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Incentivizing organ donation by swearing an oath:  
The role of signature and ritual

Xiaofei Niu, Jianbiao Li*

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Abstract: In China, United States and in many other countries, there is a serious gap between the demand and the supply of human organs for transplantation. To fill this gap, policy makers have made great efforts to promote organ donor registration. In this paper, we provide a novel organ donation incentive strategy, i.e. swearing an oath, and experimentally identify channels through which oath impacts organ donation. Our experimental results show that the impacts of oath work through the signature and ritual channels, i.e. voluntarily signing oath or swearing an oath accompanied by ritualized gesture significantly increase the organ donor registration rate. However, the oath alone does not affect organ donation behavior. In addition, we also find that the opt-out rule has a positive influence on donor registration rate only in Rounds 1-11 but not in Rounds 12-22. The donor registration rate is significantly reduced when changing from opt-out to opt-in rule, and it is unaffected when changing from opt-in to opt-out rule. These results indicate that the effect of opt-out rule may attenuate with experience.

Keywords: organ donation; oath; ritual; opt-in vs. opt-out; laboratory experiment

JEL classification: C91, I10, I18

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1. Introduction

A shortage of human organs for transplantation is one of the most pressing health policy issues across the globe, including China and United States. Based on the data by Chinese National Guideline on Organ Donation, more than 300,000 patients are waiting for life-saving organ transplants annually, but only around 10,000 transplants are performed in China.\(^1\) Despite the large need for organs, less than 1% of individuals over the age of 18 in China are registered as organ donors.\(^2\)

To increase supply of transplantable organs, several strategies have been proposed by policy makers. One approach is to introduce priority rule which grants priority on organ donor waiting lists to individuals who have registered as organ donors, e.g., in April 2012 Israel had adopted this rule. Another approach is to use opt-out (or presumed-consent) rule, which automatically registers individuals as organ donors unless they actively remove themselves from the registry, e.g., in December 2015 Wales had moved to the opt-out.\(^3\)

Our paper provides an alternative that complements approaches above by developing an organ donation incentive strategy, i.e. swearing an oath. Oath pervades human life.\(^4\) More than 2500 years ago, in China oath was used to conclude treaties of peaceful coexistence among vassal states. In ancient Babylon, oath was an important evidence in civil procedure.\(^5\) In modern society, oath use is also widespread such as the Hippocratic Oath for physicians, the Oath of Office for government staffs, the MBA

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\(^{1}\) China began a voluntary deceased donor trial in 2010 and promoted the practice nationwide in 2013. In 2015, China published its first National Guideline on Organ Donation; on January 1 this year China banned use of executed prisoners’ organs for transplants, making majority of transplanted organs coming from deceased donors. China uses the opt-in rule (or explicit-consent) in which nobody is an organ donor without registering to be one. China recently has begun granting priority to family members of deceased organ donors.

\(^{2}\) Based on the data of Chinese National Guideline on Organ Donation published in 2015.

\(^{3}\) Some countries like Germany and United States have adopted the opt-in rule. Other countries like Spain and Austria have adopted the opt-out rule.

\(^{4}\) According to the Oxford English Dictionary, an oath is “a solemn or formal appeal to God (or to a deity or something held in reverence or regard), in witness of the truth of a statement, or the binding character of a promise or undertaking;........a statement or promise corroborated by such an appeal, or the form of the words in which such a statement or promise is made.”

\(^{5}\) According to the Code of Hammurabi, “If anyone who has not lost his goods state that they have been lost, and make false claims: if he claims his goods and amount of injury before God, even though he has not lost them, he shall be fully compensated for all his loss claimed, i.e. the oath is all that is needed.” (see http://www.sacred-texts.com/ane/ham/ham06.htm)
Oath for graduate students, and the Economist’s Oath. Despite the growing use of oath in everyday life, little work is done to examine whether oath makes any difference by changing individual behavior, including the organ donation.

The aim of this study is (i) to identify channels through which oath does or does not have an impact on individual organ donation decision-making, and (ii) to examine whether these effects are robust in the different default rules for organ donor registration (i.e. opt-in and opt-out). We address these questions by collecting data from laboratory experiments. A key advantage of using an experimental method is the ability to induce exogenous variation in oath-taking procedure, which allows for a clean separation of channels through which oath impacts organ donation.

Our experiments follow the design of Kessler and Roth (2014), in which subjects play an organ donation game modeled on the decision to register as an organ donor. Specifically, we implement variation in oath-taking procedures, and first test whether oath alone can increase organ donor registration. The oath content, adapted from Chinese organ donor registration card, emphasizes dedicating or committing individual to care life, promote humanity and show love.7 Oath typically contains a commitment to treat beneficiaries in a certain described way, that is justified by a function the oath-taker fulfils in society (Sulmasy, 1999). There is evidence that heightening individual commitment to organ donation with persuasive messages is an important element in designing organ donor card as it can increase donor registration (Skumanich and Kintsfather, 1996; Li, 2016). Therefore, offering oath cards may have positive influence on individual organ donation decision-making.

We then test the role of signature in individual donor registration. Previous studies have found that getting an individual to commit to being the type of person that does a certain action (e.g., sign a truth-telling oath) can improve compliance with a demanding request (e.g., tell the truth) (Jacquemet et al., 2013; Jacquemet et al., 2018a). Signing oath may have great binding force, due to it involves the whole person of the oath-taker and risks his standing as a person (Sulmasy, 1999). Individual commitment

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7 The Chinese organ donor registration card is shown in Figure 1S.
is stronger if it has been made freely, or voluntarily signed (Joule et al., 2007). Thus, voluntarily signing oath card may increase the organ donor registration.

Further, we examine whether ritual affects donor registration. According to the theoretical framework of oath proposed by de Bruin (2016), one of important characteristics of oath, as opposed to mere promise, is sworn in solemn ritual and is accompanied by particular gesture.\(^7\) Ritual is an omnipresent component of human social life. As Bell (1997) noted, “At one time or another, almost every human activity has been done ritually or made part of a ritual” (p. 91). Although specific definition of ritual vary widely across the social sciences, most agree that ritual involves at least two defining features: it is composed of specific actions characterized by rigidity, formality, and repetition; and its gestures are imbued with symbolic meaning beyond the physical actions (e.g., Brooks et al., 2017; Tian et al., 2018; Schroeder et al., 2019). The oath card may be validated through symbolic ritualized gestures. This validation will increase moral weight of the oath, making a positive impact on subsequent organ donation decision-making. Several papers have documented that ritual can promote prosociality (Xygalatas et al., 2013), and moral behavior (Mitkidis et al., 2017). Ritualized gestures may thus increase organ donor registration.

At last, we investigate whether those impacts are robust in the different default rules. This is an important question because the opt-in and opt-out are two most dominant organ donation rules around the world. Clarifying the robustness of oaths impacts in the two default rules can make us understand the scope of its application. To this end, we also implement variation in default rule. In the opt-in rule subjects are asked to make decisions about whether they want to pay a fixed cost to register as organ donors. In the opt-out rule, however, paying the same fixed cost to register as organ donor is the default option. A subject is asked to make decisions about whether he wants

\(^7\) Sulmasy (1999) clarified how an oath differed from a promise. Compared with promise, an oath was generally characterized by its greater moral weight, its public character, its validation by transcendent appeal, the involvement of the personhood of the oath-taker, the prolonged time frame of the commitment, and the fact that interpersonal fidelity was the moral hallmark of the commitment of the oath-taker. However, Sulmasy (1999) did not emphasize the ritual aspect of oath-taking. Based on an extension of Sulmasy’s (1999) theory, de Bruin (2016) added the ritual to his theoretical framework.
to withdraw from the donor registry. The fixed cost would be refunded if the subject withdraws his donor registry. Thus, in both opt-in and opt-out rules subjects who are organ donors need to pay a fixed cost, otherwise they do not need to pay any money. That is, subjects in the two default rules have same monetary incentive.

Our experimental results show that the oath card alone does not have impacts on subjects’ organ donation behavior; oath card accompanied by asking subjects to freely sign oath or enact ritualized gesture can both significantly increase organ donor registration rates. These effects are robust when we change the default rules. In addition, we also find that opt-out rule has positive impacts on organ donor registration rate. However, this effect is only present in the first 11 rounds, and it is not present in the last 11 rounds. Interestingly, when default rule is changed from opt-out to opt-in, the donor registration rate is significantly reduced; the donor registration rate is unaffected when default rule is changed from opt-in to opt-out.

Our paper complements the experimental literature that tests the effectiveness of organ donation incentive strategy. Most of the studies focus on the donor priority rule and default rule. For example, Kessler and Roth (2012) were among the first to examine the impact of priority rule on the organ donation decision in a laboratory experiment. They found that the priority rule significantly increased registration rates for organ donation. In a second laboratory study, they investigated how a loophole might affect the ability of priority rule to increase organ donation, and found that majority of subjects used the loophole when available (Kessler and Roth, 2014). Johnson and Goldstein (2003) used an online experiment to investigate the effect of default rule on organ donation, and found that donor registration rates were about twice as high when opt-out as when opt-in. Li et al. (2013) utilized a laboratory experiment to test the

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8 Based on Kessler and Roth (2012), several experimental papers have found the robustness of this result and have extended it in various dimensions. Herr and Normann (2016) showed that two-thirds of subjects voted in favor of a priority rule after having played several rounds both with and without the priority rule. Herr and Normann (2019) then evaluated how much priority bonus should be given to registered organ donors by varying the number of bonus periods in a laboratory experiment. Their experimental results showed that a higher number of bonus periods led to higher registration rates. Other types of literature about priority rule sees Stoler et al. (2016, 2017), and Dai et al. (2019).

9 The loophole of priority rule, as the case in Israel, is an individual can register to receive priority but avoid ever being in a situation to donate organs after death.
effectiveness of donor priority and default rule. They documented that the opt-out with priority rule generated the highest donor registration rates, and either a priority rule or an opt-out rule separately could also increase registration rates.\textsuperscript{10} Other studies test the role of offering financial compensation for organ donors.\textsuperscript{11} For example, Hawley et al. (2018) investigated whether it was possible to increase the donor registration rate by reducing the disincentives. They found that sizable increases in the registration rate would be achievable if the disincentives were eliminated. In a similar vein, Eyting et al. (2016) showed that monetary incentive increased the number of organ donors.\textsuperscript{12}

We contribute to these studies by introducing an effective organ donation incentive strategy, i.e. swearing an oath. We identify channels through which oath impacts individual organ donation behavior, i.e. the effects of swearing an oath on organ donation are through the signing oath and ritualized gesture channels. In line with previous studies, we also find the organ donor registration rates in the opt-out rule is higher than that in the opt-in rule. Our novel finding about default rule is that the impact of opt-out is significant in the first 11 rounds, but it is not significant in the last 11 rounds. Using a field experiment on CO2 off setting, Löfgren et al. (2012) investigated the effect of default options among experienced individuals. The authors documented that the impact of default options was reduced by experience. Thus, the effect of opt-out rule on organ donation decision might attenuate with experience.

Our paper also complements a nascent experimental literature that tests the role of oath in individual behavior. Jacquemet et al. (2013) designed a truth-telling oath-taking procedure, in which a subject was offered an oath card entitled “solemn oath”, and was asked whether he or she agreed to sign it before entering the lab.\textsuperscript{13} Using this oath-taking procedure, the authors found that the truth-telling oath could improve preference

\textsuperscript{10} There is a consensus finding that organ donor registration rates in the opt-out rule are higher than that in the opt-in rule (e.g., Abadie and Gay, 2006; McKenzie et al., 2006; Davidai et al., 2012).

\textsuperscript{11} Due to ethical considerations and repugnance factors (Roth, 2007), financial incentives for organ donation are outlawed and prohibited around the world, except for the Islamic Republic of Iran where there exists a legal market for living kidney donation.

\textsuperscript{12} Other types of literature about financial incentives for donors sees Lacetera et al. (2014), Bilgel and Galle (2015), and Elias et al. (2015, 2019).

\textsuperscript{13} The oath content was “I swear upon my honor that, during the whole experiment, I will tell the truth and always provide honest answers”. The subject was asked to read it, but never loudly.
elicitation in a second-price auction (Jacquemet et al., 2013), eliminate hypothetical bias in a voting referenda (Jacquemet et al. 2017), increase efficient coordination in a coordination game (Jacquemet et al., 2018b), and reduce lying in a sender-receiver game (Jacquemet et al. 2018a). Based on the social psychology of commitment, they argued that the truth-telling oath as a commitment device worked through an increase of willingness to tell truth. However, it is an open question whether their truth-telling oath still affects individual honesty behavior by ruling out the procedure of signature. In other words, whether the oath alone could strengthen the commitment and change individual behavior. We answer this question by adding a condition where a subject is only offered an oath card, and demonstrate that the oath alone does not impact organ donation behavior, indicating that it is necessary to sign oath in the oath-taking procedure.

At last, our paper extends the oath literature by adding a ritual in the oath-taking procedure. An emerging stream of psychological literature documents the impact of ritual on a variety of behavioral consequences, such as enhanced consumption experiences (Vohs et al., 2013), mitigated grief over loss (Norton and Gino, 2014), reduced anxiety (Brooks et al., 2017), improving self-control (Tian et al., 2018) and promoting cooperation (Schroeder et al., 2019). We show that ritualized gesture is an important characteristic of oath; and it can promote individual organ donation behavior.

The remainder of the paper is organized as follows. In Section 2, we explain the experimental design and procedure. Section 3 presents our experimental results. Section 4 concludes with a discussion of our results.

2. Experimental Design

Our experiment was based on the organ donation game developed by Kessler and Roth (2014).14 Participants played the game modeled on the decision to register as an

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14 This organ donation game was a simplified version of Kessler and Roth (2012). Kessler and Roth (2014) replicated the pattern of findings from Kessler and Roth (2012), though the experimental parameters were quite different from their earlier work.
organ donor over 22 rounds.\textsuperscript{15}

At the beginning of a round, each subject was a virtual human and endowed with 10 Chinese yuan ($1.5), an A organ (representing a brain), and two B organs (representing the two kidneys).\textsuperscript{16} In each round, subjects had one of two health outcomes, i.e. A-organ failure or B-organ failure. If a subject encountered A-organ failure, he did not earn any money in the round. When a subject had B-organ failure, he needed a B organ donated by another subject to earn more money in the round. Each round, before observing his health outcome, each subject decided whether to pay a cost of donation that would make his B organs available to others if he had A-organ failure. Subjects always needed to make their donation decision before they learned their health outcome, i.e. they had to decide whether to pay the cost of donation before they knew whether they would have A-organ failure (in which case their B organs could be donated to other subjects with A-organ failure) or B-organ failure (in which case their B organs would be useless). The cost of registering for donation was 5 Chinese yuan ($0.75).\textsuperscript{17}

If a subject paid the cost to register as an organ donor and had A-organ failure in a round, each of his B organs were donated to a subject with B-organ failure in that round. Subjects played in a fixed group of 12 participants.\textsuperscript{18} In each round, 3 of the 12 participants would be randomly selected to have A-organ failure and the other 9 would

\textsuperscript{15} In the experiment of Kessler and Roth (2014), subjects played 30 rounds which we shortened to 22.

\textsuperscript{16} Alekseev et al. (2017) indicated that there were some advantages to using context-framed instructions. First, meaningful context could enhance understanding of an environment and help gain experimental control. Second, contextual instructions might affect behavior in the experiment, but this effect might be appropriate as it related to the research question. For example, evocative framing in terms of as “organ” altered the results relative to the abstract terms of “unit” (Li et al., 2013), but using evocative terms made the psychological costs associated with organ donation more salient and could lead to behavior that better reflects what happens in naturally-occurring environments. Thus, the external validity of the experimental results increases. Following Li et al. (2013), Hawley et al. (2018), as well as Herr and Normann (2016, 2019), in the instructions to subjects we thus employed a contextualized frame (using terms like “organ” rather than “unit”).

\textsuperscript{17} As explained by Kessler and Roth (2014), the cost of organ donation is modeled as a cost of registering to be a donor rather than of having the organs recovered (i.e. removed). Deceased donation occurs after death, when we generally assume that utility flows stop and an individual no longer incurs costs or benefits. In the experiment of Kessler and Roth (2014), half of the subjects bore costs of $0.5 and the other half $4. We modify this setup and introduce a fixed cost of 5 Chinese yuan ($0.75), which corresponds to the half of endowment (i.e. 10 Chinese yuan).

\textsuperscript{18} In the experiment of Kessler and Roth (2014), subjects played in a fixed group of 8 participants which we increased to 12.
have B-organ failure. Thus, the probability of A-organ failure was 25%, and the probability of B-organ failure was 75% (both B organs failed together). 0, 2, 4 or 6 B organs were donated in a round, depending on whether neither, one, two, or three subjects who registered as an organ donor and ended up with A-organ failure. Consequently, either 0, 2, 4 or 6 of the nine participants with B-organ failure would receive a B organ in each round.

Subjects could not earn any additional money in the round, if they had A-organ failure or B-organ failure without receiving a B organ from another participant. Subjects had B-organ failure and received a B organ could earn additional 5 Chinese yuan ($0.75) in the round. Since there were always three subjects with A-organ failure and nine subjects with B-organ failure, a subject who paid the cost to register as a donor and had A-organ failure would always donate his B organs to two other subjects. Both of those subjects earned an additional 5 Chinese yuan ($0.75) from receiving the B organ. Consequently, paying the cost of donation to register as an organ donor generated 2.5 Chinese yuan ($0.375) in expectation for other subjects, i.e. with 25% probability paying the cost of donation generated a total of 10 Chinese yuan ($1.5) in extra earnings for other subjects.

Our experimental design varied the default and oath conditions. There were two different default conditions and four different oath conditions, generating eight different treatments in a 2 × 4 design as shown in Table 1. We first describe the oath condition and then the default condition.

<table>
<thead>
<tr>
<th>Table 1. The 2 × 4 experimental design</th>
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<tbody>
<tr>
<td>2 × 4 design</td>
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<tr>
<td>Oath Condition</td>
</tr>
<tr>
<td>No Oath</td>
</tr>
<tr>
<td>Opt-in</td>
</tr>
<tr>
<td>OPT-IN-NO</td>
</tr>
<tr>
<td>OPT-IN-CARD</td>
</tr>
<tr>
<td>OPT-IN-SIGNATURE</td>
</tr>
<tr>
<td>OPT-IN-RITUAL</td>
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<tr>
<td>OPT-OUT-NO</td>
</tr>
<tr>
<td>OPT-OUT-CARD</td>
</tr>
<tr>
<td>OPT-OUT-SIGNATURE</td>
</tr>
<tr>
<td>OPT-OUT-RITUAL</td>
</tr>
<tr>
<td>Opt-out</td>
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The oath conditions differed in whether offering oath cards as well as oath-taking procedures. The No Oath condition was the baseline; subjects in this condition did not receive oath cards, and there was no oath-taking procedure.
In the Oath Card condition, each subject was offered an oath card entitled “Solemn Oath”. The oath card used in the experiment is depicted in Figure 1. The content the oath card was “I swear upon my honor that, during the whole experiment, I will care life, promote humanity, advocate dedication, and show love”. The oath-taking procedure in this condition was implemented as follows: “Each subject alone entered a cubicle, and was directed to a monitor. The subject was offered an oath card by the monitor, and was told to quietly read the content of the oath card. After the monitor took back the oath card, the subject entered the lab.” Note that subjects were not informed about the topic of the experiment when they received the oath card. To avoid communication prior to the experiment, another monitor stayed in the lab until all subjects had been presented with the oath. Subjects waiting their turn could neither see nor hear what was happening at the cubicle; they thus had no information about whether other subjects were offered the oath card, or whether other subjects were exposed to the oath-taking procedure.

Figure 1. Oath card used in the experiment. The title of the oath card is “Solemn Oath”; the content the oath card is “I swear upon my honor that, during the whole experiment, I will care life, promote humanity, advocate dedication, and show love”.

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19 The subject was asked to read the oath content only once. However, he could also read it more times.
20 The exact wording used by the monitor was scripted to standardize the phrasing of the oath procedure.
In the *Oath Signature* condition, the monitor offered each subject the oath card to sign. The only difference from the oath card condition was that subjects signing the oath was included in the oath-taking procedure, i.e. the subject was asked whether he agreed to sign the oath after quietly reading the content of the oath card.\textsuperscript{21} The monitor explicitly told the subject that he was free to sign the oath or not, and that participation and payoffs were not conditional on signing the oath. Regardless of whether the subject signed the oath, he was thanked and invited to enter the lab.\textsuperscript{22} Other oath-taking procedures were identical to the oath card condition.\textsuperscript{23}

In the *Oath Ritual* condition, each subject was also offered the oath card. The only difference from the oath card condition was that subjects needed to perform a ritual while they read the oath, i.e. the subject was told to quietly read the content of the oath card accompanied by ritualized gestures. The gestures were “*standing up straight, pressing oath card with left hand, and raising right clenched fist to forehead*”.\textsuperscript{24} Standing up straight made subjects have feelings of solemnity and sacredness. Pressing oath card with left hand heightened conscience and transcendence. In China, the clenched fist symbolized strength, solidarity, perseverance, and persistence; it also meant “sincere heart and soul”, a sign of loyalty. Other oath-taking procedures were identical to the oath card condition.

Taken together, subjects in the *No Oath* condition did not receive oath cards. In the latter three conditions (*Oath Card*, *Oath Signature*, *Oath Ritual*), subjects were offered oath cards. In the *Oath Card* condition, subjects were only asked to read the oath. However, subjects in the *Oath Signature* condition were asked to freely sign the oath after reading it; and in the *Oath Ritual* condition they needed to enact ritualized gestures while reading the oath. Therefore, the *No Oath* and *Oath Card* conditions can

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\textsuperscript{21} The signature was asked to sign at the bottom right of the oath card.

\textsuperscript{22} The compliance rate with the signature of oath was 97.22\% (70 among 72 subjects signed the oath). This less-than-100\% rate suggested the subjects knew they had the option to not sign the oath.

\textsuperscript{23} The oath-taking procedure in the oath signature condition was closely followed Jacquemet et al. (2013, 2017, 2018a, 2018b), i.e. the oath was taken freely and signed in the presence of the monitor.

\textsuperscript{24} In China these ritualized gestures are widely used, such as oath-taking of joining the *Communist Party of China*, or the *communist Youth League of China*; and oath-taking of *Constitution of the People's Republic of China*. Figure 2S shows an example of the ritualized gestures used in the experiments.
examine whether oath cards alone affect donor registration; the *Oath Card*, *Oath Signature*, and *Oath Ritual* conditions can identify the effects of signature and ritual on donor registration.

In addition to varying the oath conditions, the experiment also varied the default conditions which differed in whether subjects were organ donor by default. In the *Opt-in* condition, subjects were not organ donor by default. That meant the default option for subjects was not paying 5 Chinese yuan ($0.75) to register as organ donor. The subjects who wished to register as organ donor needed to initatively pay 5 Chinese yuan ($0.75). 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 register as an organ donor, please check the box below; otherwise, please leave it empty. Note that registering as an organ donor would cost you 5 Chinese yuan.”

In the *Opt-out* condition, subjects were organ donor by default. That meant paying 5 Chinese yuan ($0.75) to register as organ donor was subjects’ default option. The subjects who had no willingness to register as organ donor needed to initatively withdraw their donor registry; then the 5 Chinese yuan ($0.75) would be refunded to them. The donation decision was described in the experiment as follows: “In this round, you are paying 5 Chinese yuan to register as an organ donor by default. If you want to withdraw your donor registry, please check the box below; otherwise, please leave it empty. Note that withdrawing your donor registry would refund you 5 Chinese yuan.”

Using a similar experimental design, Li et al. (2013) have tested the effect of the default rule on organ donor registration rate. However, it is important to note that our design for the default rule differs from Li et al. (2013). In their experiment, being an organ donor in the opt-out rule was less costly than in the opt-in rule. Specifically, subjects in opt-in rule were charged $0.75 if they registered as organ donors. Subjects in opt-out rule were registered organ donors by default, and they did not need to pay any money; those who wished to withdraw the donor registry were charged $0.75 to

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25 The default option means what happens when individuals take no action regarding a particular choice opportunity (Johnson and Goldstein, 2003).
opt out.\textsuperscript{26} That is, compared with opt-in rule, the opt-out rule have a monetary incentive to stay in the donor registry. Therefore, the treatment differences in organ donor registration rates between the two default rules may be exclusively driven by the asymmetric monetary incentive. In our experiment, there was no asymmetric monetary incentive between the two defaults rules, as in both default rules registering as organ donor was charged 5 Chinese yuan ($0.75) and not registering would have no charge. This design makes it possible to rule out the effect of asymmetric monetary incentive on treatment differences.

A total of 288 subjects participated in one of 24 sessions, which run at Nankai University during the Fall and Winter of 2018. Subjects were undergraduate students and no subject participated in more than one session of this experiment. There was one fixed group of 12 subjects in each session. Table 2 shows the number of sessions and subjects who participated in each order of the default conditions under the no oath, card oath, signature oath, or ritual oath.

<table>
<thead>
<tr>
<th>Table 2. Number of sessions and subjects in each condition order</th>
<th>Oath Condition</th>
</tr>
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<tbody>
<tr>
<td>Default Condition Order</td>
<td>No Oath</td>
</tr>
<tr>
<td>Opt-in, Opt-out</td>
<td>3 sessions (36 subjects)</td>
</tr>
<tr>
<td>Opt-out, Opt-in</td>
<td>3 sessions (36 subjects)</td>
</tr>
</tbody>
</table>

Subjects stayed in the same oath condition (\textit{No Oath} or \textit{Oath Card} or \textit{Oath Signature} or \textit{Oath Ritual}) for the entire experiment but played in two different organ donation default conditions (either \textit{Opt-in} or \textit{Opt-out}). Subjects were unaware of the total number of rounds of the game they would play, but after they had played 11 rounds in one default condition, they were informed that the rules of the game had changed.

\textsuperscript{26} The reasons for their design are that there are costs associated with making an active organ donation decision. For example, psychologically the organ donation decision may induce stress from thoughts of dying; filling out registration forms also involves time and physical effort. They thus modeled these costs as a simple monetary cost, which was charged if subjects deviated from the default.
The experimenter handed the new instructions and clearly explained all changes in the rules. Then the subjects played 11 more rounds in a different default condition.

At the start of each session, subjects were told that six rounds would be randomly selected for cash payment. After all rounds had been played, subjects were informed of the rounds that had been randomly selected for cash payment. Sessions lasted approximately one hour and subjects earned on average 40 Chinese yuan (5.81), including a show-up fee of 5 Chinese yuan. The experiment was conducted using z-Tree 3.3.11 (Fischbacher, 2007).

3. Experimental Results

In this section, we firstly compare oath card condition and no oath condition to test whether organ donor registration rate can be increased by only offering the oath card (Section 3.1). Then we test the differences of donor registration rate between oath signature condition and oath card condition in Section 3.2. Moreover, Section 3.3 presents the differences of donor registration rate between oath ritual condition and oath card condition. At last, Section 3.4 tests effect of default rule on donor registration rate.

3.1 Oath card

Figure 2 displays 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 the OPT-IN-NO, OPT-OUT-NO, OPT-IN-CARD, and OPT-OUT-CARD treatments. The grey lines show data in the no oath condition by round. The black lines show data in the oath card condition by round. The data lines are broken after round 11. This gap indicates that different groups comprise the data in Rounds 1-11 and the data in Rounds 12-22. Figure 2 reveals that the black lines are not far away from the grey lines in each default condition (OPT-IN-CARD vs. OPT-IN-NO, OPT-OUT-CARD vs. OPT-OUT-NO) across all 22 rounds, i.e. donor registration rates in the oath card condition are not higher than that in the no oath condition.

Figure 3 shows the average donation registration rate of the OPT-IN-NO, OPT-OUT-NO, OPT-IN-CARD, and OPT-OUT-CARD treatments in the first and last 11
rounds. The left panel, Panel A, displays the data from subjects playing in Rounds 1-11. The right panel, Panel B, displays the data from subjects playing in Rounds 12-22. Averaging across the first 11 rounds of the game, the OPT-IN-CARD (OPT-OUT-CARD) treatment averaged a donation registration rate of 17.42% (23.73%), and the OPT-IN-NO (OPT-OUT-NO) treatment averaged a donation registration rate of 15.66% (21.46%). Over the last 11 rounds of the game, OPT-IN-CARD (OPT-OUT-CARD) treatment averaged 18.69% (18.94%), and OPT-IN-NO (OPT-OUT-NO) treatment averaged a donation registration rate of 17.17% (16.41%). The treatment differences of average registration rate between OPT-IN-CARD and OPT-IN-NO, as well as between OPT-OUT-CARD and OPT-OUT-NO, are not significant regardless of being played in the first or last 11 rounds (all Mann-Whitney tests p>0.30), indicating the oath card has no impact on the donor registration rate.27

Table 3 reports linear probability model estimates of organ donation by condition.28 The independent variables include the variables of Card, Signature, Ritual, Opt-out and Last 11 Round, as well as the interactions of Card × Last 11 Round, Signature × Last 11 Round, Ritual × Last 11 Round, Opt-out × Last 11 Round. Card is a dummy variable equal to 1 if the data is from the oath card condition. Signature is a dummy variable equal to 1 if the data is from the oath signature condition. Ritual is a dummy variable equal to 1 if the data is from the oath ritual condition. Opt-out is a dummy variable equal to 1 if the data is from the opt-out condition. Last 11 Round is a dummy variable equal to 1 for rounds 12 to 22. Regressions (1) through (2) analyze data from the No Oath and Oath Card conditions. Regressions (3) through (4) analyze

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27 In our data analysis, all statistical tests involve two-tailed p-values if not otherwise stated.
28 Since the regressions of the decision to be a donor are meant to demonstrate the differential average effects across the conditions and since Probit or Logit specifications can introduce bias in estimates of interaction terms (Ai and Norton, 2003), Table 3 (and Table 4) report linear probability models using OLS regression specifications with robust standard errors clustered at the subject and round level. While the linear probability model is inefficient, it is unbiased by using robust standard errors to address the heteroskedasticity of the error terms. In addition, none of our specifications imply estimated probabilities less than 0 or greater than 1. The robustness analysis shows that the results are qualitatively the same (i) whether we cluster at the subject and session level, or cluster at the session and round level, (ii) when we control subjects’ health outcomes in previous round, and when we control whether subjects receive an organ last round, (iii) when we specify Probit models, for the coefficients of each interaction, the correction proposed in Norton et al. (2004) is used and the coefficients are almost identical to those estimated by the linear probability model.
data from the Oath Card and Oath Signature conditions. Regressions (5) through (6) analyze data from the Oath Card and Oath Ritual conditions. Regressions (7) through (10) analyze data from all oath conditions.

Regression analysis of Table 3 confirms our previous result by showing that the coefficients of Card and Card × Last 11 round are not significant (see columns (1), (2), (9), and (10) in Table 3).

**Result 1: offering oath card alone has no impact on the donor registration rate.**
Figure 2. Percentage of donation registration rate in the OPT-IN-NO, OPT-OUT-NO, OPT-IN-CARD, and OPT-OUT-CARD treatment by round. The grey lines show data in the no oath condition by round. The black lines show data in the oath card condition by round. The circle markers show data in the opt-in condition by round. The triangle markers show data in the opt-out condition by round. The data lines are broken after round 11. This gap indicates that different groups comprise the data in Rounds 1-11 and the data in Rounds 12-22.

Figure 3. Average donation registration rate of the OPT-IN-NO, OPT-OUT-NO, OPT-IN-CARD, and OPT-OUT-CARD treatment in the first and last 11 rounds. The left panel, Panel A, displays the data from subjects playing in Rounds 1-11. The right panel, Panel B, displays the data from subjects playing in Rounds 12-22. Error bars indicate ±1 s.e.m.
3.2 Signing oath

To test the effect of signing the oath, the organ donor registration rate in the OPT-IN-SIGNATURE, OPT-OUT-SIGNATURE, OPT-IN-CARD, and OPT-OUT-CARD treatments are reported in Figure 4 and Figure 5. Figure 4 displays the percentage of donor registration rate in those four treatments by round. The dash lines show average registration rate in the oath signature condition by round. Figure 5 shows the average donor registration rate of those four treatments in the first and last 11 rounds. The left panel, Panel A, displays the data from subjects playing in Rounds 1-11. The right panel, Panel B, displays the data from subjects playing in Rounds 12-22.

We find that the oath signature condition has a significant positive impact on the donor registration rate across all 22 rounds. Both of OPT-IN-CARD and OPT-OUT-CARD treatments (the black lines) lie beneath the OPT-IN-SIGNATURE and OPT-OUT-SIGNATURE treatments (the dash lines) regardless of being played in the Rounds 1-11 or Rounds 12-22. Specifically, for the first 11 rounds the average donation registration rate in OPT-IN-SIGNATURE treatment is 29.55%, which is significantly higher than OPT-IN-CARD treatment (17.42%) (Mann-Whitney test, p<0.001); the average donor registration rate in OPT-OUT-SIGNATURE treatment is 38.64%, which is significantly higher than OPT-OUT-CARD treatment (23.73%) (Mann-Whitney test, p<0.001). For the last 11 rounds, the treatment differences between OPT-IN-SIGNATURE (30.81%) and OPT-IN-CARD (18.69%), as well as between OPT-OUT-SIGNATURE (31.31%) and OPT-OUT-CARD (18.94%), are also significant (for both Mann-Whitney tests p<0.001). The regression analysis confirms these results that the coefficients of Signature are positive and significant at 1% level, but the coefficient of Signature × Last 11 round is not significant (see columns (3), (4), (9), and (10) in Table 3).

Result 2: signing oath card significantly increases the donor registration rate.
Figure 4. Percentage of donation registration rate in the OPT-IN-SIGNATURE, OPT-OUT-SIGNATURE, OPT-IN-CARD, and OPT-OUT-CARD treatment by round. The dash lines show average registration rate in the oath signature condition by round. The black lines show average registration rate in the oath card condition by round. The circle markers show data in the opt-in condition by round. The triangle markers show data in the opt-out condition by round. The data lines are broken after round 11. This gap indicates that different groups comprise the data in Rounds 1-11 and the data in Rounds 12-22.

Figure 5. Average donation registration rate of the OPT-IN-SIGNATURE, OPT-OUT-SIGNATURE, OPT-IN-CARD, and OPT-OUT-CARD treatment in the first and last 11 rounds. The left panel, Panel A, displays the data from subjects playing in Rounds 1-11. The right panel, Panel B, displays the data from subjects playing in Rounds 12-22. Error bars indicate ±1 s.e.m.
3.3 Ritualized gesture

To investigate the effect of enacting ritual on donor registration rate, Figure 6 plots the percentage of donor registration rate in the OPT-IN-RITUAL, OPT-OUT-RITUAL, OPT-IN-CARD, and OPT-OUT-CARD treatments by round. The short-dash dot lines show average donor registration rate in the oath ritual condition by round. Figure 7 plots the average donor registration rate of OPT-IN-RITUAL, OPT-OUT-RITUAL, OPT-IN-CARD, and OPT-OUT-CARD treatments in the first and last 11 rounds. The left panel, Panel A, displays the data from subjects playing in Rounds 1-11. The right panel, Panel B, displays the data from subjects playing in Rounds 12-22.

The figures reveal that the oath ritual condition has a significant positive impact on the donor registration rate across all 22 rounds. The oath ritual conditions (the short-dash dot lines) lie above the oath card conditions (the black lines) regardless of being played in the Rounds 1-11 or Rounds 12-22. Averaging across the first 11 rounds of the game, the OPT-IN-RITUAL treatment averaged a donor registration rate of 39.14%, and the OPT-OUT-RITUAL treatment averaged a donor registration rate of 47.22%. Over the last 11 rounds of the game, OPT-IN-RITUAL treatment averaged 39.65%, and OPT-OUT-RITUAL treatment averaged a donation registration rate of 39.39%. For both the first and last 11 rounds, significant differences of average donor registration rate are found between the OPT-IN-RITUAL and OPT-IN-CARD treatments, as well as between the OPT-OUT-RITUAL and OPT-OUT-CARD treatments (all Mann-Whitney tests p<0.001). The regression analysis also shows that the coefficients of Ritual are positive and significant at 1% level, but the coefficient of Ritual × Last 11 round is not significant (see columns (5), (6), (9), and (10) in Table 3).

**Result 3:** ritualized gesture significantly increases the donor registration rate.
Figure 6. Percentage of donation registration rate in the OPT-IN-RITUAL, OPT-OUT-RITUAL, OPT-IN-CARD, and OPT-OUT-CARD treatment by round. The short-dash dot lines show average registration rate in the oath ritual condition by round. The black lines show average registration rate in the oath card condition by round. The circle markers show data in the opt-in condition by round. The triangle markers show data in the opt-out condition by round. The data lines are broken after round 11. This gap indicates that different groups comprise the data in Rounds 1-11 and the data in Rounds 12-22.

Figure 7. Average donation registration rate of the OPT-IN-RITUAL, OPT-OUT-RITUAL, OPT-IN-CARD, and OPT-OUT-CARD treatment in the first and last 11 rounds. The left panel, Panel A, displays the data from subjects playing in Rounds 1-11. The right panel, Panel B, displays the data from subjects playing in Rounds 12-22. Error bars indicate ±1 s.e.m.
Table 3. Organ donation by condition. Robust standard errors clustered by subject and round are in parentheses: * significant at 10%, ** significant at 5%, *** significant at 1%. Columns (1) and (2) use only data from no oath conditions (OPT-IN-NO and OPT-IN-OUT treatments) vs. oath card conditions (OPT-IN-CARD and OPT-IN-CARD treatments), columns (3) and (4) use only data from oath card conditions (OPT-IN-CARD and OPT-IN-CARD treatments) vs. oath signature conditions (OPT-IN-SIGNATURE and OPT-IN-SIGNATURE treatments), and columns (5) and (6) use only data from oath card conditions (OPT-IN-CARD and OPT-IN-CARD treatments) vs. oath ritual conditions (OPT-IN-RITUAL and OPT-IN-RITUAL treatments). Columns (7) to (10) present regressions for all conditions. Card is a dummy variable equal to 1 if the data is from the oath card condition. Signature is a dummy variable equal to 1 if the data is from the oath signature condition. Ritual is a dummy variable equal to 1 if the data is from the oath ritual condition. Opt-out is a dummy variable equal to 1 if the data is from the opt-out condition. Last 11 Round is a dummy variable equal to 1 for rounds 12 to 22.

<table>
<thead>
<tr>
<th>Donation (0 or 1) in a linear probability model (OLS)</th>
<th>Card</th>
<th>Signature</th>
<th>Ritual</th>
<th>Opt-out</th>
<th>Last 11 Round</th>
<th>Card × Last 11 Round</th>
<th>Signature × Last 11 Round</th>
<th>Ritual × Last 11 Round</th>
<th>Opt-out × Last 11 Round</th>
<th>Constant</th>
<th>Observations</th>
<th>R-squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) No Oath vs. Oath Card</td>
<td>0.020</td>
<td>0.128**</td>
<td>0.217***</td>
<td>0.036*</td>
<td>-0.018</td>
<td>(0.027)</td>
<td>(0.024)</td>
<td>(0.029)</td>
<td>(0.028)</td>
<td>0.177***</td>
<td>3168</td>
<td>0.001</td>
</tr>
<tr>
<td>(2) Oath Card vs. Oath Signature</td>
<td>0.020</td>
<td>0.133***</td>
<td>0.226***</td>
<td>0.072**</td>
<td>-0.018</td>
<td>(0.035)</td>
<td>(0.037)</td>
<td>(0.040)</td>
<td>(0.030)</td>
<td>0.186***</td>
<td>3168</td>
<td>0.001</td>
</tr>
<tr>
<td>(3) Oath Card vs. Oath Ritual</td>
<td>0.020</td>
<td>0.153***</td>
<td>0.246***</td>
<td>0.072**</td>
<td>-0.018</td>
<td>(0.035)</td>
<td>(0.037)</td>
<td>(0.040)</td>
<td>(0.030)</td>
<td>0.186***</td>
<td>3168</td>
<td>0.001</td>
</tr>
<tr>
<td>(4) All Conditions</td>
<td>0.020</td>
<td>0.153***</td>
<td>0.246***</td>
<td>0.072**</td>
<td>-0.018</td>
<td>(0.035)</td>
<td>(0.037)</td>
<td>(0.040)</td>
<td>(0.030)</td>
<td>0.186***</td>
<td>3168</td>
<td>0.001</td>
</tr>
<tr>
<td>(5)</td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>
3.4 Default rule

We also examine the effect of default rule on organ donor registration rate across 22 rounds. In Figure 2, Figure 4 and Figure 6, the circle markers show data in the opt-in condition by round, and the triangle markers show data in the opt-out condition by round. The figures reveal that opt-out conditions (triangle markers) lie above the opt-out conditions (circle markers) only in Rounds 1-11 but not in Rounds 12-22.

Figure 8. Average donation registration rate of the opt-in and opt-out condition in the first and last 11 rounds by the default order. The black lines show data that change from opt-out condition to opt-in condition, which indicates that the average donor registration rate is significantly decreased from Rounds 1-11 to Round 2-22 (Wilcoxon signed-rank test, p<0.001). The dash lines show data that change from opt-in condition to opt-out condition, which suggests that no significant difference in average donor registration rate is found from Rounds 1-11 to Round 2-22 (Wilcoxon signed-rank test, p=0.741). In addition, in the Rounds 1-11 the average donor
registration rate of opt-out condition is 32.64%, which is significantly higher than the opt-in condition (25.44%) (Mann-Whitney test, p<0.001); while in the Rounds 12-22, the difference between the opt-out and opt-in conditions is not significant (26.52% vs. 26.58%, Mann-Whitney test, p=0.679). The regression analysis confirms these results by showing that the coefficient of Opt-out is significantly positive and the coefficient of Opt-out × Last 11 round is significantly negative (see columns (7), (8) and (10) in Table 3).

Specifically, for the first 11 rounds, the opt-out condition has a significant influence on the donor registration rate in all the oath conditions. In the no oath condition, the donor registration rate is 21.46% in OPT-OUT-NO treatment and 15.66% in OPT-IN-NO treatment (Figure 3). In the oath card condition, the donor registration rate is 23.74% in OPT-OUT-CARD treatment and 17.42% in OPT-IN-CARD treatment (Figure 3). In the oath signature condition, the donor registration rate is 38.64% in OPT-OUT-SIGNATURE treatment and 29.54% in OPT-IN-SIGNATURE treatment (Figure 5). In the oath ritual condition, the donor registration rate is 47.22% in OPT-OUT-RITUAL treatment and 39.14% in OPT-IN-RITUAL treatment (Figure 7). These treatment differences of donor registration rate between opt-in and opt-out conditions are significant (all Mann-Whitney tests p<0.01).

For the last 11 rounds, however, the opt-out condition has no significant influence on donor registration rate in all the oath conditions. In the no oath condition, the donor registration rate is 16.41% in OPT-OUT-NO treatment and 17.17% in OPT-IN-NO treatment (Figure 3). In the oath card condition, the donor registration rate is 18.94% in OPT-OUT-CARD treatment and 18.69% in OPT-IN-CARD treatment (Figure 3). In the oath signature condition, the donor registration rate is 31.31% in OPT-OUT-SIGNATURE treatment and 30.81% in OPT-IN-SIGNATURE treatment (Figure 5). In the oath ritual condition, the donor registration rate is 39.39% in OPT-OUT-RITUAL treatment and 39.65% in OPT-IN-RITUAL treatment (Figure 7). These treatment differences of donor registration rate between opt-in and opt-out conditions do not reach significance (all Mann-Whitney tests p>0.20).

Table 4 presents linear probability model estimates of organ donation in opt-out
condition. The independent variables include the dummy variables of *Opt-out* and *Last 11 Round*, as well as their interaction. Regressions (1) through (2) analyze data from the No Oath condition. Regressions (3) through (4) analyze data from the Oath Card condition. Regressions (5) through (6) analyze data from the Oath Signature condition. Regressions (7) through (8) analyze data from the Oath Ritual condition.

The regression analysis of Table 4 suggests that the coefficients of *Opt-out* are significantly positive and the coefficients of *Opt-out × Last 11 Round* are significantly negative across the oath conditions.

**Table 4. Organ donation in opt-out condition.** Robust standard errors clustered by subject and round are in parentheses: * significant at 10%, ** significant at 5%, *** significant at 1%. Columns (1) and (2) use only data from no oath conditions (OPT-IN-NO and OPT-IN-NO treatments), columns (3) and (4) use only data from oath card conditions (OPT-IN-CARD and OPT-IN-CARD treatments), columns (5) and (6) use only data from oath signature conditions (OPT-IN-SIGNATURE and OPT-IN-SIGNATURE treatments), columns (7) and (8) use only data from oath ritual conditions (OPT-IN-RITUAL and OPT-IN-RITUAL treatments), columns (9) and (10) present regressions for all conditions. Opt-out is a dummy variable equal to 1 if data is from the opt-out condition. Last 11 Round is a dummy variable equal to 1 for rounds 12 to 22.

<table>
<thead>
<tr>
<th>Donated (0 or 1) in a linear probability model (OLS)</th>
<th>No Oath</th>
<th>Oath Card</th>
<th>Oath Signature</th>
<th>Oath Ritual</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Opt-out</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.025*</td>
<td>0.058***</td>
<td>0.033†</td>
<td>0.063***</td>
<td>0.045*</td>
</tr>
<tr>
<td>(0.019)</td>
<td>(0.028)</td>
<td>(0.020)</td>
<td>(0.028)</td>
<td>(0.024)</td>
</tr>
<tr>
<td>Last 11 Round</td>
<td>0.015</td>
<td>0.012</td>
<td>0.013</td>
<td>0.005</td>
</tr>
<tr>
<td>(0.026)</td>
<td>(0.027)</td>
<td>(0.033)</td>
<td>(0.033)</td>
<td>(0.035)</td>
</tr>
<tr>
<td><strong>Opt-out × Last 11 Round</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>−0.066*</td>
<td>−0.061†</td>
<td>−0.081†</td>
<td>−0.083*</td>
<td></td>
</tr>
<tr>
<td>(0.038)</td>
<td>(0.040)</td>
<td>(0.047)</td>
<td>(0.049)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>0.164***</td>
<td>0.181***</td>
<td>0.174***</td>
<td>0.302***</td>
</tr>
<tr>
<td>(0.012)</td>
<td>(0.018)</td>
<td>(0.014)</td>
<td>(0.019)</td>
<td>(0.016)</td>
</tr>
<tr>
<td>Observations</td>
<td>1584</td>
<td>1584</td>
<td>1584</td>
<td>1584</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.001</td>
<td>0.004</td>
<td>0.002</td>
<td>0.002</td>
</tr>
</tbody>
</table>

**Result 4:** opt-out rule significantly increases the donor registration rate in the first 11 rounds but not in the last 11 rounds.

**Result 5:** when default rule is changed from opt-out to opt-in, the donor registration rate is significantly reduced; when default rule is changed from opt-in to opt-out, the donor registration rate is unaffected.
4. Discussion

Across the globe, countries face a shortage of human organs for transplant. To increase organ donation, policy makers have considered a variety of incentive strategies, such as granting priority in organ allocation to registered donors or to next of kin of deceased donors, using a presumed consent policy to opt out rather than opt in, removing financial disincentives, and facilitating kidney exchange.\(^{30}\)

In this paper, we provide a novel incentive strategy to improve organ donor registry by swearing an oath. In order to identify channels through which oath impacts organ donation behavior, we use a laboratory experiment to exogenously vary the oath-taking procedures. Our experimental data show that the impacts of swearing an oath on organ donation work through the signature and ritual channels, i.e. signing oath and ritualized gesture significantly increased the donor registration rate. However, the oath alone does not affect individual organ donation behavior. Signature and ritual aspects of swearing an oath are essential in the oath-taking procedures. Policy makers who try to design effective incentive strategies to heighten public commitment to organ donation can consider the role of swearing an oath accompanied by signature or ritual in promoting organ donor.

It is important to note that the oath used in our experiment is not a professional oath, as it is adapted from the content of Chinese organ donor registration card. Most of the professional oaths have a long history, such as the Hippocratic Oath which goes back to the fourth century B.C.E. to either Hippocrates himself or one of his scholars. Professional oaths may foster professional identity and make the oath-taker conform to professional standards (de Bruin, 2016). There is evidence that the professional oath affects individual behavior. For example, Kesternich et al. (2015) used a conceptual priming approach to vary the salience of professional norms derived from the Hippocratic Oath and examined the impact of professional oaths on physician behavior in simple distribution games. The authors found that priming Hippocratic Oath

\(^{30}\) Kidney exchange, in which incompatible patient-donor pairs are matched, can be viewed as a way to achieve (priority for) a transplant for a loved one, by donating a kidney (e.g., Roth et al., 2004 and 2007).
increased the willingness to give up some of medical subjects’ own payoffs for the benefit of another subject. Therefore, our finding that the oath alone has no influence on organ donation behavior may not be simply applied to professional oaths. The wording of oath may also be important in oath-taking procedures.\textsuperscript{31} We leave the future study to test such interesting conjecture.

Our experimental data also show that the default rule of opt-out increases organ donor registration rate in a situation where there is no asymmetric monetary incentive between the opt-in and opt-out rules. There are two possible reasons, proposed by Johnson and Goldstein (2003), that may explain our experimental result. First, subjects might perceive that default rule is an implicit recommend by the experimenters, which leads to more organ donors in the opt-out rule. McKenzie et al. (2006) conducted experiments and found that policy makers’ preferences and beliefs about organ donation could be revealed through their choice of default rules. Subjects tended to infer that the default was an implicit recommendation, which could thus have influences on their decisions about being an organ donor. Second, being organ donors in the opt-out rule and not being organ donors in the opt-in rule represent the existing state or status quo, and making a change usually involves a trade-off. Subjects disproportionately stick with the status quo as they are simply lazy or prone to procrastination (Samuelson and Zeckhauser, 1988). Thus, there would be more organ donors in the opt-out rule. Distinguishing among the competing explanations of the default effect, such as status quo and implicit recommendations, is an important and open area of research, but it is not the focus of the current paper.\textsuperscript{32}

Last but not the least, we find that the donor registration rate is significantly

\textsuperscript{31} As a vivid illustration of this point, President Barack Obama, for instance, had to retake the oath of office after the official inauguration ritual in 2009 because the Chief Justice of the Supreme Court, who administered the oath, bungled the wording.

\textsuperscript{32} Blumenstock al. (2018) reported on an experiment examining why default options impacted saving behavior. They found that default effects were driven largely by present-biased preferences and the cognitive cost associated with making decisions. Default also changed individuals’ attitudes toward saving. Davidai al. (2012) designed a series of experiments and found that different default rules affected the meaning that subjects assigned to the decision of being an organ donor. When subjects were presumed by the default option to register as organ donors, organ donation might be regarded as something that they simply did unless some exceptional factor made them reluctant to do it. In contrast, when subjects were not organ donors by default, organ donation might be regarded as something noteworthy and elective, and not something they simply did.
reduced when default rule is changed from opt-out to opt-in, but the donor registration rate is unaffected when default rule is changed from opt-in to opt-out. In addition, the positive influence of opt-out rule is only present in the first 11 rounds, and it is not present in the last 11 rounds. We think these results are mainly because of the default effect attenuates with experience (Löfgren et al., 2012). For the first 11 rounds, organ donor registration rate is higher in the opt-out rule than the opt-in rule as subjects have no experiences about the organ donation games or the default rules. For the last 11 rounds, however, the opt-out rule has no impacts on organ donor registration rates, as subjects have accumulated some experiences by having played the organ donation games in the opt-in rule. Therefore, the effect of opt-out rule may be reduced by experience.

References
Brooks, A. W., Schroeder, J., Risen, J. L., Gino, F., Galinsky, A. D., Norton, M. I., &


Supplementary Material

Figure 1S. Organ donor registration card in China. The left panel, Panel A, displays the front side of the card, which reads: Chinese organ donation registration card; Organ Donation, Sustain Life. The right panel, Panel B, displays the reverse side of the card, which reads: Name of cardholder_____, Contact number_____, Name and contact number of registration agency_____; Promote Humanity, Show Love, Advocate Dedication.

Figure 2S. Ritualized gestures used in the oath ritual condition. The gestures were “standing up straight, pressing oath card with left hand, and raising right clenched fist to forehead”. Standing up straight made subjects have feelings of solemnity and sacredness. Pressing oath card with left hand heightened conscience and transcendence. The clenched fist symbolized strength, solidarity, perseverance, and persistence; it also meant “sincere heart and soul”, a sign of loyalty.
Detailed procedure of the experiment

[No oath Condition] Participants enter the lab without doing anything.

[Oath Card Condition] Each participant alone enter a cubicle, and is directed to a monitor. The participant is offered an oath card by the monitor, and is asked to quietly read the content of the oath card. After the monitor takes back the oath card, the participant enters the lab.

[Oath Signature Condition] Each participant alone enter a cubicle, and is directed to a monitor. The participant is offered an oath card by the monitor, and is asked to freely sign the oath after quietly reading the content of the oath card. Regardless of whether the participant signs the oath, he is thanked and invited to enter the lab after the monitor takes back the oath card.

[Oath Ritual Condition] Each participant alone enter a cubicle, and is directed to a monitor. The participant is offered an oath card by the monitor, and is asked to quietly read the content of the oath card accompanied by ritualized gestures. The gestures are “standing up straight, pressing oath card with left hand, and raising right clenched fist to forehead”. After the monitor takes back the oath card, the participant enters the lab.

After all participants enter the lab, another monitor gives the experimental instructions to them.
**Experiment instructions**

You are now participating in an economic study. Please read the following instructions carefully. Here you will learn everything you need to know to participate in the study. Please raise your hand if you do not understand something. We will answer your question at your desk.

Please note that communication is strictly forbidden during the study. Furthermore, we inform you that you may only use those functions on the computer that are necessary for completing the study. Communication or playing with the computer lead to exclusion from the study.

**Show-up Fee**

You will receive an initial endowment of 5 Chinese yuan at the beginning of the study. You can earn additional income during the study.

**Experiment**

In today’s experiment, you are going to make decisions about hypothetical organ donation. None of the decisions you make in the experiment today will affect your real life. 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, two B-organ, and an endowment of 10 Chinese yuan in each round.

You will finish the experiment with a group of twelve participants. In each round, three of the twelve participants in your group would be randomly selected to have A-organ failure and the other nine would have B-organ failure. That is, you will be either A-organ failure or B-organ failure in a round, and will never experience both types of organ failure at the same time. Both two B-organ will fail if participants have B-organ failure. The participants who have A-organ failure can donate their two B-organ to those participants who have B-organ failure.

Whenever your A-organ fails, you will not earn any additional money in the round. If you have B-organ failure and receive a B-organ, you will earn additional 5 Chinese yuan in the round. If you have B-organ failure and do not receive a B-organ, you will not earn any additional money.
**Organ Donation Decision and Cost**

**[Opt-in Condition]** 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. 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 5 Chinese yuan.

**[Opt-out Condition]** At the beginning of each round, you begin by being an organ donor, which has cost you 5 Chinese yuan. You will be asked to declare whether you want to change your status and become a non-donor in that round. 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 withdrawal from being an organ donor (checking the box) would refund you the cost of 5 Chinese yuan.

Since there are always three participants with A-organ failure and nine participants with B-organ failure, participants who pay the cost to register as organ donors and have A-organ failure will always donate B organs to other participants. Those participants who receive the B organs can earn an additional 5 Chinese yuan. Depending on whether neither, one, two, or three participants who register as an organ donor and have A-organ failure, 0, 2, 4 or 6 B organs are donated in a round. Consequently, either 0, 2, 4 or 6 of the nine participants with B-organ failure would receive a B organ in each round.

In each round, your decision of donation and your state of A-organ or B-organ failure are private information. You have no information about the number of participants who register as organ donors, and the number of participants who receive (or not receive) B-organ in a round.

**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 six rounds will be randomly selected for payment at the end of the experiment. Thus, you should make your decision in each round independently of your decision in other rounds.
Detailed procedure of a round

In this part, we give some examples about the procedure of a round in the opt-in condition and opt-out condition.

[Opt-in Condition]

The first stage:

The current round number;
Your virtual life contains one A-organ, two B-organ;
Your endowment is 10 Chinese yuan;

The second stage:

Your endowment is 10 Chinese yuan;
Do you agree to pay 5 Chinese yuan to register as an organ donor?
If you agree to register as an organ donor, please press “agree”; otherwise, press “next”.

### The third stage:

**If participant becomes an organ donor.**

You have registered as an organ donor;
Your current endowment is 5 Chinese yuan;
In this round, you have B-organ failure; and you are in need of a B organ.

### If participant does not become an organ donor.

You have not registered as an organ donor;
Your current endowment is 10 Chinese yuan;
In this round, you have B-organ failure; and you are in need of a B organ.
The fourth stage:

If participant registers as an organ donor.

In this round, you have B-organ failure;
In this round, you are not saved.
In this round, your payoff is 5 Chinese yuan.
The current round is ended.

If participant does not register as an organ donor.

In this round, you have B-organ failure;
In this round, you are not saved.
In this round, your payoff is 10 Chinese yuan.
The current round is ended.
[Opt-out Condition]

The first stage:

The current round number;
Your virtual life contains one A-organ, two B-organ;
Your endowment is 10 Chinese yuan;

The second stage:

You have registered as an organ donor by default, which costs you 5 Chinese yuan;
Your current endowment is 5 Chinese yuan;
If you want to withdraw your registry, please press “withdraw”; otherwise, press “next”.

The third stage:

If participant withdraws registry.

You have withdrawn your registry, which refunds you 5 Chinese yuan;  
Your current endowment is 10 Chinese yuan;  
In this round, you have B-organ failure; and you are in need of a B organ.

If participant does not withdraw registry.

You do not withdraw your registry;  
Your current endowment is 5 Chinese yuan;  
In this round, you have B-organ failure; and you are in need of a B organ.
The fourth stage:

If participant withdraws registry.

In this round, you have B-organ failure;
In this round, you are not saved.
In this round, your payoff is 10 Chinese yuan.
The current round is ended.

If participant does not withdraw registry.

In this round, you have B-organ failure;
In this round, you are not saved.
In this round, your payoff is 5 Chinese yuan.
The current round is ended.