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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 increased payoffs prevent foremost those subjects from opting out who share 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 for avoiding it.

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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 scientists 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; List and Levitt, 2005). 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.[2] 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.

For example, an experiment with randomly selected individuals might reveal that a significant portion of subjects suffer from acrophobia. But voluntary sorting 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 individ-

[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). There is also an early statistical literature on selected samples not being representative of the total population, starting with Gronau (1974). Heckman (1979) devised a generalized econometric method for treating this problem.

[2] We use the term "sorting" to describe agents' voluntary choice of an activity, and the term "selection" to discuss the representativeness of a sample.

ual in the population.[3] If there are a sufficient number of potential non-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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[3] Cf. the literature on equalizing wage differentials and hedonic prices following Rosen (1974).

[4] See DellaVigna and Malmendier (2006), 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) in the context of field experiments.)

[6] We chose the dictator game for two reasons. First, in order to test the effect of 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 the full range of motivations for giving. The distinction between the different motivations is, however, often subtle. For example, 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"? To avoid such issues of interpretation, 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 sharing decreases when sorting becomes possible. The intuition is that people who *dislike not sharing* feel compelled to share 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.

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[7] Shame and guilt differ in the role of observability. Shame works only when others see the action taken. Guilt operates even in the absence of observability. See Kandel and Lazear (1992) for a theoretical treatment.

[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.

Second, making the sharing option more attractive induces foremost those individuals to return to the sharing environment who share the least. Here the intuition is that the more an agent *dislikes not sharing*, the higher is her willingness to pay to avoid the sharing environment. Thus, making the sharing environment more attractive (via higher surpluses) will first attract people who share little (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 frequency 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 truly *like sharing* (29%) from those who were initially sharing because they *dislike not sharing* (41%). Thus, the largest groups of initial sharers 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 and also the most averse to sharing, who do not mind not sharing. The remaining individuals, who initially share mostly because of shame or guilt, avoid the dictator

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

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 to our experiment, consider a beggar on the street asking for money. Some people may give since they derive utility from giving (*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 give none 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 below 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 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 – 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 selfselected 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]

Our paper builds on a considerable body of work on dictator, ultimatum, and trust games (see Camerer, 2003, chap. 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), sanction mechanisms (Botelho, Harrison, Pinto, and Rutström, 2005), incentive contracts (Eriksson and Villeval, 2004; Dohmen and Falk, 2005), auctions (Palfrey and Pevnitskaya, 2003), risky choices (Harrison, Lau and Rutström, 2005), and market entry games (Camerer and Lovallo, 1999).

[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.

The paper proceeds as follows. In Section II, we present a model that allows for different motives of sharing. Section III contains the description of our experimental design. We discuss the experimental results in Section IV. Section V concludes.

II. Model

Consider two individuals who, when put in an environment where sharing is an option, give away 1/3 of their endowment to another individual. 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 let the two 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. It is clear that two parameters are needed to characterize these preferences. One parameter is identical across the two individuals and determines how much they share when in a sharing environment. The other parameter dictates whether they choose to be in the sharing environment or not.

Our two parameter model captures three types of sharing preferences. The first type of agent *dislikes sharing* as in the standard economic model. The second type *likes 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 may enjoy the praise and recognition that comes from doing a good deed. Or they take pride in their own generous behavior. A third type *dislikes not sharing*. Such agents share if they have the option to do so but prefer to avoid the sharing environment altogether. 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:[11]

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

where D is a dummy variable equal to 1 if the environment allows sharing and equal to 0 if the allocation of w is exogenously determined. That is, under $D = 1$ the agent decides how to split up w between herself and the other person. Under $D = 0$ the agent has no influence on how w is allocated. In particular, we will analyze the case that the full endowment w is allocated to the agent under $D = 0$.

We characterize an individual's propensity to share in the sharing environment with parameter α. That is, she allocates x to herself and y to the other individual in accordance with

(2) $x = \alpha w$

(3) $y = (1 - \alpha)w$

Individuals with $\alpha = 1$ have standard preferences and *dislike sharing*. Individuals with $\alpha < 1$ have non-standard preferences. They either *like to share* or *dislike not sharing*. If given the choice, the latter group would pay to avoid the sharing environment, whereas the former group would pay to be in the sharing environment. For a given allocation w outside the sharing environment, an individual's willingness to pay can be expressed as a ratio of the wealth that she would have to receive in the sharing environment, w', to be just indifferent between the sharing environment and the environment that precludes sharing at wealth w. We denote this ratio as $\lambda(w)$, i. e.

(4) $\lambda(w) = w'/w$

The value of λ is related to the disutility (or utility) an individual receives from being put into a sharing environment. Individuals who have $\lambda < 1$ *like to share* and would be willing to pay for the opportunity to share ($w' < w$). Individuals have $\lambda > 1$ *dislike not sharing*. They share

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

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 choose voluntarily to enter a sharing environment. Individuals who *dislike sharing* ($\alpha = 1$) share nothing and will not be willing to pay to avoid the sharing environment ($\lambda = 1$).[12]

Three propositions follow, which form the basis of the analysis of the experiments. (All proofs are contained in Appendix 1.)

Proposition 1: *Individuals who strictly prefer the sharing environment to the non-sharing environment have values of $w' < w$, which implies that $\lambda < 1$. Conversely, individuals who strictly prefer to avoid the sharing environment have $w' > w$, which implies that $\lambda > 1$.*

Proposition 1 allows us to determine the size of λ relative to 1 in the experimental context. If agents are given the choice between the sharing environment and the non-sharing environment and have the same total amount available in each, only those who actually like to share (as opposed to dislike not sharing) choose the sharing environment. Thus, a treatment that gives players choice over environment distinguishes between those who like sharing and those who dislike not sharing.

As will be seen, 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 who share do so because they dislike not sharing, not because they like to share.

The second proposition characterizes the effect of sorting on the amount y received by the other person, either under $D = 0$ or under $D = 1$, which we denote as the "amount shared."

[12] This is a simplifying assumption that is specific to our model, not a general statement (nor required for our analysis). The model can be generalized to allow a more subtle distinction of types. For example, agents who share nothing in the sharing environment may still pay something to avoid being put in that environment. Such agents *dislike sharing* but still have $\lambda > 1$. Other agents may get *some* utility from sharing but feel compelled to share too much in a sharing environment. As a result, such agents avoid the sharing situation (and thus share nothing) despite their preference for sharing. These agents *like sharing* but have $\lambda > 1$. Additionally, an individual might dislike sharing in some ranges of w and like sharing in other ranges. For brevity and simplicity we will distinguish only the three basic types, based on their observable ("net") sharing decision.

Proposition 2: *The average amount shared is (weakly) smaller when individuals can sort between environments than when they cannot sort.*

Giving individuals the option to leave the sharing environment eliminates all of those who were sharing only 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. And the amount shared by those who *dislike not sharing* also remains unchanged. Whether they are in the sharing environment or sort out if it, the other person receives zero. To them, the option is an irrelevant alternative. However, as a result of the departure of those who were sharing only because they disliked not sharing, total sharing declines. This is like allowing pedestrians to cross the street before encountering a beggar. The beggar collects less 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.

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.

Note, however, that the conditional mean of sharing among those who choose to play may instead exceed that in the no choice environment. This depends on the distribution of α among those with $\lambda < 1$ compared to those with $\lambda > 1$ and on the number of non-sharers with $\lambda = 1$, who decide to opt out. In the experiment, we will find that the remaining sharers share more on average.

Our last result describes the dynamic sorting decision of sharers who sort out of the sharing environment if the endowment in the sharing environment increases. This result does not hold for any (unspecified) utility function but for a range of specifications. We consider a modified Cobb-Douglas utility function, described in Appendix 1. This utility function is sufficient for the following proposition:

Proposition 3: *The endowment w', at which individuals who dislike not sharing first enter the sharing environment decreases in α.*

The implication of Proposition 3 is that, among the *dislike-not-sharing* types, those who keep the most for themselves (when forced into the sharing environment) are the ones most likely to choose the sharing environment already at low premiums (when given a choice). Those, instead, who share a lot (when forced into the sharing environment) require the highest premium to voluntarily sort into the sharing environment.

The positive relation between the amount shared and the compensation required for entering the sharing environment implies a kind of adverse selection. Suppose that endowment in the sharing environment is increased above the outside option w in order to attract more people into the sharing environment. Two types of people sort back very quickly, even if the premium (above w) is low: (i) those who *dislike sharing* and keep everything for themselves; (ii) the stingiest among those who share but have an aversion to the sharing environment (*dislike not sharing*). That is, individuals who do not give much and then opt out are quickest to re-enter the dictator game as the premium for playing rises. People who *like sharing* are unaffected by the premium since they never leave the sharing environment. And people who share a lot but *dislike sharing* are the last ones to re-enter.

The results of the experiment support Proposition 3. The higher the initial amount shared by subjects who then opt out, the higher is the premium they require to re-enter. The data also gives some support to the implication that paying individuals a premium to enter the sharing environment attracts extreme types: those who *like to share* and never opt out; and the stingiest among those who opt out when no premium is paid. Finally, the results of the experiment are also consistent with the Cobb-Douglas specific prediction that individuals share a constant proportion of their wealth. This seems close to accurate.

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. 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.

We now have a series of predictions that can be borne out or refuted by experimental evidence. First, a round that does not allow any option to avoid sharing will see sharing of $(1-\alpha)w$. The amount shared gives us an estimate of the importance of sharing to subjects, but not of the reason for the sharing (*like to share* or *dislike not sharing*). It is, however, possible to distinguish the reason for sharing by offering subjects a choice of environments: one with an opportunity to share, and another without sharing. The only ones who choose the sharing environment are those for whom $\lambda < 1$, i.e., those who share because they *like to share*. Those who were sharing because they *dislike not sharing* opt out. Finally, individuals who share initially but then opt out can be induced to sort back if compensated with a premium. The required premium is the higher the more an individual shared initially.

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 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 the full amount 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 allow 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.[13] 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 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 ex-

[13] 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.

perimenter 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.[14] 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.[15] 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 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 the Anonymity and the 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)

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

[15] 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.

and marked an "X" on the sheet inside.[16] 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.[17]

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.[18]

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

[16] 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.

[17] 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.

[18] 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.

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).[19] 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. The complete dataset is available from the authors.

IV. Results and Empirical Analysis

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% share in the No-Anonymity treatment and 67% in the Anonymity treatment. 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 a positive amount, and a significant proportion of the surplus is shared. 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

[19] 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.

evidence that, first, sorting matters and, second, a large fraction were sharing in Decision 1 not because they *like to share*, but because they *dislike not sharing*. Most share when forced into a sharing situation, and most do not share when given the option to sort out of the sharing situation altogether. 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). This shows that subjects who *like to share* as evidenced by choosing to play in Decision 2 without a monetary premium also share higher amounts.[20]

Thus, the sorting opportunity 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 allocation increases. As shown in Figures 1a and 1b, the proportion choosing to play rises monotonically after Decision 2, as the endowment given for playing increases relative to the fixed $10 for not playing ($w' > w$). Even if individuals dislike being in the sharing environment (demonstrated by opting out in Decision 2), they put themselves into this unpleasant environment as the premium rises. 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 average 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).[21]

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[20] 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. Most of these subjects shared nothing in the first decision.

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

Treatment Differences

Decision 1 differs between the treatments only in the anonymity of the dictator. If the decision is selected to count, then in the Anonymity sessions the recipient finds out only the participant number of the dictator, while in the No-Anonymity sessions the recipient finds out the dictator's identity. Comparing Decision 1 in the two treatments we find that, as expected, the lack of anonymity produces slightly more sharing. The average allocation was \$2.42 in Anonymity and \$2.92 in No-Anonymity. However, this difference is not statistically significant.[22]

General trends in subsequent decisions are also similar between the two treatments. In both treatments, the amount to be allocated in the dictator game increases. This produces more entry into the dictator game (indicated by the dotted line in Figures 1a and 1b) and more 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

Before we turn to the empirical tests of Proposition 1 to 3, we analyze the influence of treatment (anonymity) and individual (gender) characteristics on the proportion shared in the baseline dictator game. Table 2 presents the regression analysis of the individual propensity of dictators to share in Decision 1. The dependent variable is the proportion of the endowment shared with the recipient. Anonymity reduces the portion shared, though the effect is not consistently significant. Female dictators appear to give about \$2 more in the anonymous treatment; they do not display significant differences in behavior in the treatment without anonymity. The inclusion of session fixed effects strengthens the results.

In Tables 3 and 4, we test directly the empirical predictions of Propositions 1 and 2. We analyze how the frequency and the amount of sharing are affected by the option to sort

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[22] 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).

out of the dictator game. Proposition 1 implies that, if the option to sort out has a negative effect on the frequency of sharing, then some individuals must *dislike not sharing*. In other words, a negative effect is evidence of a positive willingness to pay for avoiding the sharing environment. Proposition 2 mirrors this implication for the amount shared.

Table 3 considers 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 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 variable of interest is "Sorting Option," a dummy variable capturing whether the potential dictator has the ability to opt out of playing. Thus, Sorting Option equals 0 in Decision 1 and it equals 1 in Decision 2. We include all controls of Table 2. We use a probit model and correct the standard errors for heteroskedasticity and arbitrary within-session correlation.

As Column (1) shows, the presence of a sorting option decreases the frequency with which subjects share. The negative effect is large, a reduction of about 45%, and statistically highly significant. In Column (2) we include a separate dummy for decisions with the option to sort under the anonymous treatment. The positive coefficient (significant at the 10% level only in Column (4)) indicates that sharing is less strongly influenced by the sorting option under anonymity. Finally, we include a separate dummy for the sharing decision of female subjects when sorting is possible. Column (3) shows that women are more strongly influenced by the sorting option than men. About 20 percentage point of the overall reduction appears to be specific to female subjects, though statistically not significant.

Table 4 reports the impact of the sorting option on the amount of sharing. The dependent variable is the portion of the endowment shared, treating a decision to opt out of the game as sharing zero. In Panel A, we use the same sample as in the frequency analysis of Table 3, i.e. Decisions 1 and 2, so that the endowment remains constant ($10). We also include the same control variables. We find that a significantly smaller proportion is shared in the presence of a sorting option. Sorting Option reduces the amount shared by about 50 percent. As before, the interaction between a sorting option and anonymity is small and barely significant (in Column (4)). Women appear to respond more negatively to the sorting option than men, though the coefficient is not significant. The inclusion of session fixed effects does not affect the results.[23] The coefficients are very similar if we include individual fixed effects; the standard errors become even smaller.

In Panel B, we replicate the analysis across all the decisions of the experiment. Thus, the binary variable Sorting Option is 1 not only for Decision 2 but for all subsequent decisions. Since the endowment varies within the dictator game, we include Endowment as an additional control variable in Column (4) and also in the fixed-effects analysis of Column (5). The effect of introducing the option to sort out remains negative and highly significant, amounting to about 14% of the total endowment, as in Panel A. The increase in endowment induces higher sharing, which is statistically significant though economically very small. It amounts to about 1% per additional dollar.

The stability of the coefficient on Sorting Option across Panel A and Panel B and the small effect of the overall endowment also suggest that subjects may be using a "proportional sharing" rule, as implicitly assumed in our econometric specification. The proportional sharing behavior is not important to the core point of this paper, but useful to our analysis. It is consistent with the class of modified Cobb-Douglas preferences we chose to derive Proposition 3 (see Appendix 1). We thus test the validity of this assumption directly. For each subject, we relate the portion of initial sharing in Decision 1 to the portion shared in later decisions, conditional on playing the dictator game. That is, we estimate

$$\text{(5)} \qquad \text{Proportion Shared}_{id} = \alpha + \beta \cdot \text{Initial Proportion}_i + X_i^{'}\Gamma + \text{Initial Proportion}_i\, X_i^{'}\Delta + \zeta \cdot \text{Endowment}_d + \varepsilon_{id}$$

where i denotes the individual dictator, d the decision, and X_i are the usual controls: gender, anonymity, their interaction, and endowment. We estimate this model on all observations of subjects participating in the game except the first one, which is used to determine the Initial Proportion shared by the subject. If all subjects always shared the exact same proportion in every round, in which they participate in the dictator game, we should find an α of zero and a β equal to 1. In addition, the coefficients of all other independent variables should be equal to zero as well. The R^2 should be equal to 1.

[23] The same is true for the frequency analysis of Table 3. Since the inclusion of session fixed effects biases the coefficients in the probit regression, we used a conditional logit estimation to obtain this result.

We estimate the equation (5) first setting Γ and Δ equal to zero. We then allow for linear shifts by treatment and gender. We finally add interactions with the Initial Proportion of endowment shared. The results are in Columns (1) to (3) of Table 5. The discrepancy between the large coefficient of Initial Proportion and the minuscule coefficients of the controls is striking, as is the discrepancy in their statistical significance. The coefficient of Initial Proportion ranges from .75 to .89 depending on the controls included. The coefficient of the constant lies between .01 and .08 and is insignificant in all specifications. The same is true for all control variables. All level effects are smaller than 0.09 (in absolute value) and statistically insignificant. Note in particular that the (insignificant) coefficient on Endowment amounts only to -0.003. The interactions of Initial Share and the control variables have slightly higher absolute values, between 0.12 and 0.19, though only the interaction with Anonymity is significant (at the 10% level). The R^2 lies around 60% in all specifications.

Thus, while not a perfect fit, "proportional sharing" describes the sharing decision of those choosing to play rather well. The coefficients on the interaction terms of Initial Proportion suggest that the slope varies by treatment (Anonymity versus Non-Anonymity) and gender, but that sharing is still close to proportional in each subsample. Note also that the coefficient of Initial Proportion increases with the inclusion of additional controls. Any misspecification thus appears to bias the correlation down. Downward bias in the coefficient estimate may also arise from noise in the sharing decision in higher rounds. Since sharing is bounded below (at zero) for those who share little and bounded above (at one) for those who share a lot, noise diminishes the positive coefficient. When replicating the analysis for the subset of subjects who choose to play at least two times, three times, or four times the coefficient estimates monotonically increase in each specification, as the sample becomes more restrictive, likely due to the reduced noise in the measurement of sharing. Columns (4) to (6) show the regression results for players who choose to play the dictator game at least four times.

In summary, subjects share significantly less when sorting is possible; but those who choose not to sort out keep sharing roughly the same portion, regardless of the endowment.

Individual Behavior and Preferences

The negative effect of sorting on the frequency and amount of sharing has implications for the motivation behind sharing. As laid out in our model, sorting allows us to differentiate three types based on how much they share and whether they choose the sharing environment if they could avoid it at no cost. Those who never share *dislike sharing*, those who share and choose the sharing environment *like sharing*, and those who share, but prefer avoiding sharing environments *dislike not sharing*.

In Table 6, we examine the frequency of these types in our experiment. We categorize subjects by their behavior in Decisions 1 and 2 and by treatment. We classify subjects as *dislike sharing* if they share nothing in Decision 1 and either opt not to play or share nothing in Decision 2, as *like sharing* if they share in Decision 1 and play the game and share in Decision 2, and as *dislike not sharing* if they share in Decision 1 and opt not to play in Decision 2. These three categories account for 95% of the subjects.[24]

Table 6 reveals a high frequency of all three types.[25] There are slightly more *like sharing* than *dislike sharing* types. Combined they account for roughly half the subjects. The most frequent type, however, is *dislike not sharing*. That is, the modal behavior in the first two decisions is to share some positive amount when no sorting option is available, but to opt out of the game when sorting is possible. This behavior is consistent with individuals in our model having a $\lambda^* > 1$. That is, they share if they are in the environment that allows sharing, but would pay to avoid that environment. 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?

As the last step in our analysis we ask how increasing endowments in the dictator game 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

[24] 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 one 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 decision. After their first decision, each of these four subjects behaved entirely consistently with one of our types.

[25] 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%) and 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 ($\chi^2(2) = 1.97$, $p = 0.37$).

distaste for playing the game. 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). *Dislike-sharing* 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 the more *dislike-not-sharing* individuals shared initially, the longer they will remain out of the game (Proposition 3).

We test this prediction in two steps. First, we report, for *dislike not sharing* types, how generously they shared initially and how the initial sharing relates to their sorting decision. In Table 7, we report the average amount shared in Decision 1 for *dislike not sharing* types who subsequently opted to play. 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 in that round. The first row (Decision 1) presents the average amount shared in Decision 1 by all *dislike not sharing* types. The next row (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 goes 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).[26] 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. However, as both figures reveal, the dislike not sharing subjects who chose to re-enter the game in

[26] Recall that each token was worth \$0.25.

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).

As a second step, we test for the relationship between the amount of sharing and sorting in a regression framework, controlling for other determinants of sorting. Table 8 reports the results of several probit estimations, using as the dependent variable a subject's decision to play (1) or to pass (0). Since all subjects had to play the game in Decision 1 and since the choice to play the game in Decision 2 is used to construct the types, we exclude these two decisions from the analysis. The coefficients represent marginal effects.

In the first two columns, we consider the subset of subjects who *dislike not sharing* as defined by sharing in Decision 1 and opting out in Decision 2. We find that the amount of initial sharing is strongly negatively related to the decision to play the game. For each additional dollar shared (corresponding to 10% of the initial endowment), individuals enter the dictator game 7.9% less often. The result is robust to the inclusion of the usual controls (treatment, gender, their interaction, and endowment). As a placebo test, we rerun the same regression for subjects who *like to share*, as defined by sharing both in Decision 1 and in Decision 2. As shown in Column (3), the coefficient has the opposite sign and is statistically insignificant. Similarly, we do not find a significant effect using the full sample, with or without controls (see Columns (4) and (5)).[27] The final specification, in Column (6), uses again the full sample but includes a dummy for being a *Dislike-Not-Sharing* type as well as its interaction with the Initial Proportion Shared. We find a significantly positive coefficient of the Initial Proportion shared, amounting to 30% more participation for 100% more sharing. The coefficient on the interaction of the dummy for initial sharing and the dummy for *Dislike-Not-Sharing*, however, is negative and statistically significant. The order of magnitude is as in the split-sample regressions. Subjects who *dislike not sharing* participate about 80% less per 100% more initial sharing.

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.

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

V. Conclusions

In the real world people regularly sort into and out of economic environments such as firms, markets, and institutions; but 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 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 some of those who appear to be most fairness-minded in the forced-choice experiments are likely to avoid environments where they can act fairly. We conduct an experiment 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, the more such subjects feel compelled to share, the higher the price they 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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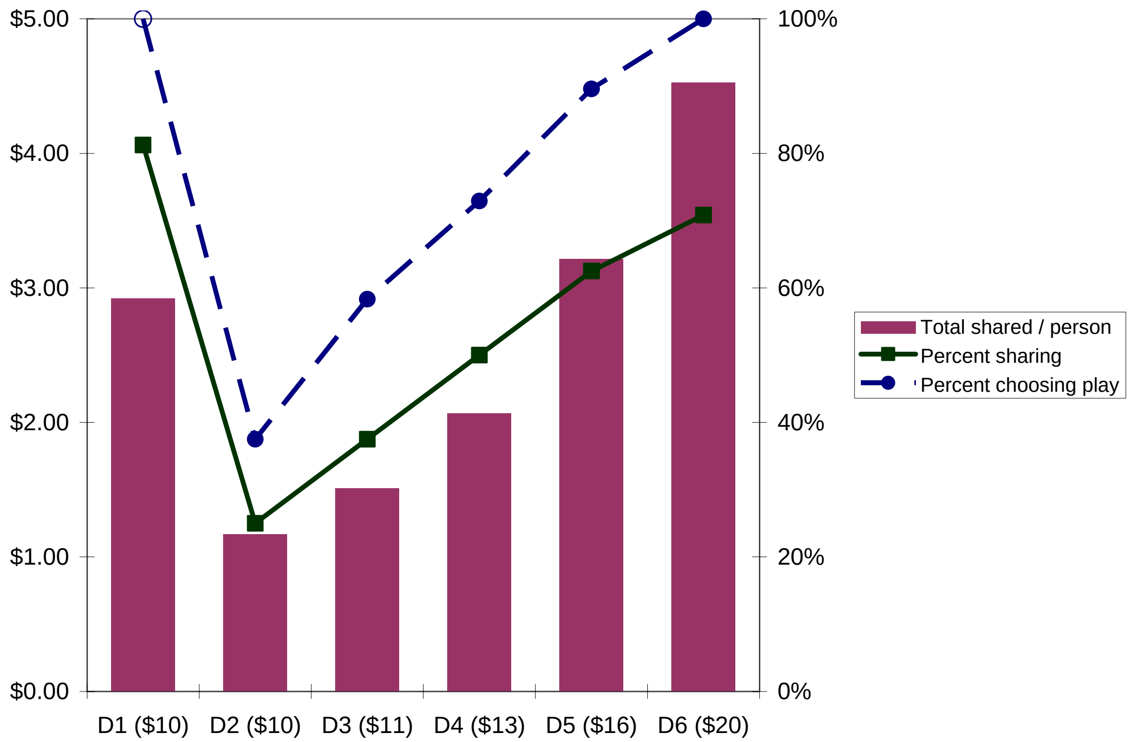
<u>Figure 1a. Aggregate Behavior in No-Anonymity Treatment</u> (6 sessions, *N* = 48)



<u>Figure 1b. Aggregate Behavior in Anonymity Treatment</u> (6 sessions, *N* = 46)

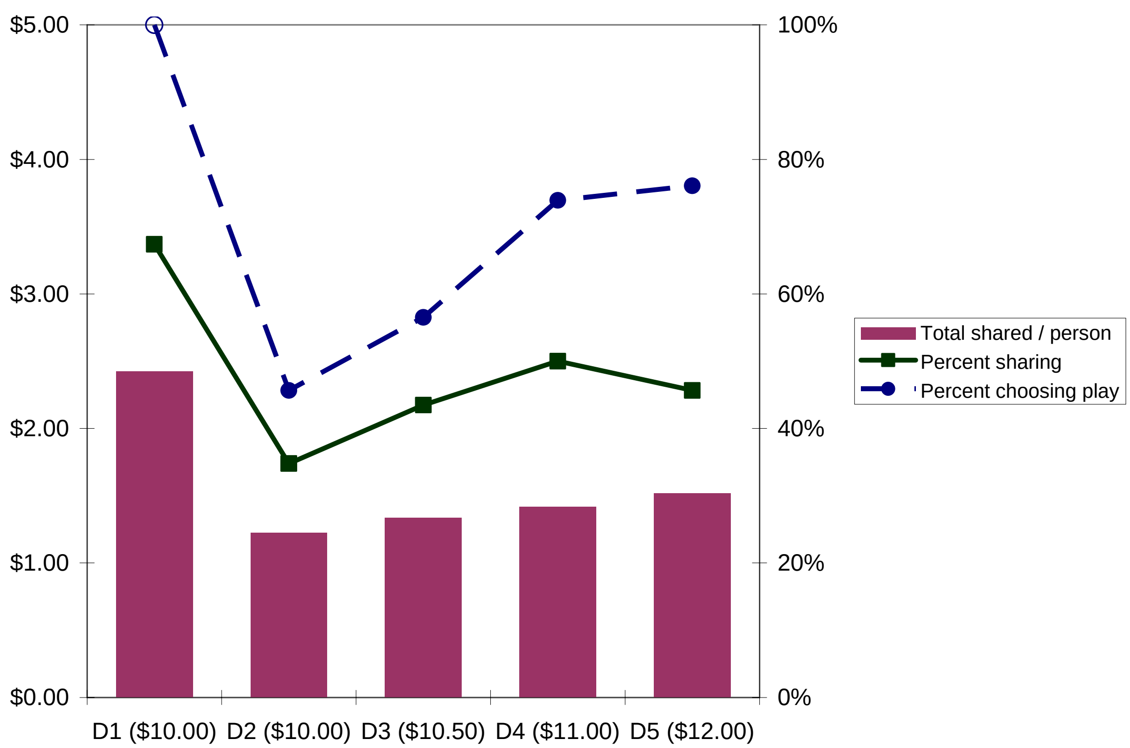


Figure 2a. Percent of *Dislike-Not-Sharing* Types Who Choose to Play, by Initial Amount Shared (No Anonymity)

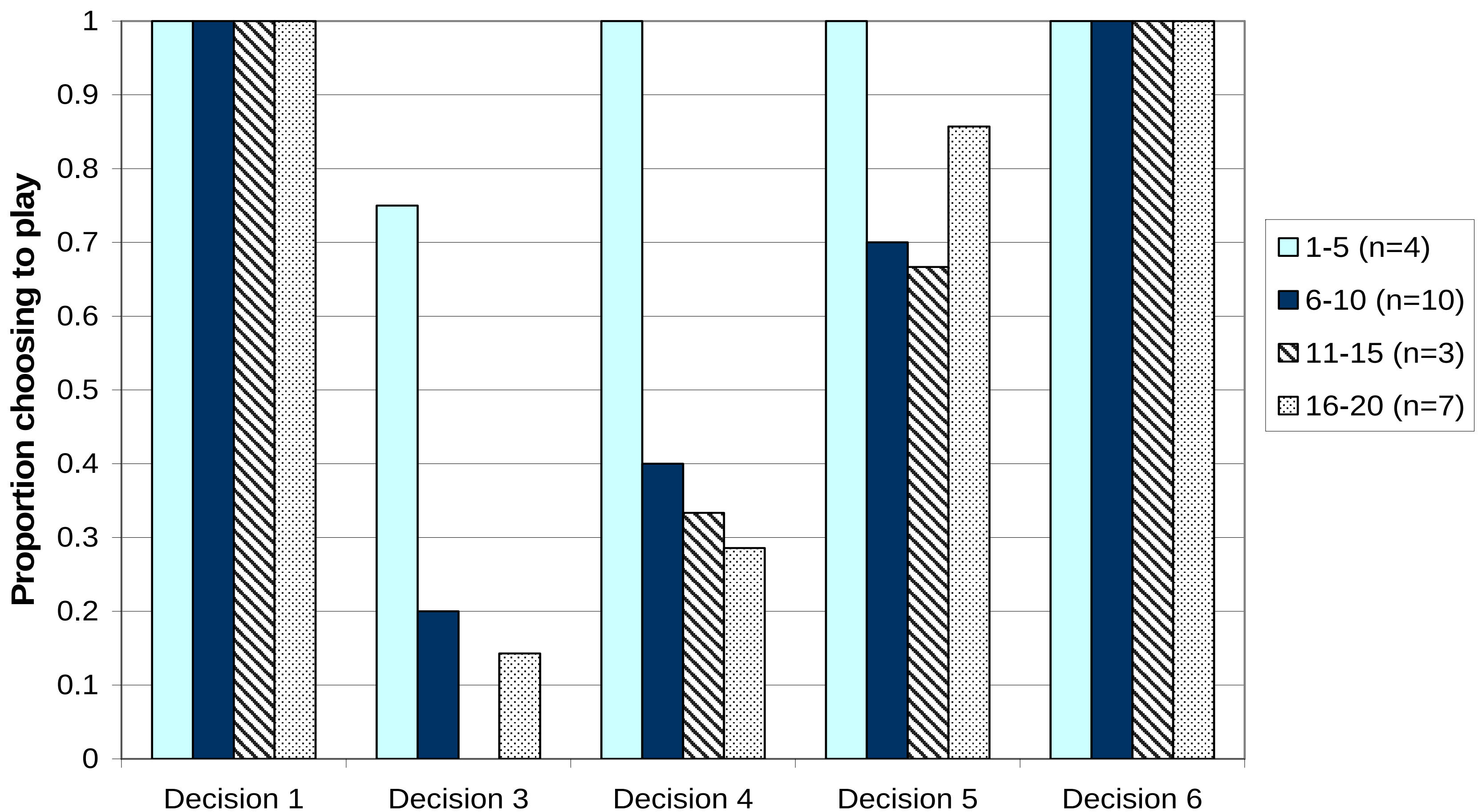


Figure 2b. Percent of *Dislike-Not-Sharing* Types Who Choose to Play, by Initial Amount Shared (Anonymity)

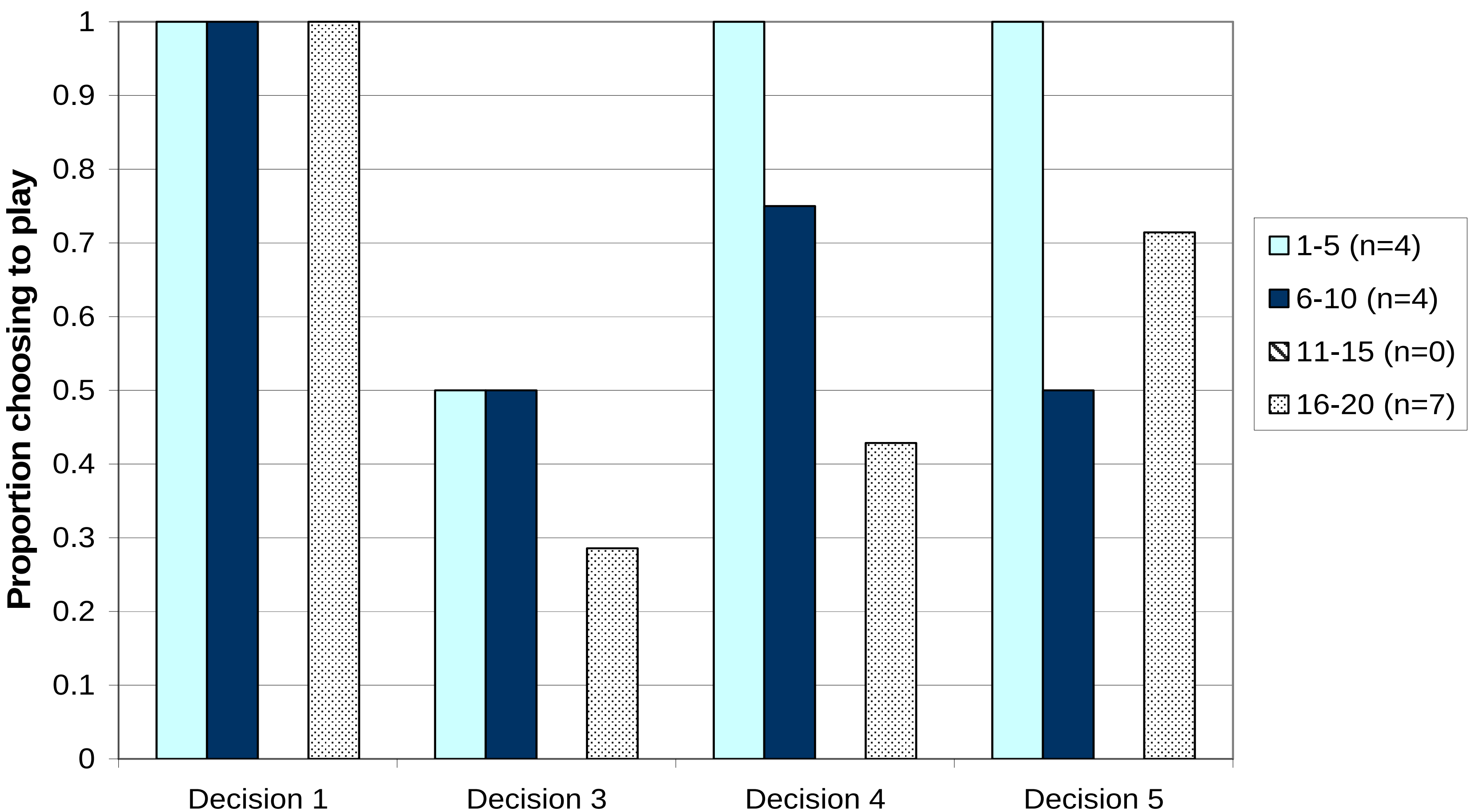


Table 1. Endowment in Dictator Game by Decision and Treatment

	Dictator Allocation (Anonymity)	**Dictator Allocation (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	

<u>Table 2. Proportion Shared in Dictator Game</u> (Decision 1 Only)

The sample contains all Decision 1 observations. The table displays OLS regressions with Proportion Shared (between 0 and 1) as the dependent variable. Standard errors are robust to heteroskedasticity and arbitrary within-session correlation.

	(1)	(2)	(3)
Anonymity	–0.052 (0.030)	–0.164 (0.062)**	–0.309 (0.072)***
Female	0.029 (0.057)	–0.070 (0.074)	–0.074 (0.082)
(Anonymity)*(Female)		0.205 (0.098)*	0.210 (0.109)*
Constant	0.278 (0.028)***	0.327 (0.038)***	0.354 (0.066)***
Session Fixed Effects			X
R^2	0.020	0.080	0.143
N	94	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)

Probit estimations, using the sample of all Decisions 1 and Decisions 2. The dependent variable is binary and equal to 1 if the subject shared a positive amount. The coefficients represent the marginal coefficients of the probit in response to a discrete change of the dependent variables. Standard errors are robust to heteroskedasticity and arbitrary within-session correlation.

	(1)	(2)	(3)
Anonymity	–0.109 (0.130)	–0.249 (0.671)	–0.104 (0.124)
Female	–0.024 (0.120)	–0.027 (0.580)	0.089 (0.141)
(Anonymity)*(Female)	0.148 (0.183)	0.143 (0.814)	0.145 (0.183)
Sorting Option	–0.449 (0.072)***	–0.564 (0.102)***	–0.351 (0.127)***
(Sorting Option)*(Anonymity)		0.270 (0.136)*	
(Sorting Option)*(Female)			–0.214 (0.146)
Pseudo-R^2	0.155	0.168	0.163
N	188	188	188

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

Table 4. Determinants of Proportion Shared

OLS regressions with Proportion Shared as dependent variable. Proportion Shared is zero if subject sorted out of the dictator game. Standard errors are robust to hetero-skedasticity and arbitrary within-session correlation.

Panel A. Decisions 1 and 2

	(1)	**(2)**	**(3)**	**(4)**
Anonymity	–0.077 (0.057)	–0.105 (0.056)	–0.077 (0.058)	–0.086 (0.049)
Female	–0.052 (0.051)	–0.052 (0.051)	–0.022 (0.062)	–0.014 (0.071)
(Anonmyity)*(Female)	0.101 (0.091)	0.101 (0.091)	0.101 (0.091)	0.093 (0.099)
Sorting Option	–0.148 (0.019)***	–0.176 (0.026)***	–0.117 (0.049)**	–0.144 (0.051)**
(Sorting Option)*(Anonymity)		0.055 (0.034)		0.061 (0.031)*
(Sorting Option)*(Female)			–0.058 (0.060)	–0.063 (0.063)
Session Fixed Effects				X
Constant	0.304 (0.026)***	0.318 (0.027)***	0.289 (0.032) ***	0.266 (0.044)***
R^2	0.137	0.142	0.142	0.198
N	188	188	188	188

Panel B. All Decisions

	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Anonymity	–0.072 (0.057)	–0.079 (0.055)	–0.071 (0.057)	–0.083 (0.055)	–0.054 (0.049)
Female	–0.062 (0.049)	–0.062 (0.049)	0.001 (0.063)	0.002 (0.063)	0.009 (0.070)
(Anonmyity)*(Female)	0.059 (0.091)	0.059 (0.091)	0.056 (0.091)	0.056 (0.092)	0.035 (0.096)
Sorting Option	–0.120 (0.014)***	–0.124 (0.015)***	–0.080 (0.035)**	–0.129 (0.043)**	–0.129 (0.043)**
(Sorting Option)*(Anonymity)		0.008 (0.028)		0.048 (0.031)	0.048 (0.031)
(Sorting Option)*(Female)			–0.075 (0.049)	–0.076 (0.049)	–0.076 (0.050)
Endowment				0.011 (0.003) ***	0.011 (0.003) ***
Session Fixed Effects					X
Constant	0.320 (0.026)***	0.323 (0.026)***	0.286 (0.032) ***	0.185 (0.038)***	0.160 (0.041)***
R^2	0.073	0.073	0.078	0.095	0.143
N	518	518	518	518	518

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

Table 5. Proportional Sharing

OLS regressions with Proportion Shared as dependent variable. The sample contains all observations of subjects choosing to play the game, i.e. after Decision 1. Initial Proportion is the individual's Amount Shared divided by Endowment in Decision 1. Frequent Players are subjects who choose to play at least four times. Standard errors are robust to heteroskedasticity and arbitrary within-session correlation.

	Full Sample			**Frequent Players**		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Initial Proportion	0.748 (0.039)***	0.755 (0.039)***	0.894 (0.069)***	0.802 (0.054)***	0.799 (0.056)***	0.947 (0.065)***
Anonymity		0.012 (0.043)	0.063 (0.055)		0.050 (0.053)	0.130 (0.118)
Female		–0.040 (0.027)	0.017 (0.029)		–0.057 (0.023)**	0.002 (0.043)
(Anon)*(Fem)		–0.045 (0.055)	–0.081 (0.060)		–0.064 (0.070)	–0.129 (0.118)
(Init Prop)*(Anon)			–0.171 (0.095)*			–0.267 (0.213)
(Init Prop)*(Fem)			–0.187 (0.156)			–0.191 (0.119)
(Init Prop)*(Anon)*(Fem)			0.121 (0.232)			0.227 (0.273)
Endowment		–0.003 (0.002)	–0.003 (0.002)		–0.000 (0.002)	–0.000 (0.002)
Constant	0.014 (0.016)	0.078 (0.046)	0.078 (0.046)	0.019 (0.029)	0.040 (0.040)	0.078 (0.046)
R^2	0.580	0.605	0.614	0.646	0.684	0.695
N	288	288	288	178	178	178

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

Table 6. Classification of Types by Behavior in Decisions 1 and 2

	No Anonymity ($N = 48$)	Anonymity ($N = 46$)	Combined ($N = 94$)
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 7. Average Amount Shared in Decision 1 for *Dislike-Not-Sharing* Types

The sample contains all sharing decisions of subjects who shared a positive amount in Decision 1 but sorted out in Decision 2 and who choose to play game in the respective Decision.

	No-Anonymity (Number of subjects)	Anonymity (Number of subjects)
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 8. Decision to Play the Game

Probit estimations, using the sample of all decisions other than Decision 1 and Decision 2. The dependent variable is binary and equal to 1 if the subject decides to play the dictator game. The sample of *Dislike-Not-Sharing* types in Columns (1) and (2) contains all subjects who shared in Decision 1 and opted out in Decision 2. The sample of *Like-Sharing* types in Columns (3) and (4) contains all subjects who shared both in Decision 1 and in Decision 2. The coefficients represent the marginal coefficients of the probit in response to a discrete change of the dependent (dummy) variables. Standard errors are robust to heteroskedasticity and arbitrary within-session correlation.

	Dislike-Not-Sharing types		*Like-Sharing* types	Full sample		
	(1)	(2)	(3)	(4)	(5)	(6)
Initial Portion Shared	–0.787 (0.145)***	–0.778 (0.145)***	0.334 (0.298)	–0.087 (0.160)	–0.064 (0.137)	0.314 (0.195)*
Anonymity		0.432 (0.073)***			0.157 (0.089)*	0.079 (0.069)
Female		0.049 (0.113)			0.040 (0.108)	0.025 (0.065)
(Anonymity)*(Female)		–0.240 (0.236)			–0.161 (0.155)	–0.072 (0.097)
Endowment		0.126 (0.014)***			0.068 (0.011)***	0.068 (0.011)***
Dislike Not Sharing						–0.016 (0.074)
(*Dislike Not Sharing*)* (Initial Portion Shared)						–0.824 (0.271)***
Pseudo-R^2	0.046	0.300	0.017	0.00	0.134	0.262
N	141	141	93	330	330	330

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

Appendix 1. Theoretical Derivation

A generalized utility function has the form

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

where D is a dummy variable equal to 1 if the environment is one where sharing is possible and 0 if sharing is not possible; x is own payoff; y is other payoff. When $D = 0$, $y = 0$ because the individual is precluded from sharing. It is possible that even with the opportunity to share (i.e. when $D = 1$), $y = 0$, but this depends on individual choice. We assume that utility is increasing in the endowment, characterized in (1) as $x+y = w$. Hence, the utility function can then be rewritten as

(A1) $\quad U = U(D, x, w - x)$

We can characterize the different motivations for sharing as follows:

(A2) $\quad \arg\max_{x\in[0,w]} U(1,x,w-x) < w$ and $\max_{x\in[0,w]} U(1,x,w-x) > U(0,w,0)$ for those who *like to share*;

$\arg\max_{x\in[0,w]} U(1,x,w-x) < w$ and $\max_{x\in[0,w]} U(1,x,w-x) < U(0,w,0)$ for those who *dislike not sharing*.

The premium that the individual would pay to avoid or to ensure being placed in the sharing environment is given by $w' - w$, which is positive for those who *dislike not sharing* and negative for those who *like sharing*. Define

(A3) $\quad \lambda = w'/w.$

Then w' and/or λ are implicitly defined implicitly by

(A4) $\quad \mathrm{U}(1, x', w' - x') = U(0, w, 0)$

where x' is the own payoff chosen in the sharing environment with allocation w'.

Proof of Proposition 1. (A2) and (A4) imply that $\max_{x\in[0,w]} U(1,x,w-x) > U(1,x',w-x')$ for those *who like sharing*. Since utility is increasing in wealth, $w' < w$ is implied. Conversely, (A2) and (A4) imply $\max_{x\in[0,w]} U(1,x,w-x) < U(1,x',w-x')$ for those who *dislike not shar-*

ing. Again, because utility increases in wealth, $w' > w$ is implied. The relation of λ relative to 1 follows directly from (A3). **Q.E.D.**

Proof of Proposition 2. Individuals with $\lambda > 1$ share in the absence of choice, but sort out of the sharing environment (and thus share zero) when given a choice. Their amount shared falls from a positive amount to zero. Individuals with $\lambda < 1$ share in the absence of choice and choose the sharing environment and share the same amount when given a choice. Individuals with $\lambda = 1$ share zero in either environment. Thus, total sharing weakly declines when individuals are given a choice. **Q.E.D.**

Special case: Modified Cobb-Douglas utility function

Proposition 3 does not hold in the general set of utility functions employed above. We consider a branched Cobb-Douglas utility function which allows for individuals to have the opportunity to (share or not). Its value depends on x, y, and D as follows:

(A5) $$U(D,x,y) = x^{\alpha[D+(1-D)/\alpha]}[y^{1-\alpha}D + 1 - D][D + (1-D)\lambda^{1-\alpha}\alpha^{\alpha}(1-\alpha)^{1-\alpha}]$$

with $\alpha \in [0;1]$. This seemingly complex function is nothing more than the summary of rather simple behavior under $D = 1$ and under $D = 0$. When $D = 1$ (A5) becomes

(A6) $$U(1,x,y) = x^{\alpha}y^{1-\alpha}$$

which is the standard Cobb-Douglas formulation. The optima of x and y, given this utility function, are $x^* = \alpha w$ and $y^* = (1-\alpha)w$ so that (A5) becomes

(A6′) $$U(1,x^*,y^*) = [\alpha w]^{\alpha}[(1-\alpha)w]^{1-\alpha}$$
$$= \alpha^{\alpha}(1-\alpha)^{1-\alpha}w$$

When $D = 0$, (A5) becomes

(A7) $$U(0,x,y) = \lambda^{1-\alpha}\alpha^{\alpha}(1-\alpha)^{1-\alpha}x$$

And since $x = w$ and $y = 0$ under $D = 0$

(A7′) $$U(0,w,0) = \lambda^{1-\alpha}\alpha^{\alpha}(1-\alpha)^{1-\alpha}w$$

This is also Cobb-Douglas, with one variable where the coefficient on x is 1.

In this specification $\lambda(w) = \lambda^{1-\alpha}$. Individuals prefer $D = 1$ to $D = 0$ (*like to share*) if $\lambda^{1-\alpha} < 1$, and thus $\lambda < 1$. Individuals share under $D = 1$ but prefer $D = 0$ to $D = 1$ if $\lambda > 1$. Individuals of this latter group get more utility from the environment that does not permit sharing, but have an $\alpha < 1$ and will thus share if in a sharing environment.

Note further that, under $D = 1$, the allocation of w to x and y does not depend on λ. Agents with equal α share the same amount αw, when placed into a sharing environment, though those with $\lambda > 1$ *dislike not sharing* and those with $\lambda < 1$ *like sharing*.

Proof of Proposition 3. The endowment w' at which agents are indifferent between the two environments is defined by (A4), Comparing (A7′) to (A6′), this implies

(A8) $\quad w' = \lambda^{(1-\alpha)} w$.

Differentiating (A8) with respect to α shows that w' is decreasing in α.

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.