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Can Markets Save Lives? An Experimental Investigation of a Market for Organ Donations

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Comments

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An Experimental Investigation of a Market for Organ Donations

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Many people die while waiting for organ transplants even though the number of usable organs is far larger than the number needed for transplant. Governments have devised many policies aimed at increasing available transplant organs with variable success. However, with few exceptions, policy makers are reluctant to establish markets for organs despite the potential for mutually beneficial exchanges. We ask whether organ markets could save lives. Controlled laboratory methods are ideal for this inquiry because human lives would be involved when implementing field trials. Our results suggest that markets can increase the supply of organs available for transplant, but that the specific institutional design of such markets must be carefully considered. However, the increased supply of transplantable organs derives disproportionately from the poor. We also find that exogenously reducing incentives to keep one's organs has a similar effect to creating a market, but with equitable donation rates across income levels.

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Introduction

Advances in medical technology enable human organs to be transplanted from one person to another. Many types of organ transplant are now fairly routine procedures that save thousands of lives each year. However, countries around the world face chronic shortages of organs for transplant. In the United States more than 80,000 people in need of a kidney transplant are currently on a waiting list for a donor kidney.[1] Deceased donors account for most transplant organs, though kidneys from living donors (usually family members) provide organs to an increasing number of those waiting. However, since data was first collected in 1988, demand for kidneys has grown far more quickly than donor supply. In fact, in just the last year, over 4000 Americans died while on the waiting list for kidney transplants, and the numbers are even higher when we include patients who die while waiting for other organs.[2]

Societies are grappling with ways to reduce the shortage of transplantable organs. Cynowiec, et al (2009) conclude that this effort will focus heavily on providing incentives for increasing organ supply. However, as pointed out by Surman, et al (2008) there are insufficient data to provide a solid foundation for new policy. Jasper, et al (2004) and Haddow (2006) report surveys of US medical professionals' and the Scottish general public's views on using various monetary and non-monetary incentives to promote donation, respectively, and both find that many people are opposed to incentives even though they believe such mechanisms would be effective. Jasper et al (2004) claim "nothing short of a market test can demonstrate conclusively the impact that incentives would have on the supply of donated organs."(p. 384)

We rely upon experimental methods to test the impact of creating a market for organs. As argued by Smith (1994) controlled laboratory experiments provide a means to evaluate policy proposals. Specifically, we model the incentives faced by donors and recipients to explore mechanisms for increasing the supply of organs. We test 1) the lifesaving effectiveness of reducing the opportunity cost (repugnance) of organ transfer, 2) the power of a market solution to an organ shortage, and 3) the distributional impact of these interventions. In the

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[1] Statistic from US Dept. of Health and Human Services (http://optn.transplant.hrsa.gov/latestData/rptData.asp)
[2] http://online.wsj.com/public/article/SB119490273908090431.html

laboratory we control the number of people in need of an organ, the number of potential organ providers, and the wealth of each agent. We begin with a system of "presumed consent" voluntary donation in which agents may opt out of donating or accepting an organ. To model repugnance or an ethical cost of transferring organs, we implement a lottery with a large potential payoff.[3] This lottery is available only to those *not* exchanging organs. By comparing situations with and without this lottery, we can directly evaluate the effects of induced opportunity cost for organ donation or sales. To determine whether access to a market for organs will reduce the excess demand for organs we replicate the lottery environment with and without a market.

We find that eliminating the lottery increases the number of lives saved by organ donation relative to our baseline, presumed consent condition; on the other hand, the market actually increases the death rate. We identify the causes of death in the baseline treatment as both insufficient demand and insufficient supply. While eliminating the lottery solves both of these problems, the market only increases supply. However, only 11% of those in need of an organ would have been *unable* to acquire one at some price in the market treatment. Hence, we find more support for the effectiveness of the market solution than indicated by the death rate statistics alone. A combination of institutional factors and market thinness caused many of the deaths in the market treatment, highlighting the importance of the specific market institution in any proposal to create an active organ market. Furthermore, as some critics of organ markets have suggested, we find that organ sales are primarily undertaken by poor subjects.

We also conducted a post-experiment survey to gauge the views of our respondents regarding organ markets and donations and ask if these attitudes correlate with their observed behavior in the experiment. Overwhelmingly, our respondents were supportive of voluntary organ donation, although Catholic respondents were less supportive. On average respondents were indifferent to compensating donors or their families, but they were strongly opposed to

[3] Clearly we cannot actually induce the strong moral feelings, desperate needs, and risks associated with organ donation, sales and transplantation in the lab without actually creating a market for organs (something IRB will not allow). The purpose of this induced cost is merely to model the incentives involved in organ transplantation.

"selling organs." Reported opinions of organ markets and donations were uncorrelated with donations in the experiment. However, subjects who offered to sell organs in the experiment were more supportive of selling organs with the proceeds going to charity.

Background

Many policy solutions to the organ shortage have been suggested, but none has been so controversial as permitting a (regulated) market for organs. In the 1960s, British newspapers began printing advertisements from live donors attempting to sell their kidneys, suggesting the prospect of an open market in human organs (Dukeminier Jr., 1970). In 1983, a former physician, Dr. H. Barry Jacobs created a brokerage for human kidneys in Virginia, opening the debate in the United States and sparking moral outrage. Within a year, a federal law was passed to ban the sale of human organs and his company was shuttered (S.H.D. 1985).[4] Roth (2007) argues that the "repugnance" of such transactions stems from moral opposition to the objectification of the body, the potential for coercion, and the fear that permitting one sort of problematic transaction will open the door to a host of others. Whether the objection is grounded in an individualized moral code, shared cultural heritage, or religious creed, many people regard the buying and selling of the body as taboo. To uphold a moral code or to maintain purity, people are willing to rule out even the *possibility* of potentially beneficial transactions (Durkheim 1976, Belk et al. 1989).

Despite others' strong moral objections, many proponents of kidney markets have argued that providing monetary incentives to increase supply of transplant kidneys would alleviate shortages and supplement kidneys provided by altruistic donors (Arrow 1972, Perry 1980, S.H.D. 1985, Mahoney 2000, Becker and Elias 2007). Opponents of a market in kidneys have argued that the commoditization of organs may actually crowd out altruistic motivations and thereby decrease the total quantity supplied (Titmuss 1971, Singer 1973, DeJong et al 1995, Byrne and Thompson 2001). Additionally, opponents argue that the decision to sell an organ may lead to time-inconsistent decisions and regret (Byrne and Thompson 2001, Satz 2008).

[4] India in the 1980s and early 1990s and Iran since 1988 are the only examples of legal organ markets. (Becker and Elias 2007)

Some also highlight the potential negative distributional consequences of kidney sales by pointing to the injustice of a system in which organ sales are undertaken primarily by the poor and desperate (Archard 2002, Borna 1987).[5,6]

Of those opposed to market solutions for the shortage of transplantable organs, many argue that sufficient supply could be obtained through better marketing to the altruism of potential donors and that the kidney shortage represents a failure that could be alleviated by simply improving procurement efforts (Prottas 1983, Thorne 1998, Healy 2004). There is empirical evidence that a policy of "presumed consent" for donation, a legal regime under which people are presumed to be willing to donate organs upon death unless they specify otherwise, increases the available supply of kidneys. This approach has been successfully adopted in Spain, Portugal and Austria (Abadie and Gay, 2006, Mossialos et al, 2008). The United States relies upon an "informed consent" or opt-in system for deceased organ donation; however, even if all cadaveric kidneys were made available for transplant, a shortage would remain, highlighting the potential power of a market solution (Israni et al, 2005, Beard et al, 2006). Furthermore, Tetlock et al. (2000), and Tetlock (2003) describe survey evidence that people are willing to make taboo trade-offs despite their strongly-held moral beliefs which indicates that market incentives could overcome moral objections to donation. Hence, we design a stylized experiment that induces both the necessity and opportunity cost of organ transfer in order to test the welfare effects of a market solution to organ shortages.

Experimental Design

To explore the impact of a market for organs, we employ a partial 2x2 within-subjects experimental design. The first dimension is the existence of an organ market and the second dimension is the presence of an opportunity cost of *not* retaining one's organ. In the *Baseline* environment, there is no market for organs, but people can donate them and people have a

[5] Hypothetical survey evidence in Halpern et al. (2010) suggests that income is not strongly correlated with willingness to sell or donate kidneys and that other factors such as own risk of kidney failure, the price offered, and relation to the recipient are dominant. However, as we detail below, our results suggest that when the decisions involve real monetary incentives, wealth may matter.

[6] Harvey (1990) objects not to direct transfers for organs, but to the idea of a middleman profiting from the organ of another individual.

positive opportunity cost of not retaining an organ after death. This positive opportunity cost is meant to model some internal opposition (religious, ethical, disgust, etc.) to separating the organ from its original owner.[7] Specifically, those people who do not donate or accept an organ are entered into a lottery that pays $100 with a 0.001 chance and 0 with a 0.999 chance. The expected value of this lottery is a dime and a risk-averse individual will value it even less.[8] Thus, theopportunity cost of donation is low, but it offers some chance of a large reward.

Each group of subjects first participates in a *Baseline* treatment with a presumed consent (opt-out) policy, which is meant to represent the current best-case policy situation. The group of subjects then participates in one of the two alternative treatments meant to coincide with potential solutions for increasing the supply of transplanted organs. In the *Market* treatment we introduce a market that allows people to sell organs; while, in the *NoLotto* treatment we eliminate the opportunity cost of donating the organ (that is, the lottery for those who choose not to accept or donate). Creating a market compensates those who allow their organs to be transplanted, thus increasing the marginal benefit of doing so. On the other hand, removing the lottery represents a reduction in the marginal cost of having one's organs transplanted. Either treatment is expected to increase the number of organs offered for transplant. In the experiments organs were referred to as *assets* so as not to bias subject behavior; however, other terms described below such as "Poor," "Wealthy," "Young" and "Old" were used to aid subjects in understanding the structure of the experiment as described below.

In each laboratory session there are ten subjects who interact in an overlapping generations framework where people live for two periods. In the first period there are three "Young" people and three "Old" people. The other six people are inactive. In the second period, three of the people who were inactive in the first period become "Young," the three people who were Young in the first period become Old, and the three people who were Old in the first period become inactive. This process repeats after each period. To avoid issues associated with repeated play games, each Old person must be inactive for one period before returning to

[7] If our market included live donors, we could induce risk with a similar mechanism.

[8] Previous experimental work has routinely found that people behave as if they are risk averse (see e.g. Holt and Laury 2002; Goeree et al. 2003 and Cox et al 1982).

the economy, the number of inactive people is larger than the next generation, and there is no way to identify other people across lives.[9]

Each period that a living person holds a useable asset they receive a specified payment. There are two types of people in each economy. Half of the subjects are "Wealthy" and half are "Poor." Wealthy people receive a payment of $8 for holding a useable asset when they are Young and $5 for holding a useable asset when they are Old. Poor people receive a payment of $2 for holding a useable asset when they are Young and $5 for holding a useable asset when they are Old. Thus both Wealthy and Poor people have the same value for a useable asset when Old and income levels do not affect the gains from exchange when an asset is donated or traded. The Young can be thought of as workers for whom income variation is due to labor productivity or some other factor exogenous to the experimental environment, whereas Old subjects can be thought of as being retired. Inactive people cannot hold any assets. Each subject remains Poor or Wealthy throughout the entire experimental session; thus generations may differ in the number of Wealthy and Poor people.

There are two types of useable assets: yellow and green. Yellow assets last for one period. Green assets last for two periods before turning yellow and lasting one additional period. After one period yellow assets become red assets, which have a value of $0 to both agent types. In each new generation, two people are born with new green assets and one person is born with a yellow asset. Every active person can observe the color of his or her own current asset.

In periods in which there was no market, Old people who owned a green asset (i.e. an asset that was turning yellow and would last one more period) could choose to either "Donate My Asset" or "Keep my Asset" with the default choice being to donate the asset.[10] A young person with a yellow asset has a similar choice between "Accept an Asset" or "Keep my Asset." Given

[9] This approach is commonly used in macroeconomics experiments where the economy outlives individual agents. See e.g. Lim et al. (1994), Marimon and Sunder (1994), and Marimon et al. (1993).

[10] Previous work by Samuelson and Zeckhauser (1988) has indentified a "status quo bias" in which people are likely to maintain the default choice. This has been the impetus for organ donation policies in Europe where a person is by default an organ donor unless they take active steps to not be an organ donor. As mentioned above, Abadie and Gay (2006) provide evidence that this policy increases the supply of transplantable organs. As an experimental design choice, this should strengthen any claim that the market "works" since it is competing against the best "real-world" alternative policy currently employed in any developed country.

the set up of the experiment, there were always two Old people with green assets and as long as either of them donated the asset and the young person accepted the asset, then in the following period the young person would hold the donated asset and earn $5. The asset would become yellow in the next period when the recipient was Old and thus could not be donated again to the following generation. The decision to donate the asset or not did not affect the payoff to the Old person or the Young person in the period the decision was made. In this sense the agreements are about what will happen to the Old person's asset in the next period when he or she has died.[11] In situations where there was a lottery, only those who selected "Keep my Asset" had the chance to win the additional $100 by guessing an integer from 0 to 999. After each period with a lottery, a winning number was drawn from a uniform distribution over [0, 999] and announced to everyone. If a person chose to donate or accept an asset, they did not play the lottery even if they did not ultimately give or receive an asset as could occur when a potential recipient was willing to accept but no one donated an asset or when a there was no willing recipient for a donation.

When there was an active market for assets, Old people with green assets chose between "Sell my Asset" and "Keep my Asset." If the subject selected "Sell my Asset" they also had to enter an ask between $0 and $5 in cents. Similarly, Young people with yellow assets chose between "Buy an Asset" and "Keep my Asset" and those who opted to buy an asset had to enter a bid, also between $0 and $5 in cents. If there was no bid or no ask then there was no trade. If the lowest ask was above the bid then there was again no trade. If the bid was above a single ask the price was the average of the bid and ask and the young person bought the asset from the seller offering the lowest ask. If the bid was above two asks then the price was equal to the average of the two asks and the young person bought the asset from the seller with the lowest ask. A person was ineligible for the lottery if they placed a bid or an ask, regardless of whether they were actually involved in a trade. Each period with a market, all of the subjects in the session observed a summary report of any bids, asks, or prices. This was done in part to

[11] Hence our market treatment creates a futures market. See Cohen (1989) for an argument in favor of organ futures markets.

provide information to market participants and to aid price convergence since the markets are thin and the parties do not have the opportunity to renegotiate.[12]

After completing the directions, subjects answered a series of comprehension questions, and an experimenter went over the answers and privately corrected any mistakes. Once all of the subjects had answered the questions correctly, the experiment began. After 20 periods (19complete generations) of the baseline condition had been completed, subjects were given additional instructions for the treatment that would be in place for the last 20 periods of the experiment starting when the 20th generation became Old. Subjects were not informed of the number of periods in either portion of the experiment nor were subjects initially informed that the experiment would have two parts. Copies of all directions and the comprehension questions are available in the appendix.

After the experiments were completed, subjects answered a web-based survey eliciting their opinions on donating and trading organs and supplied limited demographic information. A copy of the survey is included in the appendix. Once all subjects had completed the survey, one of their experimental "lives" was randomly selected, and the subjects were paid based upon those earnings. Each subject was paid in private and then dismissed from the experiment. The average salient payment was $9.41 and the experiment lasted approximately 45minutes. Subjects also received a $5 payment for completing the survey and a $7 participation payment. A total of 80 undergraduates from a private university in the United States participated in the experiment. Some subjects had previouslyparticipated in other economics experiments, but none had participated in any related studies.

Hypotheses

Our first hypothesis concerns the effects of the *Market* and *NoLotto* treatments on the provision of organs to sick individuals relative to the *Baseline*. Since the existence of a market increases the marginal benefit of supplying an asset and the removal of the lottery decreases

[12] Specific institutional features can have a dramatic effect on market performance (see e.g. Friedman 1993 and Coppinger et al. 1980). The purpose of this paper is not to determine the optimal market structure for an organs market, but to see how an active market could increase the supply of transplantable organs. The issue of designing an organ market is a question left for future research.

the marginal cost, *both treatments should increase the provision of organs relative to the Baseline*.

A naïve prediction based upon material self-interest is that the *Baseline* treatment with the lottery will lead to zero donations since subjects must give up a potential gain to provide a benefit to others; however, results from dictator games suggest that people frequently part with money when doing so yields direct benefits to others. Furthermore, as the ratio of other's gains to own losses grows, so does the amount given (Forsythe, et al. 1994, Andreoni and Miller 2002, and Deck 2009). Based upon that behavioral pattern one would expect somepeople to accept an expected $0.10 loss to provide a $5.00 gain to the recipient.Anyone willing to forgo $0.10 should also be willing to donate the asset when it is costless to do so. Therefore, donations should be at least as frequent in the *NoLotto* treatment as in the *Baseline*. When a market is introduced, the supplier is compensated so that the loss cannot exceed $0.10. Under the assumption that anyone willing to incur a $0.10 loss would also be willing to incur a smaller loss or even a gain to benefit another person, organ provision should be at least as frequent in *Market* as in *Baseline*.

Our second hypothesis pertains to wealth effects. We create persistent income differences across subjects in order to test for evidence of one of the common ethical concerns addressed to those who favor the creation of markets for human organs. It is frequently argued that market exchange in human organs will act as an "undue inducement" encouraging the poor and desperate to disproportionately provide supply in such a market. This conjecture is formalized in the following hypothesis: *In the* Market *treatment, Poor subjects will be more likely to offer their organs for sale than Rich subjects*.

We do not offer explicit predictions for the number of assets that will be exchanged in any environment in part because a person's behavior is contingent upon their beliefs about the actions of others. An old person should not forgo $0.10 to donate an asset if they believe the other potential donor will donate or that the potential recipient has chosen not to accept a donation. A young person should not forgo $0.10 to accept donations if she believes that neither potential donor is going to donate. In fact, in all three of our treatments everyone selecting “Keep My Asset” is a Nash Equilibrium. We also note that there is no pure strategy equilibrium price in the Market treatment because of the avoidable cost of having to forgo the lottery to enter the market. This intuition for this is straightforward. Since a seller could earn \$0.10 by staying out of the market, any seller must expect to earn at least \$0.10 from placing an ask. This could not be true at any price below \$0.10, but for any price above \$0.10 both sellers would have an incentive to undercut their rival.[13]

Results: Effectiveness of theTreatments

Our data consist of 640 salient organ supply choices and 320 salient organ demand choices from subjects in 8 independent sessions. Half of the observations are from the *Baseline* condition, while one fourth of the observations are from each of the *Market* and *NoLotto* treatments. We present the experimental results as a series of findings. The first finding considers the metric of lives saved.

Finding 1: Only the NoLotto *treatment reduces the number of subjects who die young relative to the* Baseline*. In fact, the percentage of subjects who die young actually increases in the* Market *treatment.*

Figure 1 below displays the percentage of sick subjects who received organs by treatment. On inspection it appears that in comparison to the *Baseline* the, the *NoLotto* treatment reduces the death rate, while the *Market* treatment marginally *increases* the death rate. This finding is supported statistically by mixed-effectslogistic regression where the eight sessions are modeled as random effects (e_s) to compute treatment effects on the probability of death while controlling for *Period*.[14] Specifically we estimate equation (1) where the binary dependent variable is $Death_t$, which equals 1 if the sick person did not receive a new asset in period t and is 0 otherwise.

$$Death_t = \alpha_0 + \alpha_1 NoLotto + \alpha_2 Market + \alpha_3 Period + \varepsilon + e_s \qquad (1)$$

NoLotto and *Market* represent dichotomous dummy variables indicating the absence of the lottery and the presence of the market, respectively. The left column of Table 1 reports the

[13] See van Boening and Wilcox (1996) for a discussion of markets with avoidable costs.
[14] All statistics and graphics created using *R: A Language and Environment for Statistical Computing* (2009). Regressions computed using Harrell (2009) and Warnes (2009).

estimation results. Consistent with our hypothesis, the coefficient on *NoLotto* is negative and significant indicating that removing the lottery increase the number of assets received by those in need. However, while the coefficient on *Market* is negative, it is insignificant, indicating that the specific market institution did not increase the number of assets that were successfully transferred.

While the *NoLotto* treatment did not completely eliminate the organ shortage, the response was encouraging. However, the negative effect of opening a market for organs is surprising and warrants further attention. Specifically, to explain the differences between the treatments we compare in greater detail the causes of death across treatments.Deaths may occur because no one is willing to provide an organ, no one is willing to supply an organ, or the terms of the exchange cannot be agreed upon. The third cause cannot occur in the absence of a market as donations effectively set the exchange terms at a price of 0.

We define a demanded organ as an instance in which a sick subject chose "Accept" or "Buy" and define a supplied organ as a choice to "Donate" or "Sell." Thus there are excess demanded organs when a sick subject chose "Accept" or "Buy", but no subject chose "Donate" or "Sell." Similarly, there are excess supplied organs when someone chose to "Donate" or "Sell," but the potential recipient chose "Keep".Table 2 provides summary statistics for the three treatments indicating the number of periods in which subjects died young, demanded organs and supplied organs as well as the number of periods with excess organ demand or excess organ supply. The next series of findings consider how the treatments affected the number of organs demanded and supplied.

Finding 2: Deaths in the Baseline *result from insufficient supply and demand.*

In column 1 of Table 2, note that of the 160 *Baseline* treatment periods, thesick subject demanded an organ (i.e. choose "Accept") in only 115 instances, or 72% of the time. Hence, of 87*Baseline* deaths, 45, or 52%, were caused directly by a sick agent refusing to accept an organ. We find this behavior somewhat surprising, but it could be rationalized depending on the subject's value for the lottery and expectations that an organ will be supplied. On the supply side, at least one healthy, old agent chose to "Donate" an organ in 95/160 periods (56% of the time). This result may be less surprising, given the aforementioned evidence from dictator games, and one could conceive of utility functions that rationalize this behavior. However, for our purposes it is enough to note the existence of a shortage under these conditions.Both insufficient demand and insufficient supply contributed to premature deaths, and we ask which, if either, of these failures the treatments successfully addressed.

Finding 3: The NoLotto *treatment increases demanded organs relative to the* Baseline*, but the* Market *treatment does not.*

Figure 2(a) shows the percent of periods in which sick subjects demanded organs by treatment.It is clear from this figure that the *NoLotto* treatment increases demand for organs relative to the Baseline, but the *Market* treatment does not. This conclusion is supported parametrically with a logistic regression. As before, the sessions are modeled asrandom effects and our fixed effects compute the impact of the treatments, controlling for *Period*. The dependent variable for the model is $Demand_t$, which takes a value of 1 if the potential organ recipient chose "Accept" or "Buy" in period t and is 0 otherwise. The model is given by equation (2) and the results are reported in the center column of Table 1.

$$Demand_t = \beta_0 + \beta_1 NoLotto + \beta_2 Market + \beta_3 Period + \varepsilon + e_s \qquad (2)$$

As before, *NoLotto* and *Market* represent dichotomous dummy variables indicating the absence of the lottery and the presence of the market, respectively. Apositive and significant coefficient on *NoLotto* indicates that removing the lottery increases the willingness of sick subjects to accept organs. This change could be because sick agents value the lottery (with expected value of $0.10) at more than $5.00, or it could be that the sick believe that others are more willing to donate in the absence of a lottery. While the coefficient on *Market* is positive, the effect is insignificant, suggesting that this market institution does not encourage those in need of an organ to seek one.One explanation is that these subjects place a high value on the lottery, or alternatively, that the sick person does not believethat prospective sellers are willing to trade at an acceptable price. We return to these issues in detail below.

Finding 4: Both the NoLotto *and* Market *treatments increase the supply of organs relative to the Baseline. In fact, the total quantity supplied is nominally (though not statistically) greater in the* Market *treatment than in the* NoLotto *treatment.*

Figure 2(b) displays the percent of periods in which at least one organ was supplied. Clearly, both treatments increase supply relative to the *Baseline*. Again, a mixed-effectslogistic regression with random effects for session is used to identify treatment effects controlling for *Period* with dichotomous dummy variables for the treatments. The dependent variable in equation (3) is $Supply_t$, which takes the value 1 if there was at least one supplied organ in period t and is 0 otherwise.

$$Supply_t = \gamma_0 + \gamma_1 NoLotto + \gamma_2 Market + \gamma_3 Period + \varepsilon + e_s \quad (3)$$

The estimation results are reported in the right-hand column of Table 1. Positive and significant coefficients on both treatment variables indicate that the removal of the lottery and the introduction of the market both increase the supply of healthy organs for transplant. Marginal effects indicate that the *NoLotto* treatment increases the probability that an organ is supplied in a period by 34% relative to the *Baseline*; while, the *Market* increases the probability by 38%.

Thus our evidence suggests that eliminating the costs of donation as in the *NoLotto* treatment reduces deaths from organ shortage because it increases both demand and supply; while, the *Market* treatment, on the other hand, fails to reduce deaths because it has a positive impact only on supply. It is worth noting that we see no evidence that creating a market crowds out altruistic motives.

Although the *NoLotto* treatment saves lives in our experimental environment, we must reiterate that our induced moral cost is no more than a highly stylized representation of powerful factors that influence individuals' decisions to donate – culture, religion, values, beliefs, etc. In our experiment it is trivial to eliminate this cost and observe the beneficial effects, but in practice, this would require implementing a successful campaign to fundamentally change the hearts and minds of millions of individuals. While altering the moral dimension of transactions involving human organs might be ideal, it is likely unrealistic in the short run, especially as a policy proposal. The purpose of this treatment is to show that such costs matter, even in abstract form. From a practical perspective then, our focus is on the *Market* treatment. Here the increased supply of organs is encouraging for proponents of a market solution, but the failure of the institution to actually save lives in this environment merits further examination.

Thus we return to Table 2 and analyze the causes of death in the *Market* treatment in greater detail. The most salient fact is that deaths were largely *not* caused by lack of supply. There were only 9 instances (11% of periods) in which no organ was offered for transplant in the *Market* treatment, and in 7 of those cases sick agents expressed demand but were unable to purchase a healthy organ on the market.[15] Of the 53 deaths in the *Market* treatment, 25 (47%) resulted from insufficient demand. As shown in Table 2, there was excess supply in 23 of these 25 cases, so all but 2 of these deaths were feasibly avoidable if the sick agent had chosen to purchase an organ and an agreeable price had been found. However, of the remaining 28 deaths, 21 occurred with both a buyer and a seller in the market. These 21 subjects died because they attempted to trade but did not submit mutually agreeable prices.

These unconsummated trades highlight the importance of institutional design. Recall that after each period, all subjects observed any bids and asks in the market as well as the transaction price if a trade occurred. Hence, some of the 25 cases in which sick agents chose to play the lottery may have resulted from expectations derived from their own or others' prior failed attempts to purchase in the market. An institution that was more successful at finding mutually agreeable prices would likely have induced even more potential recipients to seek out an organ and also encouraged more potential sellers to enter the market. Previous experimental research has shown that markets with a repeated bargaining process or direct communication leadto more mutually beneficial trades (see e.g Valley et al. 2002 and Ketcham et al 1984). Thus, if after the initial bid and asks failed to yield a mutually agreeable price, we permitted subjects to submit updated offers, or if we allowed them to communicate with one another directly, many of the *Market* treatment deaths might have been avoided.

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[15] This compares favorably to the 65 cases (41%) of zero supply in the *Baseline* treatment, resulting in 42 deaths from excess demand.

A related issue is the nature of supply and demand in our markets, which involve only a single buyer and two sellers. The real-world ratio of healthy to sick organs is much higher than 2:1, so the probability of finding a willing seller would likely be significantly higher than we induce in this environment. Furthermore, the small number of subjects on either side of the market may have contributed to the failure of our institution. Previous experimental work has also shown that thicker markets tend to converge to competitive equilibria more quickly and more reliably than those with only a few sellers (see e.g. Smith and Williams 1990). Thus, in some sense our environment was biased against the market's success in saving lives, yet even so, it created a substantial increase in supply.

Results: Distributional Consequences

We now turn to our second hypothesis above, pertaining to the distributional effects of a market for organs. Recall, critics of market solutions to the organ shortage argue that the decision to sell one's organ will be undertaken primarily by the poor and desperate (e.g. Satz 2008, Archard 2002, Borna 1987). To test this hypothesis we induced persistent income differences across subjects, and we ask whether poor subjects are disproportionately likely to sell their organs.

Finding 5: Poor subjects are more likely than rich subjects to offer their organs for sale.

Table 3 provides summary statistics on rate of organ provision and acceptance by treatment and subject type. In the *NoLotto* treatment the increase in the percentage of people willing to supply organs is similar for Wealthy and Poor subjects. However, in the *Market* treatment, the increase in willingness to supply is much greater for the Poor (27%) than for the Wealthy (10%). Finding 5 is supported by mixed-effects logistic regression with random effects computed for subjects (e_i) where the dependent variable is $Supply_{i,t}$, which equals 1 if subject i was willing to supply an organ in period t and is 0 otherwise. The model is shown in equation (4) where the treatment dummies are as before and $Poor_i$ is a dichotomous dummy variable indicating whether subject i is poor.

$$Supply_{i,t} = \delta_0 + \delta_1 NoLotto + \delta_2 Market + \delta_3 Poor_i + \delta_4 Period + \delta_5 NoLotto \times Poor_i + \delta_6 Market \times Poor_i + \varepsilon + e_i \quad (4)$$

Table 4 contains estimated coefficients and marginal effects for the estimation. The positive and significant coefficient on the interaction term $Market{\times}Poor_i$ indicates that poor subjects are more likely than wealthy subjects to offer their organs in the market. The marginal effect is that poor subjects are 17% more likely to sell their organs than rich subjects. Insignificant coefficients on $Poor_i$ and $NoLottoxPoor_i$ indicate that there are no distributional effects in the other treatments.

Survey Results

The survey asked opinions of various organ-related activities using several scales (see Appendix C). The scales included morality, preferred legality, upsetting-ness, offensiveness, rationality, compassionateness, and sanity. The Cronbach alpha was high for each activity indicating that these scales were capturing a consistent measure of the respondents' attitudes towards the given behavior. Table 5 gives the average attitude towards each action. These scores are bounded between 1 and 5 with a lower number indicating a more favorable outlook. The table also shows how personal attributes and behavior correlate with the survey responses. Fifty four percent of the respondents were male. Twenty one percent of the respondents were Catholic, while 28% reported being Protestant and 19% reported being affiliated with another organized religion. Forty four percent of the respondents rarely went to religious services, while 26% went at least once a month.

From Table 5, it is clear that the respondents had positive attitudes towards donating organs (Behaviors 1 and 4), but opposed selling organs (Behaviors 7-10) or taking them without permission (Behaviors 2 and 5). However, the responses were more neutral towards the notion of 'compensating' organ providers (Behaviors 3 and 6). This suggests a disconnect between views on profit seeking in a market and the idea of compensating desirable behavior. Not surprisingly, people who report being listed as an organ donor had more favorable opinions of organ donation at death and while alive (ρ = -0.22 and ρ = -0.24, respectively), but were not significantly more likely to have a favorable outlook on people receiving money for providing organs. Catholics have a less favorable opinion of donating organs at the time of death and for compensation of such donations (ρ = 0.23 and ρ = 0.25, respectively). Somewhat surprisingly, those who report any religious affiliation are more opposed to live kidney donations (ρ = 0.24), but perhaps unsurprisingly are more supportive of the proceeds of a live donation going to charity (ρ = -0.21). We also note that we find no significant gender differences. Attitudes towards organ donation and organ markets had no correlation with behavior in the Baseline environment. However, for those who were in the market treatment, the willingness to sell one's organ was correlated with greater support for living people to donate organs and sell organs if the proceeds go to charity (ρ = -0.30 and ρ = -0.27, respectively). It was also correlated with a greater tolerance for taking organs without explicit consent (ρ = -0.30 and ρ = -0.27, respectively)

Conclusions

We design a laboratory experiment with overlapping generations in which to analyze the effects of various mechanisms on organ donation. We find that both the introduction of a market and the elimination of the opportunity costs of organ donation increase the supply of usable organs relative to a baseline of presumed consent donation. While our *NoLotto* treatment yielded a significant reduction in the death rate, we note that moral and ethical concerns about transactions in human organs cannot easily be removed. This treatment rather serves to demonstrate that moral and ethical concerns, modeled here as a relatively small avoidable cost, can have a powerful impact organ supply and demand. Thus, based on the evidence of increased supplyin our *Market* treatment, we argue that a suitably designed market institution would likely provide a means of reducing unnecessary deaths from the current organ shortage. Indeed, because of the institutional and structural features of our simple market institution, the power of the market is understated by our design.

A market solution that incentivizes individuals to make taboo tradeoffs would provide an obvious social benefit, in terms of human lives, but ethical concerns about violation of the body remain and are augmented by additional concerns about coercion and equity. A social planner could produce the same benefits as a market by forcibly taking organs from the healthy or recently deceasedand giving them to the sick, but many proponents of the market would likely argue that the difference between these two examples is in the *voluntary* nature of market exchange. While this principle is clear enough, as Satz (2008) notes, the meaning of "voluntary" is brought into question if the probability of donating is contingent on factors other than risk preferences and the intensity of one's ethical views on organ transactions. If, for example the incentives affect individuals facing various economic circumstances differently, as is suggested by the fact that poor subjects in our experiment are more likely to sell their organs, then the existence of a market may constitute an "undue inducement" to poor individuals.[16]

Furthermore, a market with unequal distributional consequences could lead to perceptions that rich individuals are essentially harvesting organs from the poor. In our environment, we note no difference in the survival probability of rich and poor agents because no agent is unable to afford an organ if he or she attempts to purchase one. In the real world, however, the market price of organs could potentially price certain classes of individuals out of the market, further exacerbating ethical concerns.

What we desire is a mechanism that increases the provision of organs by incentivizing donation while also minimizing the ethical costs. Coffman (2009) shows that ethically questionable actions are deemed less worthy of punishment when undertaken by a third-party agent. Hence, an alternative approach is a monopsonist who compensates voluntary donors at a fixed price for donating an organ. Introducing a third party to the transaction (e.g. an insurance company or government agency) and eliminating the direct sale of organs could allay ethical concerns and promote donation by ensuring that risky donation is appropriately compensated.[17]Jasper et al (2004), Haddow (2006), and Halpern, et al (2010) analyzed attitudes towards similar proposals with surveys of medical professionals and the general public, with mixed results, but little data exists on which to base a policy prescription. Future experiments can provide data on the incentive properties of these mechanisms. Furthermore, since our environment concerns deceased donations and futures markets we hope future work will utilize experiments incorporating live donation and spot markets for organs.

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[16] Karelis (2007) rationalizes the risk-seeking behavior of poor individuals by arguing that the marginal utility of income is actually increasing below some minimum level.

[17] Satz (2008) points out that unless prices are set appropriately, such a policy could lead to shortages as well.

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Table 1: Treatment Effects on Deaths, Demand and Supply

		Dependent Variable		
		Death equation (1)	*Demand* equation (2)	*Supply* equation (2)
Constant	Estimate	-0.03 (0.30)	1.11 (0.30)***	0.65 (0.29)+
NoLotto	Estimate	-1.61 (0.53)**	1.32 (0.60)*	1.89 (0.62)**
	Marginal Effect	*-0.36*	*0.24*	*0.32*
Market	Estimate	-0.01 (0.51)	0.19 (0.55)	2.36 (0.64)***
	Marginal Effect	*0.002*	*0.03*	*0.40*
Period	Estimate	0.02 (0.02)	-0.02 (0.02)	-0.02 (0.02)
	Marginal Effect	*0.004*	*-0.003*	*-0.004*

Logistic regression, standard errors in parentheses, clustered by Session.
*** $p < 0.001$
** $p < 0.01$
* $p < 0.05$
+ $p < 0.1$

Table 2: Summary Data by Treatment

	Treatment		
	Baseline	*NoLotto*	*Market*
Sessions	8	4	4
Periods	160	80	80
Died Young	87 (54%)	20 (25%)	53 (66%)
Periods Demanded	115 (72%)	70 (88%)	55 (69%)
Periods Supplied	95 (56%)	69 (86%)	71 (89%)
Periods with Excess Demand	42 (26%)	10 (13%)	7 (09%)
Periods with Excess Supply	30 (19%)	9 (11%)	23(29%)

Percentage in parentheses.

Table 3: Donation and Acceptance Statistics

	No Lotto Treatment			Market Treatment			
	Lotto	*No Lotto*	*Change*	*No Market*	*Market*	*Change*	
Rich Accept	31	29		23	25		Average Rich Bid
Rich Sick	38	32		36	42		298.6
%Rich Accept	81.6%	90.6%	0.090	63.9%	59.5%	-0.044	
Poor Accept	32	41		29	30		Average Poor Bid
Poor Sick	42	48		44	38		236.3
% Poor Accept	76.2%	85.4%	0.092	65.9%	78.9%	0.130	
Rich Donate	32	62		34	37		Average Rich Ask
Rich Old and Healthy	80	89		84	74		259.4
%Rich Donate	40.0%	69.7%	0.297	40.5%	50.0%	0.095	
Poor Donate	30	42		28	55		Average Poor Ask
Poor Old and Healthy	80	71		76	86		284.5
%Poor Donate	37.5%	59.2%	0.217	36.8%	64.0%	0.271	

Table 4: The Effects of Poverty on Donation

		Dependent Variable
		Supply$_{i,t}$ equation (4)
Constant	Estimate	1.54 (0.57)**
NoLotto	Estimate	-1.83 (0.45)***
	Marginal Effect	*-0.38*
Market	Estimate	0.65 (0.44)
	Marginal Effect	*0.13*
Poor$_i$	Estimate	-0.59 (0.47)
	Marginal Effect	*-0.12*
Period	Estimate	-0.01 (0.02)
	Marginal Effect	*-0.003*
NoLotto*Poor$_i$	Estimate	0.32 (0.48)
	Marginal Effect	*0.07*
Market*Poor$_i$	Estimate	1.06 (0.46)*
	Marginal Effect	*0.22*

Logistic regression, standard errors in parentheses.

*** p< 0.001
** p< 0.01
* p< 0.05
+ p< 0.1

Table 5: Analysis of Survey Responses

Behavior	Average Attitude	Cronbach's Alpha	Correlation with Attitude for Given Behavior: Gender	Any Religion	Catholic	Protestant	Listed as Donor	Percent Donated Periods 1-20	Percent Offer to Sell in Market
1. Donating a Kidney at the Time of Death	1.63	0.79	0.17	-0.10	0.23	0.08	-0.22	-0.04	0.01
2. Taking a Kidney at the Time of Death without Explicit Permission	3.56	0.91	0.20	-0.08	0.19	0.08	-0.18	0.00	-0.30
3. Paying the Family at the Time of Death in Return for a Kidney	2.70	0.88	-0.17	-0.03	0.25	-0.17	-0.01	-0.01	0.00
4. Donating a Kidney while Alive	2.09	0.88	-0.20	0.24	0.03	-0.16	-0.24	0.00	-0.30
5. Taking a Kidney from a Living Person without Explicit Permission	4.44	0.83	0.15	-0.11	-0.01	0.12	-0.15	0.09	-0.27
6. Paying a Living Person in Return for a Kidney	3.06	0.91	-0.18	-0.05	0.00	-0.12	0.11	0.07	-0.21
7. Selling a Dead Person's Kidney on eBay	4.40	0.9	0.05	-0.20	0.09	-0.01	0.02	0.06	-0.09
8. Selling a Dead Person's Kidney and Giving the Earnings to Charity	3.84	0.92	0.03	-0.18	0.01	0.03	-0.01	0.09	-0.15
9. Selling a Living Person's Kidney on eBay	4.36	0.9	-0.02	-0.12	0.02	-0.02	-0.02	0.11	-0.17
10. Selling a Living Person's Kidney on eBay and Giving the Money to Charity	3.59	0.92	0.07	-0.21	-0.07	0.07	-0.06	0.13	-0.27

Figure 1: % of Sick Subjects Receiving Organs by Treatment

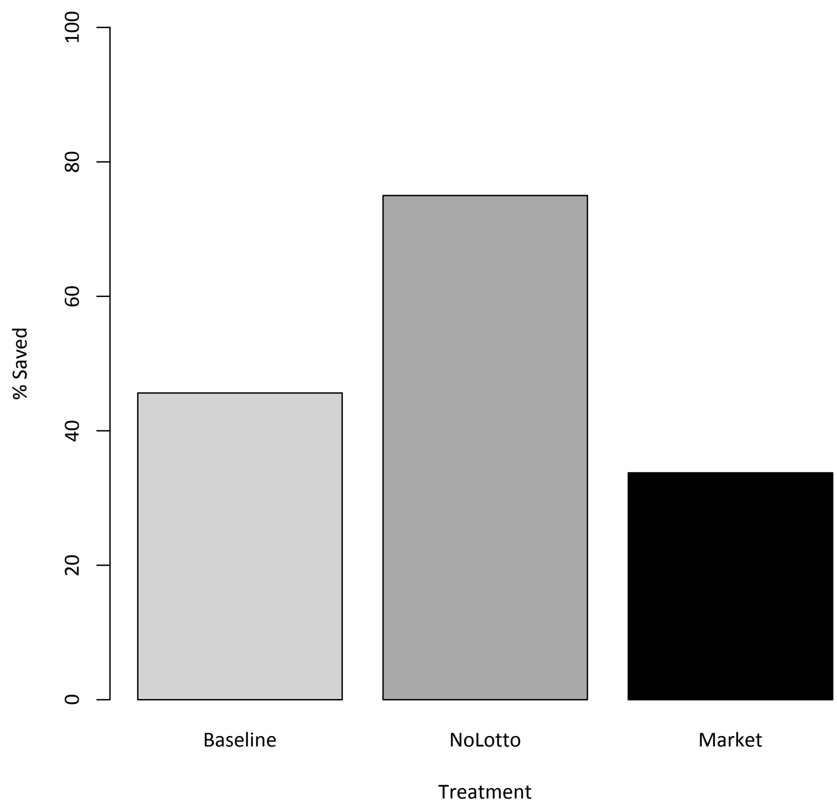
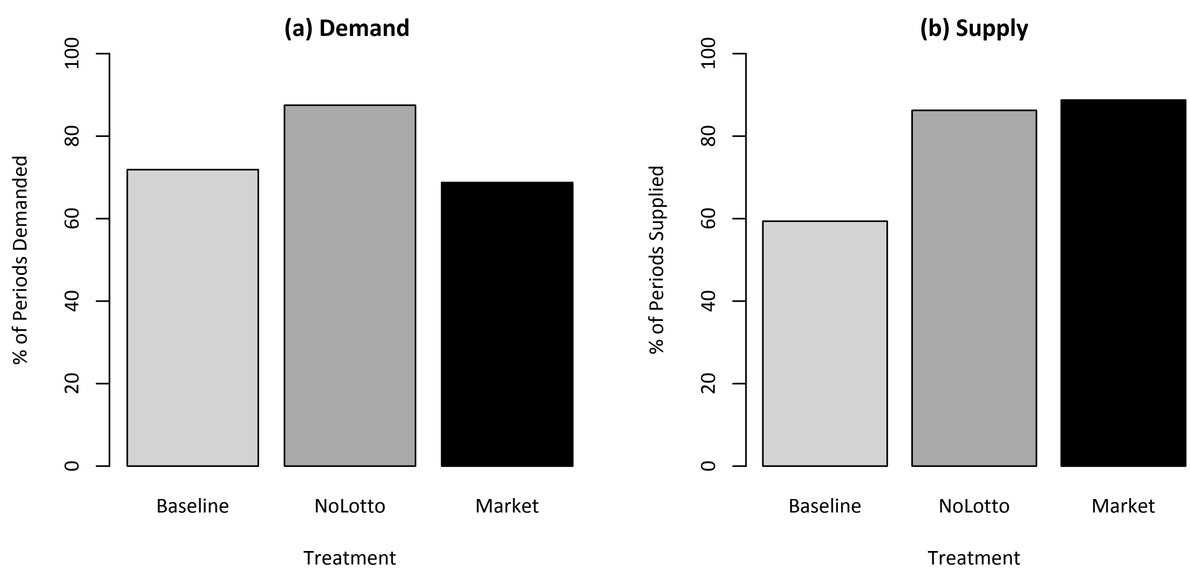


Figure 2: Demand and Supply for Organs by Treatment



Appendix A: Experiment Instructions

This is an experiment on economic decision-making. You will be paid in cash at the end of the experiment based upon your decisions and the decisions of others, so it is important that you understand the directions completely. All payoffs are in cents, so 100 = $1. If you have a question at any point, please raise your hand and someone will come to you. Otherwise, you should not communicate with anyone else during the experiment.

This experiment is broken into a series of periods. In any period there are 3 young, 3 old and 4 inactive people. In the next period the young become old, the old become inactive, and 3 of the inactive people become young. Which inactive people become young is randomly determined, but everyone must be inactive for at least one period after being old and before becoming young again. Notice that there are more inactive people than young people so some people will be inactive for multiple periods.

Young and old people earn money by holding assets (shown on the screen as colored balls). There are three kinds of assets. Red assets last for 1 period and are worth 0 to everyone. Yellow Assets last for 1 period before becoming Red assets. Green assets last for 2 periods, before becoming Yellow assets in the 3rd period. Each period, two young people start with a Green asset and 1 young person starts with a Yellow Asset. This is determined randomly. Notice that a Green asset lasts longer than its initial owner can use it because people earn money while they are young or old, but not while they are inactive.

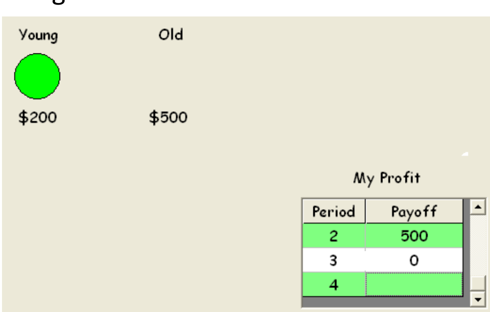
In the experiment there are wealthy and poor people. Your type is determined randomly and it will not change during the entire experiment.

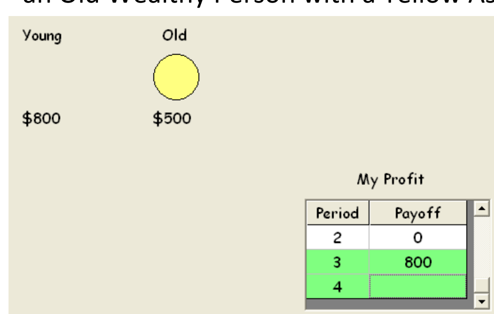
1) Wealthy people earn 800 from holding a Yellow or Green asset while young.
2) Poor people earn 200 from holding a Yellow or Green asset while young.

Green and Yellow assets are always worth 500 to an old person, regardless of whether the person is Wealthy or Poor. Young people never have Red assets and no one can hold more than one asset.

Here are screen images for

a Young Poor Person with a Green Asset & an Old Wealthy Person with a Yellow Asset



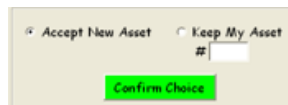


Period earnings are shown in the table at the bottom right of the screen (earnings are updated after the period ends). Green rows indicate active periods. Since people cycle through being young, then old, then inactive, active periods come in pairs. After the entire experiment is completed, one pair of active periods will be randomly selected to determine your payoff.

You cannot earn money with an asset when you are inactive; nor can you keep it until you become young again. If you are old and have a Green asset, you can “Keep My Asset” or you can “Donate My Asset.” Donating the asset means that a young person with a yellow asset this period can use your asset next period. Regardless of whether or not an old person donates her asset, she earns 500 in the period in which she was old. The donation occurs in the next period when the old person becomes inactive. The default is to “Donate My Asset.” If you want, you can make the donation by pressing “Confirm Choice.” If you want to “Keep My Asset” you must first click on this option and then click “Confirm Choice”.

If (and only if) an old person chooses “Keep My Asset” she has the opportunity to guess a random number between 0 and 999, inclusive, to earn 10,000 (that is US$100). You enter a guess by typing it in the box below “Keep My Asset.” After each period, everyone in the experiment will be informed of the winning number.

A young person with a yellow asset has to choose between “Accept New Asset” (the default option) or “Keep My Asset.” Accepting an asset means that if an old person donates an asset then the young person could use it to earn money in the next period after becoming old. A young person who instead opts to “Keep my Asset” will be able to guess a number between 0 and 999, inclusive, to win 10,000. Either choice must be confirmed by pressing the “Confirm Choice” button.



A young person with a green asset will not make a decision (as he automatically keeps his asset), nor will an old person with a yellow or red asset (as this asset has no value in the next period). Inactive people also have no decision to make.

In the following examples (poor) Person A is old in period 6 and (wealthy) Person B is young in period 6.

Example 1: In Period 6, Person A chooses to “Donate My Asset” and Person B chooses to “Accept New Asset.”

Here Person A donates the asset to Person B. No one has the chance to earn 10,000.

Period	A is Poor	B is Wealthy
5	Young **200**	Inactive **0**
6	Old **500**	Young **800**
7	Inactive **0**	Old **500**

Example 2: In Period 6, Person A chooses to “Donate My Asset” and Person B chooses to “Keep My Asset.”

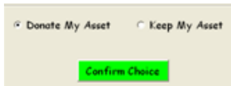
Here Person B does not receive the asset and only Person B has a chance to earn 10,000.

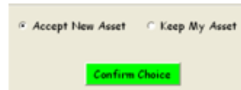
Period	A is Poor	B is Wealthy
5	Young **200**	Inactive **0**
6	Old **500**	Young **800** + chance at 10,000
7	Inactive **0**	Old **0**

Once you have completed the directions and all of your questions are answered, please press the “Enter ID” button and enter your experiment ID. After you have done this, you will be given a brief quiz, which will not affect your payoff in any way. The quiz is intended to make sure everyone understands how the experiment works and how payoffs are determined. The experiment will begin after everyone has completed the handout and had their responses checked by an experimenter.

No Lotto Treatment

The next set of periods is similar to those you have already completed. The only difference is that there is no longer an opportunity to guess a number and earn 10,000 if you choose to "Keep My Asset."





In the following examples (poor) Person A is old in period 6 and (wealthy) Person B is young in period 6.

Example 1: In Period 6, Person A chooses to "Donate My Asset" and Person B chooses to "Accept New Asset."

Here Person B receives the asset donated by Person A.

Period	A is Poor	B is Wealthy
5	Young **200**	Inactive **0**
6	Old **500**	Young **800**
7	Inactive **0**	Old **500**

Example 2: In Period 6, Person A chooses to "Donate My Asset" and Person B chooses to "Keep My Asset."

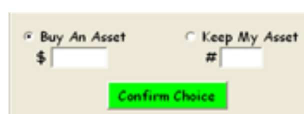
Here Person B does not receive the asset.

Period	A is Poor	B is Wealthy
5	Young **200**	Inactive **0**
6	Old **500**	Young **800**
7	Inactive **0**	Old **0**

Once you have completed the directions and all of your questions are answered, please wait quietly. The experiment will resume once everyone has completed these directions. Keep in mind that one pair of active periods from the entire experiment will be randomly selected to determine your payoff.

Market/Lotto Treatment

The next set of periods is similar to those you have already completed. The only difference is that instead of assets being donated, you may now buy and sell assets. An old person with a green asset can now choose to "Keep My Asset" or "Sell My Asset." Similarly, a young person with a yellow asset can choose to "Keep My Asset" or "Buy An Asset." Anyone who chooses "Keep My Asset" will still have a chance to earn 10,000 by guessing a number from 0 to 999, inclusive.



Old people with a green asset can make an offer to sell by typing it into the box below "Sell My Asset." Young people with a yellow asset can make an offer to buy by typing it into the box below "Buy An Asset." Offers to buy and sell must be integer amounts between 0 and 500 (the value to the young person of the asset when he becomes old). You must press "Confirm Choice" after making your decision. One of several things will happen in the market.

1. If no one selects "Sell My Asset" or no one selects "Buy An Asset" then there will be no trade and no price in the market.

2. If the offer to buy is below all offers to sell, then again there will be no trade and no market price.

3. If the offer to buy is greater than *only one* of the offers to sell then the price is the *average* of the offer to buy and the lowest offer to sell. The young buyer pays the price to the old person with the lowest offer to sell in exchange for use of the asset in the next period.

4. If the offer to buy is greater than *both* offers to sell then the price is the average of the two offers to sell. The young buyer pays this price to the old person who made the lowest offer in exchange for use of the asset in the next period.

After each period, everyone in the experiment will be informed of the market price, if it exists, as well as all offers to buy or sell. However, no one will know who made which offer.

The following are three examples of what could occur. In the examples (poor) Person A is old in period 6, (wealthy) Person B is young in period 6, and (wealthy) Person C is old in period 6.

Example 1: In Period 6, Person A chooses to "Sell My Asset" with an offer to sell of 300, Person B chooses to "Buy An Asset" with an offer to buy of 400, and Person C chooses to "Keep My Asset."

Here we have the offer to buy of 400 ≥ the offer to sell of 300 so the price is 350 (the average of 400 and 300) and Person B buys the asset from Person A. Only Person C has the chance to earn 10,000 since C chose "Keep My Asset."

Period	A (Seller) is Poor	B (Buyer) is Wealthy	C is Wealthy
5	Young **200**	Inactive **0**	Young **800**
6	Old + Price 500 + 350 = **850**	Young - Price 800 - 350 = **450**	Old **500** + chance at 10,000
7	Inactive **0**	Old **500**	Inactive **0**

Example 2: In Period 6, Person A chooses to "Sell My Asset" with an offer to sell of 300, Person B chooses to "Buy An Asset" with an offer to buy of 200, and Person C chooses to "Keep My Asset."

Here we have the offer to buy of 200 < the offer to sell of 300 so there is no price and Person B does not buy the asset from Person A. Only Person C has the chance to earn 10,000 because C chose "Keep My Asset."

Period	A is Poor	B is Wealthy	C is Wealthy
5	Young **200**	Inactive **0**	Young **800**
6	Old **500**	Young **800**	Old **500** + chance at 10,000
7	Inactive **0**	Old **0**	Inactive **0**

Example 3: In Period 6, Person A chooses to "Sell My Asset" with an offer to sell of 300, Person B chooses to "Buy An Asset" with an offer to buy of 400, and Person C chooses to "Sell My Asset" with an offer to sell of $350.

In this case we have the offer to buy of 400 ≥ both offers to sell of 350 and 300. The price is 325 (the average of 300 and 350) and Person B buys the asset from Person A. No one has the chance to earn 10,000 because no one chose "Keep My Asset."

Period	A (seller) is Poor	B (buyer) is Wealthy	C is Wealthy
5	Young **200**	Inactive **0**	Young **800**
6	Old + Price 500 + 325 = **825**	Young - Price 800 - 325 = **475**	Old **500**
7	Inactive **0**	Old **500**	Inactive **0**

Once you have completed the directions and all of your questions are answered, please wait quietly. The experiment will resume once everyone has completed these directions. Keep in mind that one pair of active periods from the entire experiment will be randomly selected to determine your payoff.

Appendix B: Quiz Questions

1. A green asset lasts for how many periods?

   a. 1 Period
   b. 2 Periods, then it becomes a yellow asset for 1 more period
   c. 3 Periods

2. How much does an active agent with a red asset earn in a period?

   a. 0
   b. 200
   c. 500

3. How many periods will an agent be inactive after being old?

   a. 1
   b. 2
   c. Unknown, but at least 1

4. Agents may hold more than one asset at a time.

   a. True
   b. False

5. Only an old agent with a green asset and a young agent with a yellow asset may choose to "Keep My Asset".

   a. True
   b. False

6. If an old agent with a green asset chooses to "Donate My Asset", then that agent will be able to guess a number between 0 and 999 in hopes of earning $100.

   a. True
   b. False

7. If a young agent with a yellow asset chooses to "Keep My Asset", that agent will be unable to receive a donated asset.

   a. True
   b. False

NoLotto Alternate Questions

6. Old agents with yellow assets may choose to “Donate My Asset” to young agents with yellow assets.

a. True
b. False

7. If a young agent with a yellow asset chooses to “Keep My Asset”, that agent will be unable to receive a donated asset.

a. True
b. False

Market Alternate Questions

6. Only an old agent with a green asset may choose to “Sell My Asset”.

a. True
b. False

7. If an old agent with a green asset chooses to “Sell My Asset”, then that agent will be able to guess a number between 0 and 999 in hopes of earning $100.

a. True
b. False

Appendix C: Survey Questions

1) What is your gender? Male Female

2) How do you describe your religious affiliation?

Atheist	Agnostic	Baptist	Buddhist	Catholic	Jewish	Methodist	Muslim	Other Organized Religion	Other Protestant

3) How often do you attend religious services? Never Rarely Monthly Weekly More than Once a Week

4) Is there anyone in your family or anyone of your close friends who received or donated an organ? Y/N

5) Are you currently listed as an organ donor? Y/N

6) Rate the following behaviors on the scales below:

Donating a Kidney at the Time of Death
Taking a Kidney at the Time of Death without Explicit Permission
Paying the Family at the Time of Death in Return for a Kidney
Donating a Kidney while Alive
Taking a Kidney from a Living Person without Explicit Permission
Paying a Living Person in Return for a Kidney
Selling a Dead Person's Kidney on eBay
Selling a Dead Person's Kidney and Giving the Earnings to Charity
Selling a Living Person's Kidney on eBay
Selling a Living Person's Kidney on eBay and Giving the Money to Charity

Scales:

Highly Moral	Somewhat Moral	Unsure	Somewhat Immoral	Highly Immoral
Should Be Banned	Banned with Minor Exceptions	Permitted with Major Restrictions	Permitted with Minor Restrictions	Should Be Permitted
Extremely Upsetting	Very Upsetting	Moderately Upsetting	Not Very Upsetting	Not Upsetting at All
Not at All Offensive	Not Very Offensive	Moderately Offensive	Very Offensive	Extremely Offensive
Very Irrational	Somewhat Irrational	Neutral	Somewhat Rational	Very Rational
Very Compassionate	Somewhat Compassionate	Neutral	Somewhat Cruel	Very Cruel
Completely Crazy	Somewhat Crazy	Neutral	Somewhat Sane	Completely Sane

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