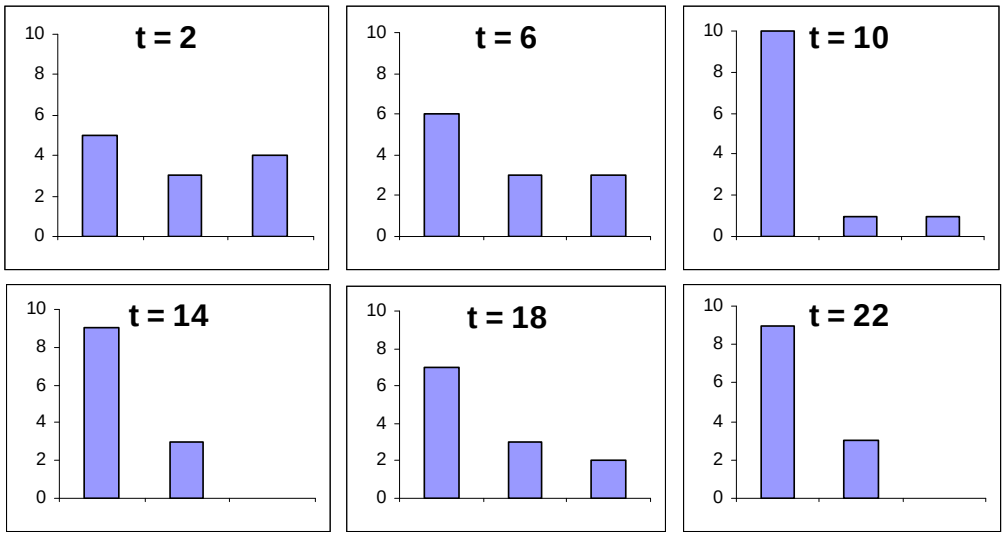

Figure 2. Distributions of gifts per treatment.

where $\delta \in [0,1)$ is the discount rate, and $u_{it}(c_i)$ is a standard Cobb-Douglas utility function of individual i at time t as follows:

$$u_i(c_i) = (1-c_i)^{1-\alpha_i} c_i^{\alpha_i}. \tag{2}$$

The main feature of (2) is that the Dictator is assumed to take into account both her own and the Receiver's payoffs. The parameter $\alpha_i \in [0,1]$ measures i's altruism. If $\alpha_i = 0$, i is selfish; if $\alpha_i = \frac{1}{2}$, she maximizes the total welfare, and if $\alpha_i = 1$ she is totally altruistic.

Recall that, in our experiment, both the payoffs of Dictator and Receiver are delayed by the same time interval. Thus, using (1) and (2), we can easily show that the optimal gift of the Dictator is

$$c_i = \alpha_i. \tag{3}$$

In words, Dictators should give the same amount, irrespective of t. This is the main hypothesis we test.

To this aim, we model Dictators' gifts as a function of personal characteristics and time. To test the robustness of our findings, we provide estimations of two alternative models, which differ in the functional relation between gifts and t, as follows:

$$c_i = \beta_0 + \beta_1 s_i + \beta_2 eq_i + \beta_3 sex_i + \beta_4 state_i + \beta_5 s_i * eq_i + \beta_6 s_i * sex_i + \beta_7 s_i * state_i + \varepsilon_i. \tag{4}$$

In (4), 3 variables elicited in the questionnaire are present: sex_i, eq_i and $state_i$. The variable $sex_i = 0(1)$ for (fe)males, and $eq_i \in \{0,1\}$ and $state_i \in \{1,..,7\}$ use standard questions in social capital surveys.[6] Both models contain the mentioned variables, time-related variable s_i, and interactions of the questionnaire variables and s_i.

The difference between the 2 models is the way t enters the estimation. The most obvious time-dependence of gifts is suggested by Figure 1. Gifts seem to stay constant for $t \leq 6$. Once a certain threshold is reached ($t = 10$), they jump down and stay constant. In terms of an econometric model, we define a time dummy variable $s_i \in \{0,1\}$, such that $s_i = 0$ if $t \leq 6$ and $s_i = 1$ otherwise (Model 1). In the second model, Model 2, we estimate a hyperbolic relation between gifts and t. Formally, $s_i = \frac{1}{t_i}$ where t_i stands for the treatment i participates in. Table 1, in the Appendix, reports the estimation results.[7]

[6] The variable eq_i is an answer to the following question: *"Consider the following situation: Two secretaries with the same age do exactly the same work. However, one of them earns 20€ per week more than the other. The one that is paid more is more efficient and faster, while working. Do you believe it is fair that one earns more than the other?."* The variable $eq_i = 0$ if the answer is "No" and 1 otherwise. The second variable, $state_i \in \{1,...,7\}$, measures the position of i's opinion between two extreme statements: *"The unemployed individuals should accept any job they are offered or lose their unemployment benefits"*, and *"The unemployed individuals should have the right to reject any work they do not like"*. The closer is i's opinion to the first statement, the lower is $state_i$.

[7] There is a scope for other functional relations between gifts and time. Two other models have actually been estimated: a model with a dummy for each t and a model where gifts do not depend on t for $t \leq 6$ and hyperbolically decrease otherwise. The estimation results are in harmony with findings reported here.

The main hypothesis, the impact of t on Dictators' gifts and altruism, is similar in both models. Mathematically, the marginal effect of s_i on c_i is:

$$\frac{\partial c_i}{\partial s_i} = \beta_1 + \beta_5 eq_i + \beta_6 sex_i + \beta_7 state_i. \tag{5}$$

To test whether (5) is on average equal to 0 is analogous to test the following joint hypotheses:

$$H_o : \overline{\beta}_1 = 0, \overline{\beta}_5 = 0, \overline{\beta}_6 = 0 \text{ and } \overline{\beta}_7 = 0.$$

The second row of Table 2 lists the p-values of H_o for each model. As we can see, time has a significant impact on gifts in both cases, which confirms our descriptive findings of Figure 1. As t rises, Dictators' giving behavior systematically changes in the direction of selfishness.

The marginal effect of time coincides with (5) in Model 1. In Model 2, the marginal effect of t does not coincide with the marginal effect of s. The actual marginal effect of t is given by $-(\beta_1 + \beta_5 eq_i + \beta_6 sex_i + \beta_7 state_i)\frac{1}{t_i^2}$. The third row of Table 2 lists the average estimated marginal effects of t.

Model 1 suggests that subjects give, on average, 12% less for $t > 6$. In Model 2, as time increases, the gifts decrease and the effect of time is statistically significant. Thus, both models show that time has a negative effect on gifts.

Last, we test whether the estimated values of the dependent variables are significantly positive for large t. Indeed, the tests support the above conjecture that, on average, gifts are positive for any $t > 6$.[8]

4 Discussion

Our experiment uncovers another aspect that drives the Dictator game gifts down. For instance, the double-blind experimental protocol (Hoffman *et al.*, 1994) and social distance (Jones and Rachlin, 2006) have been observed to negatively affect giving. Here we provide evidence that, as payments are delayed, average gifts tend to decrease. Another interesting result is that the altruism does not disappear completely.

A possible explanation of our findings is that *self-concern and fairness may be discounted with different rates*. Since subjects played only once, and monetary consequences for Dictators and Receivers were synchronized, we cannot use our data to estimate the different discount rates for Dictators' and Receivers' payoffs. For this, a more complex experimental design is necessary. We leave this for future research.

[8] The p-values are zero in all cases, using both models.

	Model 1	Model 2
$p-value$ of H_o	0	.02
marginal effect of t	-.12	-.01

Table 2. Test results

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5 Appendix

5.1 Experimental Instructions

- Before we ask you to fill a questionnaire, you have make one decision.
- There are 24 persons in this room. The computer will randomly select 12 individuals out of these 24 and they will be given an endowment of 1000 ptas.

- At the same time, the computer will randomly asing one of the people that have not received the endowment to each of the selected individuals. Neither during nor after the experiment will anybody know who has (s)he formed the pair with.
- Those who have received the 1000 ptas have to decide which part of the endowment they want to give to the person that has been asigned to her/him. They can decide any quantity between 0 and 1000.
- The other player does not do anything. The payment depends completely on the decision of the person that has received the endowment.
- However, the payments will not be realized right after the experiment.
- Rather, you will receive a bank transfer to the bank account number you had given us.
- We will transfer the money in X days.[9] You will receive an e-mail once the transfer has been realized.
- If the money has not arrived in the mentioned time, please, send an e-mail to the jaromirkovarik@merlin.fae.ua.es and we will solve the problem immediately.

5.2 Estimation Results

[9] The only difference across treatments is the number of days the payments are delayed, i.e. the X is replaced by the corresponding value of the treatment variable t.

	Model 1: $s_i = 0(1)$ if $t \leq (>)6$			Model 2: $s_i = \frac{1}{t_i}$		
	$\widehat{\beta}$	$\widehat{\sigma}$	p	$\widehat{\beta}$	$\widehat{\sigma}$	p
β_0	.10	.11	.34	.01	.08	.9
β_1	-.04	.13	.75	.53	.45	.25
β_2	-.16	.08	.04	.06	.06	.32
β_3	.16	.06	.01	.03	.06	.58
β_4	.04	.02	.03	0	.01	.87
β_5	.20	.09	.03	-.58	.29	.05
β_6	-.12	.08	.11	.38	.3	.2
β_7	-.04	.02	.05	.01	.08	.91
R^2		.32			.21	
p_{joint}		0			.03	

Table 1. Estimation results.