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ORGAN DONATION, TRUST AND RECIPROCITY

BY

DANYANG LI

A Dissertation Submitted in Partial Fulfillment
of the Requirements for the Degree
of
Doctor of Philosophy
in the
Andrew Young School of Policy Studies
of
Georgia State University

GEORGIA STATE UNIVERSITY
2013

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Danyang Li
2013

ACCEPTANCE

This dissertation was prepared under the direction of the candidate's Dissertation Committee. It has been approved and accepted by all members of that committee, and it has been accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Economics in the Andrew Young School of Policy Studies of Georgia State University.

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August 2013

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ABSTRACT

ORGAN DONATION, TRUST AND RECIPROCITY

BY

DANYANG LI

MAY, 2013

Committee Chair: Dr. James C. Cox

Major Department: Economics

This dissertation consists of three chapters that focus on topics in fields of experimental economics and health economics.

The first chapter, “Do I Care if You Know I Betrayed You?” , examines how concern for others’ disutility from betrayal can affect the decision to repay trust in the trust game. We use a laboratory experiment to compare trustees’ behavior when betrayal is obfuscated to an identical monetary payoffs situation where betrayal is revealed. We find that more trustees choose to defect in our experiment when betrayal is obfuscated than when it is revealed. Our result suggests that concern for betrayal costs influences not only the decision to trust but also the decision to repay trust.

The second chapter, “Increasing Organ Donation via Changes in the Default Choice or Allocation Rule”, utilizes a laboratory experiment to evaluate the effectiveness of alternative public policies targeted at increasing the rate of deceased donor organ donation. The experiment includes treatments across different default choices and organ allocation rules inspired by the donor registration systems applied in different countries. Our results indicate that the opt-out with priority rule system generates the largest

increase in organ donation relative to an opt-in only program. However, sizeable gains are achievable using either a priority rule or opt-out program separately, with the opt-out rule generating approximately 80% of the benefits achieved under a priority rule program.

The third chapter, “Improving the Approach to Organ Donor Registration”, proposes to improve organ donor registry by providing a persuasive message with the registration request. I designed a laboratory experiment to examine the impact of the persuasive message on donation decisions. The results indicate that the persuasive message has a positive impact on donation decisions in the early rounds of the experiment. Subjects were about 21 percent more likely to register as a donor in round 1 of the experiment when they were provided with a persuasive message. This behavioral difference across treatment decreased as subjects played more rounds, since subjects in the control treatment learned the information in the persuasive message through playing the game. We further find this treatment effect is mainly from subjects who are not organ donors in real life, while the treatment effect is very small for those who are self-reported organ donors.

Chapter I: Do I Care if You Know I Betrayed You?

Introduction

People often are generous both in everyday life and in experiments. This behavior has been often interpreted a preference for generous outcomes. However, recent literature indicates that people may not really value the social outcome, they may instead, just want to be seen as being generous. In a study by Güth et al. (1996), the authors modify the standard ultimatum game by varying the size of the cake, which can take either a large or a small value. Only the proposer knows the true size of the cake. They find that many proposers with a large cake offer the equal split of a small cake. The authors refer to this behavior as "hiding behind some small cake."

We extend the literature by looking at the decision to cooperate in a trust game. We modified the trust game so that subjects can "hide behind a coin flip." In our modified trust game, the first mover's (or "trustor's") decision to trust the second mover (or "trustee") is "productive" (Deck 2009), which refers to the increase in total money payoff compared with the alternative choice.[1] We introduced a move of nature in between the trustor's decision and the trustee's decision, which randomly determines the productivity level of trust. This move of nature is determined by a coin flip. The trustor does not observe nature's move or the trustee's decision unless they are revealed by his own payoff. The key feature of the modified trust game is that when the trustee repays

[1] Henceforth, we use the common, although questionable, designation of the first mover as "trustor" and the second mover as "trustee" even though the first mover's motivation may be trust or altruism, or both (Cox 2004).

low-productivity trust, the trustor receives the same payoff as when the trustee betrays high-productivity trust. That is, the trustor cannot infer betrayal of high-productivity trust.

We recruited subjects to participate in two experimental treatments. Subjects play the modified trust game in treatment 1. In treatment 2, different subjects play a game identical to the modified trust game except that the trustor observes nature's move at the end of the game, hence the trustor eventually has perfect information about the trustee's decision. We find that subjects repay high-productivity trust more frequently in treatment 2 than in treatment 1. Results of the experiment show that people are more selfish when they can "hide behide a coin flip." Our findings are consistent with the prior findings that people may not really value the social outcome of cooperation, they may instead, just want to pretend to be cooperative.

The next section of the paper describes some related literature. Section 3 describes the experimental design and protocol. Section 4 reports the results from the experiment. The final section of the paper concludes.

Some Related Literature

Traditional economic models assume that individuals' actions are exclusively motivated by material self-interest. The narrow material self-interest assumption is quite good at predicting behavior in many contexts. However, in some contexts, this assumption does not work well. Examples include ultimatum games (Güth et al. 1982; Slonim and Roth 1998), dictator games (Forsythe et al. 1994; Andreoni and Miller 2002), and investment games (Berg et al. 1995; Cox 2004; Cox and Deck 2005). Experimental studies of such games show that individuals often behave in a way that is inconsistent with narrow material self-interest.

As a result of these findings, researchers have been motivated to develop models of other-regarding preferences. These models assume individuals have genuine concern for others' material payoffs. This literature broadly falls into two classes: outcome-based models and models of reciprocity. The outcome-based (distributional) models assume that individuals care about their own and others' material payoffs. Examples include inequality aversion models (Fehr and Schmidt 1999; Bolton and Ockenfels 2000), quasi-maximin models (Charness and Rabin 2002; Engelmann and Strobel 2004), convex other-regarding preferences models (Andreoni and Miller 2002), and the egocentric altruism model (Cox and Sadiraj 2007; 2012). Alternatively, models of reciprocity assume that individuals prefer to repay kind actions by others with similar actions themselves and, also, to repay unkind actions with similarly unkind ones. For example, revealed altruism theory (Cox et al. 2008) assumes that one person's generous action may change another person's preferences and trigger a reciprocal response.

A series of recent studies find that people often "pretend to be generous", but do not truly value the generous outcome. In a two-level ultimatum game experiment, Güth et al. (1996) find that subjects are more selfish when they can hide their selfish behavior "behind some small cake." In a dictator experiment by Dana et al. (2007), dictators are more likely to be selfish when they can stay ignorant of the recipients' payoffs. The related work by Dana et al. (2006) also shows that many subjects are willing to pay to avoid the dictator decision. Charness and Dufwenberg (2006) further find that communication could affect behavior by influencing beliefs about others' beliefs. In the study by Hamman et al. (2010), the authors find that subjects are more selfish when they can delegate their selfish actions to agents (a third party).

Our work focuses on people's decision to cooperate in a trust game. We modified the trust game by introducing a random coin flip, which determines the productivity of trust. In one treatment, only trustees can observe the realized outcome of the coin flip, so that they can hide their selfish actions "behind the coin flip." In another treatment, the realized outcome of the coin flip is common knowledge between trustors and trustees. We find that fewer subjects cooperate when betrayal is obfuscated from their partners.

This finding cannot be explained by any of the above-cited outcome-based models. Trustees with preferences consistent with those models should behave consistently across our treatments because the feasible sets of material payoff alternatives are identical across treatments. Also, revealed altruism theory cannot be applied here without modification because opportunity sets in our modified trust game are not exclusively chosen by other (human) players.

In a context of the trust game, trustors can display an aversion to betrayal. The idea of betrayal aversion has been addressed by Bohnet and Zeckhauser (2004). They experiment with subjects' decision making in paired trust games played either with another person or a computer. They find that individuals are less willing to "trust" when the outcome is determined by another person than when it is determined by random draw by a computer. This result indicates an aversion to being betrayed by another human being, which is referred to as “betrayal aversion” by Bohnet and Zeckhauser. Bohnet et al. (2008) follow the same design to examine whether betrayal aversion is a robust feature beyond the United States. Their results support betrayal aversion as a broad-based phenomenon across countries.

We follow this finding and look inversely at the behavior to repay trust. Since betrayal aversion exists, trustees may feel obliged to cooperate, but may not really value the outcome generated from cooperation. This possibly explains our finding that some subjects only cooperate when their actions are revealed, since they just want to appear to be cooperative, but do not have true concerns for others’ payoffs.

Our findings can fit into the literature of the “hiding behind some small cake” — behavior (Güth et al. 1996). This result is consistent with previous findings that people are more selfish when their behavior is not revealed. We are not denying that the behavior to repay trust may be motivated by distributional concerns or reciprocity. However, this possibility may be overstated by results of prior research. Our work suggests a complementary explanation. Our results suggest that sometimes trustees who repay trust may just pretend to be cooperative.

Experimental Design and Protocol

We modified the trust game introduced by McCabe and Smith (2000) in our experiment. In the trust game, the first movers who trusts is willing to take the risk of losing a certain amount by engaging into the game, anticipating cooperation from the second mover. The second mover who is reciprocal responds to the first mover's trust by cooperation, which results in a mutually beneficial outcome. The extensive form of the modified trust game is represented in Figure 1. A first mover (the trustor) can choose a sure option ("exit" the game) that gives both movers a payoff of 10, or he can choose to trust (or "engage" into the game). The productivity level of trust is determined by nature's move.[2] Fifty percent of the time, nature moves left and yields low-productivity trust. In this case, trust increases the total money payoff from 20 to 30. Another fifty percent of the time, nature moves right which selects high-productivity trust that increases the total money payoff from 20 to 50. After observing nature's move, a second mover (the trustee) has to choose between cooperate with the trust or defect. Cooperation with low-productivity trust gives both movers a payoff of 15, while defecting results in a payoff of 0 for the trustor and 30 for the trustee. Cooperating with high-productivity trust ends with a payoff of 25 for both movers, while defecting yields a payoff of 15 for the trustor and 35 for the trustee.

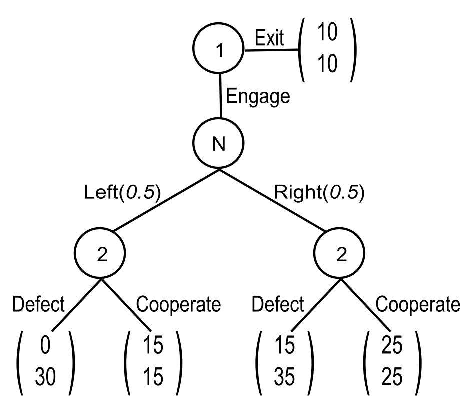

Figure 1. The Modified Trust Game

[2] This design is based on Dufwenberg et al. (2001). In their experiment the authors varied the multiplier of donations, which can either be 2 or 4.

Interestingly, when the trustee chooses to cooperate with low-productivity trust, the trustor receives the same payoff — a payoff of 15 — as when trust is highly-productive but the trustee defects. The trustor knows neither the choice nor the payoff of the trustee, unless they are revealed by his own payoff. The trustor also cannot observe nature's move. Imagine you are the trustor who receives a payoff of 15. You may want to believe that the trustee chose to cooperate and encountered an unlucky move of nature. However, it is also possible that you faced a greedy partner who relied on the presence of nature's move for obfuscation. Consequently, the trustee's action is not revealed.

We experiment with two treatments: (1) the modified trust game; (2) a game identical to the modified trust game except that the trustor observes nature's move at the end of the game. We compare data from these two treatments to capture the effect of the concern for betrayal costs. Compared with treatment 2, the trustee in treatment 1 is able to hide betrayal when trust is highly-productive. Since betrayal is not revealed, the trustee may believe that the trustor does not experience betrayal costs. This belief may allow the trustee to justify the choice to defect, and thereby lead to more self-interested actions.

Before the experiment started, the experimenter read the instructions out loud to the subjects. Whether or not betrayal would be revealed was made clear to all subjects. After the experiment began, subjects were reminded of whether betrayal would be revealed again on the decision screen. The actual decision screen for trustees in treatment 2 is shown below in Figure 2.

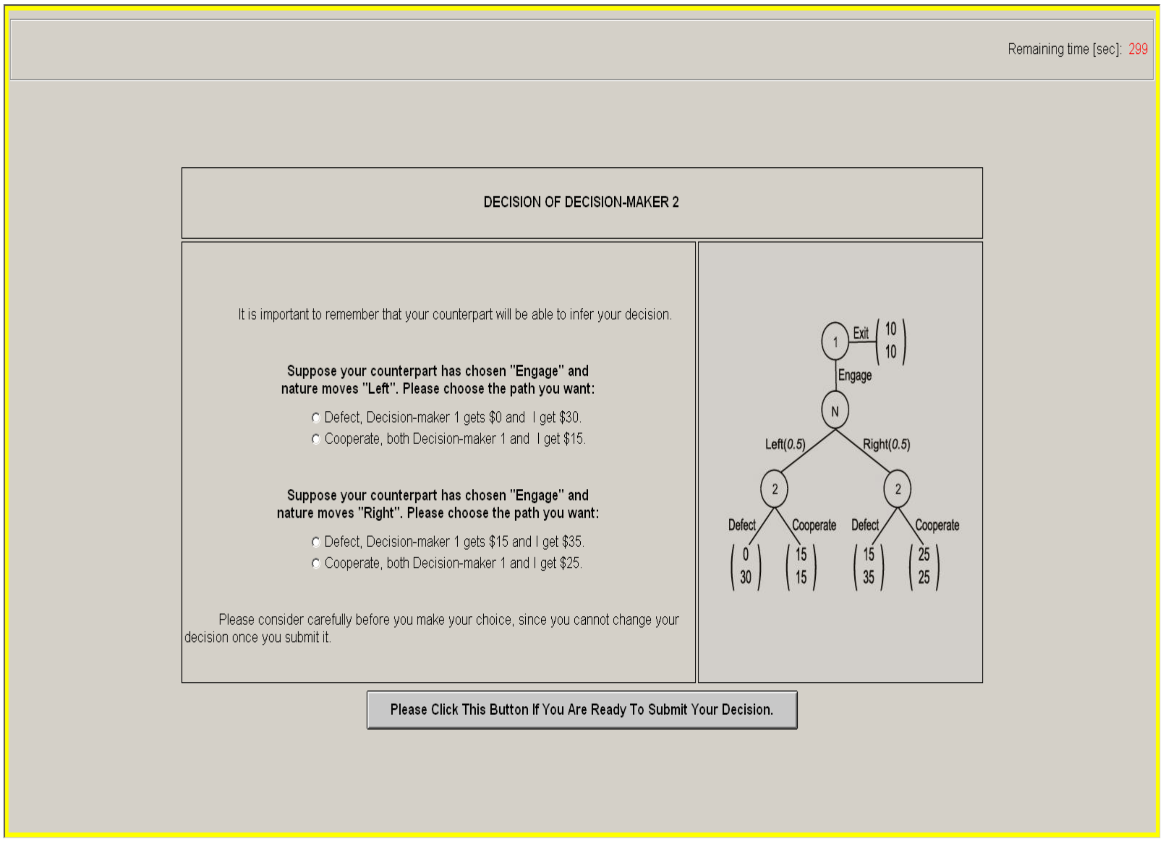

Figure 2. Decision Screen for Trustees in Treatment 2

In both treatments, we implemented the strategy method. This method allows us to observe trustees' choices for both possible moves of nature even when the trustor chooses the sure option. In each treatment, trustors had to decide whether to trust. At the same time, trustees chose to cooperate or defect for each of the possible moves of nature. The earnings of each pair of subjects were determined by choices of both parties and nature's move. Trustees were informed that their choices were only determinative for the final payoff if their paired trustors chose to trust.

After subjects finished making decisions in each treatment, the experimenter flipped a coin to determine nature's move in the presence of all of the subjects. The difference between the two treatments in the information provided to the subjects was as follows. In treatment 2, all subjects were informed whether "Heads" on the coin flip meant that nature moved left or right. In treatment 1, only trustees were informed whether Heads corresponded to left or right for nature's move.

We used a double-blind subject payment protocol in which subjects' choices are anonymous to both other subjects and the experimenter. This protocol is implemented by first asking each subject to select one from a box full of identical, sealed envelopes. Each envelope contains a key with a unique number. Subjects are asked to use these numbers as their (only) identifiers in the experiment. At the end of the experiment, subjects exit the lab individually and collect their earnings in private from a mailbox with a number that corresponds to their key number. Payoffs are contained in sealed envelopes. Subjects are asked to exit the building before opening their envelopes. While waiting for pay envelopes to be filled with money and put in the mailboxes, subjects are asked to complete a questionnaire on demographic characteristics. Subjects' questionnaire responses are linked with their decisions by their mailbox key numbers.

Results

Subjects who participated in the experiment were recruited from undergraduate students at Georgia State University. A total of 142 subjects participated in the experiment, 72 in treatment 1 and 70 in treatment 2. Subjects earned on average $22.61 (including a $5 show-up fee). There were 2 sessions in each treatment. The treatments were implemented with a between-subjects design. Subjects were randomly assigned to one role, either the trustor or the trustee. Each trustor was randomly paired with a trustee.

In each session, subjects played the game only once. Results from the experiment are as follows.

Table 1 reports the frequency of the choice to defect for each treatment. The results are consistent with our hypothesis that subjects choose to defect more frequently when betrayal is not revealed. When nature led to high-productivity trust, 29 out of 36 trustees in treatment 1 chose to defect, while 23 out of 35 trustees chose to defect in treatment 2. This difference across treatments is weakly significant (z = 1.4122, p-value = 0.0789). The observed difference across treatments provides some support for the conjecture that concern for others' betrayal costs is a motivation for choosing cooperation.

Table 1. Frequencies of the Choice to Defect by Treatment

		Low-productivity Trust			High-productivity Trust		
	Sample Size	Obs	Percent	SD	Obs	Percent	SD
Treatment 1	36	20	55.56	50.40	29	80.56	40.14
Treatment 2	35	22	62.86	49.02	23	65.71	48.16
Proportion test across treatment:							
z-test (*p*-value)							
Total		-0.6258 (0.7343)			1.4122 (0.0789)		

Note: The null hypothesis: difference in behavior across two treatments = 0; the alternative hypothesis: difference in behavior across two treatments>0.

When trust was with low productivity, the choice to defect was revealed in both treatments. We did not observe a statistically significant difference in choice of defect across treatments. In treatment 1, 20 out of 36 trustees chose to defect. In treatment 2, 22 out of 35 trustees chose to defect. The difference across treatments is not statistically significant (z = -0.6258, p-value = 0.7343). This finding of insignificant difference for the (trustor-revealing) choices with low-productivity trust, together with the significant difference for the (trustor-obscuring) choices with high-productivity trust, provides further support for our conjecture that it is trustees' concern for betrayal costs that explains differences between behaviors across treatments.

Table 2. Probit Regressions of the Choice to Defect

	Dependent variable: choice to defect			
	Low-productivity Trust		High-productivity Trust	
	(1)	(2)	(3)	(4)
Treatment	0.131	0.098	-0.176*	-0.224**
	(0.121)	(0.128)	(0.105)	(0.109)
Defect with high-productivity trust	0.333**	0.299**		
	(0.130)	(0.138)		
Defect with low-productivity trust			0.267**	0.240**
			(0.109)	(0.114)
Gender		-0.052		-0.009
		(0.121)		(0.106)
Race		-0.211*		-0.119
		(0.120)		(0.109)
Experience		-0.033		-0.172
		(0.148)		(0.140)
Log Likelihood	-44.788	-43.230	-37.206	-35.984
Pseudo R2	0.0672	0.0997	0.0979	0.1275
N	71	71	71	71

Notes: The base treatment is treatment 1. Reporting marginal effects. Standard error in parentheses. ***significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Table 2 presents a series of probit regressions on trustees' decisions to defect. In regressions (1) and (2), we analyze trustees' decisions when trust is with low productivity, while regressions (3) and (4) produce the anaylsis of trustees' decisions with high-productivity trust. The right-hand side of the regressions first includes a dummy variable “Treatment”, which is equal to one in treatment 2. Since trustees made simultaneous decisions for each possible outcome of nature with the strategy method, regressions under low-productivity trust have controls on trustees’ decisions for high-productivity trust and vice versa.

Regressions (1) and (3) indicate that trustees only behave differently across treatments when trust is highly productive (variable “Treatment”). Trustees are 17.6% less likely to defect in treatment 2 when trust is highly productive and the result is statistically significant at 10% level. However, the treatment does not affect the likelihood to defect when betrayal is revealed in both treatment (p-value = 0.284).

Regressions (2) and (4) include additional subject characteristic variables such as “Gender” (female = 1), “Race” (black = 1), and “Experience” (having previous experience in other experiments = 1). Again, we only see behavioral difference across treatments when trust is highly-productive. The coeffient on variable “Treatment” in regression (4) is negative and significant at 5% level, suggesting that trustees are 22% less likely to defect in treatment 2. However, regression (2) indicates that when trust is with low productivity, there is no treatment effect.

Conclusion

In this paper, we report results derived from a laboratory experiment based on a modified trust game design. This design allows us to examine whether subjects are more selfish when they can hide their selfish actions “behind a coin flip.” In the modified trust game, we introduce a random coin flip between decisions of trustors and trustees. The realized outcome of coin flip determines the productivity of trust. By varying trustors' ability to observe the realized outcome of coin flip, we allow trustees to be able to hide betrayal in one treatment. We find a significant increase in the choice to defect when trustees can hide betrayal, but no significant behavioral change when betrayal is revealed in both treatments. By backward induction, it is rational for trustors to engage in our experiment, with the frequencies of defect reported in the modified trust game. This result supports our hypothesis that subjects may just pretend to be cooperative but do not really value the outcome from cooperation. Our finding suggests that concern for betrayal costs influences not only the decision to trust, but also the decision to repay trust.

Chapter II: Increasing Organ Donation via Changes in the Default Choice or Allocation

Introduction

Between 2000 and 2009 the annual number of deceased organ donors within the United States (U.S.) increased from 5,985 to 8,022 (Scientific Registry of Transplant Recipients (SRTR) 2012). Although this represents a 34% increase in deceased donors, it has not kept pace with the rapidly risen waiting list. During this same time interval the number of patients waiting for an organ transplant has increased from 74,635 to 111,027 patients, a 49% increase (SRTR 2012). Both in absolute and relative terms there is an ever-increasing gap between the number of deceased donor organs and those waiting for a transplant.[3] Despite the large need for transplantable organs, only 42.7% of residents in the U.S. over the age of 18 are registered organ donors.[4] Clearly, the current organ supply system in the United States fails to produce an adequate supply to satisfy the demand for transplantable organs and there is an increasing need to close this gap and increase human welfare. In this paper we experimentally investigate whether or not changes in the organ donation default choices as well as organ allocation rules can effectively increase organ donation and facilitate the closing of this gap.

The experimental design is inspired by different donor registration and organ allocation systems currently applied in other countries. The U.S. system serves as a baseline for comparison where current donor registration is an opt-in program and the

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[3] It is worth noting that the reported deaths while in the waiting list per 1,000 patient years at risks has decreased from 104.6 in 2000 to 84.5 in 2009 (SRTR 2012). This is primarily due the advancements in care for these patients and not a function of increased transplantation.

[4] Based on the 2012 National Donor Designation Report Card by the Donate Life America at http://donatelife.net/wp-content/uploads/2012/06/DLA-Report-Card-2012-350781.pdf

organ allocation system does not assign priority to those who are willing to be donors themselves. We compare this institution to an opt-out donor registration system inspired by the current system in Spain and Austria, an opt-in with a priority allocation rule inspired by Israel and an opt-out with priority rule system inspired by Singapore. Our results indicate that the opt-out system with priority rule generates the largest donation rates, with the largest marginal gains arising from the priority rule allocation system. Our results are consistent with the findings of Kessler and Roth (2012) who found that a priority rule allocation program will increase donation rates, but we complement their finding to encompass the opt-out rule which is currently being utilized in other countries.

Although there are a large number of living donors within the U.S., there is currently 0.8 living donors for each deceased donor, we focus on deceased donation as the number of potential deceased donors is far above the number of current deceased donors and many types of organ transplantation rely exclusively on deceased donation.[5] Approaches to increase the organ supply from deceased donation broadly fall into two classes: improving the donation rates of eligible deceased donors and enlarging the pool of potential donors. The donation rates can be improved by increasing the consent rates from the potential donors' next-of-kin. Since first drafted in 1968, the Uniform Anatomical Gift Act (UAGA) established that an individual's statement of intent to be an organ donor is legally binding (Bonnie et al. 2008). However, it is still common practice to ask the permission of the deceased's next-of-kin to donate their organs. Along this vein, the department of Health and Human Service (HHS) passed regulation that requires

[5] While a live donor can give a kidney, or a portion of the liver, lung, intestine, or pancreas, it is essentially impossible for live donation of solid organs such as the heart, pancreas, and intestinal organs.

all hospitals to report all deaths to the Organ Procurement Organization (OPO).[6] This regulation increases the opportunity that the deceased's next-of-kin is contacted for organ donation.

Policymakers have made efforts to increase the donation rate through regulation and improvements to the organ procurement system. In the U.S. an organ procurement organization (OPO) is in charge of the procurement of deceased-donor organs. There are 58 such organizations from different regions throughout the U.S. and each regional OPO obtains direct contact with the deceased's next-of-kin. In April 2003, HHS launched the Organ Donation Breakthrough Collaborative to improve the donation rate.[7] The goal of the collaborative is to encourage the adoption of "best practices" for increasing access to transplantable organs. Recent research suggests that the collaborative has increased organ donation within the U.S. (Howard et al. 2007; Shafer et al. 2008).

Another approach to increase the organ supply is to enlarge the pool of potential donors or generating a higher registration rate among the population. Our experiment is targeted at this mechanism for increasing the organ supply as we measure the relative effectiveness of potential policy changes that target increasing the number of potential donors. Our paper is novel in that we conduct a controlled lab experiment to compare policy regimes under different institutions of organ donor registration that currently exist in the world today. Results from the experiment will inform the discussion of possible changes in organ donation public policy. We consider two highly publicized proposals:

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[6] This policy was announced in June 1998: http://archive.hhs.gov/news/press/1998pres/980617.html
[7] The Organ Donation Breakthrough Collaborative began in 2003 at the request of HHS Secretary Tommy G. Thompson.

changing the default rule for organ donor registration and changing the organ allocation rule.

Changing the default rule affects decision-making. Economists have highlighted the substantial role that defaults play in numerous areas, including health care plans (Samuelson and Zeckhauser 1988), automobile insurance (Johnson et al. 1993), retirement saving plans (Madrian and Shea 2001) and consent to online privacy policies (Johnson et al. 2002). Results show that people often choose the default option to which they are assigned, suggesting that changing the default choice of the organ donation question may influence donation decisions. The U.S. operates an opt-in policy regime so that the individual must self-select and register to be an organ donor. In other words, the current default choice in the U.S. is non-donor. One proposed policy alternative is to change the default option to being a donor, what is referred to as an opt-out system. Under an opt-out regime, an individual must self-select out of being an organ donor.

Altering the default choice influences donation decisions through various channels (Johnson and Goldstein 2003). First, the default may be considered as the recommended action by the policy-maker. For example, if the default is that an individual has consented to be a donor, potential donors might believe being a donor is recommended by policy-makers. Second, accepting the default may involve less effort for the individual making decisions. Psychologically, the organ donation decision may induce stress from thoughts of dying or pain suffered by family members should their organs be donated. Researching the information about organ donation and filling out registration forms also involves time and physical effort. These costs are upfront burdens placed upon organ donor registration and intensified when the default option is non-donor (captured by the opt-in rule within our experiment).

Several European countries like Spain and Austria have adopted an opt-out system for organ donation, while some other European countries like Germany and the United Kingdom have opt-in default options. With data reported in Gäbel (2002), Johnson and Goldstein (2003; 2004) compare donor registration rates across European countries with different default options. They find higher registration rates in countries where the default choice is being a donor (opt-out). One potential problem of this method is the assumption that all other observable characteristics can be controlled for and that the unobservable characteristics are not correlated with donor registration across countries. We provide support for these empirical results using a laboratory setting where outside confounders do not exist.

Changing the organ allocation rule is another potential way to increase the pool of registered donors. The current organ allocation system in U.S. is organized by the United Network for Organ Sharing (UNOS). UNOS maintains a national waiting list. Transplant candidates on the list are ranked, among other things, according to the candidate's health condition, physical compatibility between the donor and the candidate (i.e., the Human Leukocyte Antigen (HLA) matching),[8] their distance from the potential donor, the patient's preferences for particular donor types (i.e., is the patient willing to accept an Extended Criteria Donor (ECD) organ) and how long the candidate has been on the waiting list. When a transplantable organ becomes available, the opportunity goes to

[8] A zero HLA mismatch with a particular donor will automatically move a patient up the waiting queue.

the highest-ranked person on the list. Under the current allocation system utilized by UNOS an individual is not given priority if they have elected to be a potential donor. A proposed change is to utilize a priority rule for allocation.[9]

A priority rule allocation system gives individuals who are on the organ waiting list and are registered organ donors precedence for transplantable organs. In other words, the priority rule establishes the top criterion for ranking on the waiting list by whether a person is registered as an organ donor or not. Individuals who are registered donors rank higher on the waiting list than those who are not, despite their medical condition or other differences. The supporters of the priority rule believe that the current organ allocation system in the U.S. does not provide enough incentive for organ donation because it relies purely on altruistic motives. The priority rule motivates an individual to donate by connecting the potential of helping others to the potential of helping one's self. The results from our experiment validate this motivation.

Israel and Singapore are examples of countries that have adopted a priority rule for their national donation system. Israel has been using the priority rule system since 2010 (Lavee et al. 2010).[10] However, Israeli citizens need to elect to be included as a registered donor to receive priority over those not willing to be donors. Singapore passed the Human Organ Transplant Act (HOTA) in 1987, which applies the priority rule with

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[9] The final decision to utilize an organ is made by the transplant surgeon. However, changes in the allocation mechanism will alter the distribution of organ offers.

[10] The new organ allocation policy was first suggested to the Israel National Transplant Council (INTC) in 2006. It was put into effect in January 2010. The new policy can be found as the Organ Transplant Law 5768-2008, Israeli Book of Laws (English translation provided by the Israeli Ministry of Justice).

an opt-out system.[11] In Singapore, citizens are assumed to be organ donors, but any person who objects to HOTA can elect not to be included. If a person objects to donate his organs upon death, he automatically gives up priority for receiving an organ should they need one in the future. Therefore, the policy currently implemented in Singapore combines all the features that may increase organ donation over the current U.S. paradigm.

Our experimental design complements the recent work of Kessler and Roth (2012). Kessler and Roth designed a laboratory experiment to test for changes in the decision to register as a donor using alterations in the allocation rule (i.e., priority rule) and financial incentives (i.e., a rebate and discount). As mentioned earlier, Kessler and Roth illustrate that organ donation rates will increase if one elects to utilize a priority rule for organ allocation. Our research extends this research in two important dimensions. One, we investigate whether or not the results expressed in Kessler and Roth (2012) are a construct of the neutral framing used in their experiment as the terms “organ” and “organ donation” are not used. Secondly, we investigate whether or not the utilization of an opt-out versus an opt-in decision rule combined with a priority rule can yield further increases in organ donation. The latter is extremely important as it investigates the marginal effects of other countries policies on the organ donation decision.

Our research can be used to further inform the policy debate surrounding the current organ donation system. We not only compare the alternative policies (opt-out and

[11] Details of the HOTA can be found http://statutes.agc.gov.sg/aol/search/display/view.w3p;page=0;query=DocId%3Adb05e985-f8a0-4d61-a906-9fd39f3b5ac9%20Depth%3A0%20ValidTime%3A02%2F01%2F2011%20TransactionTime%3A31%2F07%2F2005%20Status%3Ainforce;rec=0#legis

priority allocation rules) to the current U.S. donation system, but we also test the relative effectiveness of different alternative policies in an effort to decompose their marginal effects. In addition, we further evaluate the combination of the opt-out and priority allocation rule. The opt-out with priority system, as discussed by Breyer and Kliemt (2007) and utilized by Singapore, provides a dual-incentive for donation: avoiding the cost of opting-out and receiving priority on the waiting list. A concern with combining the opt-out and priority allocation system is that the priority rule cannot prevent the free-rider problem if the introduction of the opt-out system has already generated sufficient organ supply (Breyer and Kliemt 2007). Investigating this using observational data would be infeasible but within our experiment we can investigate whether or not this concern is valid. Our result suggests that the combination of opt-out and priority rule is significantly more effective in increasing registration rates than each of the other separable policies.

An additional advancement we make is that the instructions to subjects in our experiment are stated in terms of "organs." The framing choice that should be applied in the experimental study of policy evaluation is controversial (Abbink and Hennig-Schmidt 2006; Cason and Raymond 2011). The reason we choose descriptive framing here is that we believe the organ donation decision involves significant psychological costs that cannot be captured using abstract terms. To measure the impact of framing on experimentally-observed donation decisions, we included an additional treatment, in which the instructions are stated in abstract terms. By doing this, we are able to discuss the impact on the decision to donate "tokens" or donate "organs." Our results indicate that descriptive framing increases the rate of donor registration.

In the following section, we present our behavioral hypotheses. In Section Two, we outline the experimental design utilized to investigate our hypotheses on the impact that the opt-out versus opt-in and priority allocation rules have on the organ donation decision. In Section Three we discuss the results from the experiment and in the final section we summarize our findings.

Behavioral Hypotheses

We designed an incentivized laboratory experiment to evaluate the relative effectiveness of different organ donation mechanisms. We adopted a two-by-two design illustrated in Table 3 with the dimensions being the opt-in versus opt-out decision rule combined with the presence or absence of the priority allocation rule.

Table 3. Two-by-Two Experimental Design

	Default Options	
Allocation Rules	Opt-in	Opt-out
Without Priority Rule	Control Treatment	Opt-out Treatment
With Priority Rule	Priority Treatment	Opt-out with Priority Treatment

The *Control* treatment models the current status quo of the U.S. donation system, where subjects are non-donors by default and no one is granted priority for being a registered donor. The *Opt-out* treatment is different from the *Control* treatment only in the default choice of the donation decision. As we discussed, there are costs associated with making an active organ donation decision. In our experiment, we model these costs as a simple monetary cost, which is charged if a subject deviates from the default. Being an organ donor in the *Opt-out* treatment is less costly than in the *Control* treatment. This leads to the first hypothesis:

Hypothesis 1: Ceteris paribus, changing the default choice of the donation decision from opt-in to opt-out increases the donor registration rate.

The only difference between the *Control* treatment and the *Priority* treatment is the organ allocation rule. In the *Priority* treatment, subjects who are registered donors receive priority when they need an organ, while non-donors are only able to access available organs when the needs of the registered donors on the waiting list are satisfied. Under the priority rule, donors can jump in front of non-donors on the waiting list. That is, the priority rule increases the probability that donors who need an organ will receive one if they are registered donors. This leads to our second hypothesis:

Hypothesis 2: Ceteris paribus, changing the organ allocation rule by adding donors' priority increases the donor registration rate.

In addition to comparing each alternative mechanism with the current status quo, we are also interested in the relative effectiveness of changing the default choice and changing the organ allocation rule. More formally, we test the following hypothesis:

Hypothesis 3: Ceteris paribus, changing the current status quo to the opt-out system yields the same level of increase in the donation rate as changing to the priority rule system.

The *Opt-out with Priority* treatment combines the effect of changing both the default choice (reducing the cost of donor registration) and changing the organ allocation rule (increasing the benefit of donation). It would be expected that the dual-incentives working congruently will be more effective than in the singular case. There is some concern, however, that if the change to an opt-out default choice increases donation registration significantly such that individuals are gaining very little from the priority allocation rule, then the combination of the policies may not result in higher donation rates (Breyer and Kliemt 2007). In this case, the dual-incentives will not be more effective. We test the following hypothesis on the combination of the opt-out and priority allocation rule:

Hypothesis 4: Ceteris paribus, changing the default choice and the organ allocation rule together generates the same level of increase in the donor registration rate as changing only one of them.

The framing of the decision task may impact the decision to be donor or not within the experiment. An additional advantage of our experiments is the ability to formally investigate the framing effect. We conducted an additional treatment, a neutral framing of the *Control* treatment (opt-in combined without priority), to investigate the impact that our contextual framing of the decision process had on subject behavior. This generates our final research hypothesis:

Hypothesis 5: Ceteris paribus, subjects behave the same when the experiment is framed in abstract terms as when the experiment is framed in term of organs.

Experimental Design

There were 30 rounds in each session of the experiment and a finite number of periods in each round. Subjects were unaware of the number of rounds, but they were informed at the beginning of the experiment that only one round would be randomly selected for payment at the end of the experiment. Each subject was a virtual human in the lab who had one A organ and two B organs.[12] In each period, subjects had a 10% probability of an A organ failure and a 20% probability of a B organ failure (both B organs fail together).[13] If a subject encountered an A organ failure, she ceased to participate in that round. Whenever a subject's B organs failed, she was placed on a waiting list to receive one B organ donated by another subject.[14] Subjects waiting for a B organ were not subjected to the probability of an A organ failure. Each subject with a B organ failure had up to 5 periods to stay on the waiting list. If they did not receive a B organ within this time period, they ceased to participate in that round.

At the beginning of each round, subjects were asked to make a decision about whether they wanted to register as an organ donor (the opt-in rule) or withdraw from the donor registry (the opt-out rule). Since we only focus on the donor registration decision not the procurement process, we utilized a strong version of donation in our experiment in which registering as a donor implies being a donor upon death in the experiment.

[12] Kessler and Roth (2012) have the design of one A units with two B units, where A represents brain and B represents kidney. We keep the consistent design so that the results of our experiment are comparable.
[13] These parameters are identical to those have been used by Kessler and Roth (2012). We also conducted additional sensitivity analyses, discussed in Appendix A, specific to our design to ensure they are appropriate.
[14] The assumption here is that a subject can function normally with one B organ donated by another subject. This is consistent with kidney transplantation practice.

Subjects were told that they would earn $3 in each period that they had one active A organ and at least one active B organ. However, subjects were not able to earn any money when they were on the waiting list or no longer actively participating in the round. All donation decisions were made at the beginning of each period before knowing whether or not they would have an organ failure. All subjects were told that if they chose to be a donor and their A organ failed first each of their B organs would be donated to one of the subjects who were on the waiting list in that period. However, if their B organs failed first, their active A organ could not be donated. In addition, if they received a B organ from others, the donated B organ could not be donated again.

There were costs involved with the donation decision.[15] Subjects were told that they had to pay $0.75 to make an active donation decision (override the default choice). This cost can be thought as the psychological and physical costs associate with overriding the default choice, which was charged regardless of the donation outcome. Subjects were also told that the act of donating organs would cost them $2.25. This donation cost can be thought as the psychological costs of organ procurement. Thus, one's payoff for each round is equal to the earnings in that round minus the costs they incurred for overriding the default decision as well as donating organs. At the end of the experiment, only one round was randomly selected for payment. Subjects were told at the beginning of the experiment that if in the selected round their payoff was negative the extra costs would be charged from their $10 show-up fee.

[15] The true costs associated with organ donation cannot be measured. Here we impose these costs merely to model the incentives involved in organ donation. Since the costs vary as the default choice changes, we divide the costs into two parts, the cost of overriding the default and the cost of donation.

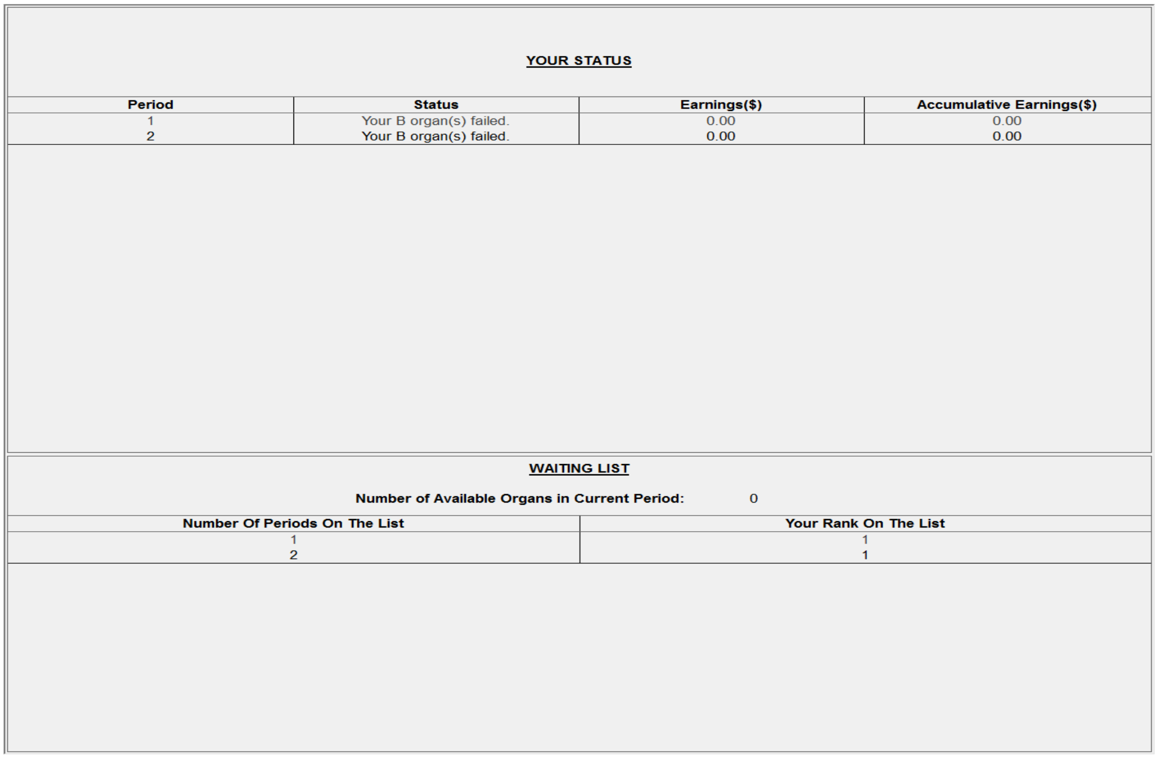

Figure 3. Illustration of the Decision Screen Used in the Experiment

After making the donation decision at the beginning of each round, subjects observed their outcome for each period, their earnings each period, and their accumulated earnings for that round. After experiencing a B organ failure, the subject began to receive the waiting list information. The waiting list information provide subjects with information on how many periods they had been waiting, their rank on the waiting list and whether they received a B organ in that period. A screenshot of the information screen presented to the subjects is shown in Figure 3. Subjects who ceased to participate in the round were not able to observe any more information until a new round started.

To investigate our five experimental hypotheses we conducted four organ-framed treatments — the *Control* treatment, the *Opt-out* treatment, the *Priority* treatment and the

Opt-out with Priority treatment — and one neutral-framed treatment.[16] In the following, we provide more detail on the five different treatments used in the experiment.

In the *Control* treatment, subjects were not organ donors by default. Those who wished to register as donors were charged $0.75 to change their status. Subjects were told that being an organ donor might potentially affect others' earnings. The donation decision was described in the experiment as follows:

> "In this round, you are not an organ donor by default. If you want to change your status to be a donor, please check the box below; otherwise, please leave it empty.
>
> □ I hereby agree to donate my organs after I cease to participate in this round."

Subjects were also told that if they chose to be an organ donor, after their A organ failed, their active B organs would be donated to those in need in the order of their rank on the waiting list. The rank on the waiting list was determined by the length of time the subjects had been waiting for a B organ. Subjects who had been waiting longer were ranked higher.[17] The rank of subjects who had the same waiting time was randomly determined. For example, if there were two subjects on the waiting list and subject 1 had been waiting for 4 periods and subject 2 had been waiting for 3 periods, subject 1 ranked higher than subject 2.

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[16] A copy of the experiment instructions for each of the five treatments can be obtained from the corresponding author.
[17] The ordering of subjects on the waiting list implicitly assumes that all the subjects are homogeneous with regard to their patient-specific characteristics that might impact their status in the queue in the real world. This is a necessary abstraction so that we can focus on the treatment effects within our experiment.

In the *Opt-out* treatment, subjects were registered organ donors by default. Those who wished to withdraw their donor registry were charged $0.75 to opt out. The choice of this treatment was described as follows:

> "In this round, you are an organ donor by default. If you want to change your status to be a non-donor, please check the box below; otherwise, please leave it empty.
>
> □ I hereby object to donate my organs after I cease to participate in this round."

Unless a subject responded that he or she did not want to be considered a potential organ donor, their active B organs were donated after an A organ failure occurred. Organs were provided to those in need according to their rank on the waiting list. Subjects on the waiting list were ranked by the length of time they had been waiting on the list, and subjects who had been waiting longer were ranked higher.

The *Priority* treatment is different from the *Control* treatment only in the ranking rule used for the waiting list. In this treatment, the default option for the donation decision was not to be an organ donor. Before making the donation decision, all subjects were informed that those who chose to be an organ donor would be given priority ranking on the waiting list. Therefore, subjects on the waiting list in this treatment were ranked on the basis of two criteria: first their donation decision, and second the length of time they had been waiting on the list. For example, if subject 1 is a non-donor who had been waiting for 4 periods and subject 2 is a registered donor who had been waiting for 3 periods, subject 2 ranked higher than subject 1.

The *Opt-out with Priority* treatment is different from the *Control* treatment in both the default option and the ranking rule on the waiting list. In this treatment, subjects were registered organ donors by default. Before making the donation decision, all subjects were informed that those who withdraw their donor registration would automatically give up their priority ranking on the waiting list. Transplantable organs would be provided to registered donors before non-donors.

The description of the decision environment to the subjects in the four treatments above was stated in terms of organ donations. We conducted an additional treatment — the *Neutral* treatment, in which the instructions to subjects were neutrally-framed, to control the effect of the experiment framing.

In the *Neutral* treatment, we adopted the same default option and ranking rule on the waiting list as the *Control* treatment. The only difference is that the experiment description was phrased in abstract terms, not in terms of organs. Subjects were informed that they would be assigned three tokens in each round: one A token and two B tokens. In each period, each subject had a 10% probability of losing their A token and a 20% probability of losing both B tokens. Subjects would earn $3 in each period that they had one A token and at least one B token. The donation decision in this treatment was described as follows:

> "In this round, you are not a donor by default. If you want to change your status to be a donor, please check the box below; otherwise, please leave it empty.
>
> □ I hereby agree to donate my B tokens after I cease to participate in this round."

We conducted eighteen experimental sessions with 15 subjects in each session. In twelve sessions, subjects played 15 rounds in one of the organ-framed treatments followed by 15 rounds in another one of the organ-framed treatments (for example, subjects participated in the *Control* treatment for rounds 1-15 and then the *Opt-out* treatment for rounds 16-30). In these sessions, subjects were stopped after round 15 and told that they would start a new treatment.[18] Subjects were handed the instructions for the new treatment and the experimenter clearly explained all changes in the rules.

In three of the remaining sessions, subjects played the *Control* treatment in all 30 rounds, while in the last three treatments subjects played the *Neutral* treatment in all 30 rounds. In these sessions, subjects were also stopped after round 15. They were told that they would start a new treatment, but there were no changes in the rules of the game. The experimenter again reviewed all the rules of the game. All of the treatment combinations used in the experiment are shown in Table 4. Lastly, the selection of which session to conduct among the eighteen sessions was randomly determined prior to subjects entering the experiment laboratory.

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[18] Subjects experienced a break after round 15, so that we had the same group of subjects that played in two different treatments.

Table 4. Number of Sessions for Each Treatment Combination

Treatment Rounds 1-15	*Treatment Rounds 16-30* Control	Opt-out	Priority	Opt-out with Priority	Neutral
Control	3 Sessions	1 Session	1 Session	1 Session	No Sessions
Opt-out	1 Session	No Sessions	1 Session	1 Session	No Sessions
Priority	1 Session	1 Session	No Sessions	1 Session	No Sessions
Opt-out with Priority	1 Session	1 Session	1 Session	No Sessions	No Sessions
Neutral	No Sessions	No Sessions	No Sessions	No Sessions	3 Sessions

At the end of each session, the subjects were presented with a brief questionnaire on their demographic characteristics and their involvement with organ donation in their own lives. They received payment after they completed the questionnaire.

Results

The experiment was performed at the Georgia State University Experimental Economics Center (ExCEN). Subjects were recruited from the undergraduate student body using a recruiting program that randomly invites registered subjects to participate in the experiment. A total of 270 subjects participated in the experiment and the average payment was $18.03.[19] Table 5 presents the descriptive statistics for the experiment. There are 8100 observations at the subject-round level. The average donor registration rate for all treatments is 41.5%. The average donation rates by treatment were as follows:

[19] The experiment was conducted using the experimental software z-Tree 3.3.6 (Fishbacher 2007).

Opt-out with Priority (70.8%), *Priority* (61.3%), *Opt-out* (48.8%), *Control* (25.3%), and *Neutral* (17.8%). The descriptive statistics clearly indicate that the highest average donation rates arise when the priority rule is utilized. This finding is consistent with that of Kessler and Roth (2012), but the descriptive statistics also illustrate that substantial gains can be achieved using just an opt-out policy.

Table 5. Descriptive Statistics for the Experiment

Variable	Obs	Mean	Std. Dev.	Min	Max
Round Profit	8100	9.216	9.83	-3	87
Round Cost	8100	0.582	0.90	0	3
Payment	8100	18.033	9.28	7	63.25
Flier	8100	0.211	0.41	0	1
Donation Registration Rate	8100	0.415	0.49	0	1
Control Treatment					
Donation Registration Rate	2700	0.253	0.43	0	1
Opt-out Treatment					
Donation Registration Rate	1350	0.488	0.50	0	1
Priority Treatment					
Donation Registration Rate	1350	0.613	0.49	0	1
Opt-out with Priority Treatment					
Donation Registration Rate	1350	0.708	0.45	0	1
Neutral Treatment					
Donation Registration Rate	1350	0.178	0.38	0	1

Figure 4 shows the percentage of subjects who were registered organ donors (those who either opted in or did not opt out) in each round of the experiment for each treatment. The line breaks indicate that subjects were stopped after round 15 in each session and then restarted under a new treatment from round 16 through 30. Figure 4 suggests that changing the default option and/or altering the organ allocation rule has a significant positive impact on the donor registration rate across all 30 rounds. The

Control treatment lies beneath the three other organ-framed treatments regardless of being played in the first or last 15 rounds. Figure 4 also suggests that the experiment framing plays an important role. The organ-framed treatment generates a higher average donor registration rate than the neutral-framed treatment. This difference in registration rate across treatments is even more notable in the last 15 rounds.

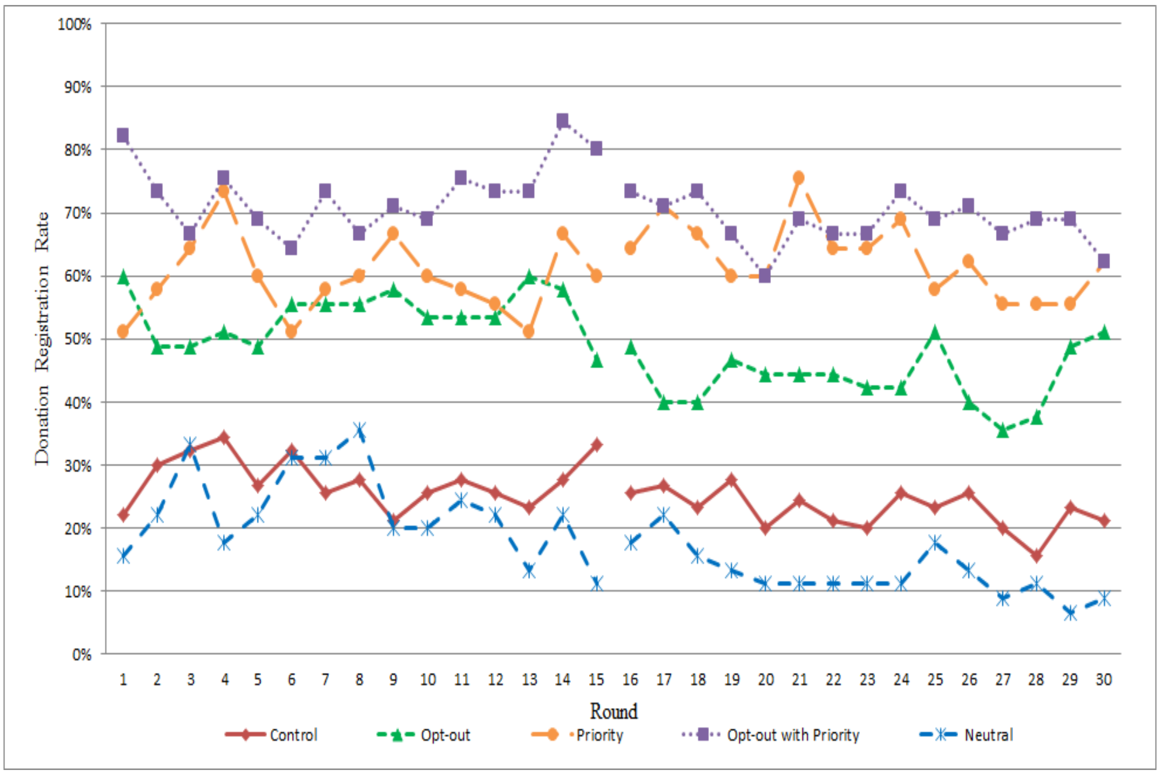

Figure 4. Percent of Donors in Each Treatment Reported by Round of the Experiment

To more rigorously investigate the treatment differences a series of Wilcoxon rank-sum tests were conducted comparing the donation decisions of subjects across treatments. Table 6 illustrates the results from these tests. The test statics are conducted using three different data partitions. The first pools all of the data across rounds, the second focuses on the first 15 rounds in the experiment and the third partition analyzes the last 15 rounds. The results from all of the Wilcoxon rank-sum tests clearly indicate that the donation decisions across treatments are statistically different from one another. They are also consistent with the observation that the donation rate is highest in the *Opt-out with Priority* treatment and the lowest is the *Neutral* treatment.

Table 6. Wilcoxon Rank-sum Tests

			Test Statistic		
Treatment		Treatment	Pooled Data	Rounds 1-15	Rounds 16-30
Control	vs	*Opt-out*	-14.988***	-11.493***	-9.713***
Control	vs	*Priority*	-22.309***	-13.895***	-17.680***
Control	vs	*Opt-out with Priority*	-27.818***	-19.491***	-19.897***
Control	vs	*Neutral*	5.376***	2.362**	5.431***
Opt-out	vs	*Priority*	-6.498***	-2.141**	-7.036***
Opt-out	vs	*Opt-out with Priority*	-11.656***	-7.402***	-9.102***
Priority	vs	*Opt-out with Priority*	-5.241***	-5.298***	-2.121**

Note: *** significant at 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Table 7. Probit Regressions on the Decision to be a Donor or Not within the Experiment

	Probit Estimation				
	(1)	(2)	(3)	(4)	(5)
Opt-out	0.249***	0.269***	0.258***	0.248***	0.252***
	(0.016)	(0.023)	(0.024)	(0.024)	(0.024)
Priority	0.365***	0.323***	0.322***	0.311***	0.315***
	(0.015)	(0.022)	(0.023)	(0.023)	(0.023)
Opt-out with Priority	0.451***	0.450***	0.437***	0.428***	0.431***
	(0.014)	(0.020)	(0.021)	(0.021)	(0.021)
Neutral	-0.098***	-0.058**	-0.055**	-0.055**	-0.052**
	(0.017)	(0.024)	(0.025)	(0.025)	(0.025)
Second Treatment		-0.058***	-0.062***	-0.062***	-0.065***
		(0.020)	(0.021)	(0.021)	(0.021)
Second×Opt-out		-0.038	-0.030	-0.029	-0.023
		(0.033)	(0.033)	(0.033)	(0.034)
Second×Priority		0.094***	0.092***	0.090***	0.100***
		(0.035)	(0.035)	(0.035)	(0.036)
Second×Opt-out with Priority		0.005	0.014	0.010	0.014
		(0.035)	(0.035)	(0.035)	(0.036)
Second×Neutral		-0.091**	-0.093**	-0.088**	-0.085**
		(0.035)	(0.035)	(0.036)	(0.036)
Earnings Last Round			0.003***	0.001*	0.001*
			(0.001)	(0.001)	(0.001)
Received an Organ Last Round				0.047**	0.047**
				(0.021)	(0.021)
Organ Benefit Last Round				0.003*	0.003*
				(0.001)	(0.001)
Male					0.011
					(0.012)
White					0.076***
					(0.019)
Donor in Real Life					0.050***
					(0.012)
N	8100	8100	7830	7830	7801
Chi2	1375.02	1425.66	1388.24	1416.61	1466.78
Pseudo R2	0.1250	0.1297	0.1306	0.1333	0.1385

Note: All variables are expressed as marginal values. Standard errors are in parentheses. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

We additionally conducted a series of probit regressions to investigate the marginal effect of different mechanisms on organ donation decisions. The results are illustrated in Table 7. The independent variables in the probit regressions include the four treatment dummy variables *Opt-out*, *Priority*, *Opt-out with Priority*, and *Neutral* corresponding with the different cells of the experimental design (Model 1). The reference group is the donation decision in the *Control* treatment, which is the opt-in system currently used in the U.S. We further control whether a decision is made in the first 15 rounds or in last 15 rounds of the experiment using a dummy variable interaction term (Model 2). The dummy variable *Second Treatment* equals to 1 if a treatment is played in the last 15 rounds and it is interacted with the four primary treatment dummies in Model 1. Regression Models 3 and 4 control for the effect of information in the previous round on the current donor registration decision. *Earnings Last Round* represents earnings from the previous round (Model 3). *Received an Organ Last Round* is a dummy variable that equals to 1 if the subject received an organ donated by others in the previous round. Organ *Benefit Last Round* captures the earnings from the previous round after receiving an organ (Model 4). Lastly, regression Model 5 includes demographic control variables *Male*, *White*, and *Donor in Real Life*. The latter is a dummy variable indicating that the subject is currently a registered organ donor.

Focusing on our first research hypothesis the results for the experiment validate our hypothesis that the opt-out rule generates a higher donor registration rate than the opt-in rule. Figure 4 illustrates that the opt-out rule has a significant positive impact on the donor registration rate in all rounds. Across all rounds, the *Opt-out* treatment has an average donation rate of 48.8%, which is almost twice the average donation rate of 25.3% in the *Control* treatment. Over the first 15 rounds, the *Opt-out* treatment had an average donation rate of 53.8%, while the *Control* treatment had a much lower average rate of 27.7%. Over rounds 16-30, the *Opt-out* treatment had a rate of 43.9%, while the *Control* treatment only had a rate of 22.9%. Results from the non-parametric tests in Table 6 are consistent with the observation that the *Control* treatment had a statistically significant lower donor registration rate than the *Opt-out* treatment regardless of being played in the first or last 15 rounds. The Wilcoxon rank-sum tests are -14.988, -11.493 and -9.713 for pooled data, first 15 rounds and last 15 rounds of the experiment respectively when comparing the *Control* treatment with the *Opt-out* treatment.

The probit regressions in Table 7 also support our first research hypothesis. The positive and highly statistically significant coefficient on the *Opt-out* dummy variable in regression Model 1 indicates that subjects are about 25% more likely to register as a donor in the *Opt-out* treatment than in the *Control* treatment across all 30 rounds. Furthermore, this finding is robust to the additional controls used in the other econometric specifications (Models 2 through 5). This represents an almost 100% increase in the donor registration rate over the 25.3% donor registration rate observed in the *Control* treatment. This finding suggests that a significant increase in the donation rate can be achieved by just introducing the opt-out rule.

In order to test our second research hypothesis we must compare the *Control* treatment (the baseline opt-in without priority system) with the *Priority* treatment as well as the *Opt-out* treatment with the *Opt-out with Priority* treatment. A statistically significant and higher donor registration rate for the *Priority* and *Opt-out with Priority* treatments, relative to the *Control* and *Opt-out* treatments respectively, will support our second research hypothesis. Figure 4 illustrate that the *Priority* treatment has a higher average donor registration rate than the *Control* treatment in all rounds. The average donation rate for the *Priority* treatment is 61.3% over all rounds, 59.6% over the first 15 rounds, and 63.0% over the last 15 rounds. A higher donation rate is also observed in the *Opt-out with Priority* treatment when compared to the *Opt-out* treatment. The average donation rate for this treatment was 70.8% over all rounds, 73.2% for the first 15 rounds and 68.4% for last 15 rounds.

The Wilcoxon rank-sum tests also demonstrate that the *Control* treatment generates statistically significantly lower donor registration rates than the *Priority* treatment over all rounds as well as in rounds 1-15 and rounds 16-30 separately. The test statistics are -22.309, -13.895, and -17.680 when comparing the *Control* treatment with the *Priority* treatment for all the rounds, rounds 1-15 and rounds 16-30 respectively. The results comparing the *Opt-out* treatment with the *Opt-out with Priority* treatment are similar to those observed when comparing the *Control* treatment with the *Priority* treatment; adding the priority allocation rule increases the rate of organ donation. The Wilcoxon rank-sum test statistics are -11.656, -7.402 and -9.102 when comparing the total rounds, rounds 1-15 and rounds 16-30 respectively. This said, the marginal differences between the *Opt-out* treatment and the *Opt-out with Priority* treatment are not as large as the marginal differences between the *Control* treatment and the *Priority* treatment. The donor registration rate increased by 45% going from the *Opt-out* treatment to the *Opt-out with Priority* treatment whereas it increased by 142% going from the *Control* treatment to the *Priority* treatment.

The probit results also illustrate the treatment differences as the statistically significant and positive coefficient on *Priority* indicates that the donation rate increases by between 31.5% and 36.5%, depending on the model assumptions. The statistically significant and positive coefficient on *Opt-out with Priority* indicates that the donation rate increases by between 42.8% and 45.1%, depending on the model assumptions. Both of these coefficients are interpreted relative to the *Control* treatment so the relative gains observed under the *Opt-out with Priority* treatment must be purged of the *Opt-out* effect solely to be comparable to the *Control* versus *Priority* treatment. Both of these results are consistent with those observed in Kessler and Roth (2012) as it is clearly evident that changing the allocation rule to a priority rule will increase the donor registration rate. This said, these comparisons do raise the question of whether or not just using the *Opt-out* rule is capable of providing a similar gain as that observed when altering the allocation rule. This is more formally investigated under our third research hypothesis.

Our previous research hypotheses have illustrated that altering either the organ allocation rule, using a priority rule system, or the default choice, going from an *Opt-in* to an *Opt-out* program, will increase the organ donor registration rate. The results from our Wilcoxon rank-sum tests as well as the probit regressions clearly indicate that the organ donation rate is greater when comparing either the *Opt-out* treatment or the *Priority* treatment with the *Control* (opt-in) treatment. From a public policy perspective it may be of interest whether or not the relative gains are comparable, as both policies require different forms of administrative change that may or may not be more palatable for different administrations and the populous. On average going from the *Control* treatment to the *Opt-out* treatment increased the organ donation rate from 25.3% to 48.8% whereas going to the *Priority* treatment increased it to 61.3%. This provides the first evidence that does not support our third research hypothesis that they generate equivalent marginal gains in the organ donor rate. Our regression results further confirm this observation. Comparing the coefficient on the *Opt-out* treatment with the *Priority* treatment illustrates that in all the models estimated the *Priority* treatment coefficient is statistically significant and greater than the *Opt-out* treatment coefficient ($p<0.01$). Therefore, our third research is not supported. However, it is important to note that changing the default choice, going from an *Opt-in* to an *Opt-out* system, is able to generate approximately 80% of the gains achievable when altering the allocation rule. Therefore, although it is not a one-to-one equivalent the gains are significant enough that policy makers may wish to consider changing just the default option versus the allocation rule if changing the default option is a more palatable public policy.

Investigating our third research hypothesis illustrated that sizable gains are achievable by changing either the allocation rule or the default choice, with the allocation rule outperforming the default choice by a small margin. Our fourth research hypothesis investigates whether or not using either of these changes in isolation yields the same result as combining them and utilizing an *Opt-out with Priority* program. Figure 4 clearly illustrates that *Opt-out with Priority* treatment outperforms both the *Opt-out* treatment and the *Priority* treatment separately, as it generated the highest donation rate of all the treatments. This does not support our fourth research hypothesis, as it is clear that combining both changes exceeds either of them individual. Over all the rounds the average donation rate was 70.8% for the *Opt-out with Priority* treatment, compared with 48.8% and 61.3% observed under the *Opt-out* and *Priority* treatments respectively. This is also true when comparing the results from rounds 1-15 and rounds 16-30. Over the first 15 rounds, the *Opt-out with Priority* treatment had an average donation rate of 73.2%, while the *Opt-out* treatment was 53.8% and the *Priority* treatment was 59.6%. Over the last 15 rounds, the *Opt-out with Priority* treatment had an average donation rate of 68.4% while *the Opt*-out treatment was 43.9% and *the Priority* treatment was 63.0%.

The non-parametric tests indicate that the *Opt-out with Priority* treatment outperforms all the other treatments and that the results are statistically significant. The tests also show that the *Opt-out with Priority* treatment generates statistically significantly higher donation registration rates than all the other treatments regardless if they are played first (rounds 1-15) or last (rounds 16-30). The test statistics comparing the *Opt-out* treatment and the *Priority* treatment with the *Opt-out with Priority* treatment concretely invalidates our fourth research hypothesis, as it evidences that in all cases the combined effect of the *Opt-out with Priority* treatment exceeds the constituent changes separately. Results from the probit regressions in Table 7 are also consistent with this observation. The coefficient on *Opt-out with Priority* in regression (1) is positive and highly statistically significant, representing that subjects are about 45% more likely to donate in the *Opt-out with Priority* treatment than in the *Control* treatment. Using estimates from regression (1), we find that *Opt-out with Priority* also performs better than either *Opt-out* (p<0.01) or *Priority* (p<0.01) treatments separately.

As mentioned earlier, our experiment is fundamentally different from Kessler and Roth's (2012) experiment as it investigates the separable and combined effects of changing the allocation rule as well as the default option and it contextualizes the decision environment. Our fifth and final research hypothesis investigates whether or not the abstract and contextual framing generates the same donor registration rates. Our experimental results indicate that the contextual framing leads to a larger donor registration rate than a neutral framing. Evidence of this can be seen in Figure 4, where the neutral framing donation rates are on average lower than those observed in the contextual framing treatment. However, the differences are not as clear over rounds 1-15 as they are over rounds 16-30.

The Wilcoxon rank-sum tests and the probit regression results clarify this treatment effect. The non-parametric tests demonstrate that the *Control* treatment generates statistically significantly higher donor registration rates than the *Neutral* treatment. This result is still statistically significant for all rounds and if we only focus on the first 15 rounds or the last 15 round; the test statistics are 5.376, 2.362 and 5.431 for the respective partitions of the data. The parametric tests estimate the likelihood of donation in each treatment. The significant negative coefficient on *Neutral* in regression Model 1 indicates that subjects are about 10% less likely to register as a donor in the neutral-framed treatment than in the organ-framed treatment across all 30 rounds. When controlling for other covariates in the experiment, Models 2 through 5, this percentage decreases to around 5%. Therefore, using a neutral framing, as was conducted by Kessler and Roth (2012), will generate a lower rate of donor registration.

Robustness of Results

Table 7 also report results from probit regressions with controls for order effects, information from the previous round and demographic controls. Results are qualitatively the same when we add additional controls. Regression (2) includes a control variable *Second Treatment* and its interactions with the treatment variables. The significant negative coefficient on *Second Treatment* shows that subjects are 6% less likely to register when they played the *Control* treatment in the last 15 rounds. The significant positive coefficient on the interaction term *Second*×*Priority* indicate that the *Priority* treatment has an even stronger impact on the registration rate when it was played after subjects have participated in another organ-framed treatment.

Regression (3) controls for the effect of earnings in the previous round on donor registration. The significant positive coefficient on *Earnings Last Round* suggests earnings in the previous round have a positive impact on the donation decision. Although subjects played multiple rounds in the experiment, only one round was randomly selected for payment at the end of each session. Subjects' donation decisions should not be affected by their previous earnings. However, subjects could get information about others' donation decision through receiving a B organ when needed in a previous period of the experiment. We further included variables *Received an Organ Last round* and *Organ Benefit Last Round* in regression (4). The significant positive coefficient on *Received an Organ Last Round* shows that subjects are 5% more likely to donate if they received a B organ in the previous round. Since receiving a B organ leads to additional earnings, especially earnings after receiving a B organ in the previous round, this may affect the likelihood of donation. The coefficient on *Organ Benefit Last Round* is positive and significant at 10% level. This indicates that the longer one remains active after receiving a donated organ (resulting in higher earnings that round), the greater the probability they will be a subsequent donor. Regression (5) controls for demographic information of the subjects. Among our selected subjects, whites are 8% more likely to register as a donor than all non-white races. Subjects who were self-reported as organ donor in real life are 5% more like to register as a donor. These two results are statistically significant.

Conclusion

A fundamental limitation to the success of transplantation-based medical treatments is the supply of organs. Although there have been sizeable gains in the development of immunosuppressant drugs that have increased the pool of potential candidates for a donated organ, there still exists an ever widening gap between the number of organ donors and the number of patients on the waiting list. Recently, the transplantation community has made sizable gains in the utilization of donated organs (Howard et al. 2007; Shafer et al. 2008), but future changes in public policy may be required to increase the rate of organ donation within the United States in order to save more lives. Drawing from the experiences in other countries, changes in public policy can arise from either changing the allocation rule to provide priority for those who are registered donors or from changing the default choice from a standard opt-in to an opt-out system. Furthermore, as is the case in Singapore, it is possible to combine both changes in the allocation rule and default choice. The results from our experiment provide the first rigorous investigation of changing both the allocation rules and default choice separately as well as jointly.

Our results are consistent with those previously observed in Kessler and Roth (2012), in that changing the allocation rule to a priority rule system yields a sizable increase in the organ donation rate. We further extend this finding to illustrate that the priority rule generates a larger marginal gain than altering the default choice from an opt-in to an opt-out public policy. In addition, we find that combining both an opt-out and priority rule policy will provide the largest gains in the organ donation rate and that gains are substantially different from the individual effect of each public policy change. We further find evidence that the context of the experiment used to investigate the organ donation decision does matter with a contextualized decision environment yielding an increase in organ donation rates of around 5%.

An important public policy finding that our results illustrate is that approximately 80% of the gains observed under a priority allocation rule are achievable by switching from an opt-in to an opt-out public policy. This is extremely important from a public policy perspective as the costs, both pecuniary and psychological, associated these two possible changes may be substantially different. A change in the allocation rule redefines the rules of whom is to receive priority for an organ which post-transplantation may invoke concepts of fairness and equality as enforcement of this rule may still rely on the deceased donors next-of-kin being amenable to their deceased's donation preferences. On the other hand, an opt-out policy redefines the rule of who owns a deceased's individuals organs from the next-of-kin to the government. The choice of which option is more appropriate is subject to the policy maker's discretion and the constituents that they represent.

Chapter III: Improving the Approach to Organ Donor Registration

Introduction

Numerous lives with organ failure could be saved by organ transplants. In the United States, deceased donors supply the majority of transplanted organs. Based on data from the Organ Procurement and Transplantation Network (OPTN), about 78% of U.S. organ transplants performed in 2012 were from decreased donors. [20] Despite the large need for deceased donor organs (over 120,000 people are currently waiting for a life-saving transplantable organ), only 42.7% of residents over the age of 18 in the United States are registered organ donors (Donate Life America 2012).[21] Since 1995, over 111,000 people on a waiting list to receive an organ have died.[22] Clearly, the current donor registration system fails to produce enough potential deceased donors to satisfy the large organ demand.

This paper proposes to improve donor registry by adding a persuasive message with the registration request. A persuasive message is a request for action when it is supposed that the recipient maybe reluctant or unaware. In this paper, I consider a persuasive message enhancing the benefits of organ donation, such as how many lives can be saved by one deceased organ donor.[23] In the United States, an individual who

[20] Based on OPTN data as of May 17, 2013, around 21,000 organ transplants performed in 2012 were from decreased donors.

[21] Waiting list numbers are based on Organ Procurement and Transplantation Network (OPTN) data as of April 27, 2012. Registration rate is reported by statistics of Donate Life America.

[22] Based on OPTN Death Removals Data as of May 10, 2013.

[23] One deceased donor who can donate multiple organs (heart, lung, kidneys, pancreas and intestine) and tissues (cornea, bone, skin, heart valves, tendons, veins, etc.) has the potential to save as many as 50 lives through organ and tissue donation.

wishes to be a deceased donor can register through the department of motor vehicles in his state of residence. The request for donor registration is commonly simple; an individual can either check a "Yes" box following a generic question such as "Do you wish to register to be an organ and tissue donor?", or leave it empty. I experimentally investigate whether supplementing this generic question with a persuasive message increases donor registration rate.

The message proposal is inspired by the evidence of the effectiveness of persuasive messages on charity fundraising and healthy behavior promotion. Just as the organ donation, many charity organizations are experiencing a shortage in donations as the result of an economic downturn. This leads to the literature in fundraising that studies the effectiveness of persuasive messages on promoting donations. One key factor of the persuasive message in order to motivate donation is that it carries evidence that increases the perceived value of the Charity goal, and therefore motivates donation (Das et al., 2008). Burt and Strongman (2004) used the method of psychological questionnaire to examine the effect of including image evidence within the donation request on donations. The authors find that using image of children is particularly powerful to motivate donations, and image of children showing negative emotions generates even stronger emotional reactions among potential donors. Another closely related work by Chou and Murnigham (2013) investigates how the persuasive message influences decisions on blood donation. The authors conducted a field experiment through the collaboration of the Red Cross, where messages about blood donation across different frames ("save a life" versus "prevent a death") and urgency level ("urgent needs" versus "moderate needs”) was emailed to 19 undergraduate residential groups at the Northwestern University. They find that among their selected subjects, those who received “prevent a death” emails were more likely to donate, while emails indicating “urgent needs” did not generate more donors. Jeong et al. (2011) further suggest that gain/loss-framed messages have different effect on audience with different dispositional motivation (approach-oriented versus avoidance-oriented) and charity appeals should be tailored according to the motivational dynamics of the target audience. An organ donation related work by Anker and Feeley (2011) focuses on the usage of messages in obtaining donation consent. The authors studied 15 specific messages across 4 domain areas and find the content of request message is associated with familial consent.

Within the health domain, persuasive messages have been found to be effective to improve health practice. Morman (2000) investigates whether a persuasive message can motivate men to begin regular performance of the testicular self-exam (TSE) in order to detect testicular cancer. The author finds that a fear message can educate individuals about the threat of diseases and motivate them to perform TSE on a regular basis. Rothman and Salovey (1997) proposed that how a message is framed alter a message’s persuasive impact on different health behaviors. A loss-framed message is more persuasive when developing initiatives to promote detective behaviors, while a gain-framed message is more effective when targeting prevention behaviors. Rothman et al. (1999) further conducted two psychological experiments which provide empirical support to the theoretical framework by Rothman and Salovey (1997). The two experiments investigate the framework in the context of both hypothetical and real health problems.

Their results directly confirm the relation between message framing and health behaviors predicted by Rothman and Salovey (1997).

There are a number of reasons why such a persuasive message may increase the number of registered organ donors. First, it may educate potential donors of the value of organ donation and make them more knowledgeable. Knowledge about organ donation has been shown to be significantly associated with the behavioral intent to register as a donor (Morgan and Miller, 2002). This relation is also evidenced in the context of educational policy interventions that aims to increase intention to be organ donors (Quinn et al., 2006; Thornton et al., 2012).

Second, a persuasive message could create an emotional connection between the audience and the recipient in need of their help. For instance, it evokes empathy that makes the audience perceive more of themselves in others who are in need of help, and therefore can increase helping behavior (Cialdini et al., 1997).

Third, this message addresses the likelihood that the goal of charity can be attained — one donor may potentially save as many as 50 lives. Individuals are not likely to donate unless they believe donating could help solve the problem and reach the charity goal (Das, Kerkhof, and Kuiper, 2008). Donations are more likely when there is evidence that the charity goal can be achieved, such as the charity organization is perceived to be effective (Sargeant, West, and Ford, 2004), or the information that others contribute as well (Sell and Wilson, 1991; Croson and Marks, 1998; Clark, 2002). This leads us to the hypothesis:

Hypothesis: Changing the content of the donor registration request — by including a persuasive message about the benefits of organ donation — increases the registration rate.

I examined the hypothesis by using a laboratory experimental method. The basic design bears similarity to Li, Hawley, and Schnier (2013), where subjects played virtual lives and the only decision is to choose whether or not to be an organ donor. I kept consistent experimental parameters and implementation with Li, Hawley, and Schnier (2013), since I combined part of their data into my data analysis. Subjects started each round of the experiment with a donor registration decision. In a control treatment, subjects faced a standard registration request inspired by the current donor registration request applied in the United States. This is compared to an information treatment where the request includes a persuasive message highlights the value of donation. The persuasive message is shown to have a positive impact on donation decisions in the early rounds of the experiment. Subjects are about 13 percent more likely to register as a donor in round 1 of the information treatment than the control treatment. The results also indicate that the information treatment affects donation decisions in the experiment mainly among subjects who are not organ donors in real life, while the treatment effect is very small for those who are self-reported organ donors. Subjects who are non-donors in real life are about 21 percent more likely to register as a donor in the experiment when they are provided with persuasive messages.

This paper proceeds as follows. The following section outlines the experimental design utilized in this study. Section Three represents the results from the experiment. The final section concludes the paper.

Experimental Design

In the experimental design, each subject lives a virtual life where the only decision is to be an organ donor or not. The description of the experiment in the instructions to subjects was stated in terms of organ donations. Each round of the experiment, the subject was endowed with one A organ (not transplantable) and two B organs (transplantable). In each period, each subject had 10% probability of A organ failure and 20% probability of B organs failure (both B organs fail together). No subject was involved into both organ failures at the same time. Whenever an A organ failure happened to a subject, he was considered dead in that round and the round ended for him. When a subject's A organ failed, his B organs were still alive and transplantable in that period. Whenever a subject's B organs failed, he was placed on a waiting list to receive one B organ donated by others (for example, people have two kidneys, but can still live with one healthy kidney). Subjects with B failure had up to 5 periods to stay on the list. If they did not receive a B organ within the given periods, they were considered dead in that round and the round ended for them.

Subjects started each round with the default of being a non-donor. At the beginning of each round subjects were asked to make a decision about whether they wanted to register as an organ donor, so that subjects made their decisions before knowing whether they would be involved in an organ failure. All subjects were told that if they chose to be a donor and their A organ failed first, each of their B organs would be donated to the subjects who were on the waiting list in that period. However, if their B organs failed first, their active A organ could not be donated. In addition, if they received a B organ from others, this received B organ could not be donated again.

There were two types of costs involved in the donation decision making.[24] Subjects were told that they had to pay $0.75 to register as a donor. This cost can be thought as the transaction cost of donor registry. Subjects were also told that a virtual donation would cost them $2.25. This donation cost can be thought as the psychological costs for the donors and their families to actually donate organs.

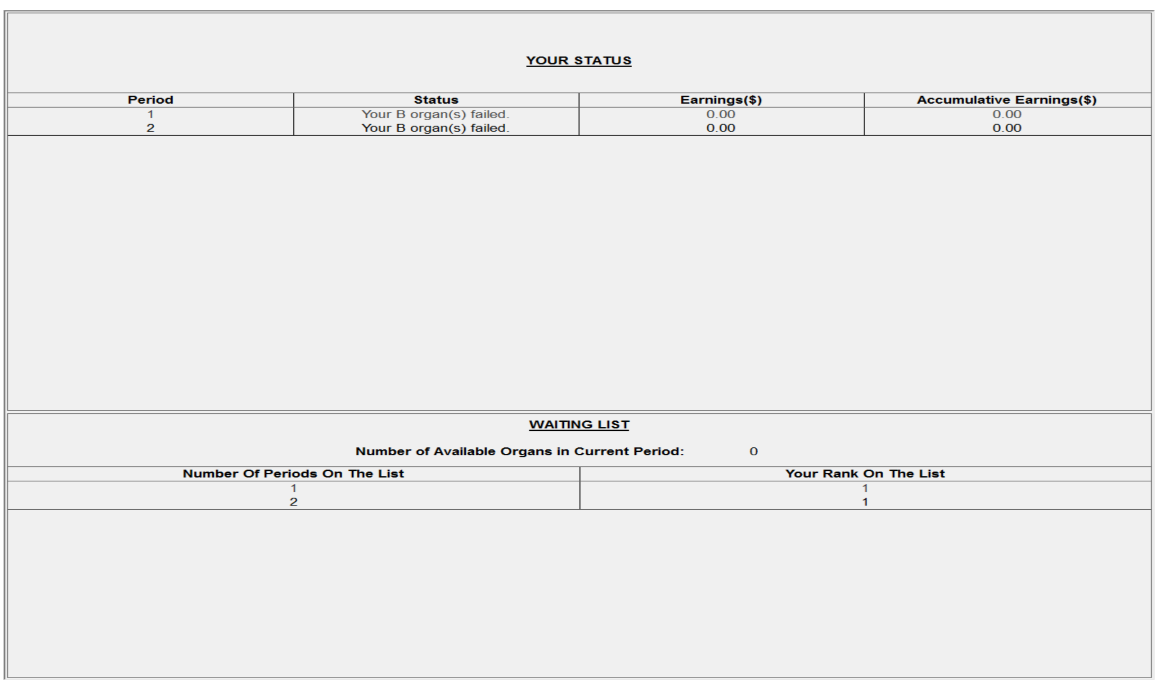

Figure 5. Screenshot of the Experimental Program

[24] This is a consistent design with Li, Hawley and Schnier (2013). Li, Hawley and Schnier (2013) designed two types of costs to measure the effect of different default choices on donation decision. Since I am using part of the data from Li, Hawley and Schnier (2013) in my analysis, I kept the same design so data from the two works is comparable.

After making the donation decision, subjects observed their health status. Subjects were told at the beginning of the experiment that they were able to earn $3 in each period that they had both one A organ and at least one B organ. Figure 5 shows a screenshot of the information screen that was presented to the subjects. Subjects received information about their health status in each period, their earnings in each period, and their accumulated earnings in that round. Once a subject's B organs failed, they started to observe the waiting list information: how many periods they have been waiting, their rank on the waiting list and whether they receives a B organ in that period. If subjects are considered dead, they are not able to observe any more information until the new round starts.

All subjects were informed at the beginning of the experiment that only one round would be randomly selected to be paid at the end of the experiment. Subjects were told at the beginning of experiment that they had earned $10 for showing up at the experiment. If their earnings were less than the donation cost in the selected payment round, the extra cost would be deducted from their show-up earnings.

The experimental treatments varied the content of the registration request provided to subjects. In the control treatment, subjects faced a request states:

> "In this round, you are not an organ donor by default. If you want to change your status to be a donor, please check the box below; otherwise, please leave it empty.

> □ I hereby agree to donate my organs after I cease to participate in this round."

Besides the message above, subjects in the information treatment received a message about benefits of organ donation in the experiment — the additional earnings a subject earned on average after he was saved by a B organ donated by others. This information was collected from data attained in Li, Hawley, and Schnier (2013). The message was stated as follows:

> "According to the data collected from previous sessions of the same experiment series, a subject who was saved by a donated organ earned **$10.18 more** on average in each round, compared with the average earnings of $18.63 per subject per round."

I conducted three experimental sessions of each treatment, with 15 subjects in each session. There were 30 rounds in each session of the experiment. In each session, subjects experienced a break between round 15 and 16.[25] Subjects were stopped after round 15 and told that they would start a new treatment, but there was no change in the rules. The experimenter again handed out the instructions and reviewed all rules.

[25] This is another consistent design with Li, Hawley and Schnier (2013). Li, Hawley and Schnier (2013) adopted a within-subject design where subjects in each session play the first 15 rounds in one treatment and followed by 15 rounds in another treatment. I combined data from three sessions in Li, Hawley and Schnier (2013) with my data analysis. In these three sessions, Li, Hawley and Schnier (2013) had subjects play a control treatment through all 30 rounds, though they still experienced a break between round 15 and 16. I kept the same design so data from the two works are comparable.

After finishing all 30 rounds, subjects were informed of which round was randomly selected for payment. At the same time, subjects were asked whether they would like to receive a flier containing some information about organ donation. While the experimenters were preparing for payment, subjects were presented with a questionnaire on their demographic characteristics. After they completed the questionnaire, subjects received their payments in cash one by one and those who requested fliers were also provided with an organ donation flier.

Results

The experiment was performed in the laboratory of the Georgia State University Experimental Economics Center (ExCEN).[26] Subjects were recruited from the undergraduate student body using a recruiting program that randomly invites registered subjects to participate in the experiment. Data of the control treatment was collected from three sessions of the experiment by Li, Hawley, and Schnier (2013), which was conducted in April 2012. A total of 45 subjects participated in these 3 sessions of experiment and the average payment was $17.38. Three session of the information treatment were conducted in April 2013, with the total participation of 45 subjects. The average payment for the last three sessions was $15.72. Table 8 presents the descriptive statistics for all six sessions of the experiment. There are 2700 observations at the subject-round level. The average donor registration rate for all sessions is 30.7%, while the average payment is $16.55. Among all selected subjects, 47.8% of them were self-

[26] The experiment was conducted on computers using the experimental software z-Tree 3.3.6 (Fischbacher, 2007).

reported as organ donors in real life, and 22.2% requested a flier containing additional information about organ donation at the end of the experiment.

Table 8. Descriptive Statistics for the Experiment

Variable	Obs	Mean	Std. Dev.	Min	Max
Round Profit	2700	8.546	9.338	-3	78
Payment	2700	16.550	7.103	7	34
Donor Registration Rate	2700	0.307	0.461	0	1
Real Life Donors	2700	0.478	0.500	0	1
Organ Donation Fliers	2700	0.222	0.416	0	1
White	2700	0.200	0.400	0	1
Male	2700	0.422	0.494	0	1

I conducted a series of Wilcoxon rank-sum tests to compare donation decisions of subjects across treatments. Table 9 illustrates the summary statistics across treatments and the results from the tests. The results are reported according to four different data partitions. The first pools the data across all rounds. The second partition focuses on the first 10 rounds of the experiment, the third one focuses on round 11-20, while the forth one focuses on the last 10 rounds. The average registration rate across all rounds is 29.26% for the control treatment and 32.15% for the information treatment. The difference in registration rates across treatment is not statistically significant. Over the first 10 rounds, the average registration rate is 38.89% for the control treatment, which is higher than the 30.44% rate in the control treatment. This result is statistically significant. However, this behavioral difference across treatments decreases as subjects played more rounds. One explanation could be subjects in the control treatment collected information about the game through playing multiple rounds, including the additional earnings a subject earned after he was saved by a donated organ. Whether or not providing this information creates no difference across treatments, as subjects have learned the information voluntarily.

Table 9. Percent Choosing to be a Donor within the Experiment

	Pooled Data		Rounds 1-10	Rounds 11-20	Rounds 21-30
	Obs	Percent (SD)	Percent (SD)	Percent (SD)	Percent (SD)
Control treatment					
Session 1	450	23.11(42.20)	26.67(44.37)	23.33(42.44)	19.33(39.62)
Session 2	450	35.33(47.85)	34.00(47.53)	38.67(48.86)	33.33(47.30)
Session 3	450	29.33(45.58)	30.67(46.27)	28.00(45.05)	29.33(45.68)
Total	1350	29.26(45.51)	30.44(46.07)	30.00(45.88)	27.33(44.62)
Information treatment					
Session 4	450	27.11(44.50)	31.33(46.54)	28.00(45.05)	22.00(41.56)
Session 5	450	20.22(40.21)	28.67(45.37)	19.33(39.62)	12.67(33.37)
Session 6	450	49.11(50.05)	56.67(49.72)	56.00(49.80)	34.67(47.75)
Total	1350	32.15(46.72)	38.89(48.80)	34.44(47.57)	23.11(42.20)
Across treatment comparisons					
Rank-sum test (*p*-value)					
Total	-1.627 (0.1038)		-2.600(0.0078)	-1.426(0.1539)	1.458(0.1450)

Since there are not clear results from the non-parametric tests showing that subjects behaved differently across treatments in the experiment, I further conducted a series of probit regressions with additional controls to investigate the marginal effect of the persuasive message on donation decisions. The results of regressions with standard errors clustered by individual are illustrated in Table 10. The reference group of the regressions is donation decision in the control treatment and the independent variables include a treatment dummy variable *Information*. Regression Model 1 controls for round information and its interaction term. Since subjects experienced a break between round 15 and 16, I also control whether a decision is made in the first 15 rounds or in the last 15 rounds of the experiment in Model 1. The dummy variable *Second Treatment* equals to 1 if a treatment is played in the last 15 rounds and it is interacted with the treatment dummy. Regression Model 2 additionally controls for whether the subject is a registered organ donor in real life using a dummy variable interaction term. The dummy variable *Real Life Donor* equals to 1 if a subject was self-reported as a currently registered donor. At the end of the experiment, we collected subjects' preference toward information regarding organ donation by asking whether they want to receive a flier containing information about organ donation. Regression Model 3 includes a dummy variable *Flier*, which equals to 1 if a subject was willing to receive the organ donation flier. I further control the effect of information in the previous round on the current registration decision (Model 4). *Earnings_Last* captures earnings from the previous round. *Saved_Last* is a dummy variable which equals to 1 if the subject received an organ donated by others in the previous round. *SavedEarn_Last* represents the additional earnings from the previous round after receiving an organ. Lastly, regression Model 5 includes demographic control variables *Male* and *White*.

Table 10. Probit Regression on the Decision to be a Donor or Not within the Experiment

	Probit Estimation				
	(1)	(2)	(3)	(4)	(5)
Information	0.137**	0.214***	0.215***	0.217**	0.208**
	(0.036)	(0.007)	(0.007)	(0.011)	(0.014)
Round	-0.002	-0.002	-0.002	-0.003	-0.003
	(0.477)	(0.493)	(0.463)	(0.286)	(0.282)
Round×Info	-0.009**	-0.009**	-0.009**	-0.009**	-0.009**
	(0.022)	(0.023)	(0.024)	(0.040)	(0.039)
Second Treatment	0.002	0.001	0.003	0.009	0.009
	(0.947)	(0.971)	(0.929)	(0.811)	(0.798)
Second×Info	0.049	0.050	0.049	0.051	0.050
	(0.379)	(0.375)	(0.392)	(0.388)	(0.391)
Real Life Donor		0.163**	0.116	0.121	0.107
		(0.030)	(0.148)	(0.146)	(0.200)
*RealDonor*Info*		-0.155	-0.127	-0.138	-0.126
		(0.107)	(0.206)	(0.172)	(0.210)
Flier			0.152*	0.151*	0.147*
			(0.054)	(0.061)	(0.063)
Earnings_Last				0.001	0.001
				(0.299)	(0.299)
Saved_Last				-0.013	-0.012
				(0.705)	(0.733)
SavedEarn_Last				0.006**	0.006**
				(0.015)	(0.021)
Male					0.078
					(0.182)
White					0.005
					(0.944)
N	2700	2700	2700	2610	2610
Chi2	13.989	18.843	24.576	45.25	46.093
Pseudo R2	0.01	0.023	0.036	0.043	0.048

Note: All variables are expressed as marginal values. Clustered errors by individual (80 clusters). p-values in parentheses. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

The probit results also illustrate the treatment differences as statistically significant in early rounds of the experiment. Coefficients on *Information* and *Round*×*Info* in Model 1 indicate that the persuasive message made subjects about 13% more likely to register as a donor in round 1 (p = 0.0446). The negative coefficient on *Round*×*Info* suggests that the impact of the persuasive message decreases as subjects played more rounds. Regression Model 1 also controls for whether a decision was made in the first fifteen rounds or in last 15 rounds of the experiment. Coefficients on *Second Treatment* and *Second*×*Info* suggest there is not restart effect after the break in either the control treatment or the information treatment (p = 0.2208).

Subjects' registration decisions in the organ-framed experiment are significantly associated with their organ donation decisions in real life (Li, Hawley and Schnier, 2013). Regression Model 1 shows consistent findings that subjects who were self-reported as organ donors in real life are 16% more likely to register as a donor in the experiment, and the result is significant at the 5% level. The negative coefficient on interaction term *RealDonor*×*Info* suggests the information treatment affects donation decisions mainly among subjects who are not organ donors in real life (p = 0.0104), while the treatment effect is very small for those who are self-reported organ donors (p = 0.6401). The significant positive coefficient on *Information* indicates that the subjects who are non-donors in real life are about 21 percent more likely to register as a donor in round 1 of the information treatment than the control treatment.

The dummy variable *Flier* captures subjects' preference toward information regarding organ donation. [27] The positive coefficients on *Flier* indicate that people who want to receive additional information about organ donation are about 15% more likely to register as organ donors and the results are significant at the 10% level.

Regression Model 4 additionally controls for the effect of information in the previous round on the donor registration decision. Although the payment procedure applied in the experiment assumes subjects would make their decisions independently across rounds, Subjects' donation decision can be affected by the information about how others have contributed (Sell and Wilson, 1991). Subjects might infer others' donation decision through information in the previous round (e.g. a subject may believe many people are donating if he received an organ donated by others when he needed one). The coefficient on *SavedEarn_Last* is positive and significant at 5% level, indicating that subjects are more likely to donate if they remained active longer after receiving a donated organ in previous round. This finding supports our early prediction that subjects learned information about the additional earnings a subject earned after he was saved by a donated organ through playing the game, causing the elimination of treatment effects as subjects played more rounds.

Regression Model 5 controls for demographic information of subjects. I did not find any behavioral difference across either gender or ethnicity. Among all selected subjects, whites or males are just as likely to donate as their counterparts ($p = 0.916$).

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[27] There were more subjects asked for fliers in the control treatment (27%) than in the information treatment (18%).

Conclusion

The shortage in transplantable organs is a large concern for the American society. Although the national registration rate has been slowly increasing over the past 30 years, the gap between the number of transplantable organs and the number of waiting list patients is still widening. Future changes in public policy may be required to increase organ donations within the United States and prevent deaths from organ shortage.

This paper provides a proposal to increase donor registry by adding a persuasive message with the registration request. I designed an experiment to investigate the effect of providing a persuasive message when appealing for organ donation on the registration rate. The results indicate that the persuasive message has a positive impact on donation decisions in the early rounds of the experiment. The persuasive message makes subjects about 21 percent more likely to register as a donor in round 1 of the information treatment than the control treatment. I also find that subjects' donation decisions in the experiment are strongly associated with their real-life organ donor status and providing a persuasive message affects donation decisions within the experiment mainly among subjects who are self-reported as non-donors in real life. These findings can enter the literature on studying the effect of persuasive messages on charity giving. It suggests that providing persuasive messages with charity appeals could improve donation. This finding also provides evidence that education about organ donation information promotes the intent to donate and supports the efficiency of educational intervention.

It is worth noting that there are many other proposals to increase the number of registered donors. Drawing from the experiences in several European countries, the proposal to change the default option of donor registry has arisen. It proposes to switch the current opt-in system — in which the default choice is non-donor and individuals must register to be an organ donor — to an opt-out system where individuals are presumed to have consented to being an organ donor unless the person explicitly states that he does not wish to. The opt-out system is currently adopted by several European countries with high donor registration rates, such as Spain, Austria etc. The effectiveness of the opt-out system has been empirically evidenced (Johnson and Goldstein, 2003, 2004; Abadie and Gay, 2006; Li, Hawley and Schnier, 2013).

Another highly publicized proposal is to change the organ allocation rule by providing priority to those waiting list patients who have previously registered as organ donors. The priority rule is currently adopted by Israel and Singapore (combined with an opt-out registration system), and its effectiveness on registration rate has been theoretically and experimentally studied by Kessler and Roth (2012, 2013). Li, Hawley and Schnier (2013) complement Kessler and Roth (2012) by further studying the relative effectiveness of alternatives across different default options and organ allocation rules. Their results are consistent with Kessler and Roth (2012) that the priority rule has a positive impact on the donor registration rate. They additionally find that the priority rule outperforms the opt-out program, while the combination of two policies (Singapore's system) generates the largest increase in the number of registered donors relative to an opt-in only program (the U.S. system).

Although the effectiveness of these other proposals has been evidenced, implementing it may involve a long-term legislative transition and discussions about the ethics surrounding this issue. For example, the Uniform Anatomical Gift Act of 1968 (UAGA) makes an individual's wish to register as an organ donor legally binding under the current "opt-in" system. In contrast, a donor registry under an "opt-out" system is a passive choice, which does not provide legal clarity of the deceased's intent. Changing the default of donor registry might calls for potential change in the gift laws to address such legal concerns. On the other hand, the proposal to change the allocation rule involves substantial debate about whether non-medical criteria should be brought in for organ allocation. The paper provides evidence for the effectiveness of the message proposal, which may complement other proposals during the transition period.

Appendix A: Instructions for Chapter I Experiment

Instructions (Treatment 1)

No Talking Allowed

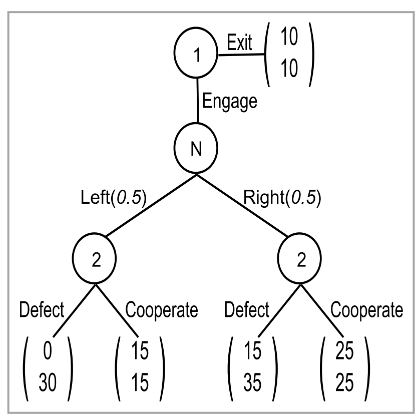
You are about to participate in an experiment on decision making. In this experiment, you will interact with another person, whose identity will remain unknown during and after the experiment. We kindly ask you not to talk or communicate with any other participant. If you have a question after we finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private.

Randomly Matched

You will be randomly paired with another participant once the experiment has begun. You and your counterpart will be randomly assigned to a role of either decision-maker 1 or decision-maker 2. Suppose you are decision-maker 1, you would receive an information screen on your computer that says "You are decision-maker 1." Your final payoff in this experiment will be determined by decisions made by you and your counterpart.

Game Tree

You and your counterpart are going to play a game like the decision tree pictured on the right. In the tree you see four circles where "branches" of the tree meet. These circles are the nodes of the decision tree.



Notice that all circles have either a number or a letter in them. The number or letter identifies the owner of that node. The circle with the number 1 indicates that decision-maker 1 owns that node. Decision-maker 1 will have to take one of the paths from that node. The two nodes with the number 2 are owned by decision-maker 2. The node with the letter N is owned by nature. More instructions are coming on what determines nature's move.

Each node is followed by two paths. Decision-maker 1 will make a choice between paths "Exit" and "Engage", and decision-maker 2 will make a choice between paths "Defect" and "Cooperate". Nature moves either "Left" or "Right".

Based on decision-makers' choices and nature's move, one of the "ends" of the tree will be reached. These ends are the U.S. $ payoffs that each decision-maker will receive. The top number is the U.S. $ payoff for decision-maker 1, and the bottom number is the U.S. $ payoff for decision-maker 2. For example, if decision-maker 1 chooses "Engage", nature moves "Left", and decision-maker 2 chooses "Defect", then decision-make 1 will receive a payoff of U.S. $0 and decision-make 2 will receive a payoff of U.S. $30.

It is clear in the game tree that if decision-maker 1 chooses "Exit", the total $ payoff for both decision-makers is $20(= $10 + $10). If decision-maker 1 chooses "Engage", the total $ payoff for both decision-makers is conditional on nature's move. When nature moves "Left", the total $ payoff is $30(= $0 + $30 or $15 + $15); while when nature moves "Right", the total $ payoff is $50(= $15 + $35 or $25 + $25).

Simultaneous Decisions

Decision-makers make choices without observing the choices of their counterparts, so decision-maker 2 would have to make choices based on the assumption that the paired decision-maker 1 has chosen "Engage". Suppose you are decision-maker 2, your choice will only determine the final payoff if your counterpart actually chooses "Engage". If your counterpart actually chooses "Exit", both of you will receive a payoff of U.S. $10 despite your choice.

Decision-makers also make choices without observing nature's move, so decision-maker 2 would have to make choices for both possible moves of nature. Suppose you are decision-maker 2, you would see the screen on your computer say "Suppose your counterpart has chosen 'Engage' and nature moves LEFT. Please choose the path you want" and "Suppose your counterpart has chosen 'Engage' and nature moves RIGHT. Please choose the path you want".

Nature's Move

The experimenter is going to flip a coin in front of every participant to determine nature's move, so there is a 50% probability for each of nature's possible moves. However, what "heads" and "tails" represent is private information for only decision-maker 2. In other words, decision-maker 1 eventually will not receive information about nature's move.

One-shot Game

You and your counterpart will only play this decision game ONCE.

Counterpart's Choice

After submitting decisions, each decision-maker will receive information about his or her own payoff. Decision-maker 2 will also receive information about nature's move and his or her counterpart's choice.

Decision-maker 1 will NOT receive information about his or her counterpart's choice, unless it is revealed by decision-maker 1's own payoff. However, since decision-maker 1 will not observe nature's move, he or she will not be able to infer his or her counterpart's choice all the time. For example, suppose you are decision-maker 1. If you receive a payoff of $0, you can infer that you counterpart has chosen "Defect". If you receive a payoff of $25, you can infer that you counterpart has chosen "Cooperate". However, if you receive a payoff of $15, you are NOT able to infer your counterpart's choice.

<u>Noteworthy Feature of the Game Tree</u>

To reiterate, if decision-maker 1 receives a payoff of $15 from the game, he or she will NOT be able to figure out whether decision-maker 2 chose "Cooperate" or "Defect".

Show-up Fees

You have already earned U.S. $5 for arriving to the experiment on time. It will be paid to you in cash with your payoff from the game at the end of the experiment.

Complete Privacy

This experiment is structured so that no one, neither the experimenters nor the other subjects nor anyone else will ever be able to link your name or other identifying information to your decision. This is accomplished by the following procedure. You have received a key contained in a sealed envelope when you walked in the room. Your identifying mark in this experiment is the number on your key which is known only by you and which you will enter by yourself in the computer. After you finish the decision-making game, you will collect your money payoff contained in a sealed envelope, from a mailbox that only you can open with your key. Your privacy is guaranteed because neither your name nor your student ID number will be entered in your computer or appear on any form that records your decisions in this experiment.

At the end of the experiment, you will walk one by one to the hallway where the mailboxes are to collect your money payoff envelope. The key and mailbox are labeled with the same number. But you will be the only person having that key and the only one who knows your key number. While collecting the envelope from your mailbox, you are kindly requested not to open it immediately. You should wait until you leave the building. After collecting the envelope, you must return your key by throwing it in a key-return box in the hallway.

Instructions (Treatment 2)

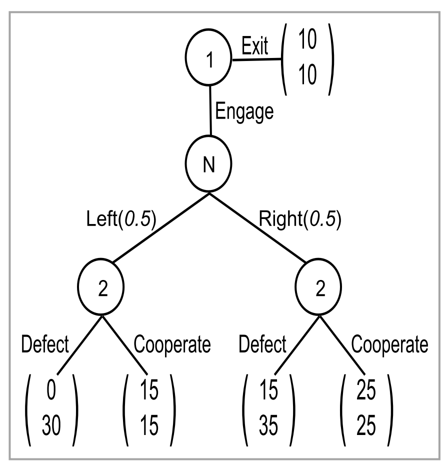
No Talking Allowed

You are about to participate in an experiment on decision making. In this experiment, you will interact with another person, whose identity will remain unknown during and after the experiment. We kindly ask you not to talk or communicate with any other participant. If you have a question after we finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private.

Randomly Matched

You will be randomly paired with another participant once the experiment has begun. You and your counterpart will be randomly assigned to a role of either decision-maker 1 or decision-maker 2. Suppose you are decision-maker 1, you would receive an information screen on your computer that says "You are decision-maker 1." Your final payoff in this experiment will be determined by decisions made by you and your counterpart.

Game Tree



You and your counterpart are going to play a game like the decision tree pictured on the right. In the tree you see four circles where "branches" of the tree meet. These circles are the nodes of the decision tree.

Notice that all circles have either a number or a letter in them. The number or letter identifies the owner of that node. The circle with the number 1 indicates that decision-maker 1 owns that node. Decision-maker 1 will have to take one of the paths from that node. The two nodes with the number 2 are owned by decision-maker 2. The node with the letter N is owned by nature. More instructions are coming on what determines nature's move.

Each node is followed by two paths. Decision-maker 1 will make a choice between paths "Exit" and "Engage", and decision-maker 2 will make a choice between paths "Defect" and "Cooperate". Nature moves either "Left" or "Right".

Based on decision-makers' choices and nature's move, one of the "ends" of the tree will be reached. These ends are the U.S. $ payoffs that each decision-maker will receive. The top number is the U.S. $ payoff for decision-maker 1, and the bottom number is the U.S. $ payoff for decision-maker 2. For example, if decision-maker 1 chooses "Engage", nature moves "Left", and decision-maker 2 chooses "Defect", then decision-make 1 will receive a payoff of U.S. $0 and decision-make 2 will receive a payoff of U.S. $30.

It is clear in the game tree that if decision-maker 1 chooses "Exit", the total $ payoff for both decision-makers is $20(= $10+$10). If decision-maker 1 chooses "Engage", the total $ payoff for both decision-makers is conditional on nature's move. When nature moves "Left", the total $ payoff is $30(= $0 + $30 or $15 + $15); while when nature moves "Right", the total $ payoff is $50(= $15 + $35 or $25 + $25).

Simultaneous Decisions

Decision-makers make choices without observing the choices of their counterparts, so decision-maker 2 would have to make choices based on the assumption that the paired decision-maker 1 has chosen "Engage". Suppose you are decision-maker 2, your choice will only determinate the final payoff if your counterpart actually chooses "Engage". If your counterpart actually chooses "Exit", both of you will receive a payoff of U.S. $10 despite your choice.

Decision-makers also make choices without observing nature's move, so decision-maker 2 would have to make choices for both possible moves of nature. Suppose you are decision-maker 2, you would see the screen on your computer say "Suppose your counterpart has chosen 'Engage' and nature moves LEFT. Please choose the path you want." and "Suppose your counterpart has chosen 'Engage' and nature moves RIGHT. Please choose the path you want."

Nature's Move

The experimenter is going to flip a coin in front of every participant to determine nature's move, so there is a 50% probability for each of nature's possible moves. Both decision-makers will receive information about what "heads" and "tails" represent.

One-shot Game

You and your counterpart will only play this decision game ONCE.

Counterpart's Choice

After submitting decisions, each decision-maker will receive information about nature's move and his or her own payoffs. Decision-maker 2 will also receive information about his or her counterpart's choice.

Decision-maker 1 will NOT receive information about his or her counterpart's choice. However, the counterpart's choice can be revealed by nature's move and his or her own payoff. For example, suppose you are decision-maker 1. If you know that nature moves left and you receive a payoff of $15, you can infer that you counterpart has chosen "Cooperate". On the other hand, if you know that nature moves right and you receive a payoff of $15, you can infer that you counterpart has chosen "Defect".

Noteworthy Feature of the Game Tree

To reiterate, if decision-maker 1 receives a payoff of $15 from the game, he or she will be able to figure out whether decision-maker 2 chose "Cooperate" or "Defect".

Show-up Fees

You have already earned U.S. $5 for arriving to the experiment on time. It will be paid to you in cash with your payoff from the game at the end of the experiment.

Complete Privacy

This experiment is structured so that no one, neither the experimenters nor the other subjects nor anyone else will ever be able to link your name or other identifying information to your decision. This is accomplished by the following procedure. You have received a key contained in a sealed envelope when you walked in the room. Your identifying mark in this experiment is the number on your key which is known only by you and which you will enter by yourself in the computer. After you finish the decision-making game, you will collect your money payoff contained in a sealed envelope, from a mailbox that only you can open with your key. Your privacy is guaranteed because neither your name nor your student ID number will be entered in your computer or appear on any form that records your decisions in this experiment.

At the end of the experiment, you will walk one by one to the hallway where the mailboxes are to collect your money payoff envelope. The key and mailbox are labeled with the same number. But you will be the only person having that key and the only one who knows your key number. While collecting the envelope from your mailbox, you are kindly requested not to open it immediately. You should wait until you leave the building. After collecting the envelope, you must return your key by throwing it in a key-return box in the hallway.

Appendix B: Parametric Tests of Chapter II Experiment

Given the complexity of the decision environment we elected to simulate the decision environment to inform our parameterization of the experiment. The most critical parameter in our experiment is the probability of organ failure. There are two types of organ failure in our experiment. Subjects with an A organ failure potentially provide transplantable organs for subjects with a B organ failure. The ratio of the probability of B organ failure to the probability of A organ failure should be high enough to keep the scarcity of transplantable organs high, but it also cannot be too high because it will cancel out the incentive to donate in the *Priority* treatment. Figure 6 shows the expected payoff difference between donors and non-donors for different parameter values in both the *Control* treatment and the *Priority* treatment (based on 100,000 simulations of donation rate from 0% to 100% for each set of parameters). The parameter values vary the ratio of the probability of B organ failure to the probability of A organ failure (Beta in Figure 6).

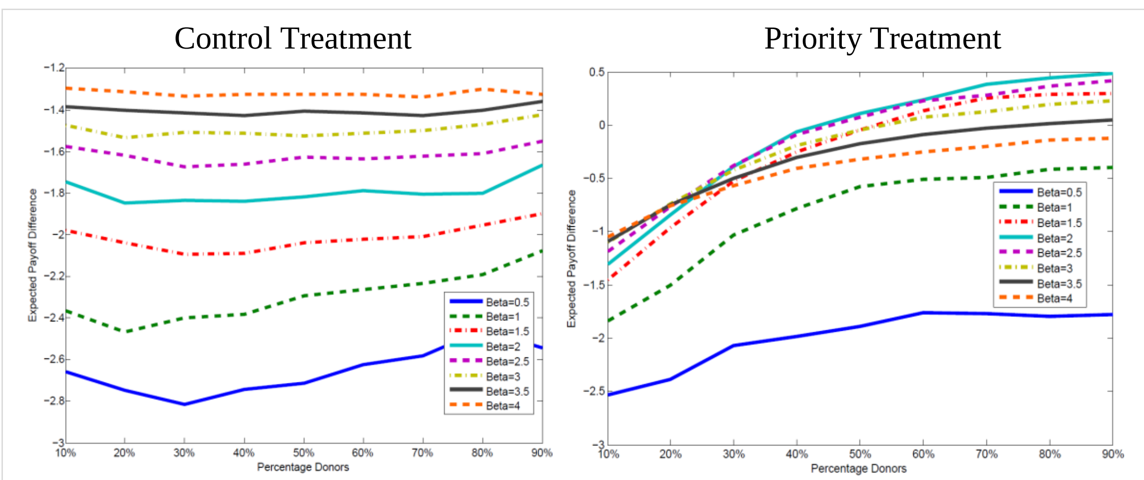


Figure 6. Simulations Payoff Difference between Being a Donor and a Non-donor

In Figure 6, the teal blue line represents the expected payoff difference with the parameters actually used in the experiment (Beta = 2), consistent with those used by Kessler and Roth (2012). In the *Control* treatment, being a donor is more costly that being a non-donor, which would predict no donation in the game. Non-zero donation in the *Control* treatment would be the expression of altruistic motivation. In the *Priority* treatment, the payoff difference is increasing with the donation rate. It is worth noting that once Beta exceeds two the payoff difference start to fall off again and the benefits of being a donor are reduced. The reason for these results is an increase in Beta generates an overwhelming gap between organ demand and supply. Due to the high odds of having a B organ failure and the insufficient organ supply, the probability of dying while waiting for a B organ increases even for donors who have priority on the waiting list. The incentive to donate provided by priority rule is canceled out, since having priority on the waiting list does not generate benefit any more.

Appendix C: Instructions for Chapter II Experiment

Instructions (Opt-in Treatment)

Now that the experiment has begun, we ask that you do not talk. If you have a question after you finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private. In today's experiment, you are going to make decisions about hypothetical organ donation. None of the choices you make in the experiment today will affect your real life.

Show-up Fee

You have already earned U.S. $10 for arriving to the experiment on time.

Experiment

There are multiple rounds in the experiment today. In each round, you are assigned a virtual life. A virtual life comprises of one A organ and two B organs. Each round consists of a finite number of periods in which you can earn money.

In each period of any round, you have a 10% probability of A organ failure and a 20% probability of B organ failure (both B organs fail together). You will never experience both types of organ failure at the same time. Whenever your A organ fails, you will cease to participate in that round. Whenever your B organs fail, you will be placed on a waiting list to receive one B organ donated from others. You may remain on the waiting list for up to 5 periods. If you do not receive a B organ within the 5 periods, you will cease to participate in that round.

Waiting List

If your B organ fails, you will be placed on a waiting list to receive one B organ donated by others in the order of your rank on the list. The rank is determined by the length of time that one has been waiting on the list. Those who have been waiting longer are ranked higher. Ranks of those who have the same waiting time are randomly determined. For example, if there are two persons on the waiting list. Person 1 has been waiting for 4 periods and person 2 has been waiting for 3 periods. According to the rule, person 1 ranks higher than person 2 on the list. If there were an active B organ donated, it would go to person 1 before person 2.

Earnings of Each Round

You will earn $3 in each period that you have an active A organ and at least one active B organ. However, you will not earn any money in any period that you are on the waiting list or you are no longer actively participating in the round.

Organ Donation Decision and Cost

At the beginning of each round, you begin by not being an organ donor. You will be asked to declare whether you want to change your status and become an organ donor in that round. Being an organ donor may potentially save two subjects who are in need of B organ and increase their earnings in that round. If you want to change your status, you must register yourself by checking the box on your screen; otherwise, you can leave the box empty. Please note that the organ donor registration (checking the box) will cost you $0.75. This registration cost will be charged whether or not you actually become a donor.

If you choose to be a donor and your A organ fails, your active B organs will be donated to those in need of a B organ in the order of their rank on the waiting list. Please note that the realized donation will cost you $2.25. This donation cost will only be charged if donation actually takes place. The organs you donated cannot be re-donated by recipients.

Final Payoff

Your payoff in each round is equal to your earnings in that round minus your costs of donation. There are multiple rounds in the experiment; however, only ONE round will be randomly selected for payment at the end of the experiment. Thus, you should make your decision in each round <u>independently</u> of your choice in other rounds. If in this selected round your earnings cannot cover your cost of donation, the extra cost will be charged from your show-up fee.

<u>Instructions (Opt-out Treatment)</u>

Now that the experiment has begun, we ask that you do not talk. If you have a question after you finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private. In today's experiment, you are going to make decisions about hypothetical organ donation. None of the choices you make in the experiment today will affect your real life.

Show-up Fee

You have already earned U.S. $10 for arriving to the experiment on time.

Experiment

There are multiple rounds in the experiment today. In each round, you are assigned a virtual life. A virtual life comprises of one A organ and two B organs. Each round consists of a finite number of periods in which you can earn money.

In each period of any round, you have a 10% probability of A organ failure and a 20% probability of B organ failure (both B organs fail together). You will never experience both types of organ failure at the same time. Whenever your A organ fails, you will cease to participate in that round. Whenever your B organs fail, you will be placed on a waiting list to receive one B organ donated from others. You may remain on the waiting list for up to 5 periods. If you do not receive a B organ within the 5 periods, you will cease to participate in that round.

Waiting List

If your B organ fails, you will be placed on a waiting list to receive one B organ donated by others in the order of your rank on the list. The rank is determined by two criteria: first one's donation decision, and second the length of time that one has been waiting on the list. If you are an organ donor, you will be given priority in ranking on the waiting list. Donors are ranked higher than the non-donors. Individuals with the same donation decision will be ranked according to the length of time they have been waiting. Those waiting longer are ranked higher. The ranks of those who have the same waiting time are randomly determined. For example, if there are two persons on the waiting list. Person 1 is an unregistered donor who has been waiting for 4 periods and person 2 is a registered donor who has been waiting for 3 periods. Person 2 will rank higher than person 1. If there were an active B organ donated, it would go to person 2 before person 1.

To reiterate, if you are not a donor, you will be ranked behind donors on the waiting list.

Earnings of Each Round

You will earn $3 in each period that you have an active A organ and at least one active B organ. However, you will not earn any money in any period that you are on the waiting list or you are no longer actively participating in the round.

Organ Donation Decision and Cost

At the beginning of each round, you begin by not being an organ donor. You will be asked to declare whether you want to change your status and become an organ donor in that round. Being an organ donor may potentially save two subjects who are in need of B organ and increase their earnings in that round. If you want to change your status, you must register yourself by checking the box on your screen; otherwise, you can leave the box empty. Please note that the organ donor registration (checking the box) will cost you $0.75. This registration cost will be charged whether or not you actually become a donor.

If you choose to be a donor and your A organ fails, your active B organs will be donated to those in need of a B organ in the order of their rank on the waiting list. Please note that the realized donation will cost you $2.25. This donation cost will only be charged if donation actually takes place. The organs you donated cannot be re-donated by recipients.

Final Payoff

Your payoff in each round is equal to your earnings in that round minus your costs of donation. There are multiple rounds in the experiment; however, only ONE round will be randomly selected for payment at the end of the experiment. Thus, you should make your decision in each round independently of your choice in other rounds. If in this selected round your earnings cannot cover your cost of donation, the extra cost will be charged from your show-up fee.

Instructions (Priority Treatment)

Now that the experiment has begun, we ask that you do not talk. If you have a question after you finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private. In today's experiment, you are going to make decisions about hypothetical organ donation. None of the choices you make in the experiment today will affect your real life.

Show-up Fee

You have already earned U.S. $10 for arriving to the experiment on time.

Experiment

There are multiple rounds in the experiment today. In each round, you are assigned a virtual life. A virtual life comprises of one A organ and two B organs. Each round consists of a finite number of periods in which you can earn money.

In each period of any round, you have a 10% probability of A organ failure and a 20% probability of B organ failure (both B organs fail together). You will never experience both types of organ failure at the same time. Whenever your A organ fails, you will cease to participate in that round. Whenever your B organs fail, you will be placed on a waiting list to receive one B organ donated from others. You may remain on the waiting list for up to 5 periods. If you do not receive a B organ within the 5 periods, you will cease to participate in that round.

Waiting List

If your B organ fails, you will be placed on a waiting list to receive one B organ donated by others in the order of your rank on the list. The rank is determined by two criteria: first one's donation decision, and second the length of time that one has been waiting on the list. If you are an organ donor, you will be given priority in ranking on the waiting list. Donors are ranked higher than the non-donors. Individuals with the same donation decision will be ranked according to the length of time they have been waiting. Those waiting longer are ranked higher. The ranks of those who have the same waiting time are randomly determined. For example, if there are two persons on the waiting list. Person 1 is an unregistered donor who has been waiting for 4 periods and person 2 is a registered donor who has been waiting for 3 periods. Person 2 will rank higher than person 1. If there were an active B organ donated, it would go to person 2 before person 1.

To reiterate, if you are not a donor, you will be ranked behind donors on the waiting list.

Earnings of Each Round

You will earn $3 in each period that you have an active A organ and at least one active B organ. However, you will not earn any money in any period that you are on the waiting list or you are no longer actively participating in the round.

Organ Donation Decision and Cost

At the beginning of each round, you begin by being an organ donor. You will be asked to declare whether you want to change your status and become a non-donor in that round. Being an organ donor may potentially save two subjects who are in need of B organ and increase their earnings in that round. However, if you want to change your status, you must withdraw yourself by checking the box on your screen; otherwise, you can leave the box empty. Please note that the decision to withdrawal from being an organ donor (checking the box) will cost you $0.75.

If you keep your status as an organ donor and your A organ fails, your active B organs will be donated to those in need of a B organ in the order of their rank on the waiting list. Please note that the realized donation will cost you $2.25. This donation cost will only be charged if donation actually takes place. The organs you donated cannot be re-donated by recipients.

Final Payoff

Your payoff in each round is equal to your earnings in that round minus your costs of donation. There are multiple rounds in the experiment; however, only ONE round will be randomly selected for payment at the end of the experiment. Thus, you should make your decision in each round independently of your choice in other rounds. If in this selected round your earnings cannot cover your cost of donation, the extra cost will be charged from your show-up fee.

Instructions (Opt-out with Priority Treatment)

Now that the experiment has begun, we ask that you do not talk. If you have a question after we finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private.

Show-up Fee

You have already earned U.S. $10 for arriving to the experiment on time.

Experiment

There are multiple rounds in the experiment today. At the beginning of each round, you will be assigned with three tokens: one A token and two B tokens. Each round of the experiment consists of a finite number of periods in which you can potentially earn more money.

In each period of any round, it is possible that you will lose your tokens. There is a 10% probability of losing an A token and 20% probability of losing both B tokens (both B tokens will be lost the same time). You will not lose both types of tokens at the same time. Whenever you lose an A token in a round, you will cease to participate in that round. Whenever you lose both B tokens in a round, you will be placed on a waiting list to receive a B token donated by others. You may remain on the waiting list for up to 5 periods. If you do not receive one B token within the 5 periods, you will cease to participate in that round.

Waiting List

If you lose your B tokens, you will be placed on a waiting list to receive one donated by others in the order of your rank on the list. The rank is determined by the length of time that one has been waiting on the list, and the ones who have been waiting longer are ranked higher. The ranks of those who have the same waiting time are randomly determined. For example, if there are two persons on the waiting list. Person 1 has been waiting for 4 periods and person 2 has been waiting for 3 periods. According to the rule, person 1 ranks higher than person 2 on the list. Whenever there is an available B token, it will go to person 1 before person 2.

Earnings of Each Round

You will earn $3 in each period in which you have one A token and at least one B token. Please note that you will not earn any money in a period in which you are on the waiting list or you are no longer actively participating in the round (i.e., do not have at least one active B token).

Donation Decision and Cost

At the beginning of each round, you will be asked to declare whether you want to donate your B tokens after you lost your A token. Donating may potentially increase other's earnings in that round. If you want to donate your B tokens, you must register yourself as a donor by checking the box on your screen; otherwise, you can leave the box empty. Please note that the decision to register as a donor (checking the box) will cost you $0.75.

If you choose to be a donor and you lose your A token, your B tokens will be donated to those who are on the waiting list in the order of their rank. Please note that the realized donation will cost you $2.25. This donation cost will <u>only</u> be charged if a donation actually takes place. The tokens you donated cannot be re-donated by recipients.

Final Payoff

Your payoff in a round is equal to your earnings in that round minus your costs of donation. There are multiple rounds in the experiment; however, only <u>ONE</u> round will be randomly selected for payment at the end of the experiment. Thus, you should make your decision in each round <u>independently</u> of your choice in other rounds. If in this selected round your earnings cannot cover your cost of donation, the extra cost will be charged from your show-up fee.

Appendix D: Instructions for Chapter III Experiment

Instructions (Information Treatment)

Now that the experiment has begun, we ask that you do not talk. If you have a question after you finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private. In today's experiment, you are going to make decisions about hypothetical organ donation. None of the choices you make in the experiment today will affect your real life.

Show-up Fee

You have already earned U.S. $10 for arriving to the experiment on time.

Experiment

There are multiple rounds in the experiment today. In each round, you are assigned a virtual life. A virtual life comprises of one A organ and two B organs. Each round consists of a finite number of periods in which you can earn money.

In each period of any round, you have a 10% probability of A organ failure and a 20% probability of B organ failure (both B organs fail together). You will never experience both types of organ failure at the same time. Whenever your A organ fails, you will cease to participate in that round. Whenever your B organs fail, you will be placed on a waiting list to receive one B organ donated from others. You may remain on the waiting list for up to 5 periods. If you do not receive a B organ within the 5 periods, you will cease to participate in that round.

Waiting List

If your B organ fails, you will be placed on a waiting list to receive one B organ donated by others in the order of your rank on the list. The rank is determined by the length of time that one has been waiting on the list. Those who have been waiting longer are ranked higher. Ranks of those who have the same waiting time are randomly determined. For example, if there are two persons on the waiting list. Person 1 has been waiting for 4 periods and person 2 has been waiting for 3 periods. According to the rule, person 1 ranks higher than person 2 on the list. If there were an active B organ donated, it would go to person 1 before person 2.

Earnings of Each Round

You will earn $3 in each period that you have an active A organ and at least one active B organ. However, you will not earn any money in any period that you are on the waiting list or you are no longer actively participating in the round.

Organ Donation Decision and Cost

At the beginning of each round, you begin by not being an organ donor. You will be asked to declare whether you want to change your status and become an organ donor in that round. Being an organ donor may potentially save two subjects who are in need of B organ and increase their earnings in that round.

> According to the data collected from previous sessions of the same experiment series, a subject who was saved by a donated organ earned **$10.18 more** on average in each round, compared with the average earnings of $18.63 per subject per round.

If you want to change your status, you must register yourself by checking the box on your screen; otherwise, you can leave the box empty. Please note that the organ donor registration (checking the box) will cost you $0.75. This registration cost will be charged whether or not you actually become a donor.

If you choose to be a donor and your A organ fails, your active B organs will be donated to those in need of a B organ in the order of their rank on the waiting list. Please note that the realized donation will cost you $2.25. This donation cost will only be charged if donation actually takes place. The organs you donated cannot be re-donated by recipients.

Final Payoff

Your payoff in each round is equal to your earnings in that round minus your costs of donation. There are multiple rounds in the experiment; however, only ONE round will be randomly selected for payment at the end of the experiment. Thus, you should make your decision in each round independently of your choice in other rounds. If in this selected round your earnings cannot cover your cost of donation, the extra cost will be charged from your show-up fee.

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