Sorting in Experiments
with Application to Social Preferences*

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Abstract

Experiments provide a controlled setting where factors can be isolated and studied more easily than in the field, but they often do not allow participants to sort into or out of environments based on their preferences, beliefs, and skills. We conduct an experiment to demonstrate the importance of sorting in the context of social preferences. When individuals are constrained to play a dictator game, 74% of the subjects share. But when subjects are allowed to avoid the situation altogether, less than one third share. This reversal of proportions illustrates that the influence of sorting limits the generalizability of experimental findings that do not allow sorting.

Moreover, institutions designed to entice pro-social behavior may induce adverse selection. We find that increasing the dictator-game surplus prevents foremost those subjects from opting out who shared the least initially. Thus the impact of social preferences remains much lower than in a mandatory dictator game, even if sharing is subsidized by higher payoffs. Our experiment also sheds light on the motives for sharing. While much sharing is consistent with other-regarding preferences, the majority of subjects share without really wanting to, as evidenced by their willingness to avoid the dictator game and to even pay to avoid doing so.

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I. Introduction

Experiments are an important part of every science, including economics. The controlled laboratory environment provides insights into behavior that cannot be studied easily in the field. It allows the scientist to answer the "what ifs" that are hard to address in the complex, ever-changing, and simultaneous structure outside the laboratory.

However, the controlled and artificial environment of most experiments is also a potential drawback. Critics have questioned the applicability of experimental results to "real people" performing "real tasks" with "real incentives" (cf. Harrison and List, 2004). Many such criticisms of experiments have been successfully addressed in the past, for example by replicating experiments under conditions more similar to field settings.[1]

The point of this paper is different and, in some ways, opposite from the argument above. Rather than arguing that the samples used in experiments may be too narrow to reflect behavior in the overall population, we suggest that the selection approach is too broad to make inferences about market outcomes. By design, most experiments try to select a random sample of the population. The participants are locked into the experimental environment and the specific game presented to them. Non-laboratory environments operate differently. In markets, individuals sort based on preferences, beliefs, and skills. Those individuals who choose to participate in markets are not a random sample of the population. The ability to sort contaminates inferences from experimental treatments for the field.[2]

For example, an experiment with randomly selected individuals might reveal that a significant portion of subjects suffer from acrophobia. But sorting and voluntary selection ensure that those who build skyscrapers are unlikely to be among the sufferers. The wage premium paid in the market reflects the preferences of the marginal individual employed, not the average individual in the population.[3] If there are a sufficient number of potential non-

[1] One obvious example is the concern that the stakes are too small in a typical laboratory experiment. However, most experiments reveal very little change in behavior resulting from higher stakes (e.g., Hoffman, McCabe & Smith, 1996; Cameron, 1999; Camerer & Hogarth, 1999; Fehr, Fischbacher & Tougareva, 2002).

[2] Lazear (1990) argues that the difference between the classic Skinner experiments is that pigeons do not have the right to work for another experimenter if they do not like the environment. Workers, on the other hand, are not forced to remain with firms that do provide distasteful reinforcement schedules.

[3] Cf. the literature on equalizing wage differentials and hedonic prices following Rosen (1974).

acrophobic construction workers, there will be no wage premium at all for working at height. It is equally conceivable that sorting exacerbates a laboratory phenomenon. Overconfidence, for example, may not be a common feature in the overall population. But those who sign up for a health club membership may be particularly prone to overestimating their future self-control, which would explain the low average rate of attendance of members who pay a high monthly fee.[4]

Both cases illustrate the power of sorting. Experiments that do not allow for sorting describe the preferences of the average individual and not the marginal one, whose behavior is relevant for determining prices and outcomes. Whether the results of an experiment overstate or understate what is observed in the market depends on the relation of the marginal individual's preferences to those of the average individual.[5]

Sharing in Experiments. To illustrate our point, we analyze a modified dictator game.[6] In a typical dictator game, one of two anonymously matched subjects (the dictator) decides how much of a given surplus to send to the other person (the receiver) and how much to keep. The standard result is that a significant proportion of subjects give some positive amount to an

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[4] See DellaVigna and Malmendier (*forthcoming*), who show, using field data, that subscribers to health clubs do not take into account their own behavior to minimize the costs of their subscriptions.

[5] This concern is similar to the discussion in the labor literature on the estimation of treatment effects on the "untreated" rather than the "treated" (e.g. Angrist and Krueger, 1999; Heckman 1997), though typically from the opposite perspective. There the concern is that a sample is too narrow to identify the effect on the untreated. Here, we worry that the sample is too broad to make inferences about the treated. A second parallel is the distinction between sorting on observables and on unobservables. The experimental literature has addressed many concerns about the observables of a typical subject pool, for example by replicating results with professionals rather than college students (see the overview and discussion in Harrison and List (2004), Section 4). However, subjects who are not differentiable on the basis of any known characteristic still behave differently due to preferences or talents that cannot be observed ex ante (cf. Harrison (2005) for a similar discussion and illustrative examples in the context of field experiments).

[6] We chose the dictator game for two reasons. First, in order to test the effect of a sorting on a particular behavior, it is helpful to start with the simplest task that captures that behavior (and little else). The dictator game is the simplest environment in which to demonstrate and test the prevalence of a propensity to share. Second, the sharing result of the dictator game is quite robust to manipulations. Sharing is usually close to 20 percent, and the distributions of the amount shared differ little between most experiments and treatments (see Camerer 2003).

anonymous receiver, even when their action is not observable by anyone, including the experimenter (see Camerer, 2003; Hoffman et al., 1994). Such sharing behavior has been largely interpreted as reflecting a stable preference for equitable outcomes or altruism (e.g., Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000). Truly other-regarding preferences are, however, not the only reason to share. Individuals may simply feel compelled to give upon request but would prefer to avoid the sharing situation in the first place. A preference to avoid giving may reflect shame or guilt at not giving or other forces.[7]

The Theory. We present a theoretical framework that embeds both "true other-regarding preferences" as put forward in the previous literature and "preferences to avoid giving." To avoid problems associated with interpreting different motivations for giving when they produce identical behavior (– Is a person who consistently shares but is motivated by the pride she derives from giving and does not care about the receiver "other-regarding"? –), we classify agents simply based on their observed behavior. The model distinguishes three types of preferences: agents who *dislike sharing*, agents who *like sharing*, and agents who *dislike not sharing*. The first type, who *dislikes sharing*, does not share regardless of the sorting options. She can be thought of as the standard economic agent. The second type, who *likes sharing*, shares a positive amount in the dictator game and continues to share when he has the option to sort out of the dictator game. He may be thought of as capturing motives for sharing discussed in the previous literature. The third type, who *dislikes not sharing*, shares in the dictator game but prefers to opt out if sorting is possible.

The model demonstrates two main points. First, sorting is an important force in determining the extent of sharing. If all three types are present, the amount shared decreases if individuals have the option to sort out of the environment with sharing opportunity. Second, making the sharing option more attractive induces first and foremost those individuals to return to the sharing environment who are least willing to share.

The intuition is that people who share may either *like sharing* (e.g. for fairness or altruism reasons) or they may *dislike not sharing*. In the latter case, they feel compelled to share

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[7] The distinction between shame and guilt has to do with observability. Shame works only when others see the action taken. Guilt operates even in the absence of observation by others. See Kandel and Lazear (1992) for a theoretical treatment of this subject.

out of shame or guilt if faced with the request to do so, but they prefer to avoid such settings.[8] Introducing the option to avoid the setting with sharing will thus reduce participation and, consequently, the average amount shared.

Among agents who *dislike not sharing*, a higher degree of shame or guilt induces higher amounts of sharing whenever they are constrained to play the dictator game. But those with higher dislike of not sharing also have a higher willingness to pay to avoid the environment with sharing option. Thus, making the sharing environment more attractive (via higher surpluses) will first attract people who are least willing to share (and experience the least guilt or shame from not sharing).

The Experiment. We test these hypotheses in an experiment in which subjects can sort between environments that do and do not allow sharing. The experiment has three stages. In the first stage, individuals play a standard dictator game with no sorting option. We use this stage to determine the individual propensity for sharing. In the second stage, they are offered a choice between playing the dictator game and "opting out." If they opt out, no game is played, and the (potential) dictators receive a fixed payment equal to the total endowment in the dictator game. In that case, the (potential) receiver never finds out that a dictator game could have been played. In the third stage, the total surplus of the dictator game increases while the fixed amount in the alternative environment remains constant.

There are two main results. First, introducing a sorting opportunity significantly reduces the frequencey of sharing. When subjects are locked into the sharing environment and forced to choose how much to share, 74% share a positive amount. But when subjects are given the choice to avoid the situation altogether and so effectively not to share, only 30% share. In other words, without a sorting option most share; with a sorting option most do not. The average percentage shared decreases from 27% to 12%. The decision to switch to the new environment distinguishes agents who were initially sharing because they *dislike not sharing* from those who truly prefer to share (*like sharing*). Overall, 29% of subjects appear to share primarily because of other-regarding preferences, as evidenced by sharing in the first and sec-

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[8] Recent experimental evidence by Dana, Cain and Dawes (2004) provides support for our intuition. They allow dictators to "reverse" their choices before the recipient finds out about them – in which case recipients never learn of the dictator game, and find that almost a third of subjects are willing to pay a small premium to do so.

ond stages. However, the largest groups of initial sharers, 41% of the subjects, appear to share because they *dislike not sharing*, i.e. feel compelled to share only if they cannot avoid the situation (as identified by sharing in the first stage and then opting out). In only 24% of the cases, self-regarding preferences (*dislike sharing*) dominate, as defined by sharing neither in the first nor second stage.[9]

Second, introducing a sorting option selects players from two extremes. They are the most inclined to share (*like sharing*) and also the most averse to sharing (*dislike sharing*), who do not mind not sharing. The remaining individuals, who initially share mostly because of shame or guilt (*dislike not sharing*), avoid the dictator game in the second stage. They are the subset of subjects on which increased incentives to play the dictator game (higher surplus) may have an effect. However, we find that, among these subjects, those who shared most initially switch back to the dictator game last (i.e., only when the compensation in the dictator game is large). In other words, incentives for individuals outside a sharing environment to enter the sharing environment have the strongest effect on those who share the least.

Implications. Our analysis demonstrates that sorting affects the applicability of experiments to market settings. As an illustrative example similar our experimental setting, consider a beggar on a street corner asking for money. Some people may give since they derive utility from giving to others (*like sharing*). Others may not derive utility from giving, but disutility from not giving when faced with the request to do so (*dislike not sharing*), e.g. because of guilt or shame. The latter motivation can be avoided by removing oneself from the situation. The first point of our analysis, then, applied to this context, is that experimental subjects who have just generously shared in a dictator game, with no sorting option, may not give any of their experimental earnings to the beggar outside the lab. Rather, they may cross the street to avoid encountering the beggar.

Although the criticism that sorting affects the external validity of experiments is fundamental, it is easily addressed. Experiments can be adjusted for endogenous selection, e. g. by giving subjects the opportunity to opt out or to choose alternative tasks. The analysis be-

[9] The remaining 5% of subjects cannot be classified using our very simple classification method. We discuss their behavior when we present the results.

low provides an example of how a simple adjustment can help account for the potential influence of selection on economic outcomes.

The sorting environment also sheds light on the question of what, fundamentally, drives social behavior. We show that many people who share in a given environment sort out of that environment, and pay a premium to do so. Our findings suggest that much sharing results from a disutility of not giving if faced with the request to do so – rather than from a stable preference for behaving fairly or kindly. In the context of the beggar example, people who enjoy giving pass by the beggar – and give. Those who do not enjoy giving and do not experience disutility from not giving in response to a request also pass by the beggar – and do not give. The third group, who do not want to give, but dislike not giving when faced with the potential beneficiary, may cross the street to avoid the beggar, but share once confronted with the beggar.

Another implication is that the design of institutions and markets can exacerbate the discrepancy between the behavior of randomly drawn samples in experiments and self-selected samples in markets. Markets may select those individuals whose behavior is furthest from that of the average member of the population. And policy interventions or institutions targeting the average individual may affect the individual with the most perverse, or at least the most extreme, preferences. In the context of our beggar example, suppose that policy-makers would like to induce more giving and pay people to pass by the beggar. Sorting will dramatically affect the impact of this policy. People who like sharing are giving already. Among the people who are not already passing by, the incentives will affect most strongly those who experience the *least* disutility from not giving. Those people give less than the median person. To attract those who do not derive pleasure from giving, but who dislike intensely walking past the beggar without giving, the highest payment is required. As a result the policy intervention will be less effective than predicted on the basis of average behavior in the overall population.[10]

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[10] This intuition is nicely demonstrated in a psychological study by Gaertner (1973), who had black males call white households asking for help with a stranded automobile, pretending to have dialed the wrong number. The households had been identified as liberal or conservative. The liberal residences were more likely to help if confronted with the request, but were also more likely to hang up before the request could be made.

Our paper builds on a considerable body of work on dictator, ultimatum, and trust games (see Camerer, 2003, Chapter 2) revealing that altruistic and fairness-minded behavior is largely robust to several experimental treatments (such as monetary stakes, anonymity, etc.). There is also a small experimental literature suggesting that the dictator game findings may not be driven by mere fairness considerations, but may instead reflect more complex context-dependent considerations (Dana, Weber, and Kuang 2003; Oberholzer-Gee and Eichenberger 2004). Further, a number of experimental papers have been concerned with selection in other experimental contexts such as the prisoner's dilemma (Bohnet and Kübler 2004), the choice of reward and punishment (Sutter, Kocher, and Haigner 2003), incentive contracts (Eriksson and Villeval, 2004), auctions (Palfrey and Pevnitskaya, 2003), risky choices (Harrison, Lau and Rustrom, 2005), and market entry games (Camerer and Lovallo, 1999).

II. Model

Consider two individuals who give away 1/3 of their endowment when they have the opportunity to share. One individual does so because he genuinely enjoys sharing. The other does so because she feels ashamed of keeping all of the money for herself. Now allow the two to have a choice between putting themselves in the sharing environment and avoiding it at no cost. The first elects to be in the sharing environment and continues to share 1/3 of his income. The second chooses to avoid the sharing environment altogether and keeps the full amount for herself. The example illustrates that two parameters are needed to determine both how much individuals share when in a sharing environment and whether they choose to be in a sharing environment.

The model that we propose captures three types of sharing preferences. First, agents may *dislike sharing* as in the standard economic model. Second, agents may *like sharing*. Such preferences capture a number of different motivations for sharing (see Andreoni, 1990). Agents may feel altruistic toward others. A sense of fairness pushes them to share. They enjoy the praise and recognition that comes from doing a good deed. Or they take pride in their own generous behavior. Third, agents may *dislike not sharing*. Such agents share if they have the option to do so but prefer to avoid the sharing environment altogether.[11] There are various reasons why agents may *dislike not sharing*. They may feel shame when others know that they had the opportunity to share, but behaved selfishly. Even in the absence of others observing their behavior, they may feel guilty about having been selfish. Or they may feel neither guilt nor shame but dislike the dirty looks of the passive agent when they do not share. Or they may simply dislike being asked to share what they view as their own.

While the theoretical framework does not explicitly model the different motives behind sharing, our experiment sheds light on the motives and the frequencies of the above types. We start with a general formulation of the utility function and will later focus on the concrete example of Cobb-Douglas-type preferences (detailed in Appendix 1).

Consider an agent who is endowed with an amount w, which she has to divide between herself (x) and another agent (y), as in the classic dictator game:

(1) $x + y = w.$

We allow utility to depend on the payoffs x and y as well as on the sharing environment:[12]

(2) $U = U(D, x, y)$

where $D = 1$ if the environment allows sharing and $D = 0$ if the allocation of w is exogenously determined. We will typically consider a dummy variable assuming either of the two extreme values. The signs of the derivatives are:

(A.1) $U_1 \leq 0$

$U_2 > 0,\ U_3 \geq 0$

$U_{22} < 0,\ U_{33} \leq 0$

Using the budget constraint $x + y = w$, the utility function can then be rewritten as

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[11] The model incorporates "mixed types" such as agents who get *some* utility from sharing but feel compelled to share too much in a sharing environment. Such agents may avoid the sharing situation (and thus share nothing) despite their preference for sharing. For brevity and simplicity we will distinguish only the three basic types, based on their observable sharing decision though the model parameterization allows a full discussion of all types.

[12] By modeling only "own" and "other person's" payoff, we implicitly assume narrow framing. That is the agent does not consider payoffs or wealth beyond the current decision.

(3) $U = U(D, x, w - x)$

For a given endowment w, we characterize preferences based on observed sharing in two environments: an environment without option to share ($D = 0$), in which the full surplus is allocated to the dictator ($x = w$, $y = 0$), and an environment with option to share ($D = 1$) the surplus $w' \geq w$.[13] We first consider $w' = w$. Agents *dislike sharing* if they do not share under $D = 1$, i. e. if

$$\arg\max_{x\in[0,w]} U(1,x,w-x) = w\,.$$

Agents *like sharing* if they share under $D = 1$ and continue to choose the sharing environment (and to share) if opting out (and not sharing) is possible, i. e.

$$\arg\max_{x\in[0,w]} U(1,x,w-x) < w \ \underline{\text{and}}$$

$$\max_{x\in[0,w]} U(1,x,w-x) > U(0,w,0)$$

Agents *dislike not sharing* if they share under $D = 1$ but opt out (and thus do not share) if possible, i. e.

$$\arg\max_{x\in[0,w]} U(1,x,w-x) < w \ \underline{\text{and}}$$

$$\max_{x\in[0,w]} U(1,x,w-x) < U(0,w,0)$$

We derive three propositions that describe the behavior of agents in the two environments. The first proposition immediately follows from the definition of types.

Proposition 1. For $w' = w$, individuals who share in a sharing environment ($D = 1$) prefer a non-sharing environment ($D = 0$) with $x = w$ only if they *dislike not sharing.*

Proposition 1 allows us to infer motivations for sharing that are different from fairness or altruism. If agents are given the choice between a sharing environment and a non-sharing envi-

[13] The type may vary with w. For example, an agent may *dislike sharing* for a range of low w's and *like sharing* for higher w's. Both in the theoretical derivation and in the experimental analysis we hold the w under $D = 0$ constant.

ronment, in which they receive the full surplus, only agents who *dislike not sharing* choose to "opt out" of the sharing environment.[14]

As will be seen in our experiment, the majority of subjects who share in the first decision opt out of playing when given the choice. This implies that the majority of subjects shares primarily because they *dislike not sharing*, not because they *like to share*.

Proposition 2 immediately follows.

Proposition 2. The average amount shared is (weakly) larger when individuals are not given choice over environment than when they are given choice.

The option to leave the sharing environment eliminates individuals who were sharing because they *dislike not sharing*. The sharing of those who *like to share* remains unchanged because the option to leave the sharing environment has no value – to them, the option is an irrelevant alternative. As a result of the departure of those who were sharing primarily because they disliked not sharing, total sharing declines. This is like allowing pedestrians to (costlessly) cross the street before encountering a beggar. The beggar collects less money when pedestrians have this option because some who would have given simply because they disliked not giving will choose to cross the street instead. Those who choose to walk by give the same amount as they did before.[15]

As will be seen in the results from the experiment, giving subjects the ability to opt out of the dictator game reduces the average amount given to and therefore received by non-dictator subjects.

Our last proposition considers dynamic sorting as the surplus in the sharing environment increases (while the outside option remains constant). The sorting behavior allows us to

[14] The number of agents who opt out is only a lower bound for the frequency of agents who share not only because of other-regarding preferences. Some agents may feel compelled to share "too much" in the sharing environment but still may choose this environment over sharing nothing.

[15] This ignores any effects that might result because like-to-share types are more sympathetic to beggars when others ignore beggars. As our experiment will show, sharing among like-to-share types does not go up with the introduction of the sorting option.

infer subjects' "price for sharing." It determines an individual's willingness to pay to avoid a sharing environment (for a given outside option w in a non-sharing environment). Denote with w' the endowment in a sharing environment at which the agent would be indifferent between this environment and w in the non-sharing environment. We denote the ratio between these endowments as $\lambda^*(w) = w'/w$. Thus, $\lambda^*(w)$ represents the price (per unit) for which the individual is willing to enter the sharing environment instead of avoiding the sharing environment (and receiving w). Individuals with standard preferences have $\lambda^* = 1$. They are not willing to pay to avoid the sharing environment nor do they require a premium to enter it. Individuals who *like sharing* have $\lambda^* < 1$. They would be willing to pay for the opportunity to share ($w' < w$). Individuals who *dislike not sharing* have $\lambda^* > 1$. That is, they share when forced into a sharing environment, but would be willing to pay to avoid that environment altogether. Put differently, they must be compensated with a higher endowed wealth, namely, $w' > w$, to enter voluntarily a sharing environment.

Consider now individuals who *dislike not sharing*, i.e. who share some portion of w under $D = 1$ but who opt out to obtain the full w if sorting is possible. We analyze at which price these individuals would return to the sharing environment. That is, how high does w' need to be in order to attract sharers who opt out back into the sharing environment. In Appendix 1, we illustrate that for Cobb-Douglas type preferences there is a monotonic relationship between the amount of initial sharing and the surplus w' at which sharers re-enter the sharing environment if these sharers put little or no weight on others' payoff (i.e. share simply because they feel compelled to do so in a sharing environment.) In that case, the compensation for entering the sharing environment is increasing in the propensity to share. Among individuals who need to be compensated for entering a sharing environment, it is most expensive to attract those who share most, conditional on being in the sharing environment ($D = 1$). The intuition is that those who share a lot but prefer the non-sharing environment (with $x = w$) in the absence of additional compensation must suffer high disutility from being asked to share. (The validity of the Cobb-Douglas specification can be ascertained and is found to hold in the data.) Denoting with α the weight on own payoffs and with $(1- \alpha)$ the weight on others' (excess) payoff, we can derive a lower bound $\underline{\alpha}$ such that:

Proposition 3: Consider individuals who *dislike not sharing*, i. e. who share under $D = 1$ but who prefer opting out ($D = 0$) with a payoff distribution $x = w$ and $y = 0$. The endowment w' at which they enter the sharing environment increases in the amount of conditional sharing, $y_1^*(w)$ within the range $\alpha \in [\underline{\alpha};1)$.

Proof. See Appendix 1.

Proposition 3 has two implications. First, a positive relationship between the size of the amount shared, on the one hand, and the reluctance to enter the sharing environment, on the other hand, would corroborate the empirical importance of agents *disliking not to share*. If we find a positive relationship then agents who share but opt out put particularly little weight on others' payoffs. In fact, $\alpha \in [\underline{\alpha};1)$ characterizes the set of agents whose utility under $D = 0$ is maximized if the other person receives zero payoff, i. e. $\arg\max_{x \in [0,w]} U(0, x, w - x) = w$.

Their dislike of not sharing emerges as the sole motivation for sharing. Only an environment with sorting allows for this distinction.

Second, a positive relationship between the amount of (conditional) sharing and the compensation required for entering the sharing environment also suggests a kind of adverse selection. Individuals who do not give much and then opt out are the quickest to re-enter the dictator game as the premium for playing rises. The results of the experiment confirm this proposition consistent with the Cobb-Douglas form. Paying individuals to play the game attracts extreme types: those who like to share and the stingiest of those who dislike not sharing.

Using the beggar example again, consider two individuals, both of whom dislike not sharing. If forced to encounter the beggar, individual A gives the beggar a very small amount, while B gives the beggar a large amount because he feels very bad about walking by without giving money. If given the opportunity to cross the street without cost, both A and B choose to do so because neither likes giving to the beggar, but feel guilty about not giving if they encounter the beggar. Now suppose that it is costly to cross the street, requiring that the individual wait at the street corner for 5 minutes until the light changes. The one most likely to wait is the one who would have given the beggar the large amount out of money. He has the most to gain from avoiding the guilt-producing environment. Individual A gives the beggar only a small amount and gains less by waiting to crossing the street. Although this is not necessary –

even those who do not give to the beggar might be quite anxious to avoid him altogether – it is implied by a class of preference specifications (including the Cobb-Douglas type preferences explored in the appendix) and is borne out in the results.

We now have a series of propositions that can be borne out or refuted by experimental evidence. As we know from previous experiments, a dictator game that does not allow any option to avoid sharing will see sharing. According to our model, this will include those who share for two reasons: agents *like sharing* and agents *dislike not sharing*. The amount shared gives us an estimate of the importance of sharing to them, although not of the reason for the sharing (*like to share* or *dislike not sharing*).

It is possible to learn about the reason for sharing by offering subjects a choice of environments. In one environment, the dictators have the opportunity to share w. But they can avoid that environment if they so choose (and receive w in the alternative environment). If agents decide to opt out of the sharing environment we can infer that they *dislike not sharing*. As a result the total amount shared will decrease.

Next consider altering the total amount available to share. Recall that w is the amount given to those who opt to avoid sharing and w' the amount given to those who choose to put themselves in the sharing environment. When $w' > w$, all of those for whom $\lambda^* \leq 1$ (i. e. who prefer the sharing environment) and even some of those who have $\lambda^* > 1$ (prefer non-sharing environment) will choose the sharing environment. Under the Cobb-Douglas specification used above, individuals who are most likely to choose to be in the sharing environment even though they have $\lambda>1$ are those who share the least if they are self-regarding.

III. Experimental Design

Our experiment consists of three parts. In all parts, subjects have the opportunity to play a simple dictator game in which they decide upon an allocation of some amount (w') between themselves (x) and another participant (y). In part 1, the dictator game endowment (w') is \$10 and there is no sorting option. In parts 2 and 3, we introduce the possibility of sorting out of the game ("passing"). In part 2, a potential dictator who sorts out receives a fixed sum (w = \$10) and the potential recipient never finds out about the game. In part 3, the amount available in the dictator game rises ($w' >$ \$10) while the sum dictators receive after opting out remains constant (w = \$10).

We conduct all three parts of our experiment in two treatments. These treatments differ in the extent to which dictators are anonymous. In the Anonymity treatment, the identities of dictators who chose to play the game are kept from recipients, meaning that recipients find out how much they receive, but not who sent it. In the No-Anonymity treatment, the identities of dictators who choose to play the game are revealed to the recipients at the end of the experiment, meaning that recipients find out both how much they receive and who sent it. We conducted these two treatments because a) the Anonymity treatment corresponds to how the dictator game is usually implemented in economics experiments (see Camerer, 2003), and b) the No-Anonymity treatment corresponds to many sharing decisions outside the laboratory (such as encountering a beggar on the street). The two treatments also allows us to explore the robustness of our theory to variations in the anonymity of the potential dictator and thus differences between guilt and shame as motivations for sharing.

In both treatments, each session consisted of an even number of between 10 and 20 participants and lasted 30 minutes. Upon arriving at the experiment, subjects were told that they would receive a $6 payment for their participation in the experiment and that, in addition, they might earn money during the experiment. Subjects were then randomly assigned participant numbers and were told that participants with numbers between 11 and 20 should follow the experimenter to an area outside the room.[16] While all subjects were still in the main room, the experimenter publicly announced that participants 11-20 would complete a series of questionnaires for about 20 to 25 minutes and that they would not receive additional money from the experimenter for doing so.

Once participants 11-20 were outside the main room, they received a set of sheets that contained a series of questionnaires. The front page asked subjects to proceed through the questionnaires at their own pace. This took about 20 minutes. If they finished early, they were told to wait quietly for additional instructions.

Once participants 11-20 had left the room, participants 1-10 received instructions telling them that they would make a series of decisions (5 decisions in the Anonymity treatment, 6 decisions in the No-Anonymity treatment), and that at the end of the experiment one of

[16] In sessions with less than 20 participants, participant numbers ranged from 1 to n/2 and 11 to 10+n/2. Thus the instructions always asked participants with numbers between 11 and 20 to exit the room and this corresponded to half the participants.

these decisions would be randomly selected by drawing a number out of a bag. This decision would be the only one that counted and would determine payoffs. Subjects were told that they would make decisions sequentially and that they would receive new instructions and materials for each decision.

Decision 1

In both treatments, Decision 1 consisted of a dictator game without a sorting option. That is, each subject played a $10 dictator game in which he or she was matched with one of the participants outside the room. Subjects were told that if Decision 1 was selected to count at the end of the experiment, then participants 11-20 would be brought back into the room. The experimenter would describe the dictator game publicly to these participants, and then each of the recipients would find out how much money he or she had been given. In the No-Anonymity treatment the recipient would also find out the identity of the dictator with whom he or she had been matched.

Subjects received an instruction sheet (describing the decision) and an envelope. They were told not to open the envelope until after the instructions were read and questions were answered. Inside the envelope was a sheet with a number (11-20) corresponding to the participant with whom the subject would be matched.[17] On the sheet, each dictator wrote his or her own participant number and indicated a division of 40 tokens (each worth 25 cents), specifying both how much to keep and give to the other subject.[18] The experimenter then collected the envelopes and placed them aside.

Decision 2

In Decision 2, participants 1-10 had the opportunity to play exactly the same dictator game as in Decision 1, though with a (potentially) new randomly selected participant. Alternatively, they could choose to "pass", i. e. not to play the game. If they chose to play the dictator game, and if Decision 2 was selected to count, then the participant with whom they were matched

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[17] Random matching in each period was implemented by shuffling the envelopes, distributing them in a different order to dictators, and allowing them to select from the stack that remained.

[18] Subjects were told that if the numbers did not add up to the allocation, then the amount to the recipient would determine the allocation (the dictator would receive the remaining amount). This occurred only once.

would be brought back into the room and informed of the game in the same way as would have occurred in Decision 1. If they chose not to play the game, they would receive a payment of $10 without having to make a choice. In this case, the potential recipient outside the room would be told nothing about the dictator game (in both Anonymity and No-Anonymity treatments).

Subjects received an instruction sheet and two envelopes, one labeled "Play" and another labeled "Pass." Subjects were instructed not to open either envelope until after the instructions had been read aloud. Then, subjects who chose to play the game opened the envelope marked "Play," saw the participant number of the person outside the room with whom they were matched, and specified a division of the 40 tokens. Subject who chose to not play the game, opened the envelope marked "Pass" (which did not contain a participant number) and marked an "X" on the sheet inside.[19] After making either choice, subjects returned the envelopes to the experimenter.

Remaining decisions

The remaining three (Anonymity) or four (No-Anonymity) decisions proceeded almost identically to Decision 2, with the exception that the dictator-game allocation increased. Table 1 presents the amount (w') that a dictator received to allocate – if he or she chose to play the dictator game – for each decision.[20]

[19] This was done to ensure that people playing and passing wrote roughly the same amount on the sheets. In this way, looking around to see how much people were writing would not reveal what others were doing. In addition, the experimenter collected the envelopes with the labeled side facing down, so that subjects could not observe what others had done by which envelope they handed to the experimenter first.

[20] There are two reasons why the parameters (number of decisions, allocation) differ between the two treatments. First, we initially conducted Anonymity sessions with the same payoffs and structure as in the No-Anonymity sessions. We found that the steeper payoffs (relative to those for Anonymity in the table above), meant that a majority of dictators opted out of the game in Decision 2 ($10 allocation), but almost all of them opted to play the game by Decision 4 ($13 allocation). Since part of our goal was to obtain variance in "re-entry" to the game, we modified the payoffs. Second, we also decreased the number of rounds to allow the experiment to run more quickly.

At the end of each session, the experimenter randomly drew one of the five (Anonymity) or six (No-Anonymity) decisions to count. If it was the first decision, then all of the participants were brought in from outside the room. If it was any of the other decisions, then the experimenter brought in only the outside participants who were matched with a subject who chose to play the game. The remaining participants were thanked for their participation and paid \$6.[21]

In the Anonymity treatment, the participants brought back into the room found out only the amount and the participant number of the subject who sent that amount. This was done by having the experimenter show each recipient the sheet filled out by the dictator. In the No-Anonymity treatment, the recipients would in addition find out the identity of the dictator with whom they had been matched. This was done by having the dictators themselves hand the sheets to the recipients.

All payment and sorting features are summarized in Table 1, and the instructions are in Appendix 2. As reported in Table 1, we conducted six sessions in each treatment, with a total of 94 dictators (46 in the Anonymity treatment, 48 in the No-Anonymity treatment).[22] The large majority of subjects were undergraduate students of the University of Pittsburgh and 54% of the dictators were female. Including subjects in the role of potential recipient, we used 188 total subjects.

[21] Both sets of participants received a short information sheet when leaving the experiment. This sheet summarized what their role had been in the experiment without providing any information about the game. For instance, participants 11-20 were told "You were assigned to a passive role in which your decisions did not determine your earnings. You might have been able to receive more money based on factors outside of your control. In some cases, we need participants to be put in this kind of situation in order to re-create situations that occur in the real world." In addition, all participants were asked not to share details of the experiment with others.

[22] One subject was accidentally allowed to participate twice (both times in the role of dictator). We omitted this subjects' second participation from the data analysis. Since subjects' choices were never revealed to anyone else until the end of the experiment, it is very unlikely that this subject could have influenced the choices of other dictators in the same (second) session.

IV. Results and Empirical Analysis

The complete dataset is available from the authors. We first provide a broad overview of the empirical findings and then specifically address the theoretical predictions in Propositions 1 through 3.

General results

Aggregate behavior is presented, by treatment, in Figures 1a and 1b. Each panel presents, by round, the total amount shared per subject (bars), the number of subjects opting to play the game (dashed line), and the percentage of subjects sharing a positive amount (solid line).

When dictators are forced to play the game (Decision 1), 81% in the No-Anonymity treatment and 67% in the Anonymity treatment share. They share average amounts of $2.42 (Anonymity) and $2.92 (No-Anonymity). Thus, consistent with earlier experimental results, when individuals are put in a sharing environment, the vast majority chooses to share something and a significant proportion of the surplus is shared.

However, when subjects are given the opportunity to opt out of the game in Decision 2, the picture reverses dramatically. Only 25% in the No-Anonymity treatment and 35% in the Anonymity treatment share. Overall, 74% share when forced to play the game, but only 30% share when dictators are given the option to avoid playing altogether. As a result, the total amount shared per potential dictator decreases substantially (to $1.22 in Anonymity and $1.17 in No-Anonymity). This is strong evidence first that sorting matters and second that a large fraction were sharing in Decision 1 not because they liked to share, but because they disliked not sharing. Most share when forced into a sharing situation, and most do not share when given the option to avoid the sharing situation altogether. If individuals are allowed to sort out of the sharing situation, many choose to do so.[23] Thus, it is clear that that the sorting opportu-

[23] Among those who opt to play the game, the average amount of sharing is slightly higher in Decision 2 than in Decision 1 ($2.68 in Anonymity; $3.11 in No-Anonimity) – not surprising since the players in Decision 2 who are choosing to play without a monetary premium offered for playing are like-to-share types. There are also some anomalies. In Decision 2, 28% of those who choose to play give nothing to the other player. They might be labeled "spiteful," "shameless," or "guiltless" because they voluntarily put themselves in the sharing environment and then give nothing to the other player. Most of these subjects shared nothing in the first decision.

nity is a powerful force in both treatments. It changes both the quantitative and qualitative nature of the conclusions about the standard dictator game.

It is also clear that individuals who avoid the dictator game in Decision 2 respond to incentives to play the game as the surplus to be allocated (w') increases. As shown in Figures 1a and 1b, the proportion choosing to play rises monotonically after Decision 2, as the endowment given for playing (w') increases relative to the fixed $10 for not playing ($w$). Even if individuals dislike being in the sharing environment (demonstrated by opting out in Decision 2), as the premium for being in that environment rises more opt to put themselves into this unpleasant situation. The entry following Decision 2 largely reflects the entry of those who dislike not sharing. Those who shared in the first round because they liked sharing should have already chosen to play in Decision 2, when the payments for playing and passing were the same.

However, in spite of the increased entry as the endowment in the dictator game increases ($w' > w$), the amount shared per subject fails to immediately reach the level in Decision 1. For instance, in Decision 4 of the No-Anonymity treatment, in which the dictator can allocate $13, the amount shared per subject is $2.07, which is well below the amount shared in Decision 1 ($2.92). In the Anonymity treatment, the effective allocation amount in Decision 5, where the dictator game is worth $12, is $1.52, which is also below the average allocation in Decision 1 ($2.42).[24]

Treatment differences

Decision 1 differed between the treatments only in the anonymity of the dictator. If the decision was selected to count, then in the Anonymity sessions the recipient would find out only the participant number of the dictator, while in the No-Anonymity sessions the recipient would find out the dictator's identity. Comparing Decision 1 in the two treatments we find that, as expected, the lack of anonymity produced slightly more sharing when there was no

[24] Both of these differences are significant in paired t-tests (No-Anonymity: $t_{47} = 2.73$, $p < 0.01$; Anonymity: $t_{45} = 2.73$, $p < 0.01$).

anonymity (the average allocation was \$2.42 in Anonymity and \$2.92 in No-Anonymity). However, this difference is not statistically significant.[25]

General trends in subsequent decisions are also similar between the two treatments. In both treatments, subsequent decisions increased the amount to be allocated in the dictator game. This produces increased entry into the dictator game (indicated by the dotted line) and increased effective sharing (indicated by the bars). Increasing the amount to be allocated in the dictator game produces an increase in the number of subjects choosing to play the game, but this frequency is below 100 percent for most decisions (except for the extreme case, in Decision 6 in No-Anonymity, in which the endowment in the dictator game is twice the value of the outside option of \$10).

Determinants of sharing

Table 2 reports regressions analyzing the influence of different factors on the proportion shared by dictators in Decision 1. The dependent variable is the proportion (between 0 and 1) of the endowment shared with the recipient. Neither anonymity nor gender influence the proportion shared directly. However, including the interaction between the two reveals that males give less under anonymity while females do not.

Tables 3 and 4 report regressions directly testing how the frequency and the amount of sharing are affected by the option to sort out. The "sorting option" variable is a dummy equal to 1 when the potential dictator has the ability to opt out of playing (i.e., it equals 0 in Decision 1 and 1 in all subsequent decisions).

Table 3 considers only the first two decisions, in both of which the endowment in the dictator game was \$10. The dependent variable is a dummy variable indicating whether a subject shared anything with the matched recipient. It is equal to 1 if the subject shared some positive amount and 0 if the subject either shared nothing or opted out of playing the game. The models allow for within-person correlation (clustering). As all the models indicate, the presence of a sorting option significantly decreases the frequency with which subjects share.

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[25] The significance fails to reach 10% either using a t-test (t_{92} = 1.17) or a Kolmogorov-Smirnov test ($D_{46,48}$ = 0.19). We can also make this comparison for Decision 3 in No-Anonymity (average amount shared = \$1.51) and Decision 4 in Anonymity (average amount shared = \$1.42), since in both cases w' = \$11. This difference is not significant (t_{92} = 0.20; $D_{46,48}$ = 0.13)

Sharing is less strongly influenced by the sorting option under anonymity (model 2) and women are more strongly influenced not to share by the sorting option than men (model 3).

Table 4 reports similar regressions, but using the proportion of the endowment shared as the dependent variable (treating a decision to opt out of the game as sharing zero) and using all decisions. The first three models allow for within-person correlation. We see that, across all the decisions, a significantly smaller proportion (about half) is shared in the presence of a sorting option. The interaction between a sorting option and anonymity is not significant, but as in Table 3 there is again a significant effect of the interaction between female and a sorting option: women share less when sorting is possible.

The last two models include individual fixed effects. Both of these regressions reveal that the proportion shared is not strongly influenced by the size of the endowment (the relationship is statistically insignificant in model 4 and significant in model 5, but the coefficient in both is small), which lends some support to the Cobb-Douglas specification. Model 5 also reveals that the introduction of the sorting option significantly decreases the proportion shared.

The above analysis presents clear evidence that the decrease in sharing associated with a sorting option is statistically and economically significant, even after controlling for size of endowments, the degree of anonymity, gender, and either clustering by person or using individual fixed effects. Thus, these results provide strong support for Proposition 2.

Individual behavior and preferences

Although an analysis of preferences is not central to our mission here, we can examine individual behavior to get a sense of the frequency of the types in our model. Recall that we predict three such types: *dislike sharing* (who never share), *like sharing* (who share and choose to enter environments where sharing is possible), and *dislike not sharing* (who share in environments where sharing is possible, but prefer avoiding such environments if they can do so at no cost).

Table 5 presents a categorization of individual subjects in our experiment by their behavior in Decisions 1 and 2 and by treatment. We classify a subject as *dislike sharing* if he or she shared nothing in Decision 1 and either opted not to play or shared nothing in Decision 2, as *like sharing* if he or she shared in Decision 1 and played the game and shared in Decision

2, and as *dislike not sharing* if he or she shared in Decision 1 and opted not to play in Decision 2. These three categories account for 95% of the subjects.[26] (Note that we are simplifying relative to the theoretical analysis and using the *lower bound* for agents who *dislike not sharing*. For example, as pointed out in Section II, some agents who share initially and continue to share may still dislike not sharing.)

Table 5 reveals a high frequency of all three types.[27] There are slightly more *like sharing* than *dislike sharing* types and these combined account for roughly half the subjects. However, the most frequent type is those who *dislike not sharing*. That is, the modal behavior in the first two decisions is to share something when no sorting option is available, but then to opt out of the game when sorting is possible. This behavior is consistent with individuals with our model with $\lambda^* > 1$. That is, they share if they are in the environment that allows sharing, but would pay to avoid that environment. From Proposition 1, this means that the majority shared in the first decision because they dislike not sharing, not because they like sharing.

Who Is Least Willing to Play?

How does the increasing endowment in the dictator game (w') influence the sorting decisions of the three types? The logic of the theory section suggests that two types are most likely to play the game: those who like to share and those who have the least distaste for playing the game.

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[26] Of the remaining 5 subjects, 3 shared something in Decision 1 ($0.25, $2.50, $5), but then shared nothing in the remainder of the experiment (but frequently opted to play); one shared $2.50 initially and then shared $0.50 in one decision after the first (Decision 4) and nothing otherwise (but opted to play every time); and the final subject shared nothing initially, but then opted to play and share $4 in all subsequent decisions. We might classify the first three subjects as "dislike sharing" and the last subject as "like sharing," with trembles or noise in their first decisions (note that after their first decision each of these four subjects behaved entirely consistently with one of our three types).

[27] The distributions of types do not differ significantly by treatment ($\chi^2(2) = 3.49$, p = 0.18). If we divide the classification by gender, males are more likely to dislike sharing than women (M: 30%; F: 20%) but women are more likely to dislike not sharing (M: 30%; F: 47%). This is consistent with the significance of the coefficient on the interaction between sorting option and female in the regressions in Tables 3 and 4. However, the difference in distributions of types by gender is not significant ($\chi^2(2) = 1.97$, p = 0.37).

Our model allows us to classify subjects by how much they share in the first decision and their sorting choice in the second decision. The model also makes clear predictions for the sorting decisions of the three types as w'/w increases (in the third stage of the experiment, beginning with Decision 3). Completely self-regarding (*dislike sharing*) individuals and *like sharing* types should always opt to play the game when $w'/w > 1$. For those who *dislike not sharing*, there should be some value of w'/w that lures them back into the game, but this value should be decreasing in how much they shared initially. Thus, we predict that among *dislike not sharing* individuals, the more they initially shared, the longer they will opt to remain out of the game.

Table 6 addresses the above prediction by reporting the average amount shared, in Decision 1, for *dislike not sharing* types who subsequently opted to play in each decision. That is, for each decision (other than Decision 2 in which, by definition, *dislike not sharing* types opted not to play the game), the table reports the initial amount shared by those who opted to play the game and who we classify as *dislike not sharing*. The first row (corresponding to Decision 1) presents the average amount shared in Decision 1 by all *dislike not sharing* types. The next row (corresponding to Decision 3) presents the average amount shared in Decision 1 by all *dislike not sharing* types who opted to play in Decision 3.

As the table reveals, the initial amounts shared are generally increasing across decisions, meaning that those re-entering the game earlier are those who shared less initially. For instance, those who opt to play the game in Decision 3 were those who had initially shared only $2.00 (No-Anonymity) and $2.67 (Anonymity), well below the amounts corresponding to the average *dislike not sharing* individual ($3.04 and $3.20, respectively). As the amount to be allocated in the dictator game (w') increases in subsequent decisions, those who shared more initially are lured back in, producing the upward trend as one looks down the table.

In Figures 2a and 2b we classify *dislike not sharing* subjects into four categories of initial sharing by the number of tokens they shared in the dictator game (i.e., 1-5, 6-10, 11-15, and 16-20).[28] The figures present, separately for each treatment, the frequency with which subjects in each of the categories chose to play the game in each decision. By definition, all dislike not sharing subjects played the game in Decision 1 and opted out in Decision 2. How-

[28] Recall that each token was worth $0.25.

ever, as both figures reveal, the dislike not sharing subjects who chose to re-enter the game in Decision 3 tended to be those who shared less (1-5 and 6-10). In fact, in both graphs and for every decision, the category most likely to play the game is those who shared the smallest amounts initially (1-5).

A more direct test of our hypothesis can be seen in Table 7. This table reports the results of several logistic regressions, allowing for within-subject correlation (clustering), using as the dependent variable a subject's decision whether to play (1) or pass (0). Since all subjects had to play the game in Decision 1 and since the choice to play the game in Decision 2 was used to construct the types, we exclude these two decisions from the analysis. As the first three models indicate there is no significant relationship, for the entire sample or for subjects who we classify as *like sharing* types, between the amount shared in Decision 1 and the choice of whether to play the game.[29] However, as model 4 reveals, there is a negative and significant relationship for those subjects who we classify as *dislike not sharing* – they are less likely to play the game the more they shared in the first decision. The final model (5) confirms this relationship, whjle controlling for the size of the endowment, anonymity, gender, and including dummy variables and an interaction term to separate the effects of the other two types.

Our findings confirm our main hypotheses. Sorting significantly affects the extent of sharing, in fact decreasing it substantially, and increased incentives to enter the environment where sharing is possible have the strongest effect on those who are least willing to share.

V. Conclusions

The research presented in this paper aims at highlighting the effects of sorting in economic environments. Our work is motivated by the observation that in the real world people regularly sort in to and out of different kinds of economic environments such as firms, markets, and institutions, but that in the laboratory these sorting decisions are largely ignored. Instead, subjects are typically placed in one particular kind of situation and forced to make a choice that they might avoid making outside the laboratory. The goal of our analysis is to model the

[29] Recall that all *dislike sharing* types shared 0 in Decision 1, so this group has no variance on this variable.

influence of a sorting decision and to investigate how it affects conclusions drawn from laboratory environments without sorting.

Applied to a common laboratory situation involving sharing and altruism, we find that when individuals are forced to play a dictator game, the majority share. But when they are allowed to opt out of the game, the majority does not share. Choosing subjects randomly, and forcing them to play the dictator game, would lead us to believe that sharing is pervasive in the world outside the laboratory. However, allowing people to avoid the sharing situation might lead to the opposite conclusion, namely that a subset of individuals share, but the majority avoid situations where sharing is possible.

We have no evidence to suggest that this pattern generalizes to other situations. But the point that selection may be adverse or extreme, although not new, is relevant in experimental settings as well as in the real world. This is clearly demonstrated in our experiment.

Another contribution of this paper is that we introduce a model that allows an additional motivation for sharing than that which is present in most behavioral models. Individuals may share not because they like to share, but because they dislike not sharing. Allowing for preferences of this type, of which there is evidence in previous research (e.g., Dana, Weber & Kuang, 2005) yields some counter-intuitive predictions about the effects of sorting. In particular, we predict that sorting will lead some of those who appear to be most fairness-minded in the forced-choice experiments to be more likely to avoid environments where they can act fairly. We conduct an experimental study that allows for sorting and find support for this hypothesis. That is, we find clear evidence that some individuals share in dictator games (without an outside option) not because they value implementing fair outcomes, but because they feel compelled to for some other reason. Moreover, we find that the more that such subjects feel compelled to share, they higher price they will require for entering the sharing environment. Thus, some of the people who appear the most willing to share are the least likely to enter environments where sharing is possible.

We plan to extend this work to explore the effects of sorting on other kinds of social preferences such as reciprocation and intrinsic motivation. While we expect that sorting might produce outcomes that are less consistent with these preferences, it is worth noting that we do not mean to imply that these preferences do not exist or matter. Instead, we argue that the possibility of sorting might influence their impact outside the laboratory and that such an influence needs to be accounted for when generalizing laboratory results to non-laboratory environments.

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Figure 1a. Aggregate behavior in No-Anonymity treatment (6 sessions, N=48)

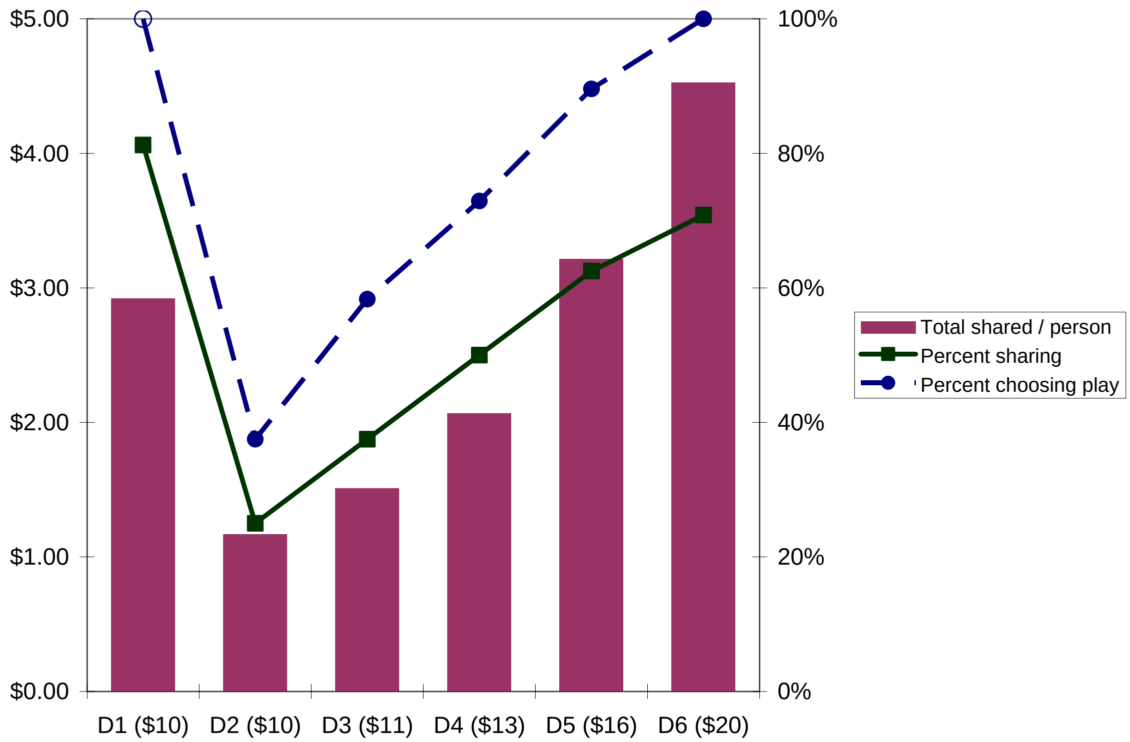

Figure 1b. Aggregate behavior in Anonymity treatment (6 sessions, N=46)

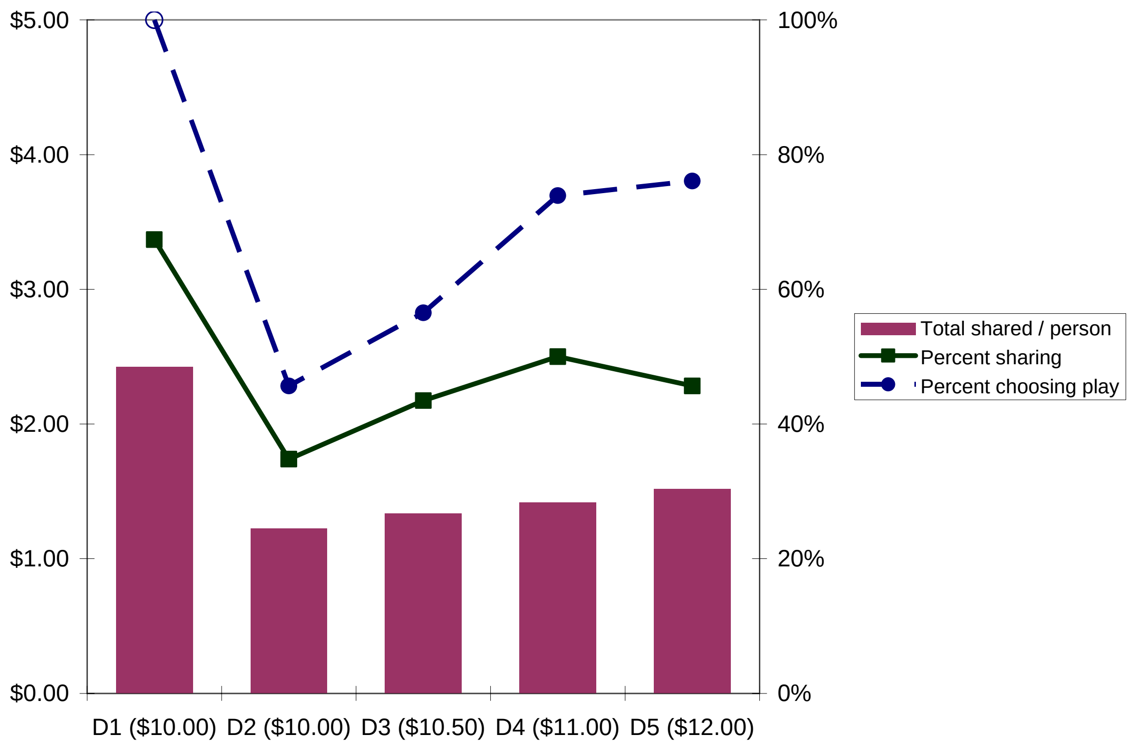

Figure 2a. Percent of dislike not sharing types playing game by initial amount shared (No Anonymity)

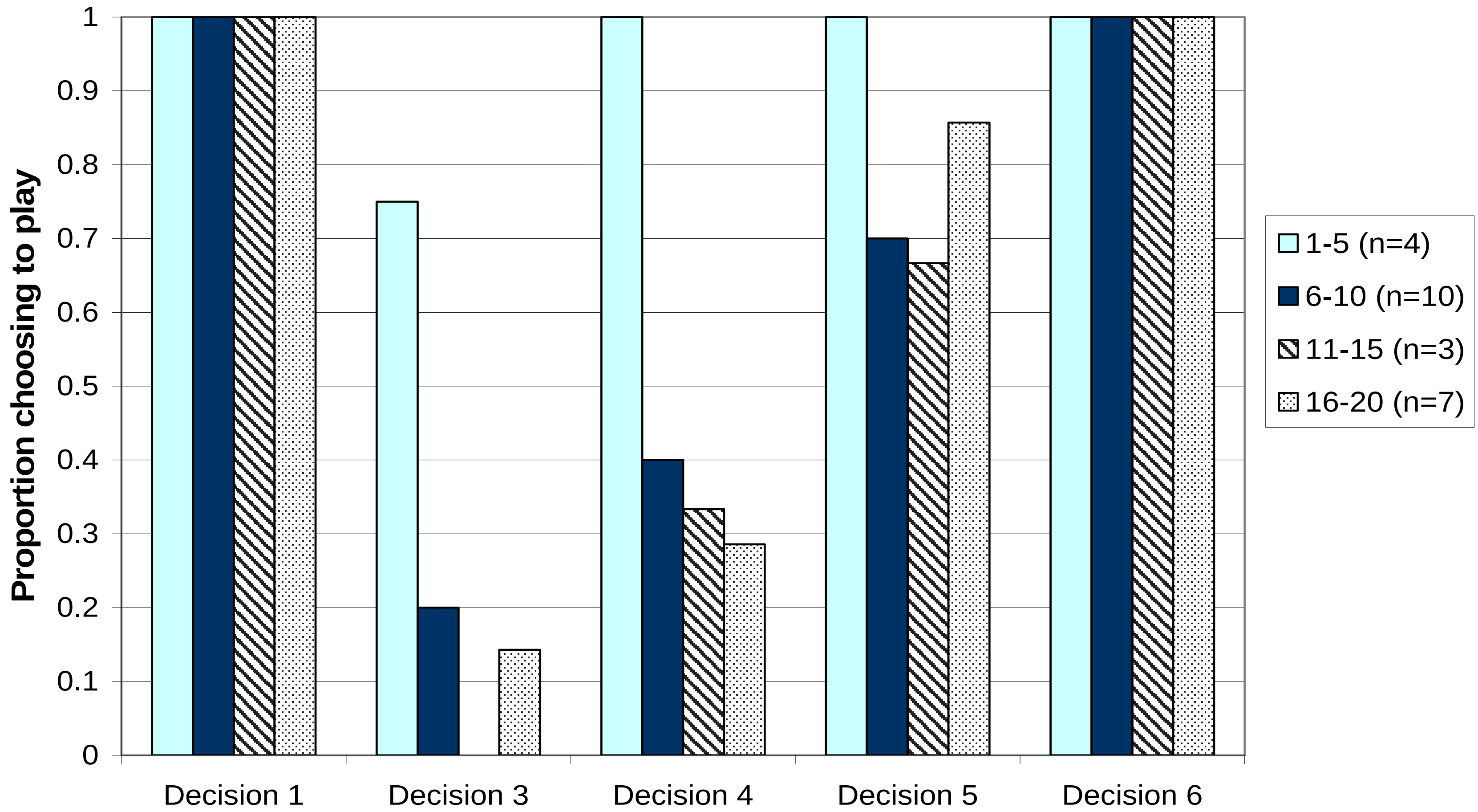

Figure 2b. Percent of dislike not sharing types playing game by initial amount shared (Anonymity)

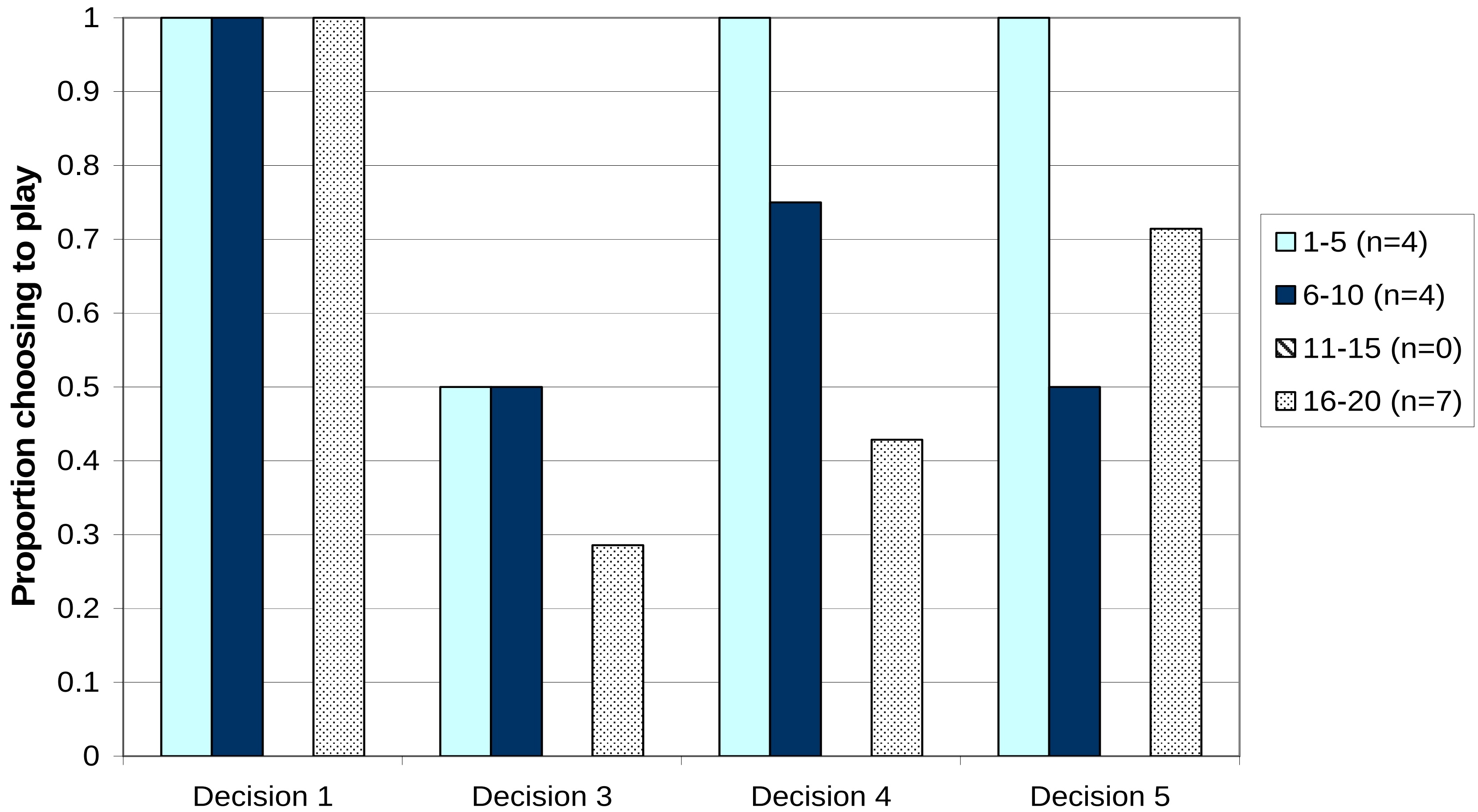

Table 1. Endowment in dictator game by decision and treatment

	Dictator allocation (w') (Anonymity)	**Dictator allocation (w') (No-Anonymity)**	**Sorting option (w = \$10)**
Decision 1	\$10.00 (40 tokens)	\$10.00 (40 tokens)	No
Decision 2	\$10.00 (40 tokens)	\$10.00 (40 tokens)	Yes
Decision 3	\$10.50 (42 tokens)	\$11.00 (44 tokens)	Yes
Decision 4	\$11.00 (44 tokens)	\$13.00 (52 tokens)	Yes
Decision 5	\$12.00 (48 tokens)	\$16.00 (64 tokens)	Yes
Decision 6		\$20.00 (80 tokens)	Yes
Number of sessions	6	6	
Number of dictators	46	48	

Table 2. Proportion Shared in Dictator Game (Decision 1 only)

Dependent variable: Proportion shared	(1) OLS	(2) OLS
Anonymity	-0.052 (0.043)	-0.164 (0.062)***
Female	0.029 (0.043)	-0.070 (0.058)
Anonymity X Female		0.205 (0.084)**
Constant	0.278 (0.037)***	0.327 (0.041)***
R^2	0.020	0.080
N	94	94

Standard errors in parentheses
*- $p < 0.1$; **- $p < 0.05$; ***- $p < 0.01$; all two-tailed

Table 3. Determinants of Whether Sharing Occurred (Decisions 1 and 2 only)

Dependent variable: Shared something (1) or did not share (0)	(1) Logit with clustering by individual	(2) Logit with clustering by individual	(3) Logit with clustering by individual
Anonymity	-0.120 (0.382)	-0.760 (0.490)	-0.122 (0.387)
Female	0.207 (0.386)	0.211 (0.394)	0.694 (0.483)
Sorting option	-1.934 (0.270)***	-2.571 (0.428)***	-1.458 (0.365)***
Sorting option X Anonymity		1.213 (0.547)**	
Sorting option X Female			-0.927 (0.540)*
Constant	1.020 (0.348)***	1.364 (0.423)***	0.783 (0.346)**
Log likelihood	-110.41	-108.72	-109.41
N	188	188	188

Standard errors in parentheses
*- $p < 0.1$; **- $p < 0.05$; ***- $p < 0.01$; all two-tailed

Table 4. Determinants of Amount Shared (all decisions)

Dependent variable: Proportion shared (= 0 if subject opted out of game)	(1) OLS with clustering by individual	(2) OLS with clustering by individual	(3) OLS with clustering by individual	(4) OLS with individual fixed effects	(5) OLS with individual fixed effects
Endowment (*w′*)				0.003 (0.002)	0.010 (0.002)***
Anonymity	-0.040 (0.035)	-0.047 (0.043)	-0.040 (0.035)		
Female	-0.036 (0.036)	-0.036 (0.036)	0.028 (0.043)		
Sorting option	-0.120 (0.017)***	-0.124 (0.021)***	-0.078 (0.023)***		-0.145 (0.014)***
Sorting option X Anonymity		0.008 (0.035)			
Sorting option X Female			-0.078 (0.034)***		
Constant	0.307 (0.034)***	0.310 (0.034)***	0.272 (0.035)***	0.137 (0.025)***	0.169 (0.022)***
R^2	0.068	0.068	0.074	0.006	0.074
ρ (variance explained by fixed effects)				0.647	0.698
N	518	518	518	518 (94)	518 (94)

Standard errors in parentheses

*- $p < 0.1$; **- $p < 0.05$; ***- $p < 0.01$; all two-tailed

Table 5. Classification of Types by Behavior in Decisions 1 and 2

	No-Anonymity (N=48)	Anonymity (N=46)	Combined
Dislike sharing	9 (19%)	14 (30%)	23 (24%)
Like sharing	12 (25%)	15 (33%)	27 (29%)
Dislike not sharing	24 (50%)	15 (33%)	39 (41%)
Unclassified	3 (6%)	2 (4%)	5 (5%)

Table 6. Average amount shared in Decision 1 for dislike-not-sharing types opting to play game

	No-Anonymity (Number of subjects)	Anonymity (Number of subjects)
All (Decision 1)	$3.04 (24)	$3.20 (15)
Decision 3	$2.00 (6)	$2.67 (6)
Decision 4	$2.36 (11)	$2.55 (10)
Decision 5	$2.99 (19)	$3.05 (11)
Decision 6	$3.04 (24)	

Table 7. Decision to Play Game (Logit with clustering by individual, excludes Decisions 1 and 2)

Dependent variable: Played game (1) or passed (0)	(1) Full sample	(2) Full sample	(3) Like sharing types only	(4) Dislike not sharing types only	(5) Full sample (excluding unclassified)
Amt. shared in D1	-0.046 (0.085)	-0.067 (0.089)	0.349 (0.409)	-0.330 (0.113)***	-0.402 (0.155)***
Endowment		0.444 (0.073)***			0.531 (0.095)***
Anonymity		0.506 (0.396)			0.452 (0.422)
Female		-0.183 (0.380)			-0.012 (0.406)
Dislike Sharing (=1)					-0.073 (0.630)
Like Sharing (=1)					-0.130 (1.842)
Like Sharing X Amt. shared in D1					0.643 (0.432)
Constant	1.251 (0.293)***	-4.381 (1.011)***	0.700 (1.798)	1.528 (0.408)***	-5.306 (1.297)***
Log likelihood	-183.63	-160.88	-29.10	-89.58	-132.14
N	330	330	93	141	312

Standard errors in parentheses
*- $p < 0.1$; **- $p < 0.05$; ***- $p < 0.01$; all two-tailed

Appendix 1. Theoretical Derivation

Utility specification. We use the Stone-Geary generalization of Cobb-Douglas preferences to allow for other-regarding and context-dependent preferences as follows:

(4) $U(D, x, y) = x^{\alpha} (y - \hat{y}(D))^{1\ \alpha}$.

As in the general setting above, utility is defined over own payoff (x), the other person's payoff (y), and the sharing environment ($D = 0$ if the agent is in an environment with exogenously determined payoff distribution and $D = 1$ if the agent determines the payoff distribution). Specifically, D enters the utility function by determining the "norm" or "subsistence level" $\hat{y}(D)$ of giving. If $\hat{y}(D)$ is positive, the agent feels compelled to give; if it is negative, the agent may even take some of the other person's (prior) payoff if possible. While the model framework can deal with all cases $\hat{y}(D) \in (-w; w)$, we will focus on $0 = \hat{y}(1) > \hat{y}(0) > -w$.[30] This specification implies that agents feel compelled to share more in a sharing environment than they would like the other person to receive without a sharing request. (A full analysis of this utility specification, allowing for heterogeneity in α and $\hat{y}(D)$ is available from the authors.) In this case, an agent has standard Cobb-Douglas preferences under $D = 1$,

(5) $U(1, x, y) = x^{\alpha} y^{1\ \alpha}$,

and Stone-Geary preferences under D= 0,

(6) $U(0, x, y) = x^{\alpha} (y - \hat{y}_0)^{1\ \alpha}$.

Thus, when an individual is in the sharing environment with surplus w, she allocates x to herself and y to the other individual in accordance with

(7) $x_1^*(w) = \alpha w$

(8) $y_1^*(w) = (1-\alpha)w$

That is, higher α individuals share less and α = 1 implies the individual does not share. We can further show that agents choose a non-sharing environment (D = 0) with $x = w$ and $y = 0$

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[30] Similarly, we could allow for a subsistence level of own payoff, $\hat{x}(D)$. Setting $\hat{x}(D)$ to zero reduces the number of cases to be considered without changing the insights and predictions for the experiment.

over a sharing environment (D = 1) with surplus w if and only if α lies below a lower bound, implicitly defined by

$$(9) \qquad (-\hat{y}(0))^{1-\alpha} w^{\alpha} - \alpha^{\alpha}(1-\alpha)^{1-\alpha} w = 0\,,$$

which we denote as $\underline{\alpha}$.

Proof of Proposition **3.** The endowment level w' equates the utility from opting out and obtaining w, $U(0, w, 0) = (-\hat{y}_0)^{1\ \alpha} w^{\alpha}$, and the utility from optimal sharing of w',

$$\max_{x\in[0;w']} U(1,x,y)$$
$$s.t.\ x+y=w'$$

and is thus implicitly defined by $(-\hat{y}_0)^{1-\alpha} w^{\alpha} - \alpha^{\alpha}(1-\alpha)^{1-\alpha} w' = 0$. Using $y_1^*(w) = (1-\alpha)w$ we can substitute for α and solve for w':

$$w' = \left(\frac{-\hat{y}_0}{y_1^*}\right)^{\frac{y_1^*}{w}} \cdot \left(\frac{w}{w-y_1^*}\right)^{\frac{w-y_1^*}{w}} \cdot w\,,$$

where we abbreviate $y_1^*(w)$ as y_1^*. Differentiating w' with respect to y_1^* gives

$$\frac{\partial w'}{\partial y_1^*} = \left(\frac{-\hat{y}_0}{y_1^*}\right)^{\frac{y_1^*}{w}} \cdot \left(\frac{w}{w-y_1^*}\right)^{\frac{w-y_1^*}{w}} \cdot \left[\ln\frac{w-y_1^*}{y_1^*} - \ln\frac{w}{-\hat{y}_0}\right]$$

Thus, w' is increasing in y_1^* iff $\frac{w-y_1^*}{y_1^*} > \frac{w}{-\hat{y}_0}$ or, substituting back α, iff $\alpha > w/(w-\hat{y}_0)$.

Hence, w' is increasing in y_1^* for agents with self-regarding preferences. **Q.E.D.**

Appendix 2. Sample Instructions

Initial Instructions

This is an experiment in decision-making. Several research institutions have provided funds for this research. In addition to a $6 participation bonus, you will be paid any additional amount you accumulate during the experiment privately, in cash, at the end. The exact amount you receive might vary and will be determined during the experiment. If you have any questions during the experiment, please raise your hand and wait for an experimenter to come to you. Please do not talk, exclaim, or try to communicate with other participants during the experiment. Participants intentionally violating the rules may be asked to leave the experiment and may not be paid.

We will now assign everyone in the room a participant number. Please take an envelope from the experimenter. In each of the randomly shuffled envelopes is a card with a number from 1 to 20. The number in your envelope is your participant number for the remainder of the experiment. Your participant number is private and should not be shared with anyone.

We would now like to ask all of you who have participant numbers between 11 and 20 to follow the experimenter to an area outside of this room. These participants will complete a series of short questionnaires for about 25 minutes. They will not be paid any money for doing so.

Instructions for Participants 1-10

Participants with numbers 1 through 10 will now make a series of decisions. There will be a total of 5/6 decisions. At the end of the experiment, we will randomly select <u>one</u> of these decisions and <u>only</u> this decision will count. We will select the decision that counts by randomly drawing a number from 1 to 5/6. Each participant will be paid based only on this decision (in addition to the $6 participation bonus). Since you do not know which of the decisions this will be, <u>you should treat each decision as if it were the only one that counted</u> –it could end up being so.

For each decision, the experimenter will hand you a set of sheets. Please wait until everyone has their sheets before turning them over. After you are done, the experimenter will collect all of the sheets and we will move on to the next decision.

Are there any questions before we proceed?

Decision 1 (Anonymity)

In the first decision, you will play a game in which you will be matched with one of the participants in the adjacent area (i.e., participants 11-20). The match is anonymous and determined by random draw.

In the game, you will allocate 40 tokens between yourself and the participant with whom you are matched. Each of the tokens is worth $0.25 cents. This means that the total value of the tokens is $10.00. Your decision will be to allocate any number of tokens between 0 and 40 to the matched participant and keep the remainder for yourself. For instance, if you keep all 40 tokens then you will receive $10 at the end of the experiment and the person you are anonymously matched with will receive $0. Or, if you give all 40 tokens then you will receive $0 and the person you are matched with will receive $10.

The participants in the adjacent area have not been told anything about this game. They were given a set of questionnaires and asked to proceed through them at their own pace. However, if this decision is selected as the one that counts, then the experimenter will bring all participants 11-20 into the room at the end of the experiment. The experimenter will then explain the game you have played to them by reading the basic instructions aloud. Each of these participants will then find out how many tokens he or she received from the participant in this room with whom he or she was anonymously matched.

The game will now proceed as follows:

1) Each of you has an envelope in front of you. Please do not open this envelope yet. Inside the envelope is the number of the participant you will be matched with and a sheet on which you will indicate your decision.
2) Once you open the envelope, you should make sure that the other participant's number is on the sheet. You should then write your participant number in the space where it asks you to do so.
3) You should then indicate how you wish to allocate the 40 tokens between yourself and the other participant. The total of the two amounts should sum to exactly 40. If they do not sum to 40, then the other participant will receive whatever sum you specify and you will receive the remainder.
4) The experimenter will then collect these sheets from you.

If, at the end of the experiment, this decision is selected to count, then the end of the experiment will proceed as follows:

5) The experimenter will bring participants 11-20 back into the room and will briefly explain the game to them. The participant you are matched with will then receive the sheet that you filled out, indicating how many tokens he or she received.
6) The experimenter will then anonymously pay participants 11-20 their total earnings, and will then anonymously pay all of you. This will conclude the experiment.

Are there any questions? If not, then please proceed by opening your envelope.

Decision 1 (No Anonymity)

In the first decision, you will play a game in which you will be matched with one of the participants in the adjacent area (i.e., participants 11-20). The match is determined by random draw.

In the game, you will allocate 40 tokens between yourself and the participant with whom you are matched. Each of the tokens is worth $0.25 cents. This means that the total value of the tokens is $10.00. Your decision will be to allocate any number of tokens between 0 and 40 to the matched participant and keep the remainder for yourself. For instance, if you keep all 40 tokens then you will receive $10 at the end of the experiment and the person you are matched with will receive $0. Or, if you give all 40 tokens then you will receive $0 and the person you are matched with will receive $10.

The participants in the adjacent area have not been told anything about this game. They were given a set of questionnaires and asked to proceed through them at their own pace. However, if this decision is selected as the one that counts, then the experimenter will bring all participants 11-20 into the room at the end of the experiment. The experimenter will then explain the game you have played to them by reading the basic instructions aloud. Each of these participants will then find out how many tokens he or she received from the participant in this room with whom he or she was matched, as well as the identity of the person with whom he or she was matched.

The game will now proceed as follows:

7) Each of you has an envelope in front of you. Please do not open this envelope yet. Inside the envelope is the number of the participant you will be matched with and a sheet on which you will indicate your decision.
8) Once you open the envelope, you should make sure that the other participant's number is on the sheet. You should then write your participant number in the space where it asks you to do so.
9) You should then indicate how you wish to allocate the 40 tokens between yourself and the other participant. The total of the two amounts should sum to exactly 40. If they do not sum to 40, then the other participant will receive whatever sum you specify and you will receive the remainder.
10) The experimenter will then collect these sheets from you.

If, at the end of the experiment, this decision is selected to count, then the end of the experiment will proceed as follows:

11) The experimenter will bring participants 11-20 back into the room and will explain the game to them. You will then hand to the participant with whom you were matched the sheet you filled out, indicating how many tokens he or she received.
12) The experimenter will then anonymously pay participants 11-20 their total earnings, and will then anonymously pay all of you. This will conclude the experiment.

Are there any questions? If not, then please proceed by opening your envelope.

Decision 2 (Anonymity)

In the second decision, you will have the opportunity to play exactly the same game as in Decision 1. Alternatively, you can decide not to play the game (i.e. you can "pass"), in which case you will receive the fixed sum of $10 (plus the $6 participation bonus). You now have two envelopes in front of you. One is labeled "play" and the other is labeled "pass." Please do not open either envelope until we are done reading the instructions.

If you choose to play the game, open the envelope marked "play." This envelope will have a sheet like the one in Decision 1. If you open this envelope, then you will be matched with the person whose participant number is on the sheet. The participant number may differ from the one in Decision 1 since the envelopes were randomly distributed each time. You should then write your participant number on the sheet and indicate how you wish to allocate the 40 tokens (each worth 25 cents, i.e. $10 in total). If this decision is selected at the end of the experiment, the matched participant will be brought back into the room and will be told about the game. This matched participant will then receive the sheet you filled out indicating how much he or she received.

If you choose not to play the game, open the envelope marked "pass." Inside this envelope is a sheet on which you will write your participant number and mark an "X" to indicate that you pass. You will not be matched with one of the participants outside the room and you will not allocate tokens. If this decision is selected at the end of the experiment, you will receive a fixed sum of $10.

Notice that if you choose to play the game, then you will be matched with one of the participants outside. If you choose to pass, then you will not be matched with any of the participants outside.

If Decision 2 is selected as the one that counts, then at the end of the experiment the experimenter will go to the area with the other participants and ask: "Will the participants with the following numbers please come back into the room?" If you chose to play the game, then the number of the participant with whom you are matched will be read to the participants outside, and this participant will be brought back into the room. The experimenter will explain the game aloud to the participants who are brought back into the room and will then give them the sheets filled out by the participants in this room with whom they were matched. If you chose not to play the game, then the number of the participant with whom you would have been matched will not be read to the participants outside, and this participant will receive the $6 participation bonus and will leave the experiment without learning anything about the game.

Are there any questions? If not, then please proceed by opening <u>only one</u> of the two envelopes.