Are People Willing to Pay to Reduce Others’ Incomes?

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Abstract

This paper studies utility interdependence in the laboratory. We design an experiment where subjects can reduce (“burn”) other subjects’ money. Those who burn the money of others have to give up some of their own cash to do so. Despite this cost, and contrary to the assumptions of economics textbooks, the majority of our subjects choose to destroy at least part of others’ money holdings. We vary experimentally the amount that subjects have to pay to reduce other people’s cash. The implied price elasticity of burning is calculated; it is mostly less than unity. There is a strong correlation between wealth, or rank, and the amounts by which subjects are burnt. In making their decisions, many burners, especially disadvantaged ones, seem to care about whether another person ‘deserves’ the money he has. Desert is not simply a matter of relative payoff.

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1. Introduction

An economic agent has interdependent preferences when her utility depends not only on her own payoff but also on that of other agents. This interdependence can be positive (say, because of altruism or group identity) or negative (say, because of envy or feelings of unfairness). The problem for economists has not primarily been in writing down possible models of this type, but rather in finding convincing evidence. This paper attempts to offer some.

Interdependent preferences have been used to explain anomalies of various kinds, related for example to demonstration effects in consumption (Duesenberry, 1949) and upward-sloping demand curves (Bernheim and Bagwell, 1989), wage determination (Frank, 1985), bargaining (Roth, 1995), growth (Mui, 1995) and public goods (Sally, 1995). A special issue of the *Journal of Public Economics* (1998, vol. 70, n. 1) has recently been dedicated to the economics of status. Various policy implications derive from the idea of interdependent preferences, for example for tax determination (Frank, 1997; Oswald, 1983), unemployment and wage rigidities (Agell, 1999), and the relative importance of unemployment and growth (Oswald, 1997).

This paper presents a new experimental test for negatively interdependent preferences. We construct a laboratory experiment. Our aim is to see whether people dislike other individuals’ wealth sufficiently that they would be willing to pay some of their own money to reduce it. We find that the answer is yes: our laboratory subjects are willing to give up money to reduce perceived inequities. Sometimes they are willing to do this even when it is very expensive to reduce other people’s cash holdings.

First, we create a wealth distribution by the means of a betting stage and an arbitrary gift (an unfair “advantage”) to some subjects; and then subjects are anonymously allowed to reduce (“burn”) other subjects' money. In the experiment we vary the price of burning, namely, the amount of their own money that subjects must relinquish to decrease other people’s money holdings. The price is a
kind of exchange rate: it fixes how many cents I must give up to burn away one of your dollars. We study how people respond in the laboratory to different levels of this price. The aim is to find a way to measure, conditional on the activities of other people, the extent of negative interdependence. In a sense, we parameterize the degree of ‘envy’.

Contrary to the predictions of the normal economics textbook, which stresses a narrow self-interest, we find significant evidence of burning. Two thirds of our laboratory subjects burn others -- even though they have to give up some of their own money to do so. This suggests that agents display negatively interdependent preferences. They may do so for at least two reasons: either because of envy or concerns for fairness. Across prices, the price elasticity of burning varies from --0.07 up to --0.9. Burning does not decline much with price. It starts to do so noticeably only when a price of 0.25 is reached (meaning I have to give up 25 cents to burn one dollar of your money holdings). There is a strong correlation between wealth, or rank, and the amounts by which subjects are burnt: most subjects -- especially disadvantaged ones (i.e., those who do not receive “gifts”) -- burn the wealthiest among the other players at least as much or more as the second in wealth, and the second in wealth at least as much or more as the third. We call this finding rank egalitarianism. While most models of envy or inequality aversion make predictions compatible with rank egalitarianism, Bolton and Ockenfels’ (2000) model does not, and is thus inconsistent with our data. Other models of interdependent preferences are also considered in our analysis: specifically, beyond the basic envy model (as formalized, for example, by Clark and Oswald, 1998), we refer to the inequality aversion models by Fehr and Schmidt (1999) and Charness and Rabin (2000), the intentionality model by Levine (1998), and the type distributions calibrated under different datasets and assumptions by Andreoni and Miller (1998) and Offerman et al. (1996).

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1 This is a standard model of interdependent preferences, with the complication that the weight on the interdependent component of the utility function is dependent on whether the agent believes the other players to be more or less altruistic or envious towards her.
Our data present anomalies that all currently available rational choice models of negatively interdependent preferences seem unable to explain. First, there is no correlation between the ‘price’ (that is, how much a subject gives up to reduce another’s cash) and the decision to burn. Second, some simple econometrics allows us to determine that, unlike advantaged subjects, disadvantaged subjects care only about whether money has been received deservedly or otherwise. They appear to use this fact in deciding whether to burn. Rational choice models cannot explain either the significance of desert, or whether it matters differently according to whether a subject is advantaged or disadvantaged.

We conclude that two factors shape negatively interdependent preferences. One is desert. In our laboratory setting, this produces a form of rank egalitarianism. The other is reciprocity. It tends to induce advantaged players to target money earned by betting proportionally more than money earned by gifts -- in the expectation that in any case they will be burnt themselves. In section 4 we label this as the categorisation effects hypothesis: it will be discussed further at the end of the paper.

2. Experiment Description: An Overview

The experiment was mainly performed at Warwick University in the July of 1998. All sessions were with 4 subjects. A total of 29 sessions was performed: the total sample was 116 subjects. The sample was made mostly but not only by students. Some ancillary staff, such as switchboard operators, took part. The average age of the participants was 25.24 (S.D.=5.03); the minimum age was 18, the maximum 48. An experimental currency was used, the “doblon”, convertible in U.K. pounds at the end of the experiment at the rate of 0.6 pence per doblon. The experiment instructions can be found in the appendix. Five extra sessions in the 0.25 price condition were run in Oxford in the November of 1999, with a comparable sample and with instructions printed on paper and not only on the computer screen.
In each session, four subjects began with a betting stage. This gave them some money. They then proceeded to a burning stage. The betting stage helped to create an unequal wealth distribution. During the betting stage and the start of the burning stage, additional money was given to some subjects according to some arbitrary criterion, discussed below. The gifts were public knowledge: these amounts going to some of the players in the room were announced on everyone’s computer screens. In the burning stage, subjects could eliminate (“burn”) other people’s money by paying some of their own winnings, at the rate (marginal price) of 0.02, 0.05, 0.1 or 0.25 experimental currency units per each unit eliminated, according to the experimental condition. When the experiment was designed, we had assumed, wrongly as it transpired, that a tax of 0.25 would tend to extinguish jealous burning. At the start of the burning stage, advantaged subjects had an average of 11 pounds sterling, and disadvantaged subjects about 6 pounds. As a guarantee to the subjects, the experiment stipulated that a minimum pay-out of 3 pounds would be received by each participant. This was to be paid in addition to any winnings remaining after the final burning stage.

The subjects were first allowed some trial rounds with no real earnings. Practice preceded both stages. In the 1998 sessions, a short questionnaire was administered in the end, before payment to subjects. This was to find out how the subjects felt they were behaving. Apart from its use of the questionnaire, the experiment was computerized. Standard experimental guidelines applied: decisions were anonymous, anonymity was preserved, and instructions were as neutral as possible (for example, the word “eliminate” was used, with no mention of the term “burn”). In about half of the 1998 sessions and all the 1999 sessions, we added a verbal clarification (indexed with a dummy variable labelled Voice in the statistical analysis presented below). It stressed some points (already in the written instructions), such as the fact that subjects could not possibly gain any money themselves by eliminating other people’s winnings. No instruction was given to the subjects telling them to burn, or suggesting that we wished them to burn. The final decision was one-shot, so no
issue of reputation was involved. No indication was given to the subjects that they would ever be recalled to play the experiment in the future.

Some effort was made to ensure anonymity among players. On each occasion, the four subjects were kept apart as much as possible. They were seated as soon as they arrived at the laboratory. Large separating screens prevented them from seeing each other. Players were taken out separately at the end. There was almost no audible speaking in the room. A player number (1, 2, 3 or 4) was allocated to each seat. Seats were assigned according to the alphabetical order of the participants’ family names. This fact was common knowledge. We viewed it as important in showing that the “unfairness” of the favoured treatment to some subjects was random. The advantaged subjects were always players 1 and 2, that is, the two players top in the alphabetical order.

3. Experiment Description: The Details

Each session lasted 45 minutes on average. It was divided into four stages: a practice stage, a betting stage, a burning stage (together with practice for the burning), and a payment stage

*Practice Stage.* In each of the ten rounds of the practice stage, players received 100 doblons. They had to choose how much of the 100 doblons to bet (i.e., a number between 0 and 100). The doblons cumulated visibly on their screen if they were not spent. The computer then randomly generated a number between 1 and 3. If a 1 was drawn, subjects kept the original amount and gained twice the amount they had bet. If a 2 or 3 was drawn, the person lost the amount he or she had bet. The screen reported the score of the subject after each round, i.e. the amount gained so far. At this juncture, no information on the scores of the other players was reported. The amounts gained in the practice stage did not count towards final actual gains, and this was also common knowledge.

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2 Obviously, in future research it may be interesting to study the effect of game repetition.
Betting Stage. The betting stage was identical to the practice stage except for two things: 1) the scores of all players (labelled as 1, 2, 3 and, if any, 4) were displayed on each screen and updated at the end of each of the ten rounds; 2) there was an experimental manipulation affecting the way money was distributed. Subjects 1 and 2 received an advantage. They got (and could bet up to) 130 doblons each round rather than the 100 of the other players, and this was common knowledge.

Practice and Burning Stage. Players 1 and 2 were given an additional gift of 500 doblons at the start of the following stage. Subjects were shown a grid displaying, from left to right: a) the initial scores of all players, and the endowment each player had received (e.g., 1800 for advantaged, non deserving - A,nD - subjects), in red cells; b) green cells in which they could put numbers to eliminate earnings from other players; c) a red column listing the scores of each player after any activity of the subject (but not that of the other subjects). A button called “View” was provided on the screen. By putting numbers in the various cells, and then clicking View, subjects could see, without making any real decision, how column c would be updated with the aggregate outcome of those numbers. Subjects were actively encouraged (both in the written instructions and with a verbal reminder) to practise (for at least ten minutes in the verbal reminder). They could do this by putting in combinations of number and clicking View, to get a grasp of what they could do, and to show them how their own holdings of cash would be diminished by reducing other people’s. Most subjects appeared to understand and follow the advice, and sometimes spent considerable time making trial allocations on their screen. When subjects were happy with their choices, they followed a step-by-step procedure to make their final decision.

Payment Stage. When everyone had made her decision at the burning stage, a computer calculated the gains of each subject. These were her initial winnings plus an adjustment depending on the sum of the burning activities of each player (if a person’s final money balance was negative,
it was automatically increased to 0. The closing monetary value of the player was displayed on her computer screen, and only her screen. In the 1998 sessions, subjects were then asked to fill in a short questionnaire, which asked basic questions such as the motivation behind their choices. The answers indirectly verified the subjects’ understanding of the experiment. Subjects were asked to sign a pledge of confidence on the content of the experiment plus a receipt, and were paid their earnings, if any, plus the 3 pounds for participation. Players were paid one at a time, in an order designed to ensure that a subject walking out of the room would not see or be seen by the others. They were asked to stay seated until paid. They were not encouraged to wait outside the building to meet those who had been their fellow subjects.

4. Experiment Hypotheses

H0 (Pure Self-Interest, Pure and Impure Altruism). Stealing is not possible, so purely self-interested agents should never burn. Altruists should also never burn.

One possible objection to any finding of positive burning is that subjects simply misunderstood the instructions. This objection was addressed in two ways. First, for the 1998 sessions, statistical testing was also conducted on a reduced sample of the subjects (n=106). The sample was obtained by removing those who appeared not to have understood the instructions. Second, in about half of the 1998 sessions (16 sessions out of 29), we provided some additional standardized verbal clarification (see the appendix). We also tried individually to explain to subjects exactly what they were doing, whenever they wanted to go on to the final decision, in order to check their full understanding of the consequences of their actions. We shall refer to this verbal and

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3 This correction may have introduced a distortion in the analysis: in particular, if people expected their own gains to go below zero (i.e., if they expected to become ‘bankrupt’), then their burning activity would become costless: after all, 30.01% of the burners got to negative balances at the end of the burning stage, so the bias may be potentially significant. If the bias existed, we would expect a) ‘bankrupt’ subjects to burn more than ‘non bankrupt’ subjects, and b) proportionally more bankrupt subjects among the burners than among the non-burners. However, in the 1998 sessions, a) the bankrupt burners burnt only slightly more than bankrupt ones (an average 1394 vs. 1241 doblons): the difference is not significant in a t test, not even at the 0.1 level; b) bankruptcy obtained at a virtually identical rate among burners and the non burners (26.32 vs. 27.5%, respectively). In the 1999 sessions, only two subjects went bankrupt: one was a
individualised integration of the instructions as the Voice manipulation. If misunderstandings seriously compromise the seriousness of our findings, we would expect Voice to lead to lower burning. In the 1999 sessions, Voice was also provided, but there was no individual checking of instructions understanding.

**H1 (Envy, Inequality Aversion, Intentionality).** There are some common predictions from any rational choice model allowing for negatively interdependent behavior. First, we would expect less burning the greater the marginal price. Second, we would expect that, the greater the price, the more the people who decide to burn. Third, we would not expect any difference in burning activity towards a doblon earned by betting and a doblon earned by an undeservedly awarded advantage. The intuition is that, if desert does not matter, subjects should treat a doblon earned by another player as gift or by betting in the same way.

The Bolton and Ockenfels (2000) model of inequality aversion predicts that people do not care about how money is divided among other subjects, i.e. they are not egalitarian. This is not the case of other models of interdependent preferences, specifically that of Charness and Rabin (2000) and a concave-utility version of Fehr and Schmidt’s (1999).

**H2 (Type distributions).** It is quite possible that people have different interdependent preferences: perhaps, say, some people are envious, others are altruistic and still others self-interested. We shall consider three recently proposed type distributions: Offerman et al.’s (1996), Levine’s (1998) and Andreoni and Miller’s (forthcoming). According to Offerman et al.’s distribution, we should expect no more than 7% of the people to burn; according to the Andreoni and Miller model, no more than 34.5%. This bound is basically non-existent for the (rather nasty) Levine’s type distribution, where as much as 86% of the subjects could burn. This does not mean that our data will not bear on the validity of the Levine model, for this is a rational choice model still making at an aggregate level the predictions discussed above under the heading H1.