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A Complicated Formation of Warm Glow Giving

By Yasuhiro Nakamoto[*]

We examine what lies behind the act of warm glow giving in a laboratory experiment. Making use of the experimental design in Crumpler and Grossman (2008, Journal of Public Economics), we separate the warm glow giving from the altruistic motivation. We find that the contributions generated by the warm glow giving are highly sensitive to the reference contribution, indicating to the complementary relationship between own and the others' contributions. Finally, we make regression to investigate the relationship between demographic attributes and the contribution generated by the warm glow.

Introduction

Since the seminal papers by Andreoni (1988, 1989), the warm glow giving is incorporated into the motivation on voluntary contributions. The act of warm glow giving means that donors receive utility from the act of giving itself, that is, the component of utility arises from the private joy of giving. In that sense, such an individual has a purely egoistic motivation for donating. While the warm glow giving in the impure altruism model was a major step toward an economic understanding of voluntary contributions, the simple incorporation of warm glow giving into utility function allows us not to explain the complicated behavior of individuals. For example, a review of the psychological literature indicates that motivation for voluntarism is a multifaceted phenomenon. The field is highly complex, and related theories are so varied and contradictory that no single conceptual model has received general support (See Anderson and Moore 1978 etc).

Abe et al. (2011) examine the motivation on contributions in Japan where in May 2011, 8420 respondents answered the questionnaire. For instance, the first and sixth motivations are related with moral principles and obligations. Alternatively, the fifth motivation implies conformity. That is, because people want to keep or strengthen their social relationships, they care about others and want to keep up with the donating behavior of others. Importantly, both motives lead to the complementary relationship between own and others' contributions. However, whether the pure or the impure altruism is applied under the standard assumptions of utility function, the relationship between own and others' contributions is substitute. Then, the doubts of simplicity are raised in the basic specification of warm glow giving.

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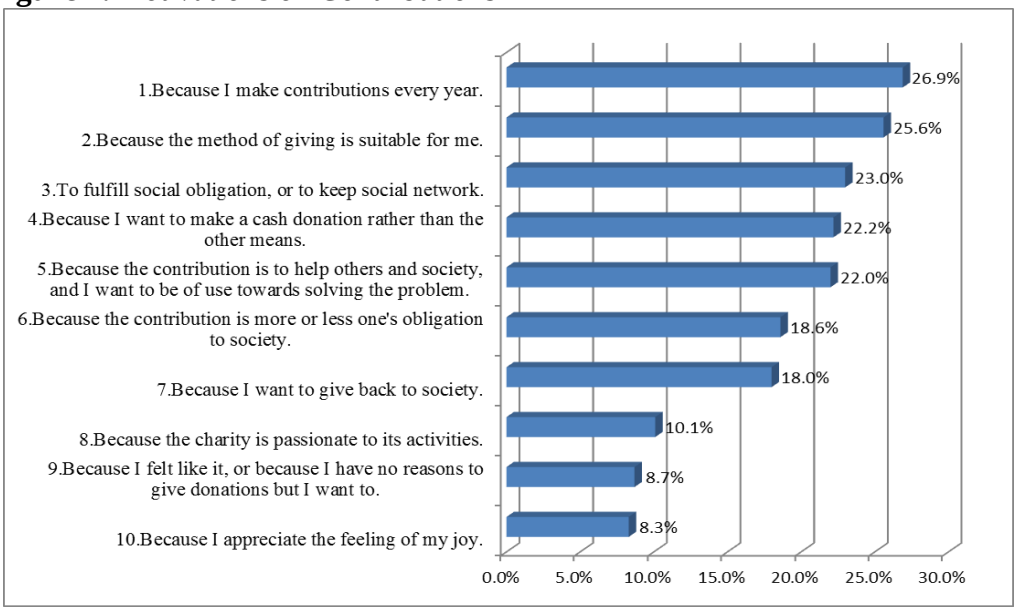
Figure 1. *Motivations on Contributions*



In this paper, using a laboratory experiment, we examine what lies behind the act of warm glow giving. Our main result is that contributions derived by the warm glow giving are highly sensitive to the reference contribution (RC). In particular, we reveal the complementary relationship between own and the others' contributions.

Experimental Design

To examine what lies behind the act of warm glow giving, we performed a two stage experiments. In the first stage we used Crumpler and Grossman (2008) dictator game. In the second stage, we asked participants for an additional contribution based on the rule of the first stage.

We performed our experiment at two large universities, Kyushu Sangyo University (KSU) and Kyushu University (KU) where subjects were chosen from various academic disciplines. Five sessions were conducted on twenty-thirty students; a total of one hundred ten students (fifty-six males and fifty-four females). One session at KSU was composed of thirty students and the remaining four sessions at KU were twenty students where four sessions were conducted separately.

Upon arrival each subject selected an ID number by drawing from a sealed box. They were instructed they could not have any contact with each other. To maintain subject anonymity, each subject was seated individually at a table marked with their ID number and was never informed of the identity of the other subjects. The subjects were given a large packet containing an instructions booklet, a list of charities, one white colored-small paper, four colored-small papers, five envelops, a pencil, and a sealed envelope to be opened at the beginning of the second stage.

At each session, the proctor read the instruction booklet aloud with the subjects following the directions given. No subject was allowed to read ahead maintaining uniformity. The subjects were informed that the charity they choose would receive a set donation amount. After they had chosen their preferred charity from the given list, they wrote their ID number and the charity on the white piece of paper and sealed it in an envelop to be collected by the other proctor.

The First Stage

We used a repeatedly random choice experimental design. Four allocation problems (A, B, C, and D) were presented to the subjects. For each problem they were asked how they would allocate the 2000 yen (self vs. charity). The subjects were informed that after they answered all four problems, the assistant would randomly draw one ball labeled A, B, C, or D from a sealed box, and that the subject's decision for the problem which corresponds to the selected ball would be played out for real. Knowing this procedure of the experiment gave the subjects an incentive to make seriously all choices. For each problem the subjects would write their donation amount on the remaining four pieces of paper, each sealed separately in corresponding envelopes. The envelopes were collected and the proctor continued reading the following question.

Four allocation problems differ in RC and the number of subjects in smaller groups. Twenty or thirty subjects in the same session were divided into smaller groups composed of two, five or ten persons where they did not reassemble into the smaller groups, but kept their original seats to keep anonymity. Alternatively, they were informed that the different levels of RC would be given among the divided groups. The purpose of introducing the smaller groups is mainly to collect a richer set of data based on the limited number of participants. The following instructions were read:

> *'Regardless of the amount of your chosen contributions in each project, your selected charity will receive neither more nor less than the amount of your reference contribution. In other words, if the amount of your contributions is more than the level of your reference contribution, the charity receives total amount of your contributions; instead, the amount contributed by the proctor to your selected charity decreases so that the total amount of contributions is not changed. Alternatively, if your selected contribution is less than the level of reference contribution, the amount the proctor contributes increases. As a result, regardless of the amount of your chosen contributions, the total amount of contribution which your selected charity receives is fixed at the established amount of contributions."*

The above description is almost the same with that in Crumpler and Grossman (2008). Importantly, it allows us to separate the motivation based on

the warm glow from the altruistic motive by increasing the total amount of donation. This is because regardless of subjects' selected donations, the total amount of donations is constant.

The Second Stage

The subjects opened the sealed envelope containing the second stage instruction, a piece of paper and an envelope. The essence of instructions is as follows where a detailed description is given in the Appendix.

In the second stage the subjects were informed that 50 yen was forcibly collected from each subject in addition to the donation given in the first stage (FC), and that one subject chosen by random was given the freedom to decide the amount of own additional donation. In keeping with the rule of the first stage, we assume regardless of the subject's choice, the total contribution is fixed. In other words, the selected charity receives neither more nor less than 50 yen regardless of his/her choice.

To collect data of a richer range, three sessions were conducted as above; however, the remaining two sessions were given different instructions with the forcible repayment (FR). That is, we forcibly return 50 yen to all members in each group except for one person so that the amount of donations decreases.

Supposing that the subjects were one person who could be freely able to choose the amount of their additional donations by the random selection, they decided and wrote down whether they would additionally increase, decrease, or keep the donation amount the same. This information was also sealed in an envelope and collected.

Finally, they were asked to answer gender and pocket money as demographic attributes. In addition, they were to answer questions to ascertain achievement motives; self-fulfillment achievement motive (SAM) and competitive achievement motive (CAM) used in the field of psychology. SAM and CAM may be important factors why people volunteer. SAM is defined as the achievement motive that people aim their goals, implying that it is related to the egoistic motivation because their purpose is to accomplish their targets or goals, not purely helping others. CAM is the achievement motive where people want to be socially evaluated by competing with and winning others (See Benwig (1964)); however, it would be expected that such the motivation is sufficiently excluded in a fully anonymous design. We conducted factor analysis of the questions given in Table 1. The Loading I (II) indicates SAM (CAM) where we finally omit one item because the value of communality was extremely low (0.031) compared with the others.

Table 1. *Factors, Factor Loadings and Items of SAM and CAM*

Item	1. Self-fulfillment achievement motivation	Loading I	Loading II
23	I want to make innovated contribution using my skills.	0.693	-0.035
18	I want to do excellent works which make everyone satisfied.	0.661	0.214
21	I want to work energetically without being restricted by the results.	0.656	-0.289
2	I want to grapple with any problems using my unique attributes.	0.625	0.177
20	I want to have the motivation to reach any goals at any time.	0.619	0.198
24	I will work hard to gain better knowledge in what I am interersted in.	0.612	-0.078
7	It is important to give it your all rather than winning.	0.566	-0.331
22	It is always enjoyable to think about what one does daily.	0.553	-0.038
8	I want to demonstrate my creativity even if the work is predetermined.	0.499	0.191
10	I am excited when I think of my future dreams.	0.472	0.054
6	I want to deepen my knowledge through work experience and education.	0.393	-0.143
9	I want to give my best efforts no matter how hard the challenge may be.	0.372	-0.11
1	I want to do my best in handling my problems.	0.311	-0.216
19	I like to design simple devices.	0.273	0.21
	2. Competitive achievement motivation		
14	I strongly desire a bright and successful future after graduation.	-0.044	0.833
13	I want to surpass others in works.	0.102	0.715
5	It is important to strive for a higher social status.	-0.149	0.712
15	I want to work in a company that is highly regarded by the public.	0.09	0.707
16	Success is to achieve honor or high status.	-0.19	0.612
11	I am pleased when I compete with others and succeed.	-0.157	0.578
4	I strongly desire to be greater than others.	0.114	0.577
12	The reason I have studied and worked so hard is not to be inferior to others.	-0.107	0.532
3	I am distressed when I lose the competitive opponent.	0.338	0.488
17	The present society believes that ones own potential influences success in life.	Omit	

Table 2 shows summary data. At first, there were five sessions and eleven blind groups (the subjects were unaware they were separated into groups). All groups were formed using their ID number where the number of subjects in each group, ten persons, is unified. The differentiating factors among the groups were RC and the male-female ratio. FC and FR refer to forcible contributions and forcible return, and RCs were 400 yen, 800 yen, and 1200 yen.

Table 2. *A Summary in our Experiments where M(F) is Male (Female)*

			First stage						Second stage		
			Rounds: Parameters y (*n*)								
Session	Group	M (F)	A	B	C	D	Ave (Std.)	Ball	FC or FR	UP	DOWN
1	11	5 (5)	800 (10)	800 (2)	800 (5)	400 (10)	566(64.1)	C	FR	0	4
	12	4 (6)	1200 (10)	1200 (2)	1200 (5)	800 (10)	774(89.9)			0	5
	13	7 (3)	800 (10)	1200 (2)	1200 (5)	1200 (10)	875(78.8)			0	3
2	21	6 (4)	800 (5)	400 (10)	800 (2)	800 (10)	580(49.4)	D	FC	4	1
	22	3 (7)	1200 (5)	800 (10)	1200 (2)	1200 (10)	746(86.7)			6	0
3	31	3 (7)	400 (10)	400 (2)	1200 (10)	400 (5)	385(35.8)	B	FR	1	4
	32	3 (7)	400 (10)	800 (2)	1200 (10)	800 (5)	566(50.1)			1	2
4	41	6 (4)	800 (2)	800 (5)	400 (10)	800 (10)	775(61.7)	D	FC	4	0
	42	4 (6)	400 (2)	400 (5)	400 (10)	1200 (10)	600(76.7)			6	0
5	51	7 (3)	400 (10)	800 (10)	800 (5)	800 (2)	397.5(45.5)	D	FC	3	0
	52	8 (2)	1200 (10)	400 (10)	400 (5)	400 (2)	538(59.0)			3	1

Results

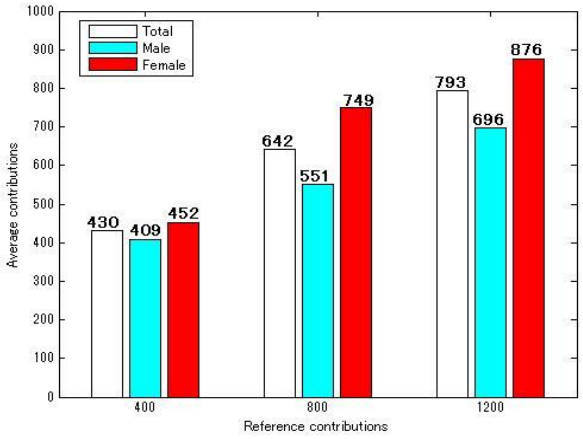
Results of the First Stage

The experimental design of the first stage allowed us to isolate the warm glow giving from the altruistic motive. As a result of the four problems given to each subject, the total data is 440. Figure 2 gives the results of average donations, and Table 3 shows the distribution of contribution according to each level of RC. First, from figure 2 we confirm one of our main results, which is that more RC yields considerably more individual contributions. At 400 yen's RC, the mean amount is 430 yen. At 800 yen's, the average contribution increases by 210 yen, a statistically significant difference (t=-5.19, p=0.00) making use of Welch's test. At 1200 yen's, the average amount of donation furthermore increases by 153 yen, itself a statistically significant increase over 800 yen's RC (t=-2.79, p=0.01). The difference of nearly 360 yen between mean donation at 400 yen's and that at 1200 yen's is, of course, highly significant (t=-6.91, p=0.00). We find it remarkable that the average amount of contributions is clearly increasing in the levels of RC.

Table 3. *Distribution of Contributions under each Level of RC in the First Stage (M=Male)*

	400 Yen		800 Yen		1200 Yen		Total	
Amount	Obs.(M)	%	Obs.(M)	%	Obs.(M)	%	Obs.(M)	%
0	12(12)	0.09	12(12)	0.07	6(6)	0.05	30(30)	0.07
0-200	18(12)	0.12	24(18)	0.14	20(13)	0.15	62(43)	0.14
201-399	12(5)	0.09	6(4)	0.04	8(4)	0.06	26(13)	0.06
400	62(24)	0.44	8(4)	0.05	1(0)	0.01	71(28)	0.16
401-600	18(9)	0.13	18(9)	0.11	22(9)	0.17	58(27)	0.13
601-799	0	0.00	8(0)	0.05	0	0.00	8(0)	0.02
800	2(1)	0.01	64(33)	0.38	3(1)	0.02	69(35)	0.16
801-1000	13(6)	0.09	23(9)	0.14	28(10)	0.22	64(25)	0.15
1001-1199	0	0.00	0	0.00	2(0)	0.02	2(0)	0.00
1200	0	0.00	2(1)	0.01	29(13)	0.22	31(14)	0.07
1201-1400	1(1)	0.01	0	0.00	1(0)	0.01	2(1)	0.00
1401-1600	0	0.00	0	0.00	3(0)	0.02	3(0)	0.01
1601-1800	0	0.00	1(0)	0.01	2(1)	0.02	3(1)	0.01
1801-2000	2(2)	0.01	4(2)	0.02	5(3)	0.04	11(7)	0.03
Total:	140(72)	1.00	170(92)	1.00	130(60)	1.00	440(224)	1.00

Figure 2. *The Average Contributions in the First Stage*

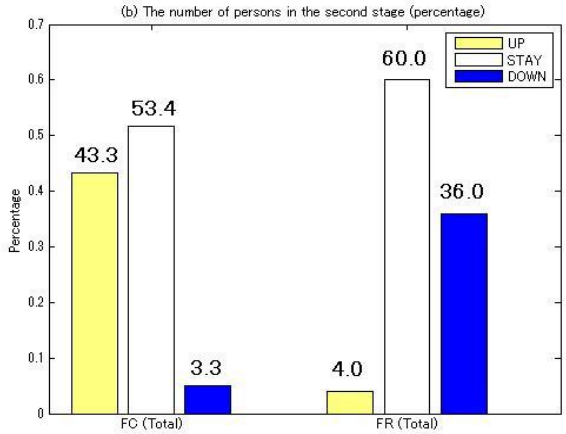


Results of the Second Stage

The second stage corresponds to a comparative static analysis in the sense that after completing the optimal choice, the subjects were asked whether they would additionally contribute to own selected charity by changing the amount of total contributions.

Figure 3 presents the percentage of subjects who chose to additionally increase, decrease, or not change their contributions. Interesting facts are revealed in Figure 3. In FC most subjects (96.7 percent) kept up with the contributions by others (43.3 percent) or did not change the optimum amount of their contribution (53.4 percent). We can conclude that the act of warm glow giving includes other motives which allow us to see the complementary relationship between own and the others' contributions. As seen in the results of FR in Figure 3, we confirm that the above result of FC is significantly supported as subjects (96 percent) opted to decrease (36 percent) or not change (60 percent) the amount of contribution.

Figure 3. *The Results of the Second Stage*



Regression Analysis

We present our regression results where the dependent variable is defined as the amount of individual contributions in the first and second stages. Firstly, because our data in the first stage is observed with two censored observations (zero yen's and 2000 yen's contributions), we execute the tests of normality and homoscedasticity following Cameron and Trivedi (2010, chapter 16) after the Tobit regression with two limits. Although some independent variables have significant impacts on the dependent variables in this model, the assumptions of normality and homoskedasticity are strong rejection (The p-values of both tests below 1 percent).

Therefore, we divide total data in the first stage into three categories: (i) zero contribution (thirty data of ten persons);(ii) full contribution (eleven data of five persons); (iii) the others (three hundred ninety-nine data) where we notice that the identical individuals selected the censored values of contributions at multiple times. Assuming that two parts (i) and (iii) or (ii) and (iii) are independent respectively, we finally omit the forty-one data of (i) and (ii) after some procedures are confirmed. The reason why we omit the censored data is firstly that the number of individuals who select zero or full contribution is few so that some demographic features are extremely biased. For instance, the individuals who selected zero contribution are all males. Next, our focus is to confirm what lies behind the warm glow giving by examining how the amount of own contribution changes according to the change in RC. Hence, even if the censored observations of zero and full contributions are omitted, the main effect would be confirmed.[1]

Table 4 reports the results of OLS regressions where the dependent variable is used as the amount of individuals' contributions in the first and the second stages. First, the variable "RC" has significant effects on the determination of individuals' contributions at the 0.01 level in the columns (1) and (2). As expected, the greater the level of RC, the greater the amount of individuals' contributions. Next, we confirm the negatively significant gender impact in the column (1), meaning that the amount of contributions by females is greater than by males. It would be plausible based on the results of Figure 2. However, in the column (2) we cannot confirm the impact. The column (2) shows that the greater score of SAM leads to the greater amount of individual contributions. It would be reasonable because the persons with high scores of SAM have stronger motives to satisfy or accomplish own purposes through volunteering behavior. In other words, the egoistic persons make more contributions as argued since the pioneer work of Andreoni (1988,1989). The variable "Pocket money" is an amount of money that subjects freely spend, a statistically significant at the 0.01 level. It shows that the richer persons tend to spend money for the contribution. The variable "Part time job" means whether

[1]In fact, we used Heckman selection model; however, it was not adopted. This is because the convergence of regression was not observed unless some independent variables are omitted. If some independent variables were omitted, it was confirmed to accept the null hypothesis that (i) and (iii) or (ii) and (iii) are independent from the likelihood-ratio test, respectively.

subjects participate in a part-time job or not, which has a negatively significant impact. That is, the persons who work contribute less than the others. Intuitively, the persons who work may consider that the experiment is a kind of part time job seriously so that they tend to keep own money.

The remainder variables by ”CAM”, ”Order of questions” and ”Number of subjects in group” do not have significant impacts. Taking account of the variable ”Order of questions”, the repetition of questions in the first stage does not strongly impact the determination of individuals. From the results of ”CAM” and ”Number of subjects in group”, it may be said that in our experiment the motivation on contributions given by the conformity is sufficiently excluded because of the anonymity of our experiment.

Table 4 (3) and (4) present the results of OLS regression when the dependent variable is defined as the answers in the second stage.[1] Only the variable ”FC or FR” has a significant effect, meaning that the additional increase (decrease) in the level of RC makes own contribution increased (decreased). That is, the relationship between own contribution and the others is complementary. Alternatively, the remaining variables do not have significant impacts.[2]

Table 4. *The Results of OLS Regression in the First and the Second Stages*

	(1)	(2)	(3)	(4)
RC	0.418***	0.444***	1.35***	1.43***
	(7.91)	(8.44)	(4.57)	(3.88)
Gender	-88.51***	-28.97	-40.86	-34.81
(0=female,1=male)	(-2.67)	(-0.81)	(-1.39)	(-1.02)
SAM		58.07***		13.94
		(3.21)		(0.82)
CAM		-27.18		10.53
		(-1.59)		(0.65)
Part time job		-180.08***		-31.71
(0=no job, 1=job)		(-4.90)		(-0.93)
Pocket money		6.29***		0.33
		(4.15)		(0.23)
Order of questions		-4.54		
		(-0.32)		
Number of subjects in group		-5.73		-2.86
		(-1.23)		(-0.55)
cons	337.62***	324.84***	43.72**	53.34***
	(7.03)	(4.53)	(2.18)	(3.06)
adj R-square	0.1471	0.2212	0.1663	0.1409

[1]We omitted the data which select zero or full contribution in the first stage. Besides, we confirmed that the rest data does not include the censored observations even if the second stage is considered.

[2]Note that we omit the variable “Order of questions” in table 4(3) and (4) because the repetition of questions was executed in the first stage.

Concluding Remarks

Our goal in this study was to investigate what lies behind the act of warm glow giving in laboratory experiments. We obtained the data by making use of the experimental design in Crumpler and Grossman (2008), which allows us to isolate the warm glow motives from the altruistic motives. Our finding is that the contributions generated by the act of warm glow giving are highly sensitive to RC, indicating to the complementary relationship between own and the others' contributions.

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Appendix: Instructions of the Second Stage (in Japanese)[1]

Now, we are soliciting further contributions in addition to your contributions determined in the first stage. In the second stage, we provide the different explanations for [9] persons and the remaining one person. In the second stage, we forcibly collect 50 yen from [9] persons so that the amount of total donations decreases by [450] yen. The remaining one person can freely select their own contributions. This person is randomly determined later when we draw one ball from the sealed box. In next page, you will obtain a number. If the number of the drawn ball is the same as your number, you are the person who can choose the amount of your contribution. Second, regardless of your choice, your selected charity will obtain neither more nor less than 50 yen. In other words, if your donation is less than 50 yen to your selected charity, the charity receives the total amount of your donation; instead, the amount contributed to your selected charity by the proctor increases so that the total amount of contributions does not change. Alternatively, if your selected

[1]Because the instruction in the first stage is almost the same in Crumpler and Grossman (2008), I omit it.

donation is more than 50 yen, the amount contributed by the proctor to your selected charity decreases.

Now, we forcibly collect the additional contribution of 50 yen. In this case, supposing that you are the person who can freely select your amount of contributions, please circle a method from the following answers.[1] "I additionally make the contribution." "I do not make the additional contribution, but decrease the amount of my contribution determined in the first stage. " "I make neither."

How much is your additional contribution? Please notice that the sum of amounts in the first stage and in the second stage is not over 2000 yen and not below zero yen. If you do not change your amount of contribution, please write 0. After writing your answer, please put the pink-colored paper into the envelope and seal it.

[1]As shown in the above, these numbers are different among participants. Hence, the instructor does not mention this number.