Volunteer Now or Later: The Effects of Effort Time Allocation on Donations (Draft Paper - please do not circulate without permission of the authors)

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Abstract

We study how effort time allocations, where effort is tied directly to charitable contributions, affect donations. Consistent with our theoretical predictions, we find that flexibility in choosing when to allocate effort donations increases overall donations, and decreases the probability to refuse to donate. People who donate through effort show a lower rate of dynamically inconsistent choices compared to monetary giving. The results are consistent with warm glow giving and provide support to the idea that effort donations (i.e., volunteering) differs, in fundamental ways, from monetary charitable donations.

Keywords: Charity Donation, Volunteering, Flexibility, Dynamic Inconsistency, Warm Glow
JEL Classification: D6, C83, C91

1 Introduction

In the last thirty years, economists have made important theoretical as well as empirical contributions to the understanding of charitable donations. In experimental economics, the growth of research in this area has been propelled, in part, by the concerted efforts of John List through the science of philanthropy initiative and by Jim Andreoni (1989[2], 1990[3]), who introduced the theory of "warm-glow." This idea has provided a theoretical framework for testing utility derived from the act of giving. Yet, despite the progress made in understanding monetary donations, it is generally not known the extend to which these findings are transferable to volunteering. Are effort donations fundamentally similar or are they different from monetary donations?

There are a few papers suggesting differential warm-glow effects in effort giving compared to money giving. Lilley and Slonim (2014)[37], for example, developed a theoretical model that illustrates effort donations being more motivated by the warm-glow effect than monetary donations. Brown et al. (2018)[15] found that participants in an experiment preferred donating through effort to donating through earned income, which suggests that individuals' intrinsic warm-glow effect is higher in effort than in money. Further experimental evidence of higher warm-glow effects from effort donations can be found in Tonin and Vlassopoulos (2010)[45] and Imas(2014)[28]).

Although studying the effects of warm-glow seems to be a reasonable start, it is not known the extend to which existing experimental findings about giving money are translated to effort giving. For example, Fosgaard and Soetevent (2018)[25] found substantial amount of time-inconsistent behavior in a charitable donation experiment. The percentage of subjects who were willing to donate money increased from 31% when donation was immediate to 46% when the monetary gift was sent one week later. The authors argued that the social pressure that individuals felt when they were asked to donate money and lack of self-control contributed to time-inconsistent behavior. Other researchers have also looked at commitment as a way to "cure" self-control problem in monetary donation experiments. For example, Andreoni and Serra-Garcia (2017)[5], and Breman (2011)[13] showed that allowing subjects to delay money donations combined with commitment could result in higher overall donations. Nevertheless, it is still not known whether these findings extend to volunteering.

In this paper, we investigate time effort allocations where effort is directly tied to charitable contributions. More specifically, we ask: when people are given the flexibility to decide when to volunteer, do they increase their charitable effort donations? Do people prefer to volunteer sooner or later? Is there evidence of time inconsistent preferences towards volunteering? We explore answers to these questions using data from an online experiment with 542 participants from Amazon Mechanical Turk (MTurk) to participate. Our experiment tested hypotheses derived from a model of inter-temporal volunteering. Our model predicts that both warm-glow altruism and (pure) altruism can impact an individual's decision to volunteer, although individuals who experience warm-glow altruism gain utility from the act of giving, as compared to those who choose to help others improve their social welfare purely out of altruistic motives. In inter-temporal settings like ours, Damgaard and Graver (2017)[22] found that individuals with very high warm-glow utility would donate earlier than later in

order to experience the warm-glow utility immediately, which as a result, might alleviate self-control problem. Consistent with the established empirical findings that warm-glow effects are larger in effort donations than in monetary donations (see Lilley and Slonim (2014)[37]; Brown et al. (2018)[15]), our model also predicts lower dynamic inconsistency in volunteering compared to money giving. Our experimental results confirm this prediction.

Our model also considers the impact of social pressure motives for volunteering. DellaVigna et al. (2012)[23], Castillo et al. (2014)[19], Lacetera et al. (2016)[35], Andreoni et al. (2017)[6], Andreoni and Serra-Garcia (2017)[5] demonstrated that if people were unwilling to donate but asked to, they would felt pressured and thus agree to behave prosocially. Andreoni and Serra-Garcia (2017)[5] showed that social pressure was experienced when the decision of giving was made, regardless of whether the final donation transaction was made or not. In our paper, we follow the assumption that social pressure increases people's likelihood of agreeing to donate if they are asked to. At the moment of making a time effort donation, those who feel pressured to say "yes" to a future donation are likely to change their mind later. Thus, although allowing flexibility increases donations, it *can* also cause greater dynamic inconsistency if taking into account the impact of social pressure. We also incorporate individuals' motive of protecting their self-image (Tonin and Vlassopoulos 2010[45]) into our model: if the costs of reneging are so high that individuals feel guilty about not being able to fulfill the promise to donate in the future, they would be more likely to behave consistently. Data from our experiment suggest that, for our specific experimental setting and subject pool, flexibility increases dynamic inconsistency.

Previous laboratory and field experiments have provided evidence that transaction costs affect donations (see Knowles and Servatka (2015)[33], Rasul and Huck (2010)[42], Damgaard and Graver (2017)[22], Knowles et al. (2018)[34]). Our model also assumes that individuals take into account the transaction costs of volunteering. Furthermore, we assume that transaction costs are independently distributed so that future donations might have higher or lower transaction costs than immediate donations. In our experiment, all individuals participated on two different days, Day 1 (now) and Day 4 (future), and thus they might face different transaction costs on each day. Section 3 describes the experimental design and procedures.

Finally, we used well-established and validated psychological and preference survey questionnaires to measure individual characteristics relevant to personality traits, time preference, and altruism. Existing literature such as Caprara et al. (2012)[18], Yarkoni et al. (2015)[46], Brown and Taylor (2015)[14], Habashi et al. (2016)[27], Pinazo et al. (2016)[40] studied the relationship between the Big Five personality traits (openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism) and prosocial behaviors. They showed that agreeableness and neuroticism were positively correlated with prosocial behaviors. We obtained similar findings: indeed, people who scored higher in agreeableness and neuroticism were more likely to volunteer, which linked to higher rates of effort donations.

The rest of the paper is organized as follows. Section 2 describes our model and the theoretical predictions. Section 3 explains the experimental design and procedures. Section 4 presents the empirical results of the experiment, which is followed by conclusion and discussion in Section 5.

2 The Model

2.1 Setup

We set up a model based on Andreoni's (1989[2], 1990[3]) assumptions of warm-glow giving whereby individuals derive utility from the act of giving. We extend the basic model to effort donations or volunteering as in Lilley and Slonim (2014)[37] and Brown et al. (2018)[15]. In this paper, we are mainly interested in intertemporal allocations of charitable donations as in Andreoni and Serra-Garcia (2017) [5], but in effort giving rather than money giving. Our model also takes into account transaction/opportunity costs of giving as in Rasul and Huck (2010)[42] and Damgaard and Gravert (2017)[22], who showed that transaction/opportunity costs significantly affected charitable giving.

In our model and experiment, individuals faced three decision environments that differed with respect to the time effort allocation directly tied to a charitable donation. That is, individuals are asked to decide to volunteer or not to volunteer for charity. An individual i is said to volunteer when he or she chooses to donate effort to benefit a third party. In our experiment, donating effort refers to answer additional set of survey questions, which is identical for all participants. In the first environment (Group 1 in our experiment), individuals choose between volunteering now or not volunteering. In the second environment (Group 2), individuals choose between volunteering now, volunteering on a future date (i.e., plan to volunteer), or not volunteering. In the third environment (Group 3), individuals choose between volunteering on a future date, or not volunteering.

Let the effort of volunteering for an individual be e_{it}, where t $\in \{now, future\}$. His or her effort cost is $c(e_{it})$ with $c(0) = 0$ and $c(e_{it}) > 0$. There is a transaction/opportunity cost ϵ_{if} of volunteering on the future date, such that $c(e_{if}) = c(e_{in}) + \epsilon_{if}$, where ϵ_{if} can be both positive or negative. In the experiment, if an individual volunteered, the experimenter contributed a fixed amount $\hat{g}$ to a GiveWell.org charity. In our model, we assume individuals have identical Cobb-Douglas preferences, and they receive a fixed amount of endowment W_t in each period. Hence, an individual randomly assigned into the effort donation task or the monetary donation task has consumption utility of $u(x_{it}) = u(W_{it})$ in the former, or has consumption utility of $u(x_{it}) = u(W_{it} - g_{it})$ in the latter, where $g_{it} \in \{0, \hat{g}\}$. Individuals derive utility from seeing or knowing that the charity's beneficiaries are better off. This is represented by an altruism term a(G), where $G = \sum_i g_{it}$. A warm-glow utility term $v(g_{it})$ with $v(0) = 0$ and $v'(g_{it}) > 0$ stands for utility from the act of giving. Based on the empirical results from Lilley and Slonim (2014)[37], Brown et al. (2018)[15], we assume there is a stronger warm-glow effect from effort donation than from monetary donation; that is, $v^e(g_{it}) > v^m(g_{it})$ or $v^e(\hat{g}) > v^m(\hat{g})$. [1]

[1] We discuss monetary donations later in this paper.

2.2 Effort Donation

2.2.1 Group 1

In Group 1, we consider a case where an individual *i* chooses effort donation in the now, but not in the future. So that a rational individual needs to determine whether to volunteer or not to volunteer given the knowledge of her utility. A typical individual's utility function includes her endowment, the effort cost of volunteering, the warm-glow effect that she receives during volunteering, and the social welfare that the beneficiaries will receive. [2] Hence,

- If individual *i* **donates now**, her utility function is:

$$\begin{aligned} u_{G1\,Donate}(e_{in}) =& u(W_{in}) - c(e_{in}) + a(G_{-i} + g_{it}) + v^e(g_{it}) + \delta_i u(W_{if}) \\ =& lnW_{in} - c(e_{in}) + a_{1i} ln(G_{-i} + \hat{g}) + a^e_{2i} ln\hat{g} + \delta_i ln(W_{if}) \end{aligned} \tag{1}$$

  where $a_{1i} \geq 0$ denotes the weight for pure altruism, and $a^e_{2i} \geq 0$ denotes the weight for warm-glow.

- If individual *i* **refuses to donate now**, his/her utility is:

$$u_{G1\,Not\,Donate}(0) = lnW_{in} + a_{1i} ln(G_{-i}) + \delta_i ln(W_{if}) + r_i \tag{2}$$

  where $r_i \leq 0$ denotes the utility of refusal in consideration of the social pressure. We assume this is constant in both time periods (now and future).

Therefore, an individual *i* **chooses to donate now** if:

$$\begin{aligned} & u_{G1\,Donate}(e_{in}) \geq u_{G1\,Not\,Donate}(0) \\ \leftrightarrow\ & lnW_{in} - c(e_{in}) + a_{1i} ln(G_{-i}+\hat{g}) + a^e_{2i} ln\hat{g} + \delta_i ln(W_{if}) \geq lnW_{in} + a_{1i} ln(G_{-i}) + \delta_i ln(W_{if}) + r_i \\ & ln[(\frac{G_{-i} + \hat{g}}{G_{-i}})^{a_{1i}}\, \hat{g}^{a^e_{2i}}] \geq c(e_{in}) + r_i \end{aligned} \tag{3}$$

2.2.2 Group 3

In Group 3, we consider a case where an individual *i* chooses now between volunteering in the future or not to volunteer. When the future session arrives, she faces the choices between confirming her effort donation choice made in the past, or reneging on her promise to volunteer.

[2] In some previous literature, such as O'Donoghue and Rabin (2001) use sophistication assumption to describe individuals' time preferences, whereby individuals are partially sophisticated with respect to their future present bias. That is, $\hat{\beta} \in (\beta, 1]$, where $\hat{\beta} = \beta$ represents fully sophisticated people, and $\hat{\beta} = 1$ represents full naiveté. In this paper, we include the discount factor δ instead of $\beta\delta$ in this model since we will not cover present bias and choices are made in two periods only. However, our model could include the β δ model as present bias measures.

- If individual *i* **plans to donate now and confirms donation in the future**, his/her utility is:

$$\begin{aligned} u_{G3\,Confirm}(e_{if}) =& u(W_{in}) + \delta_i[v^e(\hat{g}) - c(e_{if}) + a(G_{-i} + \hat{g}) + u(W_{if})] \\ =& lnW_{in} + \delta_i[a^e_{2i} ln\hat{g} - c(e_{if}) + a_{1i} ln(G_{-i} + \hat{g}) + ln(W_{if})] \end{aligned} \tag{4}$$

- If individual *i* **directly refuses to donate now**, his/her utility is:

$$u_{G3\,Not\,Donate}(0) = lnW_{in} + \delta_i[a_{1i} ln(G_{-i}) + ln(W_{if})] + r_i \tag{5}$$

We follow Andreoni and Serra-Garcia (2017)[5]'s assumption in social pressure. That is, social pressure is experienced only at the moment of making decision, while utility from utility is experienced at the moment of volunteering. In addition, we assume an individual will experience disutility at the moment of reneging. So that:

- If individual *i* **plans to donate now, but reneges in the future**, his/her utility is:

$$u_{G3\,Renege}(0, L_i) = lnW_{in} + \delta_i[a_{1i} ln(G_{-i}) + ln(W_{if}) + L_i] \tag{6}$$

where L_i is utility of reneging, with $L_i \leq 0$

Therefore, an individual *i* in Group 3 **prefers to confirm donation rather than renege on the future date** if:

$$\begin{aligned} & u_{G3\,Confirm}(e_{if}) \geq u_{G3\,Renege}(0, L_i) \\ \leftrightarrow\ & [a^e_{2i} ln\hat{g} - c(e_{if}) + a_{1i} ln(G_{-i} + \hat{g}) + ln(W_{if})] \geq [a_{1i} ln(G_{-i}) + ln(W_{if}) + L_i] \\ & ln[(\frac{G_{-i} + \hat{g}}{G_{-i}})^{a_{1i}}\, \hat{g}^{a^e_{2i}}] \geq c(e_{if}) + L_i \end{aligned} \tag{7}$$

Given that $c(e_{if})$ and L_i are the only two unknowns for individual *i* during the now session, we assume $c(e_{if}) = c(e_{in}) + \epsilon_{if}$, and set $L_i \sim U[-l, 0]$ and $\epsilon_i \sim U[-e, e]$. Let's assume the two unknowns' PDF are: $f(\epsilon_i)$, $f(L_i)$, and their CDF are: $F(\epsilon_i)$, $F(L_i)$, and they are continuous and strictly increasing over the their assumed domains. According to equation (4), let's say $\gamma_i = ln[(\frac{G_{-i}+\hat{g}}{G_{-i}})^{a_{1i}}\, \hat{g}^{a^e_{2i}}] - c(e_{in})$. by which we can derive the prior choice (confirm or renege) in the future (at now) by comparing expected $\epsilon_i + L_i$ and γ_i. That is, if expected $\epsilon_i + L_i \leq \gamma_i$ then individual's prior is to confirm. However, if expected $\epsilon_i + L_i \geq \gamma_i$ then this individual's prior is to renege. Notice that the prior is independent of the discounting factor δ_i. We discuss the prior probability of reneging or confirming as well as their ranges for ϵ_i and L_i accordingly in Appendix 6.1.1. Therefore, after knowing one's own prior probability of reneging (we call it M_i) an individual *i* **prefers plan to donate in the future to directly refuse to donate now** if:

$$\begin{aligned} & Eu_{G3\,Plan}(e_{if}) \geq u_{G3\,Not\,Donate}(0) \\ \leftrightarrow\ & E[Pr(Renege_i)]\ u_{G3\,Renege}(0, L_i) + E[Pr(Confirm_i)]\ u_{G3\,Confirm}(e_{if}) \geq u_{G3\,Not\,Donate}(0) \\ & ln[(\frac{G_{-i} + \hat{g}}{G_{-i}})^{a_{1i}}\, \hat{g}^{a^e_{2i}}] \geq \frac{\frac{r_i}{\delta_i} - M_i L_i}{1 - M_i} + c(e_{if}) \end{aligned} \tag{8}$$

In summary, an individual who prefers to volunteer in the future or "plans to donate" rather than directly refuse to volunteer now needs equation (8) to be satisfied, given his or her prior belief on the probability of reneging in the future. On the contrary, if equation (8) is not satisfied, this individual prefers directly refuse to donate effort now. When the future arrives, if equation (7) is satisfied for this individual, she will confirm her effort donation. Otherwise, she will renege on her promise when the future arrives.

2.2.3 Group 2

In Group 2, we consider a case where an individual *i* can choose among three options: donate now, donate on a future date, or directly refuse to donate. When the future date arrives, she has the choice to confirm her promised donation or renege on her promise.

Therefore, for the future session, we apply the same method as that in Group3. That is, for an individual *i* who **plans to donate and confirms donation in the future**, her utility is the same as that in equation (7), and equation (8) needs to be satisfied. However, for an individual *i* who **plans to donate but reneges in the future**, his or her utility is the same as that in equation (6), and the opposite of equation (7) needs to be satisfied.

- For the now session decision, an individual *i* who prefers to **donate now** to "plan to donate" on the future date or "directly refuse to donate" requires the utility of donating now larger than the other two options:

$$(i)\ ln[(\frac{G_{-i}+\hat{g}}{G_{-i}})^{a_{1i}}\,\hat{g}^{a^e_{2i}}] \ \geq\ \frac{1}{1-\delta_i+\delta_i M_i}[\delta_i(M_i-1)\epsilon_{if}+\delta_i M_i L_i+(1-\delta_i+\delta_i M_i)c(e_{in}) + (\delta_i-1)a_{1i}lnG_{-i}] \quad (A) \tag{9}$$

$$(ii)\ ln[(\frac{G_{-i}+\hat{g}}{G_{-i}})^{a_{1i}}\,\hat{g}^{a^e_{2i}}] \ \geq\ c(e_{in})+r_i \quad (C) \tag{10}$$

- However, if this individual prefers **plan to donate in the future date** than the other two options, the following equations need to be satisfied:

$$(i)\ ln[(\frac{G_{-i}+\hat{g}}{G_{-i}})^{a_{1i}}\,\hat{g}^{a^e_{2i}}] \ \leq\ \frac{1}{1-\delta_i+\delta_i M_i}[\delta_i(M_i-1)\epsilon_{if}+\delta_i M_i L_i+(1-\delta_i+\delta_i M_i)c(e_{in}) + (\delta_i-1)a_{1i}lnG_{-i}] \quad (A) \tag{11}$$

$$(ii)\ ln[(\frac{G_{-i}+\hat{g}}{G_{-i}})^{a_{1i}}\,\hat{g}^{a^e_{2i}}] \ \geq\ \frac{\frac{r_i}{\delta_i}-M_i L_i}{1-M_i}+c(e_{in})+\epsilon_{if} \quad (B) \tag{12}$$

- Further, if this individual prefers **directly refuse to donate now** than the other two options, the following equations need to be satisfied:

$$(i)\ ln[(\frac{G_{-i}+\hat{g}}{G_{-i}})^{a_{1i}}\,\hat{g}^{a^e_{2i}}] \ \leq\ \frac{\frac{r_i}{\delta_i}-M_i L_i}{1-M_i}+c(e_{in})+\epsilon_{if} \quad (B) \tag{13}$$

$$(ii)\ ln[(\frac{G_{-i}+\hat{g}}{G_{-i}})^{a_{1i}}\,\hat{g}^{a^e_{2i}}] \ \leq\ c(e_{in})+r_i \quad (C) \tag{14}$$

Finally, when the future date arrives, an individual *i* who prefers **confirm donation to renege** needs:

$$\begin{aligned} u_{G2\,Confirm\,donation}(e_{if}) &\geq u_{G2\,renege}(0, L_i) \\ ln[(\frac{G_{-i}+\hat{g}}{G_{-i}})^{a_{1i}}\,\hat{g}^{a^e_{2i}}] &\geq c(e_{if}) + L_i \qquad (D) \end{aligned} \tag{15}$$

Notice that all the LHS of above equations have exactly the same value. We set their values equal to λ_i. We also set the RHS of equation (9) and equation (11) to be A; the RHS of equation (12) and equation (13) (i) be B; the RHS of equation (10) and equation (14) be C; and the RHS of equation (15) to be D. Therefore, we use three critical values A, B, C to determine the choices in the now session, where A and C determine the relationships in equations (9) and (10), A and B determine the relationships in equations (11) and (12), and B and C determine the relationships in equations (13) and (14). Hence, the only three possible relationships between A, B, and C that are feasible are: (i) $A > C > B$ (ii) $A > B > C$ (iii) $C > A > B$. In Appendix 6.1.2, we prove that only the relationship of $A > C > B$ exists. In addition, we call the discounted value of D as D', which equals $\delta_i[c(e_{if}) + L_i]$, so that we can compare D' with the values of A, B, C to determine the final donation and renege decisions.

In summary, the model predicts the following hypotheses: in Group 1, an individual *i* donates effort now when donate when $\lambda_i \geq C$. In Group 3, an individual *i* plans to donate in the future date when $\lambda_i \geq B$, and if $\lambda_i \geq D'$ is satisfied, she will confirm donation when the future arrives. In Group 2, an individual *i* donates effort now when $\lambda_i \geq A$, plans to donate in the future date when $A \geq \lambda_i \geq B$, and if $\lambda_i \geq D'$ is satisfied, he or she will confirm donation when the future arrives. Consistent with the findings in Damgaard and Gravert (2017)[22], our model predicts individuals with large enough warm-glow effect and altruism prefer to donate now rather than wait for the future.

2.3 Theoretical Predictions

2.3.1 Donation Preferences

Hypothesis 1: Flexibility can increase the overall rate of donation (G2 $\geq$ G3).

Flexibility with respect to the ability to decide when to donate time or effort is different across our three groups. Group 2 has the highest flexibility and Group 1 the lowest. The above analysis shows that the relationship between B and D' in all groups determines the overall decision to donate (i.e., donate now as well as planned donations that are confirmed in the future). According to our model, through the relative values of B and D', we can predict which decision environments or experimental groups would result in higher overall level of donations. The three cases are:

$$\begin{cases} (1) \text{ If } C \geq B \geq D', \text{then Group 2} = \text{Group 3} \geq \text{Group 1} (\text{in this case everyone donates}); \\ (2) \text{ If } C \geq D' \geq B, \text{then Group 2} = \text{Group 3} \geq \text{Group 1}; \\ (3) \text{ If } D' \geq C \geq B, \text{then Group 1} \geq \text{Group 2} \geq \text{Group 3. Where Group 2} > \text{Group 3 only if } D' > A. \end{cases}$$

To see the model predictions, we depict the critical values, A, B, C and D' on a line as shown in the figure below. The figure is for case (1), when $C \geq B \geq D'$. In this case, the model predicts G2 donation = G3 donation $\geq$ G1 donation.

Case(1): When $C \geq B \geq D'$, G2 donation = G3 donation $\geq$ G1 donation.

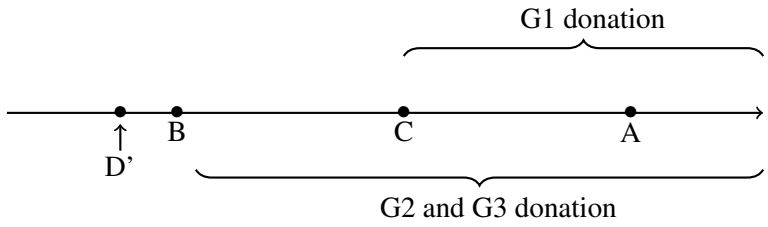


Figure 6.3 in the Appendix presents the all the cases; including when $C \geq D' \geq B$, G2 donation = G3 donation $\geq$ G1 donation, and when $D' \geq C \geq B$, G1 donation $\geq$ G2 donation $\geq$ G3 donation (happens when $L_i + \epsilon_{if} \geq 0$) $\rightarrow$ expected future transaction costs are high.

To summarize, the model predicts the groups' overall level donation always have the following relationships: Group 1 $\leq$ Group 2 and Group 3, except when the actual renege cost on the future date is low enough or/and actual transaction cost on the future date is high enough which makes Group 1 $\geq$ Group 2 $\geq$ Group 3. Figure 6.3 presents the above three cases.

Hypothesis 2: Flexibility can decrease the rate of directly refuse to donate now (G1 $\geq$ G2, G3).

From the above analysis, we illustrate that individuals in Group 1 who prefer directly refuse to donate now are those who have $\lambda_i \leq C$. However, individuals in Group 2 and Group 3 who prefer this choice are those whose $\lambda_i \leq B$. Therefore, we predict refusal to donate in the now in Group 1 to be at least as high as for Groups 2

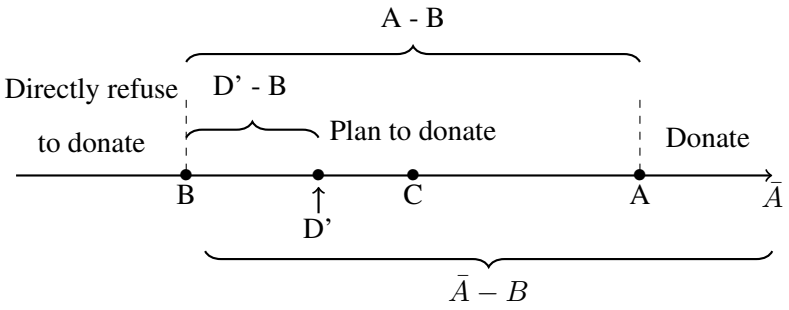
and 3; that is, Group 2 $\leq$ Group 1 and Group 3 $\leq$ Group 1. Figure 6.3 depicts graphically the above three cases.

2.3.2 Dynamic Inconsistency and Volunteering

Hypothesis 3: Flexibility can increase the rate of dynamic inconsistency (G2 $\geq$ G3).

Based on our model, when $D' \leq B$, all plan to donate individuals confirm donation in the future date, in this case Group 2 and Group 3 have zero dynamic inconsistency rate. However, when $D' \geq B$, individuals who choose to renege in Group 2 are those whose λ_i falls between B and D'. The figure below shows this on a line. Recall that it is always the case that $A \geq C \geq B$. However, D' can fall anywhere between the three critical values. Let $\bar{A}$ be the maximum value of A. Dynamic inconsistency can happen when $D' \geq B$.

Dynamic inconsistency: When $D' \geq B$



The rate of dynamic inconsistency for Group 2 equals to $\frac{D' - B}{A - B}$. This fraction represents the ration between those who refuse to confirm their donations as a fraction of the planned donations. Similarly, the rate of dynamic inconsistency in Group 3 equals to $\frac{D' - B}{\bar{A} - B}$, where $\bar{A}$ is the maximum value of A. Hence, we predict rate of dynamic inconsistency has: Group 2 $\geq$ Group 3.

Hypothesis 4: Donation rates and the rate of dynamic inconsistency are higher in effort giving than in money giving.

We set up individual's decision task in money giving following the way that we established our model in effort giving. Let's assume the transaction cost for effort donation and monetary donation are the same for an individual *i*: $\epsilon_e = \epsilon_m = \epsilon_{if}$, where ϵ_e is transaction cost for effort donation, and ϵ_m is transaction cost for monetary donation. Similarly, we call the critical values in effort donation as A_e, B_e, C_e, D_e, and D'_e, while the critical value in monetary donation as A_m, B_m, C_m, D_m, and D'_m. For money giving, we write $u(w - \hat{g}) = u(w) - c(\hat{g})$. After solving individual's problem for monetary donation, we can compare critical values between the two types of donations.

Given that warm-glow effect is higher in volunteering treatment than in monetary treatment, we have $a^e_{2i} \geq a^m_{2i}$, so that we can derive $M^m_i \geq M^e_i$. We predict the donation rate in the volunteering is higher than that in monetary donation, which can be explained from the higher warm glow effect in effort donations. In

addition, we predict the renege rate in volunteering is higher than that in monetary donation only when a^e_{2i} is large enough and the difference between D'_m and B_m is large enough. In Appendix 6.1.3 the proof is presented in detail.

2.3.3 Altruism and Personality

Hypothesis 5: More altruism yields more overall donations. However, the renege rate in Group 3 decreases, whereas it increases in Group 2.

When altruism level increases, A decreases, $\bar{A}$ increases, while B and D' are unchanged. That is, the part of participants who plan to donate in Group 2 decreases, while this part increases in Group 3. See Figure 6.3 in the Appendix.

Hypothesis 6: Higher levels of agreeableness and neuroticism are linked to higher effort donations.

Based on previous works that relate the Big Five personality trait test to pro-social behaviors (see Caprara et al. (2012)[18], Yarkoni et al. (2015)[46], Brown and Taylor (2015)[14], Habashi et al. (2016)[27], Pinazo et al. (2016)[40]) we hypothesize that agreeableness and neuroticism relate to effort donations. Agreeableness includes a pro-social and communal orientation to others. It includes traits such as altruism, tender-mindedness, trust, and modesty. We expect this trait to be positively correlated with overall effort donations. While neuroticism measures emotional stability and even-temperedness, such as feeling anxious, nervous, sad, and tense. Research shows neuroticism is highly correlated with brain areas that related to donation Pinazo et al. (2016)[40]. We don't expect openness and extraversion to affect donations. [3]

However, conscientiousness may be negatively related to the rate of time inconsistent behavior. Conscientiousness describes socially prescribed impulse control that facilitates task- and goal-directed behavior, such as thinking before acting, delaying gratification, following norms and rules, and planning, organizing, and prioritizing tasks. In the context of effort giving, those who don't want to donate will not choose to plan to donate and will refuse right away, reducing the renege rate.

[3]Definitions in John and Srivastava (1999)[31]: Openness: describes the breadth, depth and complexity of an individual's mental and experiential life. Extraversion: implies an energetic approach toward the social and material world, including traits such as sociability, activity, assertiveness, and positive emotionality.

3 Experimental Design and Procedures

3.1 Description of the Study

The experiment consisted of three treatment groups that differed with respect to their time effort allocation options. Subjects were assigned to one of the three treatment groups. Those assigned to Group 1 were given the option to answer additional questions for charity now or not answer any additional questions. Those assigned to Group 2 were given the options to answer additional questions for charity now, in three days, or not to answer any additional questions for charity. Finally, those assigned to Group 3 could choose whether to answer additional questions for charity in three days or not to answer any additional questions. To compare effort donations to money donations, we added an additional treatment similar to Group 3, but with money giving (not effort giving). At the end of the experiment, subjects were asked to explain their decisions as well as their general attitudes towards volunteering and donating to charities (see Table 1).

TABLE 1: TREATMENTS

	Time Periods	
	Now choices	Future choices (if "plan to volunteer")
Group 1	Volunteer *or* Not Volunteer	
Group 2	Volunteer *or* Plan to volunteer *or* Not volunteer	Confirm volunteering *or* Renege
Group 3	Plan to volunteer *or* Not volunteer	Confirm volunteering *or* Renege
Group 3m	Plan to donate money *or* Not donate	Confirm donation *or* Renege

The experiment was conducted online via SurveyMonkey and it consisted of two surveys implemented on Day 1 and on Day 4. Each survey took participants approximately 15 minutes to complete. On Day 1, subjects gave online consent to participate in this study. Recruited subjects answered a questionnaire and provided information on their demographics (e.g., age, gender, ethnicity, and religion), and behavioral tendencies such as exercise, smoking, and drinking habits. A set of relevant quizzes and surveys were given afterwards including quizzes to measure IQ (Grosswirth & Salny, 1983)[26], a quantitative time preference survey (Falk et al., 2016)[24], and the Locus of Control scale (Rotter 1966)[43]. At the end of these questionnaires, all the subjects

were directed to the donation decision on the Day 1 survey and asked whether they would be willing to answer additional set of questions for charity – the "volunteer survey" for a GiveWell charity[4]. The "volunteer survey" questions were taken from Falk et al.'s (2016)[24] time quantitative survey, which consists of 25 multiple-choice questions and usually takes 4 minutes to complete. In the money giving treatment, which mirrowed Group 3, participants were given an bonus of $2 for completing the Day 1 to be paid after completing the Day4 survey. They were later given an option on Day 1 to donate $1 to GiveWell.org in the future; that is, on Day 4.

All the subjects were required to participate in the Day 4 survey and answer a set of follow-up questions. These follow-up questions included the Big Five Inventory questionnaire to assess individual personality characteristics (BFI, John & Srivastava, 1999 [31]), and qualitative and quantitative preference-surveys to measure participants' altruism as well as a qualitative survey to measure their time preference (Falk et al., 2016 [24]). If on Day 1, the subjects chose to answer the "volunteer survey" in three days to benefit a GiveWell charity, then on Day 4, they were given the option of either confirming their choice made three days ago or changing their choice. If they chose to confirm, they were directed to the "volunteer survey", but if they changed their mind, they could skip the "volunteer survey" and proceed to the end of the Day 4 follow-up survey part. In the money giving treatment, those who said they would donate on Day 4 were also asked to confirm their donation of $1 or "not donate."

All participants were informed that they would receive a $2 participation fee for completing the survey on each day and, if they finished both surveys, they would be paid a total of $4 upon completion of the follow-up survey on Day 4.[5]. Immediately after we reviewed and approved their work, they received the payment via MTurk. In addition, the subjects were also informed that they would not be paid for answering the "volunteer survey"; however, if they answered the "volunteer survey", we would contribute $2 to one of their designated GiveWell.org charities: Against Malaria Foundation, Schistosomiasis Control Initiative, and Deworm the World Initiative. To check if participants overestimated or underestimated the time that will take them to complete the survey, we designed a "Day 1 only" treatment with 31 Mturk workers. In the "Day 1 only" treatment, we asked two important questions: "How long (in minutes) do you anticipate it will take you to complete the additional questions to benefit a GiveWell charity?" and "in monetary terms, how much do you think completing the additional questions will cost you (in cents)?" The participants anticipated that completing the "volunteer survey" would take them 6.87 minutes on average (S.D. 4.15). This estimate was statistically the same as how long it took them to complete the "volunteer survey" and it is about half the time it took them to complete the survey on Day 1.[6] The median estimated monetary cost of volunteering was 101 cents. This result also guided

[4]GiveWell.org (http://www.givewell.org/charities/top-charities) is an organization centralizing donations to charities that work to alleviate poverty around the world. According to research, there are three charities that are most in need: Against Malaria Foundation, Schistosomiasis Control Initiative, and Deworm the World Initiative. These are evidence-backed, thoroughly vetted, and underfunded organizations which are shown to be effective programs to alleviate poverty in developing countries.

[5]In the money giving treatment, participants were given a $2 bonus to be paid after completing the Day 4 survey

[6]If we exclude the demographic and personality questions, the estimated time is very close to how long it took them to complete the

us to design the money treatment with a $1 donation.

3.1.1 Subject pool

We recruited a total of 600 participants (542 participants in effort donation treatment, 58 in monetary donation treatment) via Amazon Mechanical Turk (MTurk). MTurk is an internet marketplace to access thousands of worldwide survey takers (workers) to perform requested tasks. Participants were all residents of the United States with qualification scores > 80%. A total of 542 (280 males and 262 females) workers participated in the effort donation treatments. They were between 20 and 73 years old with an average age of 39.13 (S.D. 10.82). About 80% of the participants were white and two thirds had some college or graduate school education.

On Day 1, we simultaneously released tasks called Human Intelligence Tasks or HITs for Group 1, Group 2 and Group 3. We released 142, 259, and 198 HITs for Groups 1, 2, and 3, respectively. We released 72 HIT for the money treatment. A larger number of HITs for Groups 2 and 3 provided us with enough power to study renege rates and dynamic inconsistency. The tasks directed participants to one of three different surveys. If a participant accepted a HIT, she instantaneously became the subject of one of the three treatment groups. On Day 4, we emailed participants via MTurk and notified them to complete the follow-up HITs that correctly linked them to the proper surveys based on their group and based on the choices they had made on Day 1. Of the 542 subjects who completed both surveys, 135 subjects (71 males and 64 females) were in Group 1, 229 subjects (116 males and 113 females) were in Group 2, and 178 subjects (85 males and 93 females) were in Group 3. Attrition was very low in our experiment. In total 90.48% of subjects returned to complete the experiment on Day 4 (95.07%, 88.42%, 89.90% in Groups 1, 2, and 3, respectively). The money treatment included 38 females and 19 males and had a completion rate of 80.56%

Existing literature emphasizes the importance of recruiting reputable MTurk workers with high approval rates so that they complete the tasks with care (for example, see Arechar et al. 2018[7] and Peer et al. 2014[41] for a discussion of approval rates). In our study, approval rate for all HITs was >80% and the vast majority of our subjects had high reputation with at least 90% approval rate. To check whether MTurk workers responded to our tasks carefully and accurately, we asked all of our participants to answer the time quantitative survey twice. We tested their decisions and found that the choices were consistent (p = 0.364).

Our experimental design differs from Andreoni and Serra-Garcia's (2017)[5] (henceforth ASG) in several important ways. First we used MTurk workers whereas ASG used student subjects. Our participants answered the follow-up survey on Day 4. In ASG undergraduates completed the follow-up survey exactly one week later, to the hour, irrespective of their decisions. Their subjects were paid a $15 participation fee immediately upon completing each of the laboratory sessions on week 1 (now) and week 2 (future). In ASG, subjects saw identical 5-minute presentations about a charity called GiveDirectly and then were asked if they would give

survey on Day 1. It is not surprising that their estimates are accurate. MTurk workers are careful about keeping track of the time it takes them to complete HITs. The opportunity cost of their time is not completing an alternative survey.

$5 of their participation fee to the charity. Related to our design, they implemented the following treatments: Decide Now to Give Now (NN) treatment, and Decide Now to Give Later (NL) treatment. Their subjects were notified via email the day before the week 2 experimental session to come to the laboratory and complete the follow-up survey. The completion rates were 92.2 % in the NN and 88.5 % in the NL treatments, respectively.

3.2 Psychological and Preference Survey Questionnaires

Recently, a great amount of behavioral and experimental economics literature has shown that personality traits play a significant role in explaining individual choices and behaviors (see for example, Jiang and Capra 2018[30]; Capra, Jiang, Engelmann, and Berns 2013[17]; Borghans et al. 2009[12]; Almlund et al. 2011)[1]. In this study, we used a brief version of the Big Five personality scale – the Big Five Inventory (BFI) consisting of 44 short questions (John and Srivastava 1999 [31]). The original Big Five model (Costa and McCrae 1992[21]) assesses the following five personality traits: openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism, and it contains 240 questions. We adopted the brief version because it took participants less time to complete the surveys online and yet, it provided reliable and consistent measures of the "big five" personality traits as in the original scale. BFI provides 44 statements and asks to what extent each statements apply to the responders: disagree strongly, disagree a little, neither agree nor disagree, agree a little, and agree strongly.[7]

To provide validated measures of individual time and social preferences, we carefully selected a series of questions from Falk et al.'s (2016)[24] preference survey module, which has shown to be the best predictors of economic preferences elicited in incentivized choice experiments. In our study, we used the time-quantitative questionnaire, time-qualitative questionnaire, altruism-quantitative questionnaire, and altruism-qualitative questionnaire, which contains 25, 36, 3, and 19 questions/paired choices, respectively.

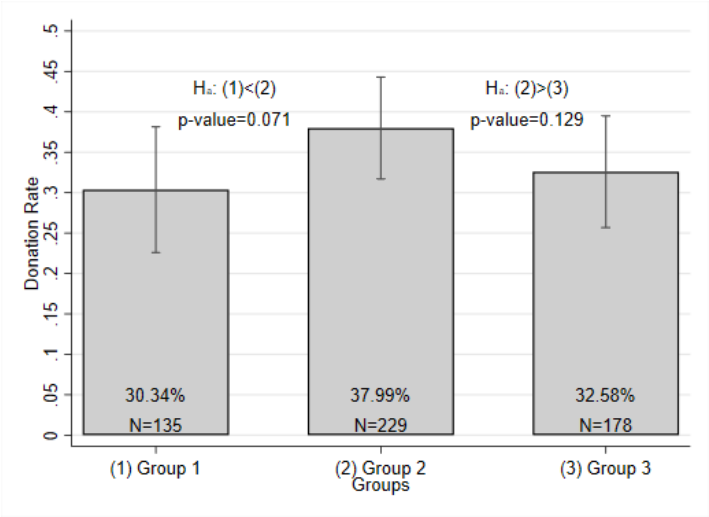
[7]We also measured locus of control, which we have not used in the analysis for this paper. Locus of control is an important aspect of personality originally developed by Rotter (1966)[43]. It measures the degree to which people believe they have control over the situations and experiences that affect their lives, as opposed to external forces beyond their control. We used the original Rotter (1966)[43]'s 29-item questionnaire, with each item consisting of a pair of alternatives that allows the responders to select the one they actually believe to be more true than the other. For instance, choose between (a) I have often found that what is going to happen will happen, and (b) Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.

4 Results

4.1 H1: Flexibility in time effort allocations increases the donation, G2 $\geq$ G3.

Comparing overall donation rates across groups, we find that there statistically significant differences between Group 1 and Group 2 (χ^2 = 2.16, p = 0.071). However, there are not differences between the low flexibility group, Group 1 and Group 3 (χ^2 = 0.17, p = 0.340). According to our discussion in section 2.3.1 and Figure 6.3, we find the critical value D' is between critical value B and C on average, and it is closer to C according to our data (since Group 3 donation should be larger than Group 1 donation if D' is between B and C as predicted, but we do not find statistically significant result). The results also prove our hypothesis of Group 2 donation rate larger or equal to that in Group 3 donation rate cannot be rejected (Ha: (2) < (3), χ^2 = 2.16, p = 0.869). Hence, we can illustrate our findings as flexibility in time effort allocations increase the overall donation rate.

FIGURE 1: FLEXIBILITY INCREASES DONATION

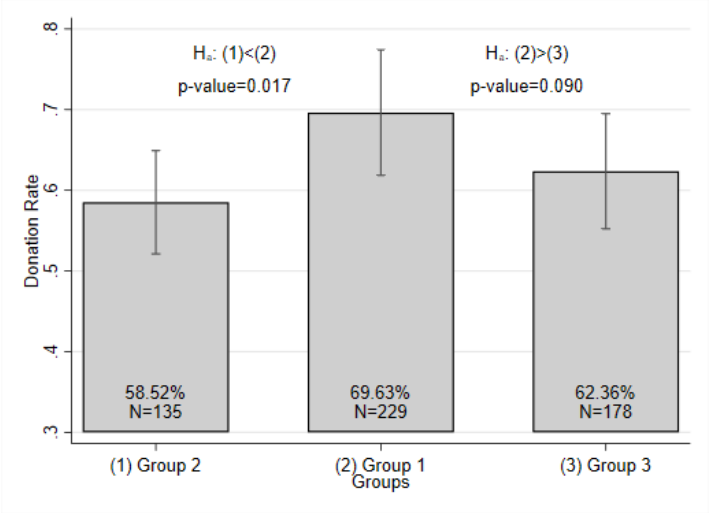


We also looked at the existence of heterogeneous effects. Consistent with Breman (2011)[13], we found differences between men and women in how they respond to flexibility in choices. Men, on average, had higher donations in G3 compared to G1 (χ^2 = 2.54, p = 0.055). Men's donations were also higher in G2 compared to G1 (χ^2 = 3.53, p = 0.030). In contrast, women did not respond much to flexibility See Figure 6.4 in the Appendix. Interestingly, 43.33% of women donate whereas only 25.37% of men donate.

4.2 H2: Flexibility can decrease the rate of directly refuse to donate now (G2, G3 $\leq$ G1).

Individuals in all groups can directly refuse to donate on Day 1. We predict that when individuals have an option to postpone their refusal, they would take that option thus reducing refusal rates on Day 1. The results of the experiment show that the refusal rate in Group 1 is higher than that in treatment Group 3 (χ^2 = 1.80, p = 0.090), and also higher than that in the high flexibility treatment, Group 2, (χ^2 = 4.48, p = 0.017).

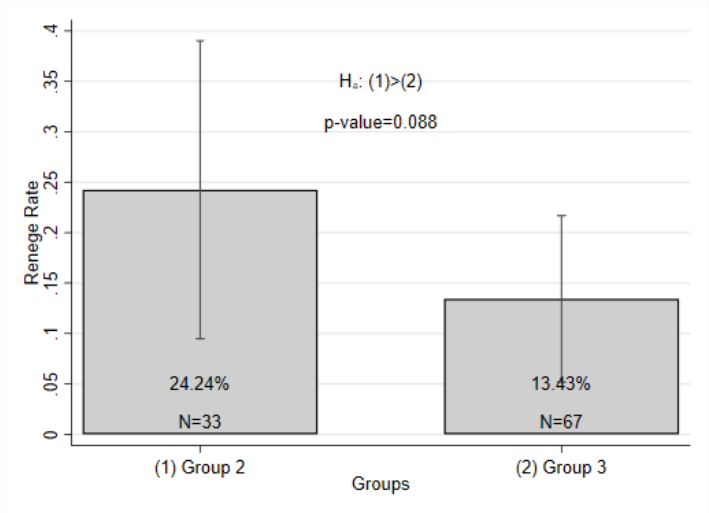
FIGURE 2: FLEXIBILITY DECREASES DIRECT REFUSAL RATES



4.3 H3: Flexibility can increase the rate of dynamic inconsistency (G2 $\geq$ G3).

As predicted, the results show that renege rate in Group 2 is 24.24%, which is statistically higher than the renege rate in Group of 13.43% (χ^2 = 1.83, p = 0.088). An explanation for this phenomenon is that those who are highly motivated by warm glow will donate on Day 1 rather than wait until Day 4 in Group 2 to experience the warm glow effect. That is, they prefer to experience warm-glow immediately. In our model this happens when $\lambda > A$. The results are consistent with the findings in Damgaard and Graver (2017)[22].

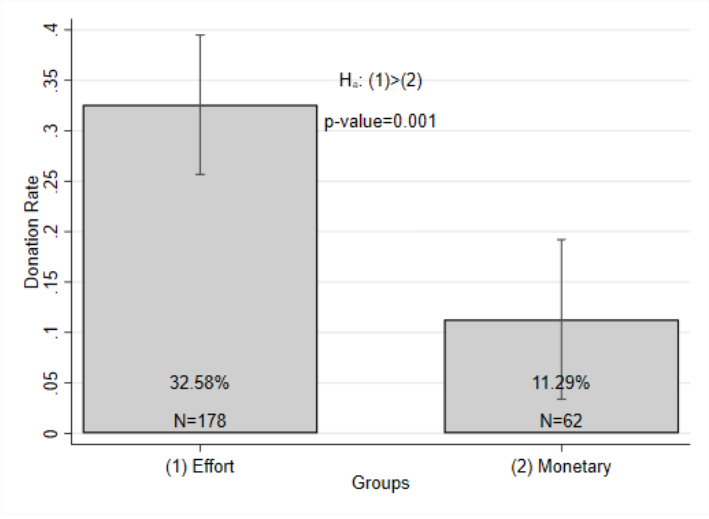
FIGURE 3: FLEXIBILITY INCREASES DYNAMIC INCONSISTENCY



4.4 H4: Donation rates and the rate of dynamic inconsistency are higher and lower, respectively, in effort giving than in money giving.

Participants in the volunteering treatment are significantly more likely to donate than those in the money giving treatment ($\chi^2 = 9.65$, $p = 0.001$). This is not surprising, as there is evidence that effort giving yields higher warm glow than money giving (see Lilley and Slonim (2014)[37], Brown et al. (2018)[15], Tonin and Vlassopoulos (2010)[45], and Imas(2014)[28]). To test the hypothesis that dynamic inconsistency is lower in effort giving than money giving, we compared Group 3's effort donation and renege rates with our money giving treatment. The results are consistent with our prediction. The rate of dynamic inconsistency of participants in the effort giving treatment was 13.43%, while no one reneged in the money treatment. In ASG, the renege rate in student subjects was 47% and 71% in Group2 and Group3, respectively. In addition to the subject pool, their experiment was different in other ways. For example. the gap between the first and second survey was 1 week long, and they methods differed in the way they compensated subjects. Please see section 2.3.2 A possible explanation can be the number of participants in monetary treatment is small, with only 7 individuals planning to donate on Day 1 (10 planned, but 3 of them did not show up on Day 4). It is telling that attrition is higher in this treatment. If we consider these participants who did not show up as renege, the dynamic inconsistency is 30% in monetary donation, which is statistically significantly higher ($\chi^2 = 1.82$, $p = 0.089$) than that in effort donation. According to Appendix 6.1.3, we find the warm glow effect is not sufficiently large, so that the renege rate in volunteering treatment is higher than that in monetary treatment.

FIGURE 4: WARM GLOW EFFECT



4.5 H5: More altruism yields more overall donations. However, the renege rate in Group 3 decreases, whereas it increases in Group 2.

In our survey we included both quantitative and qualitative questions related to altruism. We followed the steps in Falk et al. (2016)[24] to calculate our altruism index: (i) calculating z-scores of all related questions and

(ii) weighing the z-scores of quantitative question and qualitative by their coefficients of an OLS regression of experimental validation procedure, where the weights are sum to one. (iii) We added the quantitative part and qualitative part together, and the sum represents an individual level altruism index. This index is positively related to one's altruism level.

Using a Logit model, we found that one standard deviation increase in altruism index increased the probability of donating by 0.177 in Group 1, by 0.133 in Group 2, and by 0.200 in Group 3. In addition, we also found that individuals' altruism has no significant impact on the renege rate in Group 2, although the sign is correctly predicted (p = 0.247 without controls; p = 0.351 with controls). A plausible explanation is that our overall discount rate is small, making the critical value A only a little lower.

The renege rate in Group 3 is affected by altruism. A one standard deviation increase in the altruism index decreases the probability of reneging by 4.6 percentage points with control variables. The results of the regressions can be seen on Table 2. To summarize, all our hypotheses about altruism are satisfied according to our experimental results. [8]

4.6 H6: Higher levels of agreeableness and neuroticism are linked to higher effort donations.

Using Logit models and controlling groups' interaction with personality traits as well as individuals' demographic variables, we find that more agreeableness and neuroticism increases the probability of donating. We also find that increasing the level of extraversion increases the probability of reneging (see Table 3). Our results are consistent with previous empirical findings in agreeableness (Caprara et al. 2012[18], Yarkoni et al. 2015[46], Habashi et al. 2016[27]), neuroticism (Pinazo et al. 2016[40]) about individuals' likelihood of doing pro-social behaviors. We are unaware of any previous studies that looked at how personality traits and time inconsistent decisions in charitable donations relate.

Taking all demographic variables into consideration, we find that older people (p = 0.000), women (p = 0.014), those who score higher in the IQ test (p = 0.039), and those who are less confident about one's own IQ (p = 0.087) are more likely to make effort donation (χ^2 = 48.20). Those individuals who are older (p = 0.030) and with higher IQ (p = 0.083) are less likely to have time inconsistent behaviors (χ^2 = 13.86).[9]

Finally, we run a stepwise regression that included all interactions between gender with group treatment variables, time preferences, altruism levels, and personality traits. Our results were consistent with findings from previous analysis and showed that women, higher altruism, and lower extraversion contributed to higher donation rate. In contrastm lower level of extraversion contributed to lower reneging rate, with higher neuroticism of men narrowing the renege rate gap between men and women.

[8] We also used backward and forward stepwise regressions for column (4), (5) and (6). The results are consistent with our findings that individuals' altruism positively impacts overall donation and negatively impacts renege rates.

[9] Using stepwise regressions for columns (1) to (6), the results are consistent with our findings.

TABLE 2: ALTRUISM

	(1)	(2)	(3)	(4)	(5)	(6)
	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
[1] Donation Rate	0.177^{***}	0.133^{***}	0.200^{***}	0.145^{**}	0.120^{***}	0.163^{***}
	(0.052)	(0.039)	(0.029)	(0.054)	(0.039)	(0.036)
[2] Renege Rate		0.101	-0.126^{**}		0.072	-0.150^{**}
		(0.082)	(0.047)		(0.072)	(0.053)
Controls	No	No	No	Yes	Yes	Yes
Obs [1]	134	228	178	134	228	178
Obs [2]		33	67		33	67
Pseudo R^2 [1]	0.066	0.038	0.121	0.145	0.079	0.198
Pseudo R^2 [2]		0.029	0.136		0.291	0.520

Note: This table presents individuals' marginal effect of altruism level on their overall donation likelihood and their probability of reneging. Control variables are gender, age, college (dummy), white (dummy), high IQ score (dummy), have religious belief (dummy), number of children, and number of siblings. Obs [1] stands for the number of observations of testing the impact on donation rate, while Obs [2] stands for the number of observations of testing the impact on renege rate. Pseudo R^2 [1] and Pseudo R^2 [2] are presented respectively. $*$ Significant at the 10% level; $**$ Significant at the 5% level; $***$ significant at the 1% level.

5 Conclusion and Discussion

Volunteering is a common and important human behavior. Indeed, it is estimated that 25.4% of people in the US volunteer their time and effort at least once per year (BLS, 2014). According to the 2017 American Time Use Survey, on average, volunteers spent 2.5 hours per day volunteering, which is about 30% of the time spent working. Estimates of the time value of annual volunteering runs in the thousands of dollars per person and, if volunteering were counted as an industrial sector of the US economy, it would represent about 1% of annual GDP (the Urban Institute). Psychological research has also shown that donations enhance life satisfaction and the overall sense of well-being of individuals and groups, and there is evidence that this effect is stronger for volunteers (Jenkins, et al. 2013)[29].

Despite the plethora of contributions on charitable monetary donations, it is not known whether these contributions can be extended to volunteering (i.e., effort donations). Recent studies have shown that time effort allocations are different from money allocations. For example, subjects show more present bias in real effort tasks compared to monetary choices (Augenblick et al. (2015)[8]). With respect to charitable donations,

TABLE 3: PERSONALITY TRAITS

	(1)	(2)	(3)	(4)	(5)	(6)
	Donate	Donate	Donate	Renege	Renege	Renege
Extraversion	-0.021	-0.021	-0.025	0.127^{***}	0.131^{***}	0.097^{***}
	(0.024)	(0.024)	(0.024)	(0.042)	(0.037)	(0.033)
Agreeableness	0.084^{***}	0.082^{***}	0.025	-0.026	-0.034	-0.033
	(0.023)	(0.023)	(0.024)	(0.045)	(0.044)	(0.052)
Conscientiousness	0.031	0.032	-0.013	-0.061	-0.069	-0.016
	(0.024)	(0.024)	(0.027)	(0.051)	(0.048)	(0.058)
Neuroticism	0.070^{***}	0.068^{**}	0.061^{**}	-0.022	-0.033	-0.045
	(0.026)	(0.026)	(0.027)	(0.056)	(0.051)	(0.051)
Openness	0.023	0.022	0.008	0.005	-0.016	-0.010
	(0.022)	(0.022)	(0.022)	(0.029)	(0.029)	(0.027)
Groups Dummies	No	Yes	Yes	No	Yes	Yes
Controls	No	No	Yes	No	No	Yes
Obs	542	542	542	100	100	100
Pseudo R^2	0.027	0.029	0.127	0.112	0.144	0.251

Note: This table presents individuals' marginal effect of personality traits on overall donation likelihood and their probability of reneging. Group dummies mean including dummy variables Group 2 and Group 3 in column (2) and column (3), and including Group 2 in column (5) and column (6). Control variables are gender, age, college (dummy), white (dummy), high IQ score (dummy), have religious belief (dummy), number of children, and number of siblings. For renege rate testing: since personality traits related questions appear in D4 survey, so that here we use individuals participate in both D1 and D4. $*$ Significant at the 10% level; $**$ Significant at the 5% level; $***$ significant at the 1% level.

here we explore whether the behaviors we have observed in inter-temporal money donations as in Andreoni and Serra-Garcia (2017)[5] and Breman (2011)[13] extend to effort time allocations. Indeed, ours is the first paper to explore the idea that time effort allocations, where effort is tied to charitable contributions, could be subject to dynamic inconsistency.

We designed an experiment motivated by a model of volunteering that takes into account different motives for giving, including social pressure and warm-glow. We derived five hypotheses from our model that we tested with 600 Amazon Mechanical Turk workers. Most of our predictions were confirmed by the data. In particular, we found that when people are allowed to allocate their volunteering efforts across time periods (i.e., when there is more flexibility), overall donations go up. We also found that dynamic inconsistency, which we measure by the ratio of reneged effort donations to planned donations is higher with more flexibility. Compared to money

giving, effort giving is impacted more strongly by warm-glow. Volunteering is also affected by altruism and personality traits. For example, agreeableness and neu roticism positively affect volunteering decisions. All in all, this paper contributes to our understanding of a very important aspect of human and social behavior.

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6 Appendices

6.1 A: Mathematical Proofs:

6.1.1 Priors:

Given the assumption of $L_i \sim U[-l, 0]$ and $\epsilon_i \sim U[-e, e]$, we set $z_i = L_i + \epsilon_i$, and write L_i as the form of $z_i - \epsilon_i$, such that $-l \leq z_i - \epsilon_i \leq 0$, which is equivalent to $z_i \leq \epsilon_i \leq l + z_i$. We will prove the ranges for ϵ and l can determine participant's prior probability of reneging as followings.

Case (i): If $l \leq 2e$ (which is equivalent to $-e \leq e - l$), and:

$$\begin{cases} (1)\text{If} - e - l \leq z \leq -e, \text{then} - e \leq \epsilon \leq l + z; \\ (2)\text{If} - e \leq z \leq e - l, \text{then } z \leq \epsilon \leq l + z \\ (3)\text{If } e - l \leq z \leq e, \text{then } z \leq \epsilon \leq e. \end{cases}$$

Now, given that $f(\epsilon) = \frac{1}{2e}$, $f(L) = \frac{1}{l}$, and $0 \leq l \leq 2e$, we have:

(1) If $-e - l \leq z \leq -e$, $f_\gamma(z) = \frac{l+z+e}{2e}$, $F_\gamma(z) = \frac{(l+z+e)^2}{2el}$

Then, the minimum of $F_\gamma(z)$ exists when $z = -e - l$, at which $F_\gamma(z) = \Pr(\gamma \leq z) = 0 \in [0, 1]$ always holds.

In addition, the maximum of $F_\gamma(z)$ exists when $z = -e$, at which $\Pr(\gamma \leq z) = \frac{l}{2e} \in [0, 1]$.

(2) If $-e \leq z \leq e - l$, $f_\gamma(z) = \frac{1}{2e}$, $F_\gamma(z) = \frac{l}{2e} + \frac{z+e}{2e} = \frac{z+e+l}{2e}$;

Then, the minimum of $F_\gamma(z)$ exists when $z = -e$, at which $F_\gamma(z) = \Pr(\gamma \leq z) = \frac{l}{2e} \in [0, 1]$ always holds.

The maximum of $F_\gamma(z)$ exists when $z = e - l$, at which $\Pr(\gamma \leq z) = 1 \in [0, 1]$.

(3) If $e - l \leq z \leq e$, $f_\gamma(z) = \frac{e-z}{2el}$, $F_\gamma(z) = \frac{l}{2e} + \frac{2e-l}{2e} + \frac{(e-z)(z-e+l)}{2el}$.

Then, the minimum of $F_\gamma(z)$ exists when $z = e - l$ or $z = e$, at which $F_\gamma(z) = \Pr(\gamma \leq z) = 1$ always holds.

That is, $\forall e - l \leq z \leq e$, $F_\gamma(z) = 1$, so that the expected probability of renege in the future is equal to 1.

Case (ii): If $l \geq 2e$ (which is equivalent to $e - l \leq -e$), and:

$$\begin{cases} (1)\text{If} - e - l \leq z \leq e - l, \text{then} - e \leq \epsilon \leq l + z; \\ (2)\text{If } e - l \leq z \leq -e, \text{then} - e \leq \epsilon \leq e; \\ (3)\text{If} - e \leq z \leq e, \text{then } z \leq \epsilon \leq e. \end{cases}$$

Now, given that $f(\epsilon) = \frac{1}{2e}$, $f(L) = \frac{1}{l}$, and $l \geq 2e$, we have:

(1) If $-e - l \leq z \leq e - l$, $f_\gamma(z) = \frac{l+z+e}{2el}$, $F_\gamma(z) = \frac{(l+z+e)^2}{2el}$

Here, the minimum of $F_\gamma(z)$ exists when $z = -e - l$, at which $F_\gamma(z) = \Pr(\gamma \leq z) = 0 \in [0, 1]$ always holds.

In addition, the maximum of $F_\gamma(z)$ exists when $z = e - l$, at which $\Pr(\gamma \leq z) = \frac{2e}{l} \in [0, 1]$.

(2) If $e - l \leq z \leq -e$, $f_\gamma(z) = \frac{1}{l}$, $F_\gamma(z) = \frac{2e}{l} + \frac{Z-e-l}{l} = 1 + \frac{z+e}{l}$

Here, the minimum of $F_\gamma(z)$ exists when $z = e - l$, at which $F_\gamma(z) = \Pr(\gamma \leq z) = 0 \in [0, 1]$ always holds.

The maximum of $F_\gamma(z)$ exists when $z = -e$, at which $\Pr(\gamma \leq z) = 1 \in [0, 1]$.

(3) If $-e \leq z \leq e$, $f_\gamma(z) = \frac{e-z}{2el}$, $F_\gamma(z) = \frac{2e}{l} + \frac{l-2e}{l} + \frac{e^2-z^2}{2el} = 1 + \frac{e^2-z^2}{2el}$

Here, the minimum of $F_\gamma(z)$ exists when $z = -e$ or $z = e$, at which $F_\gamma(z) = \Pr(\gamma \leq z) = 1$ always holds. That is, $\forall -e \leq z \leq e$, $F_\gamma(z) = 1$, so that the expected probability of renege in the future is equal to 1.

In conclusion, whether $l \leq 2e$ or $l \geq 2e$ holds, there is always exists a threshold: equals to e-l in case (i) and equals to -e in case (ii), so that if z larger than the threshold, we can guarantee an individual's prior probability of renege in the future equals to 1. Hence, when renege dis-utility (l) is already relatively small (case i), if the dis-utility decreases, that is, the absolute value of dis-utility increases (or/and the transaction cost increases), the prior probability of renege increases since participants are less regret to renege (or/and too costly to participate in the future). However, when the dis-utility is already relatively large (case ii), given the linear relationship between l and$2e$, decreasing transaction cost makes the dis-utility decreases, and the prior probability of renege increases. In summary, decreasing of expected renege dis-utility increases the prior probability of renege. Using the same logic, decreasing (increasing) of expected transaction cost in the future decreases (increases) the prior probability of renege. However, the fluctuation of the range of expected transaction cost has ambiguous impact on the prior probability of renege.

6.1.2 Critical Values:

Prove only $A > C > B$ exists: (Given $A > B$ from above three relationship)

Set $\frac{(\delta_i - 1)}{1 - \delta_i + \delta_i M_i} a_{i1} lnG_{-i}$ = s, where s < 0 is known from model.

(1) $\forall A > B$, we have $C > B$:

$$A > B \Leftrightarrow A - B > 0$$

$$\Leftrightarrow -\frac{1}{1-\delta_i+\delta_i M_i}\epsilon_i - \frac{1}{\delta_i(1-M_i)} r_i + [\frac{M_i\delta_i}{1-\delta_i+\delta_i M_i} + \frac{M_i\delta_i}{\delta_i(1-M_i)}]L_i + \frac{\delta_i - 1}{\delta_i} c(e_{i1}) + s > 0$$

Set $\delta_i - \delta_i M_i = x$, $0 < x < 1$

$$\Leftrightarrow -\frac{1}{x} r_i + [\frac{M_i\delta_i}{1-x} + \frac{M_i\delta_i}{x}]L_i + s > \frac{\epsilon_i}{1-x}$$

$$\Leftrightarrow -\frac{1}{x} r_i + \frac{M_i\delta_i}{(1-x)x} L_i + s > \frac{\epsilon_i}{1-x}$$

$$\Leftrightarrow -\frac{1-x}{x} r_i + \frac{M_i}{1-M_i} L_i - \epsilon_i + s(1-x) > 0$$

$$\Leftrightarrow (\frac{\delta_i - \delta_i M_i - 1}{\delta_i - \delta_i M_i}) r_i + \frac{M_i}{1-M_i} L_i - \epsilon_i > 0 \quad (\Delta)$$

$$or \Leftrightarrow (\delta_i - \delta_i M_i - 1) r_i + M_i\delta_i L_i - (\delta_i - \delta_i M_i)\epsilon_i + s(1-x) > 0 \quad (\Delta\Delta)$$

$$
\begin{aligned}
C - B &= -\epsilon_i + [\frac{\delta_i - \delta_i M_i}{\delta_i(1-M_i)} - \frac{1}{\delta_i(1-M_i)}]r_i + \frac{M_i}{1-M_i}L_i \\
&= -\epsilon_i + [\frac{\delta_i - \delta_i M_i - 1}{\delta_i(1-M_i)}]r_i + \frac{M_i}{1-M_i}L_i \\
&= (\Delta) \\
&\Rightarrow\ C > B
\end{aligned}
$$

(2) $\forall A > B$, we have $A > C$:

$$
A - C = \frac{\delta_i - \delta_i M}{1 - \delta_i + \delta_i M}\epsilon_i - r_i + \frac{M\delta_i}{1 - \delta_i + \delta_i M}L_i + s
$$

Set $\delta_i - \delta_i M = x$, $0 < x < 1$

$$
\begin{aligned}
A - C &= \frac{x}{1-x}\epsilon_i - \frac{1-x}{1-x}r_i + \frac{M_i\delta_i}{1-x}L_i + s \\
&= \frac{1}{1-x}[(\delta_i - \delta_i M - 1)r_i + M_i\delta_i L_i - (\delta_i - \delta_i M_i)\epsilon_i + s(1-x)] \\
&= \frac{1}{1-x}(\Delta\Delta) \\
&\Rightarrow\ A > C \\
&\Rightarrow\ A > C > B
\end{aligned}
$$

6.1.3 Warm Glow Effects

In our experimental settings, the transaction cost and renege cost of individuals across the effort treatment and monetary treatment are assumed to be the same:

$$
\begin{cases}
Pr(Renege_e) = M_i^e = Pr(\gamma_i(e) \le \epsilon_{ei} + L_{ei}) = Pr(\gamma_i(e) \le \epsilon_i + L_i) \\
\\
Pr(Renege_m) = M_i^m = Pr(\gamma_i(m) \le \epsilon_{mi} + L_{mi}) = Pr(\gamma_i(m) \le \epsilon_i + L_i)
\end{cases}
$$

$$
\begin{aligned}
s.t.\ Pr(Renege_e) \le Pr(Renege_m) &\Leftrightarrow \gamma_i(e) \ge \gamma_i(m) \\
&\Leftrightarrow ln[(\frac{G_{-i} + \hat{g}}{G_{-i}})^{a_{1i}}\,\hat{g}^{a_{2i}^e}] - c(e_{in}) \ge ln[(\frac{G_{-i} + \hat{g}}{G_{-i}})^{a_{1i}}\,\hat{g}^{a_{2i}^m}] - c(\hat{g}) \\
&\Leftrightarrow a_{2i}^e - a_{2i}^m \ge \frac{c(e_{in}) - c(\hat{g})}{ln\hat{g}}
\end{aligned}
\tag{16}
$$

Therefore, for an individual i in Group 2 or Group 3: if equation (16) is satisfied, he or she has prior as Pr(inconsistency in volunteer donation) $\le$ Pr(inconsistency in monetary donation). In addition, in our experimental setting, we assume $c(e_{in}) = c(\hat{g}) = \$1$. We arrive at this assumption by calculating the opportunity

cost of effort donation on AmazonMutrk equals to \$6.19/h if accepted follows Hara et al. (2018), and their estimated time to finish the second part of experimental surveys is around 6.87 minutes. This is very close to the real time (7.15 minutes) that participants spend on average in this part of the experiment. We also asked the participants the cost for them to finish the second part, and the median of their answers was \$1.01. Therefore, we use this prior as individuals' expected opportunity cost to participate in the volunteering part. As a result, equation (16) is always satisfied in our case. That is, effort donation is more motivated by the warm glow effect than the monetary donation. This is consistent with Lilley and Slonim (2014)[37] and Brown et al. (2018)[15]'s findings of $a_{2i}^e \geq a_{2i}^m$. Thus, in our case of group 2 and group 3, we can assume an individual has $a_{2i}^e - a_{2i}^m = u_i \geq 0$, at which $M_i^m - M_i^e = \mu_i \geq 0$, which is equivalent to say this individual has prior of Pr(inconsistency in volunteer donation) $\leq$ Pr(inconsistency in monetary donation).

$$\begin{cases} A_e = \frac{1}{1-\delta_i+\delta_i M_i^e}[\delta_i(M_i^e-1)\epsilon_e + \delta_i M_i^e L_i + (1-\delta_i+\delta_i M_i^e)c(e_{in}) + (\delta_i-1)a_{1i}lnG_{-i}] \\ A_m = \frac{1}{1-\delta_i+\delta_i M_i^m}[\delta_i(M_i^m-1)\epsilon_m + \delta_i M_i^m L_i + (1-\delta_i+\delta_i M_i^m)c(\hat{g}) + (\delta_i-1)a_{1i}lnG_{-i}] \end{cases}$$

$$\begin{cases} B_e = \frac{\frac{r_i}{\delta_i} - M_i^e L_i}{1-M_i^e} + c(e_{in}) + \epsilon_e \\ B_m = \frac{\frac{r_i}{\delta_i} - M_i^m L_i}{1-M_i^m} + c(\hat{g}) + \epsilon_m \end{cases}$$

$$\begin{cases} D'_e = \delta_i[c(e_{in}) + L_i + \epsilon_e] \\ D'_m = \delta_i[c(\hat{g}) + L_i + \epsilon_m] \end{cases}$$

Based on above assumptions, we have $D'_e = D'_m$ and $\bar{A}_e \geq \bar{A}_m$. Furthermore, if $B_e \leq D'_e$, we will always have donation rate is higher in volunteering treatment than in monetary treatment; If $B_e \geq D'_e$, this result still holds regardless of $B_m \leq D'_m$ or $B_m \geq D'_m$ as long as the warm glow effect is high enough for this individual. According to our empirical findings of D' lies between B and C on average (result from H1), effort donation rate is predicted to be always larger than that in monetary treatment. Similarly, the renege rate would be higher in monetary treatment than in volunteering treatment if only the warm glow effect is high enough and the difference between D'_m and B_m is large enough.

6.2 Tables

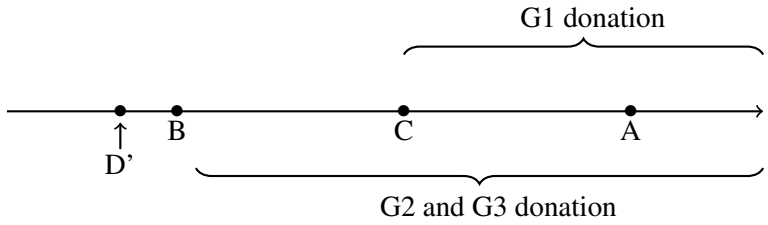
TABLE 4: DESCRIPTIVE STATISTICS (%)

	Proportions in Sample	**Proportions by Groups**		
		Group 1	**Group 2**	**Group 3**
Age:				
$21 \sim 30$	24.72	31.85	22.27	22.47
$31 \sim 40$	37.64	37.78	34.06	42.13
$41 \sim 50$	20.48	22.22	21.40	17.98
$51 \sim 73$	17.16	8.15	22.27	17.42
Demographics:				
Female (=1)	49.82	47.41	49.34	52.25
White (=1)	79.89	82.22	78.60	79.78
Married (=1)	39.48	31.11	39.74	45.51
Have Siblings ($\geq$1)	85.06	86.67	83.84	85.39
Have Children ($\geq$1)	45.02	37.04	42.36	54.49
Have Religion (=1)	45.57	45.93	46.29	44.38
Education and IQ:				
College (=1)	65.87	65.93	69.00	61.80
Mensa Quiz ($0 \sim 5$):				
Average Score	2.57	2.56	2.66	2.49
Behavioral Tendencies:				
Exercise ($\geq$1 per week)	78.78	81.48	76.86	79.21
Smoking ($\geq$1 per week)	25.56	28.15	27.51	21.02
Drinking ($\geq$1 per week)	36.72	35.56	38.86	34.83
Obs	542	135	229	178

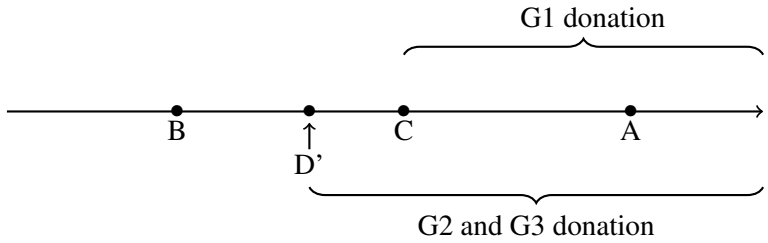
6.3 Figures

H1 : Flexibility can increase overall donation

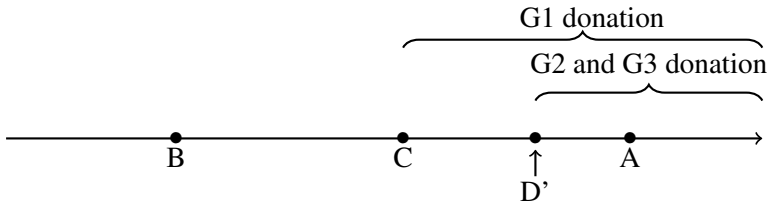
- When $C \geq B \geq D'$, G2 donation = G3 donation $\geq$ G1 donation

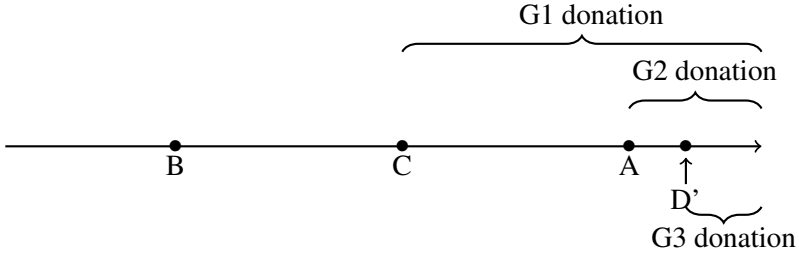


- When $C \geq D' \geq B$, G2 donation = G3 donation $\geq$ G1 donation



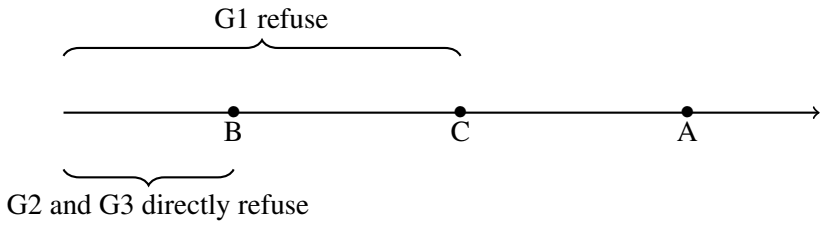
- When $D' \geq C \geq B$, G1 donation $\geq$ G2 donation $\geq$ G3 donation (Exists if $L_i + \epsilon_{if} \geq 0$) $\rightarrow$ expected future transaction costs are high.





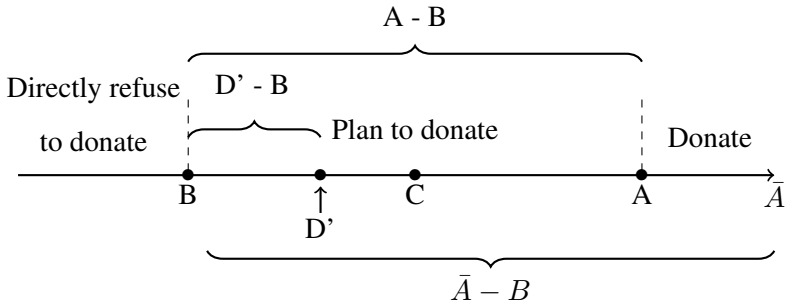
H2 : Flexibility can decrease the rate of directly refuse to donate now

- Pr(G2 directly refuse to donate now) = Pr(G3 directly refuse to donate now) $\leq$ Pr(G1 directly refuse to donate now)

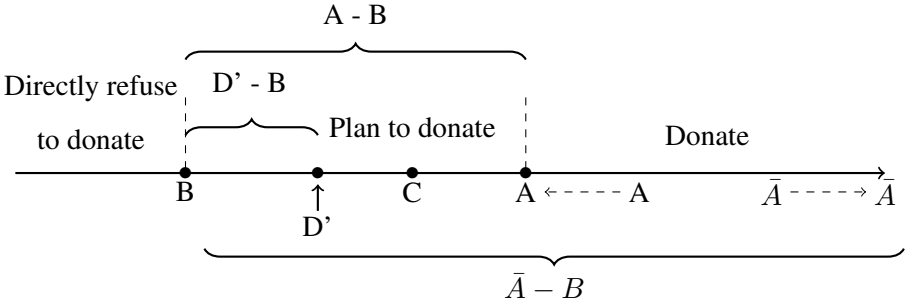


H3 : Group 2 has higher rate of dynamic inconsistency than Group 3

- G2 rate of inconsistency = $\frac{D' - B}{A - B} \geq$ G3 rate of inconsistency = $\frac{D' - B}{\bar{A} - B}$ where $\bar{A}$ is the maximum possible value of A



H5 : When altruism level increases, A decreases, $\bar{A}$ increases, while B and D' are unchanged. Therefore, the renege rate in Group 3 decreases, whereas it increases in Group 2.



6.4 Figure: Heterogeneity

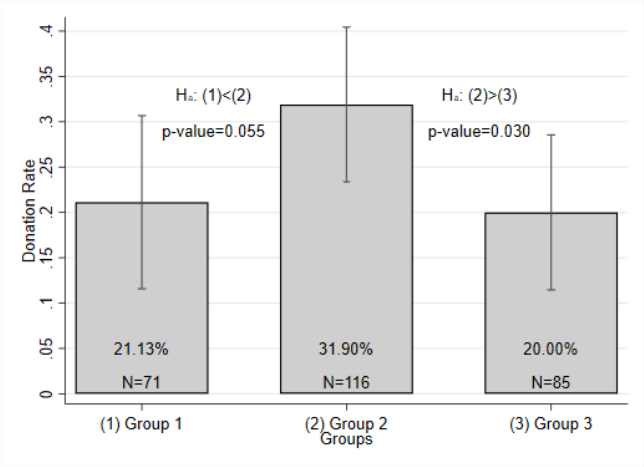


FIGURE 5: MEN

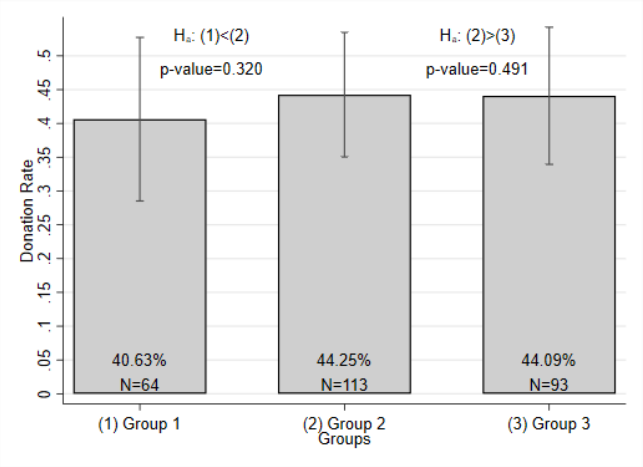


FIGURE 6: WOMEN