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Organ Donation in the Lab: Preferences and Votes on the Priority Rule*

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Abstract

An allocation rule that prioritizes registered donors increases the willingness to register for organ donation, as laboratory experiments show. In public opinion, however, this priority rule faces repugnance. We explore the discrepancy by implementing a vote on the rule in a donation experiment, and we also elicit opinion poll-like views. We find that two-thirds of the participants voted for the priority rule in the experiment. When asked about real-world implementation, participants of the donation experiment were more likely to support the rule than non-participants. We further confirm previous research in that the priority rule increases donation rates. Beyond that, we find that medical school students donate more often than participants from other fields.

JEL Classification: C90, I10, I18

Keywords: organ donation, laboratory experiment, vote

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1 Introduction

In an intriguing recent paper, Kessler and Roth (2012) analyze in an experiment the impact a priority rule has on the willingness to donate organs. Participants could decide whether to register as organ donors and (fictitiously) donate their organs in the case of brain death in several experimental rounds. Receiving an organ (say, a kidney) from a deceased donor enables participants to continue playing during that round if their organs fail, but the commitment to donate at death comes at a monetary cost (representing the psychological cost of donation decisions in the field). Kessler and Roth's (2012) main experimental treatment exogenously imposes a priority rule.[1] They find that giving priority on the waiting list to those who were themselves registered as donors significantly increases donor registration. Kessler and Roth (2012) also convincingly argue that the rule is superior to several other mechanisms in terms of overcoming legal hurdles when it comes to the implementation. They conclude that the priority rule seems feasible and can be implemented without major cost to the system, in addition to the rule being superior in terms of increasing registration rates for organ donation.

Having said that, the main problem with implementing the priority rule may be repugnance in ethics committees and in the general population. Indeed, Kessler and Roth (2012, p. 2044) expect "substantial debate and principled opposition" when changing the priorities for organ recipients. The superiority of the priority mechanism documented in the donation experiments may fail to have an impact when public opinion and experts are unaware or neglect such efficiency gains.

While a priority rule has been implemented in Israel and Singapore, it faces opposition in other countries. The United Kingdom's National Health Service Blood and Transplant (NHSBT) authority recently published a new detailed strategy to improve organ donation (NHSBT, 2013). Whereas the NHSBT suggests several policies ready for implementation, the goals regarding a priority rule are modest: the NHSBT merely demands "national debates" as to whether registered donors themselves "should receive higher priority if they need to be placed on the Transplant Waiting List" (p. 16). The authority is presumably cautious because of an opinion poll it conducted before the formulation of the new strategy (NHSBT, 2012) where 56 percent of the population opposed the priority rule. For Germany, Ahlert and Schwettmann (2011) report that the priority rule faced little support in an opinion poll, and more than 90 percent of respondents indicated that they would not (or would even negatively) change their registration

[1] Presumably all organ donation systems "prioritize" with respect to some criteria, typically medical criteria (see the German example in Table 5 in the Appendix). When we talk about "the priority rule" in this paper, we mean a reciprocal rule that prioritizes registered donors.

attitude if the priority rule was implemented. Moreover, the authority in charge of donation regulations appears reluctant to consider a priority rule.[2] The only opinion poll we have been able to find for the US (Spital, 2005) had a more favorable conclusion: a small majority of 53 percent were in favor of a priority rule but 41 percent still opposed it.

In this paper, we try to explore the discrepancy between superior registration rates in the experiment on the one hand and repugnance in public opinion about the priority rule on the other. Building on Kessler and Roth's (2012), we follow an *endogenous institutions* approach: a main novelty of our experiment is that we let subjects decide (in an incentivized majority vote) whether they wish to implement the priority rule after having played for several rounds both with and without the priority rule. This vote indicates participants' consent or resistance to the rule, after having experienced its superior performance in the lab. The literature on endogenous institutions in dilemma games has found that democratic institutions may improve cooperation. For example, Tyran and Feld (2006), Ertan et al. (2010), and Sutter et al. (2010) find that punishment and rewards in public-good games have a larger effect on cooperation when these mechanisms are implemented democratically than when they are imposed exogenously. The design of Dal Bó et al. (2010) allows to control for selection effects (for example, participants who vote for or choose a policy may be affected differently by it). For our experiment, the literature on endogenous institutions in dilemma games (for example, Dal Bó et al., 2010; Sutter et al., 2010) suggest that voting in favor of the priority rule, and thus implementing it, may increase donation rates even further.

On top of the vote on the priority rule, we also ask participants after the experiment (non-incentivized) whether they would be in favor or against the implementation of the priority mechanism in the real world. We contrast these preferences with the vote in the experiment and with the opinions of members of our subject pool who did not participate in the donation experiment. This may indicate whether participation in the experiment has the potential to change attitudes toward the priority rule.

[2]Breyer and Kliemt (2007) blame the gap between potential and actual donations on the "inappropriate social institutions" in Germany and call for reciprocity, which would help to close this gap. The German national ethics committee discussed the priority rule extremely briefly and did not consider it to be an option (Nationaler Ethikrat, 2007). The two reasons given are: first, they consider it unfair to treat patients differently because of prior behavior, and second, it cannot be ruled out that patients could opt out shortly before dying to avoid donation. The board of the German-speaking health economists association, by contrast, has repeatedly demanded (most recently in DGGÖ, 2011) that "reciprocity" (what we call the priority rule) being corporated in a new law for organ donation–without success. But even economists disagree. Countering Kliemt's (2001) arguments in favor of a priority rule, Ockenfels and Weimann (2001) argue that non-donors would be punished in a priority system, which could be compared to a "death penalty" (p. 282).

Medical doctors are opinion leaders in the organ donation debate, so we specifically target students of medicine for our experiment. As future physicians or surgeons, they may have stronger views on the priority rule than students from other fields and these opinions may be rather influential. It thus seems intriguing to have disproportionally many students of medicine amongst our subjects.

To sum up, our research questions are as follows. Do participants prefer the priority rule in the lab if they have the choice? How do their preferences in the experiment relate to their opinions about the priority rule in the field? Does participation in the experiment change attitudes toward the priority rule? And finally, do students of medicine maintain different views than students from other fields of study?

Following Kessler and Roth (2012), which will be described in detail below, a number of papers have considered organ donation in experiments (see also Kessler and Roth, 2014a). Li et al. (2013) add several modifications to Kessler and Roth (2012): first, they show that compared to a decontextualized one a contextualized frame significantly increases the willingness to donate organs. Second, they run opt-out treatments and show that this regulation leads to significantly higher donation rates.[3] Specifically, an opt-out scheme with priority leads to the highest donation rates, and increased donation rates are achievable using either a priority rule or an opt-out program separately. Kessler and Roth (2014b) experimentally analyze a loophole in Israel's priority regulation. There, individuals can register to obtain priority but avoid ever being in a situation to actually donate after death. They show that such a loophole completely eliminates the increase in donation rates due to the priority rule or even reduces them if loophole-exploiting behavior becomes public information.

Our findings are as follows. First, we replicate previous results in that the priority system outperforms the benchmark allocation system without priority. Second, we find that after having played several rounds both with and without the priority rule, two-thirds of the subjects vote for the priority rule in the final set of rounds. Roughly the same share of subjects would also favor the priority rule in reality in a non-incentivized questionnaire. Lab participants were, however, more in favor of the real-world implementation of the rule than subjects who did not play the donation experiment (only 45 percent of them favored the rule in the field). Finally, medical school students registered significantly more often as potential donors in the experiment relative to their number than participants from other fields of study. They also voted for the rule in

[3]In an opt-out system, inhabitants have to register if they oppose donation. Such a regulation exists, for example, in Spain. In the more prevalent opt-in systems, inhabitants need to register if they are willing to donate.

the experiment more often. Interestingly, medical students were *not* more inclined than non-medical school students to support the priority rule in the real world.

2 Experimental setup

The experiment consisted of five parts (see Table 1). The first part comprised eight rounds of the donation game (to be explained below) *without* the priority rule. The second part added eight further rounds of the donation game *with* the priority rule. In part three, subjects had to vote on whether or not the priority rule was to be implemented in part four of the experiment. Part four consisted of four more rounds of the donation game. The vote is incentivized because it affects subjects' payoffs in these four rounds. At the end of the experiment, in part five, we asked subjects to state their opinion (non-incentivized) about the desirability of the priority rule in the field.

Because of the within-subjects design, order effects are a possibility. In most sessions the order of treatments was as in Table 1. For two groups, we reversed the order and started with the priority rule. Upfront, we note that Kessler and Roth (2012) find only weak sequencing effects. Donation rates are lower in the second part of their experiment, but this effect is not particularly pronounced for priority.

Table 1: Experimental design

Part	rounds	description
1	1 to 8	donation experiment without priority
2	9 to 16	donation experiment with priority
3		majority vote on priority rule
4	17 to 20	donation experiment w/ or w/out priority according to vote
5		subjects give opinion about the priority rule in the field

For two groups, we started with part two, followed by part one, in order to test for ordering effects.

We largely adopt the Kessler and Roth (2012) design and use their z–Tree (Fischbacher, 2007) code almost throughout. Departing from Kessler and Roth (2012) and following Li et al. (2013), we employ a contextualized frame (using terms like "organ" rather than "unit"). With the health frame, participants can connect the experimental and the field setting more intuitively when asked for their opinion about the priority rule in the real world. In order to simplify the design, we again follow Li et al. (2013) in that there is only one level of cost of registering. Kessler and Roth (2012) show that high-cost players register less often than low-cost players, as expected. In Kessler and Roth (2012) and Li et al. (2013), subjects played 15 rounds, twice. We decided to shorten this because of the additional stages (like the voting stage) our setup requires.

Following Kessler and Roth (2012), each of the 20 experimental rounds was played as follows. The round started with all subjects having an active A organ (brain) and two active B organs (kidneys). Also at the beginning of a round, subjects had to decide whether they wished to register as an organ donor in that round, at a cost (see below). The experimental rounds were partitioned into several periods. In each of these periods, the subject's A organ had a 10 percent probability of failing and the B units had a 20 percent chance of failing (where both B organs failed together). The round ended for the subject when his or her A organ failed (representing brain death), which also occured when the B organ(s) failed and the subject did not receive a B unit from a donor during the five periods after the B failure (representing death after a phase of dialysis).

We now describe how the registration for organ donation and actual organ transplants were conducted. As mentioned, subjects were asked whether they wished to become a donor at the beginning of each round. A donor's two B organs would be donated if and only if the player had committed to donating his or her B organs in that round. Subjects could receive a B organ from a deceased player in a given period if that player's A organ failed while his or her two B organs were still active (a received B organ could not be donated again). The *baseline* allocation procedure was such that the player with the longest waiting time would receive a B organ (if a donor was available). With the *priority* allocation procedure, subjects who had registered as donors would be given priority as a recipient, with those with the longest waiting time receiving the highest priority. If there were more B organs available than registered donors, they would be allocated to non-donors according to the waiting time.

Payoffs in each round were calculated as follows. Each participant started a round with a €2 endowment. The cost of registering for donation was €0.6, which corresponds to the mean cost of Kessler and Roth (2012) where half of the subjects bore costs of $0.40 ($0.80). As long as the A organ and at least one B organ were active, subjects earned €1 in each period. If the B organ(s) failed, the subjects survived a maximum of five periods on the waiting list without earning any money. If they received an organ, they again earned one euro in each following period.[4] Once they died (all subjects died eventually), the subjects lost €1, regardless of their willingness to donate their organs.

The vote in part three was a simple majority decision. Subjects were told that they

[4]Each B organ could be donated only once but a subject could receive multiple B organs within the same round.

would play for more rounds and that they could determine the allocation procedure with a majority vote within their session.[5] The result of the vote was given to the participants as on-screen information. In the case of a tie (which did not occur), throwing a die would have determined the allocation rule.

Subjects played repeatedly in groups of 12 participants. We always had two groups of 12 in one experimental session, as did Kessler and Roth (2012). In total, we conducted eight sessions with 24 participants, so the total number of subjects was 192. The number of medical students among these participants was 21.[6] We allocated the medical students to two groups which, accordingly, consisted almost exclusively of medical students. Both groups with medical students were put together with a group of subjects from other fields of study, so we did not have sessions that consisted of exclusively students of medicine. In addition to the 192 participants in the main donation experiment, we contacted 98 participants of unrelated laboratory experiments in order to collect their opinions on the priority rule in the field.

Payments were made immediately in cash at the end of the experiment. We randomly selected three rounds for payment, one round in each part. Subjects were told about the rules for payment in the instructions (see the Appendix). Average earnings were € 20.40 (approximately $25), including an € 8 participation fee. The earnings ranged from € 10.20 to € 40.80. Sessions lasted around 120 minutes (between 10 and 30, average 18, periods per round).

3 Results

We first take a look at the main variables of interest and test for some driving factors. At the end of this section, we deliver fully-fledged regressions for a more comprehensive analysis. We sometimes report on medical school students separately because they turn out to behave differently.

We note upfront that all sessions voted in favor of the rule. This implies that in part four (after the vote) all subjects played with the priority rule.

[5]We decided to have the vote at the session rather than the group level because group level votes could differ and we wanted to avoid having the two groups playing different treatments at the same time. Only in one of the 16 groups did a small majority of the participants actually vote against the priority rule.

[6]While these medical school students are part of the lab's regular subject pool, they seldom show up at the lab, presumably because of higher opportunity cost. In fact, we had invited a disproportionate number of medical students.

3.1 The willingness to donate

Table 2 presents the descriptive statistics for the main variables of interest by treatment and subject pool. We first focus on the willingness to donate.

Our results confirm those obtained by Kessler and Roth (2012, 2014b) and Li et al. (2013). In our experiment, the average registration rate in the baseline treatment is 40 percent and the priority treatment increases the willingness to donate to 68 percent. This is comparable to Kessler and Roth (2012) where 36 percent register as a donor in the baseline treatment and 74 percent in the priority treatment. In Li et al. (2013), subjects are willing to donate in 25 versus 61 percent of the cases. When combining data from Kessler and Roth's (2014b) high and low information conditions, the average donations are 69 percent in the priority condition and 41 percent in the control treatment. Because of minor differences in design, the data of these experiments cannot be compared directly. However, the magnitudes of registration frequencies with and without priority are roughly comparable between these studies, suggesting a consistency of the treatment effect across studies. Finally, note that ours is the first experiment employing a non-US subject pool. The fact that we replicated previous results is very interesting given the structural differences in the health care sector between the United States and Germany.

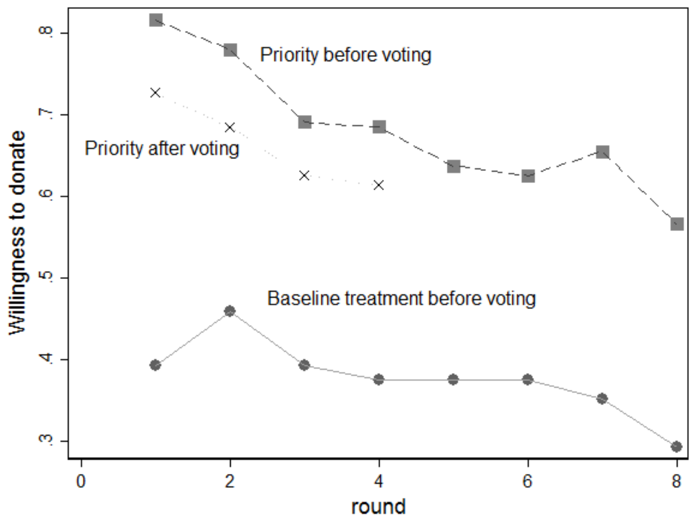
The impact of the priority rule is not only economically substantial it is also statistically significant. We can reject the null hypothesis that both distributions are the same across the 16 groups for baseline vs. priority ($p < 0.001$, Wilcoxon matched-pairs test) and baseline vs. priority after voting (periods 17 to 20, $p < 0.001$), but not for priority before vs. after voting.

Table 2: Descriptive statistics, 192 subjects

	All		General pool		Med students	
Baseline (8 rounds)	**mean**	**sd**	**mean**	**sd**	**mean**	**sd**
Willingness to donate	0.40	0.49	0.39	0.49	0.55	0.50
Earnings	3.86	3.36	3.85	3.37	3.90	3.28
Got organ last round	0.17	0.37	0.16	0.36	0.24	0.43
Earnings after got organ last round[a]	3.99	3.20	3.81	3.08	4.94	3.67
N	1,344		1,197		147	
Priority before vote (8 rounds)	All		General pool		Med students	
Willingness to donate	0.68	0.47	0.66	0.47	0.81	0.39
Earnings	3.94	3.31	3.94	3.31	3.98	3.34
Got organ last round	0.26	0.44	0.26	0.44	0.22	0.42
Earnings after got organ last round[b]	4.14	3.24	4.19	3.30	3.64	2.66
N	1,344		1,197		147	
Priority after vote (4 rounds)	All		General pool		Med students	
Willingness to donate	0.65	0.48	0.64	0.48	0.78	0.42
Earnings	4.08	3.81	4.07	3.37	4.22	3.50
Got organ last round	0.25	0.44	0.25	0.43	0.29	0.46
Earnings after got organ last round[c]	4.34	3.81	4.32	3.76	4.44	4.23
N	576		513		63	
Socio-demographics per subject	All		General pool		Med students	
Male	0.50	0.50	0.53	0.50	0.24	0.44
Age	25.82	6.33	25.97	6.60	24.57	3.19
Age 28 or older	0.23	0.42	0.23	0.42	0.24	0.44
Voting for Priority	0.67	0.47	0.65	0.48	0.76	0.44
Supporting priority rules in the field	0.71	0.46	0.71	0.45	0.67	0.48
Student	0.96	0.20	0.95	0.21	1	0
N	192		171		21	

Source: Experiment, 7 rounds per subject before voting, 3 rounds after voting (excluding first round in each case). *Earnings after got organ last round* based on positive outcomes. The number of observations are (all/general/med): *a* 224/188/36 obs.; *b* 346/313/33 obs.; *c* 146/128/18 obs., respectively.

Figure 1: Willingness to donate by treatment



Note: Experiment data, averages across 20 rounds per subject, 168 subjects. Note that all groups played using the priority rule after the vote.

Figure 1 reports the average donor registration rates over time. While in all three parts the registration rates slightly decrease over time, the priority mechanism leads to significantly more donor registrations. Figure 1 also shows the restart effects (Andreoni and Miller, 1993): donation rates jump upwards after the priority rule was introduced and again after the vote as compared to the control treatment as well as to later rounds of the priority treatment. Such restart effects are well known from the literature.

Table 2 reveals that medical school students register more often as donors. The average registration rate of medical students is between 12 and 16 percentage points higher than that of the general subject pool. Without the priority rule, 55 percent of medical students register vs. 39 percent for the general subject pool. With the priority rule, these figures read 81 percent vs. 66 percent (before voting) and 78 percent vs. 64 percent (after voting). Our regression analysis below confirms that these effects are statistically significant. We conclude that medical students are more willing to donate throughout.

As mentioned, we also ran a session (two groups) with the reversed order of treatments, where the participants first faced the priority rule before playing the baseline treatment in rounds 9 to 16. This affects donation decisions in the sense that the priority rule increases has an even bigger impact: only 16 percent register in the no-priority treatment if they play it in part two versus 40 percent playing it in part one. Registration rates in the priority treatment do not differ before the vote but are somewhat lower after voting (55 percent versus 69 percent in total).

3.2 The vote on the priority rule

The majority of participants vote in favor of the priority rule. Among 192 participants, 128 voted for the rule (around 67 percent). The share is significantly above the 50 percent level suggested by randomization (binomial test, $p < 0.0001$). As mentioned above, all individual sessions in our data set voted in favor of the rule.

Medical school students voted more often for the priority rule in the experiment. Whereas 65 percent of the non-medical students preferred priority, 16 of 21 (76 percent) of the medical students voted for it. A Pearson chi-square test indicates the difference is not significant ($\chi^2_1 = 0.96$, $p = 0.33$).[7]

3.3 Opinions about priority rule in the field

Of the 192 subjects of our experiment, 136 (71 percent) were in favor of introducing the priority rule in the field. (Recall that these are non-incentivized questionnaire data we collected at the end of the donation experiment.) This is significantly above the 50 percent level suggested by randomization (binomial test, $p < 0.001$).[8]

Interestingly, medical school students support the implementation of the priority rule in the field just as often as the other participants. The share of supporters among the medical students is 67 percent (71 percent in the general subject pool). This is surprising given that medical students register as donors more often and vote in favor of the priority rule (insignificantly) more often in the experiment. We discuss this finding below.

Opinions about the field implementation of the priority rule are correlated with the votes in the donation experiment. Among the 128 subjects who voted for priority in the experiment, a majority of 104 participants (81 percent) also favored priority rules in the real world. By contrast, among those 64 participants who did not vote for priority in the lab, only 32 (50 percent) supported the priority rule in the field. A chi-square test rejects that subjects who voted for priority in the experiment were equally in favor or against the priority rule in the field ($\chi^2_1 = 20.17$, $p < 0.001$).

[7] In the treatment with the reversed order, 63 percent voted for priority. This difference is not significant ($\chi^2 = 0.2143, p = 0.643$).

[8] The reversed-order treatment leads to a higher support for priority in the real world (21 out of 24 favoring the implementation ($\chi^2 = 3.6879, p = 0.055$).

The opinions held by the participants of the donation experiment can be compared to those held by non-participants. To collect these additional opinion data, we contacted a further 98 participants at the end of unrelated experiments and asked if they were willing to fill in a brief questionnaire for a flat payment of € 2. These 98 participants were part of our usual experimental subject pool. It turns out that the priority rule was supported by 44 of these non-participants (45 percent). This difference to the participants' preferences (71 percent preferring priority in the real world) is highly significant ($\chi_1^2 = 18.54$, $p < 0.001$). We conclude that participation in the donation experiment (and thus experiencing the dilemma situation) makes people significantly more inclined to favor the priority rule.

3.4 Other variables

Average earnings are similar in the baseline and the priority treatment (around € 3.90), are somewhat higher after voting (€ 4.08) but differ considerably by registration status (not shown in the table). Average earnings were € 4.04 when not registering and € 3.75 when registering across treatments (before the vote). The € 3.75 earnings for those willing to donate can be split into € 3.54 in the baseline treatment and € 3.88 in the priority treatment. The earnings of the non-donors shrink only slightly across treatments (from € 4.06 to € 4.02) on average per round. Thus, although the difference in earnings is reduced by the priority rule for those willing to donate, they still earn less than non-donors in the second part of the experiment.

In the baseline treatment, on average, 17 percent of the subjects (round-subject observations) received an organ in the preceding round. In the priority treatments, 26 percent of the observations faced a donation in the preceding round. If a subject received an organ, the earnings exceeded the general earnings.

Half of the subjects were male. Among the medical students, three-quarters were female. The subjects were an average of 26 years old (ranging from 18 to 59) with a relatively low s. d. of six years and 23 percent being older than 27.[9]

3.5 Regression analysis of donation decisions

To analyze the impact of the priority rule on the willingness to donate, we estimate several multivariate models using probit regressions (see Table 3). The results from

[9]One-quarter of the medical students, three-quarters of the non-students and one-fifth of the general student pool belong to this group, where the latter two are significantly correlated with that binary indicator.

linear probability models can be found in Table 6 in the Appendix and present very similar results compared to the probit regressions. The model specifications build on Kessler and Roth (2012) and Li et al. (2013), especially model (4). Our preferred model is shown in Table 3 in column (3) with the full model and column (5) adding an indicator for being medical student to (3). We explain the probability of registering as a donor with experiences within the experiment, ordering of treatments, as well as with socio-demographic characteristics and personal attitudes. In all models, standard errors are clustered at the group level and the unit of observation is the subject-round level. As noted above, we observe a restart effect when we introduce priority and again after the vote. For this reason we coded the rounds with priority as 1 to 9 and the four periods after the vote as 1 to 4 and treated them as being independent of the former priority rounds.

The impact of the priority treatment (*priority*) is positive and significantly different from zero across all models. In more detail, we can show that the priority rules increase the willingness to donate by 27 to 29 percentage points (0.55 to 0.6 standard deviations around the overall mean of 57 percent). Kessler and Roth (2012, 2014b) and Li et al. (2013) provide estimates of a 28 to 30 percentage point increase in registration rates.

The negative time trend (*round*) shows that the willingness to donate decreases both before and after the vote by around 2.6 percentage points per round. This may be due to the learning that receiving an organ while being alive and on the waiting list is a rare event. The average willingness to donate drops from 40 to 32 percent in the baseline treatment, from 82 to 60 percent in the priority treatment (before vote), and from 73 to 64 percent after voting (captured by the negative coefficient on the indicator for the three rounds after the voting *After the vote*). The reversed ordering of treatments (one session out of eight) indeed has a significant impact: The probability to register decreases by around 14 percentage points due to the very low registration rates in the second (baseline) treatment.

Model (4) excludes the time trend (*round*) and *After voting for priority* to compare our results with Kessler and Roth (2012) and Li et al. (2013). However, the other coefficients do not change noticeably compared to (3).

Table 3, columns (3) and (5) reveal that the association between registration rates and earnings itself *Earnings last round* is small and negative and is weakly statistically different from zero. We identify a 2.8 percentage point lower registration rate per 1 percent increase in earnings or vice versa, which illustrates the costs of registration as discussed above. Actually receiving an organ (*Got organ last round*) is negatively, but not significantly correlated with the decision to register in the following round. This im-

Table 3: Willingness to donate, Probit regression

P(registration= 1)	Probit				
	(1)	(2)	(3)	(4)	(5)
Priority (d)	0.266 (0.035)**	0.277 (0.037)**	0.290 (0.036)**	0.278 (0.034)**	0.291 (0.036)**
Round within treatment		-0.025 (0.006)**	-0.026 (0.006)**		-0.026 (0.006)**
After vote (d)		-0.077 (0.030)*	-0.086 (0.033)**		-0.085 (0.033)**
Reversed order (d)		-0.144 (0.046)**	-0.151 (0.036)**	-0.150 (0.035)**	-0.136 (0.031)**
Log(earnings) last round			-0.028 (0.009)**	-0.028 (0.009)**	-0.027 (0.009)**
Got organ last round (d)			-0.031 (0.042)	-0.026 (0.042)	-0.033 (0.043)
Log(earnings) after got organ last round			0.040 (0.008)**	0.039 (0.007)**	0.039 (0.008)**
Male (d)			0.001 (0.040)	0.001 (0.040)	0.016 (0.045)
Age 28 or older (d)			0.147 (0.041)**	0.146 (0.041)**	0.147 (0.040)**
Voting for priority (d)			0.257 (0.051)**	0.255 (0.051)**	0.252 (0.052)**
Supporting priority in the field (d)			0.080 (0.038)*	0.079 (0.037)*	0.085 (0.038)*
Medical student (d)					0.133 (0.061)*
Observations	3,264	3,264	3,264	3,264	3,264

Marginal effects, (d) for discrete change of dummy variable from 0 to 1; Standard errors in parentheses, clustered at the group level. Significance level indicated: * $p < 0.05$, ** $p < 0.01$. First round in each treatment excluded (lag).

pact is significantly different from zero if the earnings after the transplantation are high (a 1 percent increase in *Log(Earnings after got organ last round)*[10], if anything, increases donation rates by at most 4 percentage points).

We now interpret the lower part of the full model with the individual characteristics and preferences of the participants in Table 3. Including a coefficient for medical students in the regressions in columns (5) confirms that they register significantly more than the general subject pool. A medical student has a 13 percentage points higher probability of registering as a donor than a student of any other subject.[11] This result is new and makes us conjecture that asymmetric information, for example, on the need for organs, may hinder registration and should be reduced.

Supporting priority rules in the real world and voting for priority within the experiment are both positively correlated with the willingness to donate. The direction of the impact is unclear (see also the below analysis of the field opinions). However, in terms of importance, voting for priority within the experiment is stronger than the more abstract support of priority rules in the real world (coefficients range between 25 and 26 percentage points higher probability to register as a donor if the subject voted for priority, which is similar to the impact of priority itself, versus 8 to 9 percentage points of supporting priority in the real world). As we discuss below, this is not a causal relation. Being male does not make a significant difference for the probability of registering as a donor. Unexpectedly, being older than 27 significantly increases the probability of registering by 15 percentage points (age ranging from 18 to 59 years with mean (median) 26 (24) years and s. d. of six years). This age effect may be due to more experience with sickness in the family or a more mature view on health risks.[12]

3.6 Regression analysis of voting decisions

When we look deeper into the question of who votes for priority in the experiment (Table 4), we find that this vote is independent of former earnings, gender, or age.[13] Only 74

[10]This is defined as the number of periods (each is worth one euro) after having received a B organ until death.

[11]In additional regressions, we control for other subject groups, such as students of business and economics, sciences or non-students, which all turned out to not differ significantly.

[12]The older age is highly negatively correlated with general student status. However, being non-student is not significantly correlated with registration if this age-dummy is dropped in the multivariate regression. Note that we have only eight non-students among our subjects.

[13]Including an indicator for those individuals who played the treatments in reverse order causes problems of multicollinearity, for example with medical student (none by construction), mean registration rates or supporting priority in the field. If included, it would lower the probability to vote for priority anything else equal by 17 percentage points although the comparison of simple means (67 percent versus 63 percent) is not statistically significant.

Table 4: Voting for priority in experiment

P(Voting for priority= 1)	Probit	
	coefficient	s. d.
Log(earnings) per subj. higher in priority (d)	0.096	(0.067)
Mean registration in priority	0.083	(0.021)**
Mean registration in control	0.002	(0.014)
Supporting priority in the field (d)	0.266	(0.096)**
Male (d)	0.009	(0.092)
Age 28 or older (d)	-0.077	(0.131)
Medical student (d)	0.039	(0.085)
Observations	192	

Marginal effects, (d) for discrete change of dummy variable from 0 to 1; Standard errors in parentheses, clustered at the group level. Significance level indicated: * $p < 0.05$, ** $p < 0.01$

of the 128 supporters (58 percent) earned more in the baseline treatment than in the priority treatment. Of the 64 non-supporters, 28 (44 percent) earned more during the priority part of the experiment ($\chi^2_1 = 3.39, p < 0.07$).

The average number of registrations under the priority allocation mechanism and the dummy for whether a subject was in favor of introducing the priority rule in the field are significant.

The analysis of voting decisions confirms that donation decisions, votes, and opinions about field implementation of the rule are correlated. Priority is voted for mostly by those who were willing to donate and thus bore higher costs for which they wanted to receive some benefit. To some extent, participants who supported priority rules even before the experiment, and who may also be donors in real life, may have been more inclined to donate in the experiment and vote for priority. However, since the share of supporters of the rule in the field was significantly larger for participants of our experiment, we conclude that experiencing the dilemma in the experiment genuinely affects subjects' opinions.

4 Conclusion and Discussion

In lab experiments, a priority rule that gives preference to registered donors outperforms other allocation rules in increasing the willingness to donate organs (Kessler and

Roth 2012, 2014b; Li et al. 2013), but in the field people often object to the implementation of the rule (Ahlert and Schwettmann, 2011, NHSBT, 2012, Spital, 2005). Would lab participants vote to adopt the rule in the lab? And, more importantly, can participation in the experiment change participants' attitudes toward the priority rule in real life?

Our first finding is that we successfully replicate previous experimental work (Kessler and Roth 2012, 2014b; Li et al. 2013), using a non-US subject pool. We confirm that the priority system leads to more donor registrations than allocation systems without such a priority regulation. In the opinion polls in Ahlert and Schwettmann (2011), 90 percent of the respondents said they would not respond positively to a priority rule. Consistent with this finding, Nadel and Nadel (2013) discuss in their proposal for a priority rule what they consider to be the first and main criticism against it, namely that it would not produce more donations. In light of the experiments these worries of the opponents do not seem well-founded. The priority rule changes incentives and the overall impact of this change is positive.

Second, we identify two subject-pool effects. We find that the medical school students in our sample behaved differently than participants from other fields of study. They registered more frequently as donors in the experiment and they also voted for the priority rule in the experiment more often. On the other hand, medical students supported the priority rule in the real world just as often as non-medical school students. Medical school students (at least in Germany) differ in that they are by and large smarter than most students from other fields, the reason being that taking up studies of medicine requires the very best school grades.[14] We nevertheless think that it is not the (potential or real) superior cleverness of the medical students that makes them register more often. We are unaware of any experimental study that shows that smarter people cooperate more. We rather believe that it is the insights medical school students gain in their studies that makes them more inclined to register as donors. Medical students may put a lot of emphasis on ethical issues, like allocating organs only on medical conditions of the patients. Along the same lines, we find that participants older than 27 have a substantially higher probability to register than the younger, less mature participants.

Third, we find that after having played several rounds both with and without the priority rule, two-thirds of the subjects voted in favor of the priority rule. Why is this the case? The decision to vote for the priority rule is correlated with the inclination to register as a donor in the previous parts of the experiment. The priority rule increases the payoffs of registered donors and decreases the free-rider payoff. It appears that the

[14] Alternatively, candidates with worse grades have to wait long for a place at a medical school. However, in our sample, the medical students are not older than the general student pool.

majority of subjects are willing to donate but, absent a priority rule, they are frustrated by non-donors earning more money. Hence, most subjects vote in favor of the priority rule, which alleviates the dilemma situation of the donation experiment.

The literature on endogenous institutions in dilemma games (Tyran and Feld 2006; Ertan et al. 2010; Dal Bó et al. 2010; Sutter et al. 2010) finds that democratically agreeing on institutions or rules may lead to more cooperation than when the institution is exogenously imposed. In our data, donation rates are somewhat lower when the priority rule was implemented after the vote. One reason for this may be the differences in design. The experiments differ in terms of the timing of the vote and the experience gained prior to the vote.[15] Furthermore the voting does not always improve cooperation (Tyran and Feld, 2006). Finally, our participants had experienced declining donation rates over time in the two previous parts of the experiment and may have been skeptical of whether donation rates would turn out to be high in the third part. As a result, registration rates were higher than in the baseline but in our case were not further improved after the vote.

Finally, we asked participants and non-participants of the donation experiment in non-incentivized questionnaires whether they would favor the priority rule in the field. It turns out that among the participants two out of three were in favor of the real-world implementation of the rule but among the non-participants only 45 percent preferred it. We believe that this is an important insight: experiencing the donation dilemma in the lab has the potential to change people's attitudes in the field. We trust that the experimental results reported in Kessler and Roth (2012, 2014b), Li et al. (2013) and here, which strengthen support for the priority rule, may complement opinion poll data when public opinion is considered in the political decision-making process.

A laboratory experiment on organ donation naturally raises questions of external validity. Our subjects were presumably aware that the priority rule reduces free-riding and therefore increases payoffs. Some ethical issues associated with the priority rule cannot be captured in the lab. This may suggest that the strong support for the priority rule in the lab is predominantly due to payoff concerns. However, our experiment also shows that people who experienced the dilemma situation in the lab are more inclined to support the rule in the field.

[15] In Tyran and Feld (2006), subjects vote in every period, possibly having played both the dilemma with and without (endogenous) sanctions. In Dal Bó et al. (2010), subjects decide on a change in the payoff structure after having played a dilemma for 10 periods but they do not play the alleviated dilemma before the vote. In Sutter et al. (2010), subjects gain no experience at all before the vote.

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9

A Additional Tables

Table 5: Order of criteria for selection of an organ recipient in Germany

criteria	lung, heart, liver	kidney	pancreas
compatibility/identity with blood group	1	1	1
same size/weight	2	-	-
urgency	3	-	2
same HLA-characteristics	-	2	5
waiting time	-	3	3
conservation time*	-	4	4
combined waiting time and conservation time**	4	-	-

Source: Own table with information from `www.transplantation-verstehen.de`. *To reduce time for transportation, the geographic location is considered for the placement in the waiting list. ** If two potential recipients have been waiting for the same length of time, the closer geographic location is preferred.

Table 6: Willingness to donate, OLS regression

	OLS				
	(1)	(2)	(3)	(4)	(5)
Priority	0.266	0.273	0.263	0.255	0.263
	(0.035)**	(0.037)**	(0.034)**	(0.033)**	(0.034)**
Round within treatment		-0.023	-0.022		-0.022
		(0.005)**	(0.005)**		(0.005)**
After voting for priority		-0.070	-0.070		-0.070
		(0.028)*	(0.027)*		(0.027)*
Reversed order		-0.133	-0.129	-0.129	-0.116
		(0.042)**	(0.031)**	(0.031)**	(0.027)**
Log(earnings) last round			-0.024	-0.024	-0.022
			(0.008)*	(0.008)**	(0.008)*
Got organ last round			-0.009	-0.005	-0.009
			(0.034)	(0.034)	(0.034)
Log(earnings) after got organ last round			0.028	0.028	0.028
			(0.005)**	(0.005)**	(0.005)**
Male			0.001	0.001	0.014
			(0.034)	(0.034)	(0.038)
Age 28 or older			0.130	0.130	0.128
			(0.037)**	(0.037)**	(0.035)**
Voting for priority			0.235	0.235	0.229
			(0.049)**	(0.049)**	(0.049)**
Supporting priority in the field			0.066	0.066	0.069
			(0.032)	(0.032)	(0.033)
Medical student					0.113
					(0.052)*
Observations	3,264	3,264	3,264	3,264	3,264

Marginal effects; Standard errors in parentheses, clustered on group level. Significance level indicated: * $p < 0.05$, ** $p < 0.01$. First round in each treatment excluded (lag).

B Instructions (not intended for publication)

Instructions for the first part

Welcome
If you have a question after reading these instructions, please raise your hand at any time during the experiment. An experimenter will answer your question in your cubicle.

Instructions 1 of 5

This experiment is a study of decision making and behavior. In today's experiment you will decide on hypothetical organ donations. None of your decisions that you take in today's experiment will influence your real decisions. You will play a game in a group of 12 people. You will play this game a number of times in the same group. The rules of the game will change during your course of play, and you will be informed if they do.

The experiment consists of three parts. To determine your earnings, one round will be randomly drawn from each of the three parts. You have no possibilities to influence which rounds will be selected. You will be paid the sum of your earnings in the three randomly selected rounds of the experiment plus a participation fee of 8 euro. Money earned will be paid to you in cash at the end of this experiment.

Instructions 2 of 5

The Game:
At the start of each play of the game, you will have 2 euro and a virtual life will be allocated to you. A virtual life consists of one A organ and two B organs. Each round of the game has a limited number of periods in which you can earn money. In each period of one round in which you have one active A organ and at least one active B organ you earn 1 euro.

Instructions 3 of 5

The Game:
In each period of each round, there is a 10% chance that your A organ will fail. If your A organ fails, you cannot earn any more money in that round of the game.

In each period of each round, there is a 20% chance that your B organs will fail (your B organs operate or fail together). If your A organ is still active, you can operate for up to five periods without an active B organ. In these periods you will not earn any money. If in one of these periods you receive a B organ from someone else, you can start earning money again. If you do not receive a B organ in those five periods, your A organ will fail and you cannot earn any more money in that round of the experiment.

Instructions 4 of 5

The Game:
When your A organ fails, you lose 1 euro and you cannot earn any more money in that round. When none of the 12 people in your group can earn more money, that round of the game ends.

Instructions 5 of 5

The Game:
Before the play of the game begins you must decide whether, if your A organ fails, you would like to donate your B organs to other players in your group. A player with an active A organ and failed B organs can receive one B organ. If you decide to donate your B organs, this will cost you 0.60 euro.

If your A organ fails and if you are willing to donate, each of your active B organs will go to a person with failed B organs if such a person is operating in that period and has had five or fewer periods without an active B organ. Each donated B organ will go to the person who has been waiting for a B organ the longest without receiving one. Once a B organ has been donated, it cannot be donated again.

Summary

The important things to remember are:

1. At the beginning of each round, you get 2 euro and a virtual life with an active A organ and two active B organs.
2. If you have one active A organ and at least one active B organ, you earn 1 euro in each period.
3. At the start of play, you can register as a donor of your B organs to people who might need them in the event that you have an A organ failure.
4. Registering as a donor of your B organs costs 0.60 euro.
5. Each donated B organ will go to the person who has been waiting for a B organ the longest without receiving one.
6. You will be paid the sum of your earnings in three randomly selected plays of the whole experiment plus the participation fee.
7. Earnings and decisions are all private information and will not be published.

Decision for this play of the game

You currently have 2 euro. If you decide to donate your B organs, it will cost you 0.60 euro. If your A organ fails, each of your active B organs will go to the person who has been waiting for a B organ the longest without receiving one. By agreeing to donate your B organs in the event of an A organ failure, you are helping people who are in need, just as you may be helped by people who agree to donate their B organs.

Please decide whether you – in case of an A organ failure – would like to donate your two B organs at a cost of 0.60 euro or not (zero costs).

- Donate
- Do not donate

Instructions for the second part

Any changes to the game are described in the following.

As before:
Before the play of the game begins, you must decide whether, if your A organ fails, you would like to donate your B organs to other players in your group. A player with an active A organ and with failed B organs can receive one B organ. If you decide to donate your B organs, this will cost you 0.60 euro. Once a B organ has been donated, it cannot be donated again.

Now:
If your A organ fails and you are willing to donate, each of your active B organs will go to a person with failed B organs who has waited longest (five or fewer periods) without receiving one and who also agreed to donate their B organs. If fewer than two of those players are active, each remaining B organ will go to the person who has been waiting for a B organ the longest without receiving one and who did not agree to donate their B organs. Agreeing to donate your B organs puts you higher up on the priority list to receive an active B organ in the event of a B organ failure and thus gives you priority compared to a person who is not willing to donate.

Summary

The important things to remember are:

1. At the beginning of each round, you get 2 euro and a virtual life with an active A organ and two active B organs.
2. If you have one active A organ and at least one active B organ, you earn 1 euro in each period.

3. At the start of each round, you can register as a donor of your B organs to people who might need them, in the event that you have an A organ failure.

4. Donating - if applicable - your B organs costs 0.60 euro and gives you priority for receiving a B organ in the event that you need one.

5. Each donated B organ will go to the person who has been waiting for a B organ the longest without receiving one and who is also willing to donate their B organs. If none of those people need a B organ, the person who has been waiting for a B organ the longest without receiving one and who did not choose to donate their B organs receives one.

6. You will be paid the sum of your earnings in three randomly selected plays of the game across the whole experiment plus the participation fees.

7. Earnings and decisions are all private information and will not be published.

Decision for this play of the game

You currently have 2 euro. If you decide to donate your B organs, this will cost you 0.60 euro. If your A organ fails, each of your active B organs will go to the person who has been waiting for a B organ the longest without receiving one and who also agreed to donate their B organs. If fewer than two of those players are active, each remaining B organ will go to the person who has been waiting for a B organ the longest without receiving one and who did not agree to donate their B organs.

Agreeing to donate your B organs puts you higher up on the priority list to receive an active B organ in the event of a B organs failure. By agreeing to donate your B organs in the event of an A organ failure, you are helping people who are in need, just as you may be helped by people who agree to donate their B organs. In addition, you are particularly helping people who are also willing to help those in need.

Please decide whether you –in case of an A organ failure– would like to donate your two B organs at a cost of 0.60 euro or not (zero costs).

- Donate
- Do not donate

Voting

In this experiment, you have played 8 rounds without and 8 rounds with priority on the waiting list for people who are willing to donate their organs. In the following, you will play a limited number of rounds in the system that the majority will vote for. The rules are the same as before. Please keep in mind that you can donate organs or not. You only vote for the mechanism (with or without priority) the organs will be allocated. The majority decides. If there is a tie, the experimenter will throw a die. If the die shows a 1–3 you will play without priority, with 4–6 you will play with priority.

Do you prefer to play with or without priority during the following rounds?

- Priority.
- No priority.

Questionnaire

Please fill in the following questionnaire.

1. Please indicate your age:
2. Please indicate your gender: Male, Female
3. Please, indicate whether you are a student: Yes, No
4. Please state your field of studies / your profession (if both apply choose the main activity):
5. Please, argue in brief why you voted for priority / no priority:
6. Imagine that in Germany a priority rule for those willing to donate organs comes under debate. Would you vote for a priority rule for the allocation of organs in Germany? Yes, No
7. Further remarks:

Thank you.

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