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OTHER-REGARDING PREFERENCES AND RECIPROCITY: INSIGHTS FROM EXPERIMENTAL FINDINGS AND SATISFACTION DATA

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WORKING PAPERS

2015/14

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Title: OTHER-REGARDING PREFERENCES AND RECIPROCITY: INSIGHTS FROM EXPERIMENTAL FINDINGS AND SATISFACTION DATA

First Edition: November 2015

Other-Regarding Preferences and Reciprocity: Insights from Experimental Findings and Satisfaction Data.

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– This draft: 4 November 2015 –

Abstract

We measure satisfaction about experimental outcomes, personal and other participants' behaviour after a multiperiod 'hybrid contribution' multiplayer prisoner's dilemma (the Vote-with-the-Wallet game). Our work shows that participants who cooperated above median (which we define as strong cooperators) are significantly more satisfied with the game in proportion to their cooperative choice, irrespective of the material payoff they obtain. On the contrary, their satisfaction for the other players' behavior is negatively correlated with the extent of their own cooperative behavior and the non-cooperative behavior of the latter. The satisfaction of strong cooperators for their behavior in the game depends in turn on the share of their own cooperative choices. We document that a broader utility function including heterogeneity in expectations on other players' behavior, other-regarding preferences, and a negative reciprocity argument may account for the combination of the behavioral and self-reported data.

Keywords: Subjective Well-Being, Social Preferences, Vote-with-the-Wallet, Lab Experiment.

JEL Classification: C72 (Noncooperative games), C92 (Laboratory, Group Behavior), I31 (General Welfare).

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1 Introduction

The experimental literature provides ample evidence on the heterogeneity of individual preferences. Findings from dictator games, ultimatum games, gift-exchange games, trust games and prisoner dilemmas led to the discovery of various forms of (distribution-based and/or intention-based) social preferences and, among others, of (positive and negative) reciprocity (Rabin, 1993; Dufwenberg and Kirchsteiger, 2004), inequity aversion (Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000), other-regarding preferences (Cox, 2004), mixed-preferences (Charness and Rabin, 2002; Falk and Fischbacher, 2006), betrayal aversion (Bohnet and Zeckhauser, 2004), guilt aversion (Battigalli and Dufwenberg, 2009) and various forms of pure and impure altruism (Andreoni, 1989 and 1990).

In this paper we argue that, when investigating other-regarding preferences, information from choices revealed in incentivized lab experiments may be usefully complemented by a parallel analysis on the levels of self-reported satisfaction of experiment participants. More specifically, an investigation on self-reported satisfaction about one's own and other players' behavior in the experiment, and about the experiment itself, may be crucial to provide further information and shed light on the characteristics of players' heterogeneous preferences.

We apply the approach combining experimental results with self-reported satisfaction about experiment circumstances to an original hybrid contribution prisoner's dilemma called 'Vote-with-the-Wallet Game' (VWG henceforth) which reproduces the typical dilemma that a consumer faces more and more frequently today when choosing between a product which is advertised as socially and/or environmentally responsible and a conventional product. We reproduce the typical trade-off implied by this choice by conveniently assuming that the responsible product costs more but its purchase produces a positive externality (also for consumers buying the standard product) in terms of corporate environmental and social responsibility, in proportion to the share of consumers making the same choice. Given these characteristics the prisoner's dilemma arises because the Nash equilibrium in which everyone finds it optimal to choose the conventional product is Pareto dominated by that in which everyone chooses the responsible product.

Our paper documents that the combination of the two sources of information (experimental findings and data on declared satisfaction) may provide additional relevant knowledge on preferences.

While in a companion paper Becchetti et al. (2015) document a decay in the share of responsible buyers across rounds in the repeated version of the game, we illustrate here that 'strong cooperators' (participants with a share of cooperative choices above median in the experiment) - differently from what happens for cooperators below median - are more satisfied about the game (and about their own behavior in the game) if the share of their cooperative choices is higher (even when the latter reduces their own monetary payoffs). In addition to it, we show that their satisfaction for the other players' behavior is negatively affected by their own cooperative behavior and by the non cooperative behavior

of the other players.

The combination of findings from self-reported satisfaction and experimental choices in our paper provides clear support for the presence of heterogeneity of preferences. As well, it is consistent with the hypothesis that experiment participants have other-regarding preferences and reciprocal concerns with heterogeneous weights.

The paper presents six sections (including introduction and conclusions). In the second section, we briefly sketch the theoretical framework that motivated the original VWG experiment (Becchetti et al., 2015) outlining its hybrid prisoner's dilemma characteristics and documenting its relevance in the current economic scenario. In the third section, we describe the experimental design and briefly comment its results. In the fourth section, we present findings on satisfaction about the experiment. In the fifth section, we broaden our original theoretical framework by introducing three innovations (heterogeneous other-regarding preferences and reciprocity arguments plus expectations on other players' behavior) which allow us to reproduce our empirical findings. The sixth section concludes.

2 The theoretical framework of the VWG

In keeping with Becchetti and Salustri (2015), we consider the player's utility - contingent on the choice of voting either for the responsible product (vR) or for the conventional product (vC) - in the basic two-player version of the VWG and write it as

$$U_i(S) = \begin{cases} \beta + \alpha - \gamma & if S = (vR, vR) \\ \frac{1}{2}\beta + \alpha - \gamma & if S = (vR, vC) \\ \frac{1}{2}\beta & if S = (vC, vR) \\ 0 & if S = (vC, vC) \end{cases} \tag{1}$$

with the strategy profile being represented by $S\colon = (S^i, S^{(-i)}) \in \{vC, vR\}^2$.

The voting choice corresponding to the (vR) strategy pushes corporations towards a more socially, environmentally and fiscally responsible attitude. [1] The externality coming up from such a choice is measured by the parameter $\beta \in [0, +\infty)$, while the intensity of its effect is related to the share of players choosing the responsible product. The parameter $\alpha \in [0, +\infty)$ measures the positive effect generated when the strategy (vR) is in place, in case of players' nonzero other-regarding preferences. The cost differential between purchasing the SR product

[1] There is ample theoretical and empirical evidence that the willingness to pay for socially and environmentally responsible features of products (and effective consumers' responsible purchases) pushes companies toward a more socially and environmentally responsible attitude. For a survey on this evidence see Becchetti (2012).

and its equivalent non SR alternative - in other terms, between the vR / vC strategy - is measured by $\gamma \in [0, +\infty)$. Additionally, no income constraint is assumed for simplicity (or, alternatively, only non income constrained players may participate to the VWG).

Becchetti and Salustri (2015) show that the unique NE of the game is (vC, vC) if $\frac{1}{2}\beta+\alpha < \gamma$ and (vC, vC) otherwise, with $G = (N, (S^i)_{(i\in N)}, (U_i)_{(i\in N)})$, $N = \{1, 2\}$ and $S^i = \{vR, vC\}$. The two-player game generates a Prisoners' Dilemma for intermediate values of γ where $\frac{1}{2}\beta + \alpha < \gamma < \beta + \alpha$. This parametric interval has a unique NE (i.e. vC, vC) which is Pareto dominated by the strategy (vR, vR).

When moving to the multiplayer version of the game, we have $n > 2, G_n = \left[N, (S^i)_{(i\in N)}, (U_i)_{(i\in N)}\right], N = \{1, \ldots, n\}$, and $S^i = \{vR, vC\}$ for each $i \in N$. As a consequence, the payoff function becomes

$$U_i(S^i, S^{(-i)}) = \begin{cases} \frac{(j+1)}{n}\beta + \alpha - \gamma & if S^i = vR \\ \frac{j}{n}\beta & if S^i = vC \end{cases} \quad (2)$$

with j indicating the number of players voting with the vR strategy in $S^{(-i)}$. The unique NE of the multiplayer game is (vC, vC), when $\frac{1}{n}\beta + \alpha < \gamma$, and (vR, vR) otherwise. The most relevant difference is that the growth in the number of players produces a larger PD region, for $(\frac{1}{n}\beta + \alpha, \alpha + \beta)$ is the parametric interval of γ in which the dilemma applies. This makes the PD problem of the VWG particularly relevant in global consumer markets.

3 The Experimental design

The companion paper (Becchetti et al., 2015) investigates players' choices in a VWG with or without a redistribution mechanism transferring money from defectors to cooperators. In the base (no redistribution) version a group of 10 players are asked to choose between two goods for 10 rounds. The share of players choosing each good is the only information revealed to all players at the end of each round. The two goods are named A and B: the first costs 10 tokens, the second 5 tokens. In each round players are given an endowment of 20 tokens. There is a benefit of 3 tokens for each participant whenever a player chooses the more expensive good A (see Table A1 in the Appendix). This version of the game is specifically designed to reproduce the main characteristics of the VWG, including the positive externality in purchasing the responsible but more expensive good. The experiment's payoffs structure involves a free-riding problem, because the dominant strategy in the base treatment is represented by purchasing the cheaper but less responsible good B whatever the share of players choosing good A (see Table A2 in the Appendix).

In the 'redistribution phase' of the treatment, a balanced budget redistributive mechanism is introduced in each of the remaining 10 rounds, with all players

choosing product B being taxed of 2.5 points that are conveyed to a common fund [2]. The collected points are then redistributed before the following round among players who have previously chosen the good A. Tables A3 and A4 in the Appendix describe this second version of the game. It comes along that, in the redistribution phase, the purchase of good A becomes the dominant strategy, whatever the number of cooperative players.

In parallel treatments, two framed versions of the base and redistribution phase described above are added. More specifically, the two goods are itemized as two 'electricity supply contracts' provided by two companies: good A is sold by a 'socially responsible company', while good B by a second unspecified company.

In the two frames, social responsibility is presented as concerning two different 'areas of commitment'. Frame 1 sees the company's dedication to the local development of the economy, while Frame 2 describes the company's 'pledge' to fund social innovations initiatives and projects on a national scale. The idea behind these two versions of the game is to differentiate the possible indirect impact that players may have from the socially responsible activities of the company. The larger the distance, the lower the potential benefit for the player.

The different treatments vary as well in the order of phases's sequence. To sum up, the VWG experiment includes the following treatments: i) base-redistribution, ii) frame 1 base-frame 1 redistribution and iii) frame 2 base - frame 2 redistribution, and their corresponding inverted sequences. (see Table A5 in the Appendix).

In each treatment we ask players to engage in 10 rounds of the basic (framed or not framed) game, followed by 10 rounds of the (framed or not framed) redistribution game (or in inverted sequence), asking them to fill in a questionnaire in the end.

A nice property when investigating the VWG in a lab experiment is that the latter solely focuses on the effects of price and public good characteristics, while controlling for any other contingent factor affecting consumers' choices in real life.

The application of the theoretical framework described in section 3 to the parametric case of the base version of the game implies that $n = 10$, $\frac{1}{10}\beta = 30$, $\gamma = 5$ (where $\gamma = C_{vR} - C_{vC}$ is the cost differential between the two strategies), and $\alpha = 0$. Consequently, the payoff function becomes

$$U_i(S^i, S^{-i}) = \begin{cases} \frac{j+1}{n}30 - 10 & if S^i = vR \\ \frac{j}{10}30 - 5 & if S^i = vC \end{cases} \quad (3)$$

where j is the number of players performing the vR in S^{-i}. The unique

[2]The 'redistribution phase' is meant to mimic essential characteristics of some existing fiscal mechanisms such as feed-in tariffs adopted in 64 jurisdictions worldwide (Couture and Gagnon, 2010) in the world where the subsidy for citizens installing solar panels are paid on the general energy bill and therefore mainly by those who do not make that choice.

(Pareto dominated) NE is represented by the (vC, vC) pair, as $\frac{1}{n}\beta + \alpha < \gamma < \beta + \alpha$ (i.e. $3 < 5 < 30$).

Becchetti et al. (2015) prefer to consider $\alpha = 0$ when devising their payoff, in order to design a PD game in accordance with the standard contribution game in the PD literature (Arce and Sandler, 2005). In addition to this, it is taken into account that a plausible explanation for a nonzero share of co-operators is given by the presence of other-regarding preferences. Given what said above, from inspection of Table A2 it is clear that players can find optimal the vR strategy in no redistribution treatments only in case of $\alpha > 2$. A comparison between the basic and the framed version of the game also makes it possible to check whether the average share of co-operators is affected by other components of players' other-regarding preferences, eventually elicited by the frame. The main findings of Becchetti et al. (2015) who analyze revealed choices in the experiments are: i) the non zero but declining share of cooperators in the base (framed and non framed) treatments; ii) the upward jump in the share of cooperators once the redistribution mechanism is introduced; iii) the positive effect of the frame on the share of cooperative choices in non redistribution treatments. In what follows we analyze the determinants of satisfaction (for the game, for one's own and other players' behavior in the game) and how the combination of revealed choices and stated satisfaction may help us to outline a broader theoretical foundation of the utility function which adequately explains empirical evidence from both sources.

Figure 1: Distribution of players' choice.

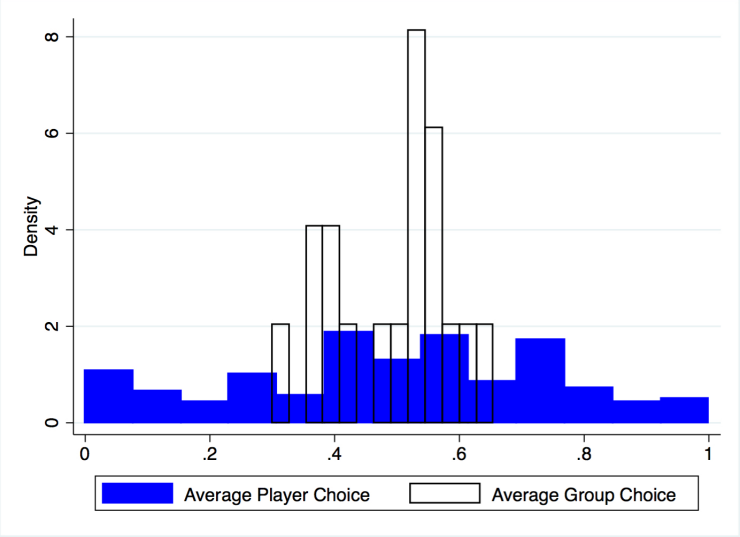
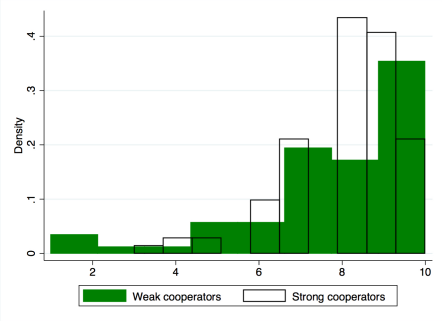
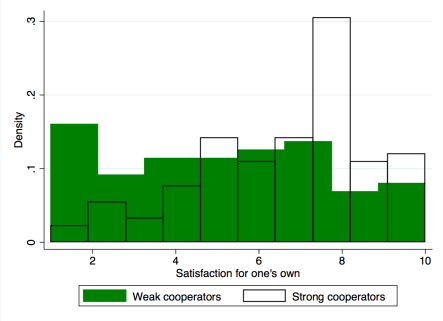


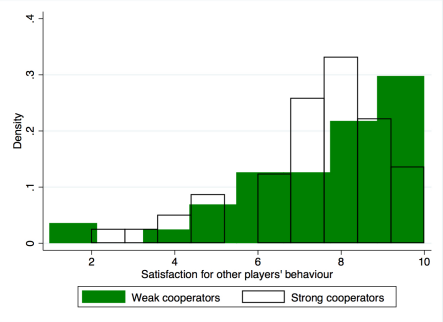
Figure 2: Distribution of satisfaction, by cooperation intensity.



(a) Satisfaction for the experiment



(b) Satisfaction for one's own behaviour



(c) Satisfaction for the other players' behaviour

4 Empirical findings on satisfaction about the experiment

We start our analysis with a description of the share of cooperative choices of experiment participants and of the average group choice of the ten participants to each session. In the first case we observe the presence of a share (14 percent) of unconditional cooperators (who always choose to buy the responsible product whatever the treatment and the information received on the number of cooperators in the previous rounds) against only one unconditional non cooperator (always choosing to buy the standard product) (Figure 1). All the other players are between these two extremes and change their strategy during the experiment, with the sample median value being exactly at 50 percent of cooperative choices.

In order to measure satisfaction about the experiment and about one's own and other players' behavior we use the standard 0-10 life satisfaction scale. We further define as strong (weak) cooperators those with a share of cooperative choices above (below) sample median and find that the overall level of satisfac-

tion about the experiment is slightly higher for weak than for strong cooperators (8.10 against 7.73) (Figure 2a). The distance is much more marked when looking at satisfaction for the other players' behavior, which is significantly lower for strong cooperators (5.12 against 6.75, with 95% confidence intervals that do not overlap) (Figure 2b). The level of satisfaction about one's own behavior in the experiment is extremely close and not significantly different in the two groups (Figure 2c).

In order to test whether game outcomes affect the three satisfaction variables we estimate the following ordered logit specification:

$$\begin{aligned} Satisfaction_i = \beta_0 &+ \beta_1 PlayerNonCoopChoiceShare_i \\ &+ \beta_2 AvgGroupNonCoopChoiceShare_i + \beta_3 Frame2_{(t,s)} \\ &+ \beta_4 Round + \beta_5 Round * Redistribution + \sum \delta_i SocioDem_i \end{aligned} \tag{4}$$

where $Satisfaction$ is one of the three satisfaction variables that we in turn consider as dependent variable in our estimates (for the experiment, for one's own behavior in the experiment, for other players' behavior in the experiment). The main regressors of interest are $PlayerNonCoopChoiceShare$ (the share of non cooperative choices - product B - of the i-th player across the 20 rounds) and $AvgGroupNonCoopChoiceShare$ (the share of group non cooperative choices - product B - considering all the ten players across the 20 rounds). We further add socio-demographic controls to the estimate such as age, gender and income classes.

We estimate the specification separately for the subsample of weak and strong cooperators. When we estimate the specification for the subsample of weak cooperators, we find that strong cooperators are significantly more satisfied with the game in proportion to the their share of cooperative choices (see Table 1, column 1). It is as well important that in the regression this effect is net of the impact of the average players' behavior, thereby not mixing up with a disappointment for the other players' non-cooperative choice. The above mentioned finding implies that, whatever the average level of group cooperation in the game, a marginal increase in one's own cooperation increases one's own satisfaction for the game. In terms of economic significance our coefficient implies that a (forced) 'radical' move of strong cooperators from unconditional cooperation to unconditional non-cooperation (0 to 100 percent cooperative choices) would produce a reduction of 56 percent in the probability of registering the highest level of satisfaction about the experiment for strong cooperators.[3]

Results from the second specification provide evidence that strong cooperators' satisfaction for other players' behavior is negatively correlated with the extent of their own cooperative behavior and of the non-cooperative behavior of the latter (see Table 1, column 3). The two coefficients are again quite large

[3]We define this move as 'forced' since revealed choices in the experiment document that unconditional cooperators would not voluntarily choose to follow such course of action transforming themselves into unconditional non cooperators. In order to evaluate the economic significance of our coefficients it is however interesting to see what would happen to their satisfaction if they should be forced to do so.

and indicate that a player's move from unconditional non cooperation to unconditional cooperation (from 0 to 100 percent cooperative choices) would reduce the probability of achieving the maximum level of satisfaction for other players' behavior by 10 percent, while the same 100 percent reduction of average group cooperative choices in the game would reduce the probability that strong cooperators achieve the maximum level of satisfaction about other players behavior by 15 percent. The likely explanation of the combined finding is that cooperation in the prisoner's dilemma is a joint endeavor which leaves more disappointment the stronger the one's own cooperative effort, on one side, and the lower the cooperative response, on the other side.

The third specification shows that satisfaction of strong cooperators for their own behavior in the game depends in turn on the share of their cooperative choices (see Table 1, column 5). Again, this effect is calculated after controlling for the average players' behavior in the game hence implying that, whatever the average level of cooperation in the game, a marginal increase in cooperative behaviour of strong cooperators increases the satisfaction for their own behavior in the game. In terms of magnitude, the move from unconditional cooperation to unconditional non-cooperation would produce for them a 72 percent lower probability of declaring the highest level of satisfaction for personal behavior (or, to consider a smaller variation, a reduction by 0.1 in the share of cooperative choices in the game would reduce by 7.2 percent the same probability).

All these effects found for strong cooperators disappear in participants who cooperated below the median (weak cooperators). For this subsample of participants satisfaction (about the game, about their own and other players' behavior) does not depend on observables (see Table 1, columns 2, 4 and 6). This difference between strong and weak cooperators is a strong indication of heterogeneity in behaviour and preferences among experiment participants.

A first robustness check of our main findings consists in a unique estimate where we use the standard *PlayerNonCoopChoiceShare* and *AvgGroupNonCoopChoiceShare* variables as regressors and test heterogeneity of preferences with two slope dummies. More specifically, the two variables above are interacted with a dummy taking the value of one for weak cooperators and zero otherwise (the *PlayerNonCoopChoiceShareDWeak* and *vgGroupNonCoopChoiceShareDWeak* added regressors).[4]

The first estimate confirms findings from separate estimates since the share of non cooperative choices is negative and significant on the dependent variable (satisfaction from the game), while the dummy for weak cooperators produces a significant and opposite effect, thereby confirming that the share of their cooperative/non cooperative choices does not affect their satisfaction with the experiment (Table 2, column 1). In terms of economic significance the estimated probability of the effect of a 100 increase in non cooperative choices for strong

[4]The advantages of the unique estimate are those of more degrees of freedom and of allowing for a direct test of a difference in the impact of the relevant variables ($PlayerNonCoopChoiceShare$ and $AvgGroupNonCoopChoiceShare$) in a unique specification. The disadvantage is the implicit restriction of equality of other regressors' coefficients between strong and weak cooperators.

cooperators on the probability that they declare the highest level of satisfaction for the experiment is quite close to what found in the separate estimate (59 percent).

The second estimate confirms that strong cooperators' satisfaction about other players' behavior in the experiment depends on the share of their cooperative choices and the average share of cooperative choices of other players in the experiments (Table 2, column 2). The impact of a 100 percent change in these two variables has effects similar to those calculated in the separate estimates (20 and 28 percent respectively). However in this case dummies testing for a difference in preferences of weak cooperators have the right sign but are not significant. This result partially differs from the observed lack of significance of the same regressors in the separate estimate of weak cooperators and indicates that, while the other regarding preference component is strongly different between strong and weak cooperators, negative reciprocity is in part common in both, even though stronger for strong cooperators when we use a unique estimate incorporating the restriction of equal coefficients for all other regressors.

The third estimate confirms that satisfaction about personal behavior in the experiment grows for strong cooperators in the share of their cooperative (non cooperative) choices, while this is not the case for weak cooperators (Table 2, column 3). In terms of magnitude, a 100 percent move from unconditional cooperation to unconditional non cooperation would reduce by 64 percent the probability that strong cooperators declare the maximum satisfaction about their behavior in the game.

A further important check is to verify that our significant effects are robust to the introduction of average individual profits as controls. To this purpose we calculate players' profits in each round and average them. The variable is then introduced in our three base estimates. The significance of our main regressors remains both in subsample estimates and in full sample estimates where we test for the heterogeneity of players' satisfaction with slope dummies (Table 3).

An alternative specification for the regression on the determinants of satisfaction with other players' behavior (the regression where we have conflicting results between the unique regression and subsample estimates for weak and strong cooperators) consists in creating a synthetic negative reciprocity variable calculated as the ratio of one's own average and other players' average cooperative choice. The ratio ranges from zero (unconditional cooperators have zero numerator of their non cooperative choices) to three (the maximum ratio between one's own non cooperative choices and the average non cooperative choices of the 10 player group). This variable aims to capture a final general sensation at end experiment of the distance between players' cooperative effort and that of their peers. The significance of our synthetic negative reciprocity variable is strong and robust to the introduction of the profit variable (Table 4, columns 1 and 2). In terms of magnitude a one point change fall in the variable produces a 7 percent fall in satisfaction about other players' behavior. This finding is particularly important since we could expect some correlation between the two. The way we constructed them, however, reduces such correlation as far as we

can (.48). This is because profits in each round depend not just on the above mentioned average distance in the game between players' cooperative effort and that of their peers, but as well by the differences in the ratio between player's and average cooperative choices in each round and by the presence/absence of the redistribution mechanism which weakens the correlation between negative reciprocity and profits.[5]

A main characteristic of the game is that players' monetary payoffs grow, when selecting the non-cooperative choice in the baseline treatment (no-redistribution) (whatever the share of cooperators), while falling in the non-cooperative choice in the redistribution treatment (whatever the share of cooperators). We therefore take into account these different characteristics and isolate in a further estimate choices made in rounds with/without redistribution. The new estimates show that satisfaction of strong cooperators with the experiment, as well as with their behavior, falls in non-cooperative choices even when we consider only choices in the no-redistribution treatments (significance of the *NoRedAvgPlayerChoice* in Table 5 column 2). The relevance of this result is that it provides strong empirical evidence for the existence of an other-regarding preference component. This is because, for the subsample of strong cooperators, it reveals the anomaly of satisfaction for a personal behavior that grows with an action - cooperating in no-redistribution treatments - which clearly reduces their monetary payoffs. We have such evidence from the combination of experimental choices (revealed preferences) and self-reported satisfaction (stated preferences).

The significant point of this result is that it provides strong empirical evidence for the existence of an other-regarding preference component. We have such evidence from the combination of experimental choices (revealed preferences) in Becchetti et al. (2015) and self-declared satisfaction (stated preferences). Indeed, for the subsample of strong cooperators, it reveals the anomaly of satisfaction for a personal behavior that grows with an action - cooperating in redistribution treatments - which clearly reduces their monetary payoffs. [6]

Results from stated preferences, differently from those from lab (or field) experiments, are subject to endogeneity problems since there may always be an unobserved third variable that can directly cause our two relevant variables

[5] A further robustness check for our findings consists in changing the threshold that divides strong and weak cooperators. More specifically, we look at percentiles close to the median but higher or lower than it. If we move down the threshold between strong and weak cooperators from .50 to .45, we still have all our main findings. The result in the satisfaction for the experiment regression is no more significant with thresholds moved down to .40 or .35 (that is, by broadening and enlarging the category of strong cooperators). The same lack of significance for this result occurs when we move the threshold up to .55 and .60 (reducing the number and creating more severe thresholds for strong cooperation). Results are omitted for reasons of space and available upon request.

[6] A possible interpretation for the other-regarding component identified by our findings may be that players' satisfaction for their cooperative choice depends on the generativeness of their act, that is, by the fact that the act positively contributes to the public good component and to the total payoff. On this line Becchetti and Degli Antoni (2010) find that the amount sent by trustors in a randomized trust game experiment is significantly and positively correlated with revealed satisfaction after the experiment but not before it.

(one's own or other players choices in the game and satisfaction about game circumstances), thereby explaining their 'spurious' correlation. However the pattern of determinants of satisfactions about game outcome and players' game behaviour (and not merely satisfaction about life) is too consistent with the direct causality story to make the endogeneity hypothesis implausible. Consider a parallel with dating in love affairs. A lover may try (and fail) to meet her/his mate through several proposed dates. The pattern of correlations we would expect in that case would very close to what we find here with satisfaction about other players' behaviour in the game which is lower the higher one's own effort and the lower the cooperative response of other players. What other explanation could we give than direct causality to the love affair and, in parallel, to our story ? To reinforce our argument in the experiment we have the advantage of full anonymity among experiment participants, differently from the love affair example where we have a full relational history. Hence the only characteristics that a given player knows about their experiment mates is their cooperative/non-cooperative choices and there are no other known factors on which she/he can base her/his satisfaction about them (and especially about their behaviour in the game). Back to our other main result, for what other reasons 'tribes of strong cooperators' can be happy about their cooperative choices in the game beyond satisfaction of their preferences? Imagine a Kantian value trait which causes both strong cooperation and satisfaction when one cooperates. Isn't it exactly the other-regarding preference component of our model? We might for absurd assume that the act of cooperating does not contribute by itself to satisfaction about one's own behavior in the game and that it is the Kantian factor that makes people cooperate and feel happy about one's own behaviour in the game. Again our model (presented in details in the next section) would be a consistent description of what we find. In terms of policy conclusions our model helps us to understand that types are heterogeneous and that virtuous matching (cooperative types playing only with cooperative types) would significantly increase total payoff in the game (this independently of the endogeneity issue) and satisfaction about game circumstances in the specific case of satisfaction for other players' behaviour. [7]

5 The broader utility function

In this section, we outline a model that can replicate the main characteristics of the observed empirical, experimental findings combined with those of revealed satisfaction about the experiment and one's own and other players' behaviour.

More specifically, the model must be able to produce: i) a nonzero but declining share of cooperative choices (the experimental finding of Becchetti et al. 2015)); ii) satisfaction for the game of strong cooperators increasing in proportion to their cooperative choice; iii) satisfaction of strong cooperators for other players' behavior negatively correlated with the extent of their own

[7] Back to the parallel with the love affair, friends are used to say to a disappointed partner "you deserve a better *someone*".

cooperative behavior and of the non cooperative behavior of the latter; iv) satisfaction of strong cooperators for their own behavior in the game depending in turn on the share of their own cooperative choices; v) none of the effects at points iii)-v) for weak cooperators.

In order to sketch a theoretical framework which can mimic all these characteristics we write the following instantaneous (experiment round) function:

$$U_{it}(S^i, S^{(-i)}) = \begin{Bmatrix} \frac{E_{it}(j)+1}{n}\beta + \alpha_i - \gamma - \theta_i \frac{n-j_{t-1}}{n} & if S^i = vR \\ \frac{E_{it}(j)}{n}\beta & if S^i = vC \end{Bmatrix} \quad (5)$$

The function presents three differences with respect to the standard utility function of Becchetti and Salustri (2015) vote with the wallet game in (1). First, we assume that other-regarding preferences have heterogeneous weight on the utility of players in the experiment (with α_i being extracted from an unknown distribution with zero lower bound). Second, we assume that there exists a negative reciprocity argument (θ_i) in the utility function whose impact depends on the previous round share of non cooperating participants on total participants.[8] The impact of the negative reciprocity argument is as well player specific. Both of the two arguments apply only when the player selects the vR strategy, while they are zero when she/he selects the vC strategy (there cannot be satisfaction of other-regarding preferences and negative reciprocity effect when the players choose the non cooperative strategy). Third, we assume that each player has her/his own expectation $E_{it}(j)$ on the number j of cooperative plays in her/his group except herself/himself (which of course depends on expectations about the weight of other-regarding preferences and reciprocity arguments of the other players).

When considering the base (no redistribution) treatment of the game the utility function specified above can produce

i) Unconditional cooperators for very high values of the other-regarding preference component or:

$$\frac{1}{n}\beta + \alpha_i - \gamma - \theta_i \frac{(n-1)}{n} > 0 \quad (6)$$

that is, unconditional cooperators cooperate also when all other players do not, since the weight of their other-regarding component is so high to compensate that of the reciprocity component (even under the most pessimistic

[8] Reciprocity assumes that agents are willing to sacrifice part of their material wealth in order to be kind (unkind) to someone who has been kind (unkind) to them (Rabin, 1993; Dufwenberg and Kirchsteiger, 2004). Our argument actually measures a disutility proportional to the share of other players that have not cooperated. As we will see in what follows in our case this argument which grows in the share of previous period non cooperators may determine a switch to the non cooperative choice by making utility (but not monetary payoffs per se) from the cooperative choice lower than that from the non cooperative choice. On the other hand,in the redistribution treatment this switch implies indeed a sacrifice in terms of material wealth (thereby producing a negative reciprocity effect fully consistent with the above mentioned definition) provided that players have not observed in the previous period an increase in the share of cooperators vis--vis the previous round.

assumption about the share of cooperative plays formulated above where $j = 0$) and the extra cost of buying responsibly.

ii) Conditional cooperators with the above inequality which may hold given a certain expectation $E_{it}(j)$ on the number of cooperating players and a given number of actual cooperating players in the previous round in their experiment session

$$\frac{E_{it}(j)+1}{n}\beta + \alpha_i - \gamma - \theta_i \frac{n - j_{t-1}}{n} > 0 \tag{7}$$

but where the inequality may be reversed thereby leading to the non cooperative choice if the expectation on the number of cooperators falls.

iii) Unconditional non cooperators who have $\alpha_i = 0$ and therefore find it always optimal not to cooperate.

The effect of the socially responsible frame (ie. frame 1) may be that of adding an extra component (f_{1i}) to the other-regarding preference factor (and eventually to the reciprocity factor as well) thereby explaining the jump in cooperative choices.

$$U_{it}(S^i, S^{(-i)}) = \left\{ \begin{array}{cc} \frac{E_{it}(j)+1}{n}\beta + \alpha_i(1+f_{1i}) - \gamma - \theta_i(1+f_{1i})\frac{n-j_{t-1}}{n} & if S^i = vR \\ \frac{E_{it}(j)}{n}\beta & if S^i = vC \end{array} \right\} \tag{8}$$

The effect of the redistribution mechanism further changes the model since we know that it makes strictly convenient to choose the cooperative strategies even in absence of other-regarding preferences given experiment parameters.

The utility function in presence of the redistribution mechanism in the treatment without frames becomes

$$U_{it}(S^i, S^{(-i)}) = \left\{ \begin{array}{cc} \frac{E_{it}(j)+1}{n}\beta + \alpha_i - \gamma - \theta_i\frac{n-j_{t-1}}{n} + \frac{n-E_{it}(j)+1}{E_{it}(j)+1}x & if S^i = vR \\ \frac{E_{it}(j)}{n}\beta - x & if S^i = vC \end{array} \right\} \tag{9}$$

A main difference here is that the cooperative choice becomes the dominant strategy.

It is as well reasonable to assume that satisfaction for other players' behavior concerns only components for which other players matter, that is (in the base treatment)

$$U_{it}(S^i, S^{(-i)}) = \left\{ \begin{array}{cc} \frac{E_{it}(j)+1}{n}\beta - \theta_i\frac{n-j_{t-1}}{n} & if S^i = vR \\ \frac{E_{it}(j)}{n}\beta & if S^i = vC \end{array} \right\} - \tag{10}$$

which is clearly increasing in one's own cooperative choice and decreasing in other players' non cooperative behavior.

Based on our model we can say that

a) the share of cooperators in the first round of the base version of the game coincides with the share of players having $\alpha_i > 2$ since the reciprocity argument cannot affect their choices;

b) the first round difference in the share of cooperators in frames 1 and 2 with those in the base treatment is given by players with $\alpha_i < 2$ but $\alpha_i(1 + f_{1i}) > 2$ (frame 1) and $\alpha_i(1 + f_{2i}) > 2$ (frame 2), that is, players in which the frame activates an additional other-regarding component inverting the inequality;

c) the time decay in the share of cooperators in the no redistribution treatment depends on the reciprocity parameter since, without reciprocity component, even when discovering that some players did not cooperate at time 1, cooperators should continue to cooperate in the no redistribution treatment where non cooperation is the dominant strategy and the relative convenience of the cooperation vs non cooperation strategy does not change in the number of group cooperators. Hence in no redistribution treatments cooperators would find it optimal to continue to cooperate given their other-regarding preferences but they stop doing so because cooperation produces, due to the negative reciprocity argument, a disutility that grows in propoportion to the share of non cooperators. The possibility of isolating this reciprocity component is a nice property of our game since the payoff difference between choosing to cooperate or not in no redistribution treatments does not depend on the number of cooperators;

d) The decay in the share of cooperators in the redistribution treatment is even more akin to a negative reciprocity effect since cooperation is here the dominant strategy and the switch to non cooperation for cooperators reduces monetary payoffs (while it reduces utility - net of the reciprocity effect - but not monetary payoffs for them in the no redistribution treatments). Note as well that, if the cooperator has a negative surprise in terms of information on the share of previous period cooperators this further reduces its payoff in case of switch to non cooperation given the redistribution mechanism, provided that players have not observed in the previous period an increase in the share of cooperators vis--vis the previous round. We may define this a pure negative reciprocity effect (I observe an unkind behavior from other players and I reciprocate the unkind behaviour even if it reduces my monetary payoffs) while we may define that under c) an impure negative reciprocity effect (I reciprocate the unkind behaviour even if it reduces my utility but not my monetary payoff)

e) upward jumps in the share of cooperators within non redistribution treatments cannot be explained by this model (and could be eventually ac-

counted for by adding random disturbances which capture for irrationality or cognitive biases);

To sum up, the combination of revealed experimental choices and declared satisfaction with the game and players' behavior produces two important results, highlighted by the broader utility function model. First, a subset of players must have an other-regarding preference component since they choose even in the first round to buy the responsible product even if it costs more. Second, (some of the) players must have a reciprocity argument since they switch from the cooperative to the non cooperative strategy when receiving information on the number of cooperators even though such choice reduces their monetary payoff in redistribution treatment and their utility - net of the reciprocity effect - in no redistribution treatments.

6 Conclusions

Our paper is an example of how two sources of information - incentivized revealed choices in experiments and self-declared satisfaction about game circumstances - can usefully complement each other. We start with an original hybrid contribution multiplayer prisoner's dilemma called 'Vote-with-the-Wallet Game'. Results of a nonzero and declining share of cooperators departing from the Nash equilibrium are supplemented by survey data on satisfaction about game circumstances. The latter show that the subset of strong cooperators (those with a share of cooperating choices above sample average) are significantly less satisfied with the game and their behavior in the game, the lower the share of their cooperative choices. In addition to it, strong cooperators are as well significantly less satisfied with the behavior of their experiment mates the more the latter do not cooperate, and the stronger they cooperate. Other interesting findings are that some players; i) cooperate in the first round of the game even though this reduces their own monetary payoffs; ii) switch from cooperation to non cooperation when knowing the number of players who cooperated/ not cooperated in the previous round even though this choice reduces their own monetary payoffs. Our econometric estimates document that our findings are robust to several controls and the inclusion of the average profit per round. The two most important findings of our paper are consistent with our theoretical framework assuming that a subset of players has other-regarding preferences, as well as a reciprocity argument in their utility function.

We conclude our analysis by proposing a broader utility function which includes three original arguments which vary for each participant: i) expectations on the number of cooperating players; ii) an other-regarding preference component; iii) a reciprocity component. The inclusion of these three arguments accounts for most of the observed choices in the game.

References

[1] Bohnet, Iris, and Richard Zeckhauser. 2004. "Trust, Risk and Betrayal." Journal of Economic Behavior and Organization 55(4): 467–84.

[2] Andreoni, James. 1989. "Giving with Impure Altruism: Applications to Charities and Ricardian Equivalence." Journal of Political Economy 97, Issue 6, pp. 1447–1458.

[3] Andreoni, James. 1990. "Impure Altruism and Donations to Public Goods: A Theory of Warm Glow Giving." Economic Journal 100, pp.464-477.

[4] Battigalli, Pierpaolo and Martin Dufwenberg. 2009. "Dynamic Psychological Games." Journal of Economic Theory 144: 1–35.

[5] Becchetti, Leonardo. 2012. "Voting with the Wallet." International Review of Economics 59(3): 245–268.

[6] Becchetti, Leonardo and Giacomo Degli Antoni. 2010. "The Sources of Happiness: Evidence from the Investment-Game." Journal of Economic Psychology, 31: 498–509.

[7] Becchetti, Leonardo, Vittorio, Pelligra and Francesco, Salustri. 2015. "The Impact of Redistribution Mechanisms in the Vote with the Wallet Game: Experimental Results." CEIS Tor Vergata RESEARCH PAPER SERIES Vol. 13, Issue 8, No. 354.

[8] Becchetti, Leonardo and Francesco, Salustri. 2015. "The Vote With the Wallet as a Multiplayer Prisoner's Dilemma." AICCON Working Papers no. 94.

[9] Bohnet, Iris, and Richard Zeckhauser. 2004. "Trust, Risk and Betrayal." Journal of Economic Behavior and Organization 55(4): 467–84.

[10] Bolton, Gary and Axel Ockenfels. 2000. "ERC: A Theory of Equity, Reciprocity and Competition." American Economic Review 90: 166–193.

[11] Charness Gary and Rabin Matthew. 2002. "Understanding Social Preferences with Simple Tests." Quarterly Journal of Economics 117 (3): 817–869.

[12] Couture, Toby and Yves Gagnon. 2010. "An analysis of feed-in tariff remuneration models: Implications for renewable energy investment." Energy Policy 38(2): 955–965

[13] Cox James C. 2004. "How to identify trust and reciprocity." Games and Economic Behavior 46: 260–281.

[14] Dufwenberg, Martin and Georg Kirchsteiger. 2004. "A theory of sequential reciprocity." Games and Economic Behavior 47: 268–298.

[15] Falk, Armin and Urs Fischbacher. 2006. "A theory of reciprocity." Games and Economic Behavior 54(2): 293-?315

[16] Fehr, Ernst and Klaus Schmidt. 1999. "A Theory of Fairness, Competition, and Cooperation." Quarterly Journal of Economics 114: 817–868.

[17] Rabin, Matthew. 1993. "Incorporating Fairness into Game Theory and Economics." American Economic Review 83: 1281—1302.

Appendices

Tables

Table 1: The effect of one's own and group non cooperation on satisfaction - separate strong and weak cooperator estimates

Variables	(1)	(2)	(3)	(4)	(5)	(6)
PlayerNonCoopChoiceShare	-3.257**	-0.402	3.547**	1.469	-5.986***	0.603
	(1.557)	(1.368)	(1.491)	(1.395)	(1.627)	(1.411)
AvgGroupNonCoopChoiceShare	2.080	1.165	-5.261**	-2.553	0.180	-3.244
	(2.335)	(2.100)	(2.433)	(2.057)	(2.321)	(2.065)
Male	0.186	-0.00166	0.613	1.015**	0.332	0.345
	(0.416)	(0.398)	(0.434)	(0.396)	(0.443)	(0.378)
Age	0.0143	0.0738	-0.0594	0.0480	-0.00219	0.102
	(0.0641)	(0.0645)	(0.0653)	(0.0627)	(0.0654)	(0.0667)
Income1	-0.131	0.0923	-0.485	-0.183	1.202	0.151
	(0.736)	(0.675)	(0.746)	(0.653)	(0.781)	(0.698)
Income2	-0.172	0.767	-0.190	-0.219	0.784	-0.177
	(0.706)	(0.758)	(0.725)	(0.721)	(0.736)	(0.754)
Income3	-1.407	0.545	-0.441	-0.457	-0.382	0.0000405
	(0.766)	(0.721)	(0.756)	(0.695)	(0.783)	(0.742)
Income4	-0.944	0.548	-0.218	-1.177	0.630	-0.231
	(0.883)	(0.821)	(0.901)	(0.798)	(0.917)	(0.817)
cut1						
_cons	-3.836*	-2.207	-5.483***	-3.234	-5.602**	-2.638
	(2.118)	(2.177)	(2.046)	(1.977)	(2.315)	(2.033)
cut2						
_cons	-3.422*	-1.091	-4.612**	-1.892	-4.481**	-1.915
	(2.079)	(2.015)	(2.015)	(1.886)	(2.162)	(1.972)
N	78	102	78	102	78	102

Dependent variables. Columns 1 and 2: satisfaction about the game; columns 3 and 4: satisfaction about other players' behaviour; columns 5 and 6: satisfaction about one's own behaviour. Subsample estimates: columns 1, 3 and 5 strong cooperators (players with above median cooperative choices); columns 2, 4 and 6 weak cooperators (players with below median cooperative choices). Legend for regressors: see Table 6. Standard errors in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2: The effect of one's own and group non cooperation on satisfaction - joint estimate

Variables	(1)	(2)	(3)
PlayerNonCoopChoiceShare	-4.075**	3.834***	-6.024***
	(1.617)	(1.460)	(1.540)
AvgGroupNonCoopChoiceShare	2.802	-5.373***	1.258
	(2.025)	(2.006)	(1.966)
PlayerNonCoopChoiceShareDWeak	3.923*	-2.223	6.861***
	(2.004)	(1.923)	(1.975)
AvgGroupNonCoopChoiceShareDWeak	-1.556	2.917	-4.695**
	(1.890)	(1.920)	(1.915)
Male	-0.0265	0.957***	0.319
	(0.272)	(0.275)	(0.271)
Age	0.0334	-0.000876	0.0403
	(0.0431)	(0.0424)	(0.0428)
Income1	-0.132	-0.302	0.568
	(0.494)	(0.488)	(0.515)
Income2	0.276	-0.219	0.329
	(0.512)	(0.504)	(0.524)
Income3	-0.353	-0.526	-0.112
	(0.513)	(0.501)	(0.532)
Income4	-0.193	-0.820	0.182
	(0.589)	(0.591)	(0.600)
cut1			
_cons	-3.456**	-3.990***	-5.106**
	(1.533)	(1.368)	(1.681)
cut2			
_cons	-3.047**	-2.969	-3.475**
	(1.478)	(1.334)	(1.422)

Dependent variables. Column 1: satisfaction about the game. Column 2: satisfaction about other players' behaviour. Column 3 satisfaction about one's own behaviour. Legend for regressors: see Table 6. Standard errors in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: The effect of one's own and group non cooperation on satisfaction - separate and joint estimates controlling for player's payoffs

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
PlayerNonCoopChoiceShare	-5.033**	-0.229	4.679*	2.826	-7.146***	2.043	-5.017*	5.007**	-5.989**
	(2.509)	(2.341)	(2.492)	(2.312)	(2.467)	(2.387)	(2.015)	(1.882)	(1.921)
AvgGroupNonCoopChoiceShare	11.70	0.362	-11.41	-8.840	6.760	-10.19	7.939	-11.74	1.059
	(10.93)	(9.045)	(11.09)	(8.750)	(10.75)	(9.526)	(6.928)	(6.733)	(6.805)
PlayerNonCoopChoiceShareDWeak							3.816	-2.115	6.865***
							(1.995)	(1.932)	(1.980)
AvgGroupNonCoopChoiceShareDWea							-1.464	2.828	-4.698*
							(1.885)	(1.929)	(1.917)
[0.5em] Male	0.157	-0.00735	0.627	0.981**	0.311	0.305	-0.0108	0.933***	0.318
	(0.419)	(0.403)	(0.434)	(0.399)	(0.446)	(0.381)	(0.272)	(0.276)	(0.272)
Age	0.00618	0.0744	-0.0550	0.0522	-0.00975	0.109	0.0294	0.00332	0.0405
	(0.0645)	(0.0648)	(0.0662)	(0.0629)	(0.0664)	(0.0685)	(0.0434)	(0.0426)	(0.0431)
Income1	-0.194	0.0980	-0.455	-0.0881	1.231	0.285	-0.159	-0.243	0.569
	(0.738)	(0.678)	(0.746)	(0.672)	(0.787)	(0.727)	(0.494)	(0.493)	(0.517)
Income2	-0.223	0.772	-0.173	-0.127	0.792	-0.0628	0.244	-0.161	0.330
	(0.712)	(0.760)	(0.722)	(0.735)	(0.741)	(0.774)	(0.513)	(0.508)	(0.527)
Income3	-1.408	0.552	-0.470	-0.356	-0.307	0.140	-0.387	-0.478	-0.111
	(0.769)	(0.725)	(0.756)	(0.715)	(0.797)	(0.772)	(0.514)	(0.505)	(0.534)
Income4	-0.985	0.554	-0.228	-1.074	0.717	-0.0864	-0.235	-0.765	0.183
	(0.885)	(0.824)	(0.901)	(0.815)	(0.934)	(0.847)	(0.590)	(0.595)	(0.601)
Profit	0.309	-0.0269	-0.195	-0.209	0.213	-0.233	0.171	-0.210	-0.00662
	(0.343)	(0.294)	(0.343)	(0.283)	(0.340)	(0.311)	(0.221)	(0.212)	(0.217)
cut1									
_cons	7.652	-3.185	-12.83	-10.83	2.336	-11.05	2.847	-11.78	-5.350
	(12.93)	(10.93)	(13.09)	(10.47)	(12.88)	(11.41)	(8.272)	(7.976)	(8.185)
cut2									
_cons	8.067	-2.068	-11.96	-9.488	3.457	-10.32	3.257	-10.76	-3.719
	(12.93)	(10.89)	(13.08)	(10.45)	(12.85)	(11.39)	(8.263)	(7.971)	(8.135)
N	78	102	78	102	78	102	180	180	180

Dependent variables. columns 1, 2 and 7: satisfaction about the game. Columns 3, 4 and 8: satisfaction about other players' behaviour; columns 5, 6 and 9: satisfaction about one's own behaviour. Subsample estimates: columns 1, 3 and 5 strong cooperators (players with above median cooperative choices. Columns 2,4 and 6 weak cooperators (players with below median cooperative choices). Columns 7-9 overall sample. Legend for regressors: see Table 6. Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: The effect of the synthetic reciprocity measure on satisfaction on other players' behaviour

Variables	(1)	(2)
NegReciprocity	1.391***	1.390***
	(0.270)	(0.298)
Male	0.959***	0.959***
	(0.272)	(0.272)
Age	-0.00451	-0.00453
	(0.0425)	(0.0425)
Income1	-0.328	-0.328
	(0.492)	(0.492)
Income2	-0.297	-0.297
	(0.506)	(0.507)
Income3	-0.507	-0.507
	(0.503)	(0.503)
Income4	-0.788	-0.787
	(0.589)	(0.592)
Profit		0.000660
		(0.0535)
cut1		
_cons	-1.894	-1.880
	(1.193)	(1.693)
cut2		
_cons	-0.917	-0.902
	(1.168)	(1.679)
N	180	180

Dependent variable: satisfaction about other players' behaviour. Legend for regressors: see Table 6. Standard errors in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix 2

Figure A1: Share of players buying the responsible product (by treatment). *Source: Becchetti, Pelligra and Salustri (2015).*

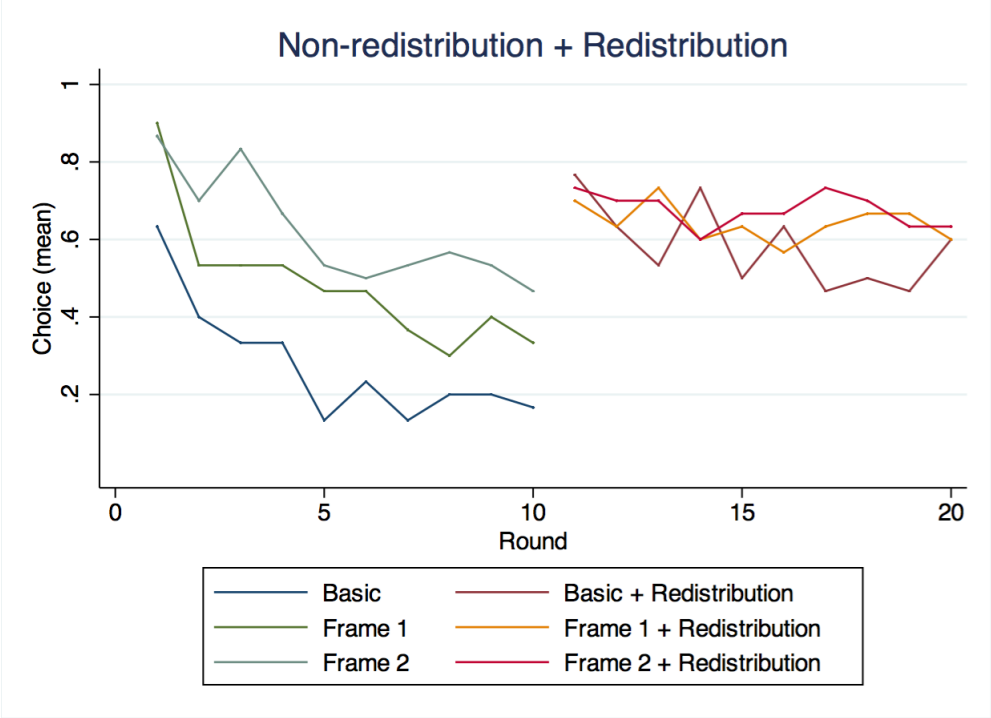


Table 5: The effects of one's own and group cooperation in different treatments on satisfaction about the experiment and one's own behaviour in the game

Variables	(1)	(2)	(3)	(4)
NoRedPlayerNonCoopChoiceShare	-2.004	-2.629**	-3.078*	-2.461
	(1.045)	(0.987)	(1.374)	(1.348)
NoRedAvgGroupNonCoopChoiceShare	0.942	-0.486	7.759	-1.545
	(1.691)	(1.545)	(5.893)	(5.967)
RedPlayerNonCoopChoiceShare	-3.079*	-3.536*	-4.186*	-3.365*
	(1.471)	(1.408)	(1.739)	(1.686)
RedAvgGroupNonCoopChoiceShare	4.052	4.048	8.034	3.404
	(3.537)	(3.231)	(4.854)	(4.765)
NoRedPlayerNonCoopChoiceShareDWeak	4.623**	5.874***	4.846**	5.841***
	(1.570)	(1.636)	(1.582)	(1.646)
NoRedAvgGroupNonCoopChoiceShareDWeak	-0.772	-2.678	-1.065	-2.636
	(2.315)	(2.250)	(2.340)	(2.263)
RedPlayerNonCoopChoiceShareDWeak	2.965	3.681*	2.753	3.712*
	(1.629)	(1.575)	(1.637)	(1.585)
RedAvgGroupNonCoopChoiceShareDWeak	-7.151	-7.274	-7.028	-7.286
	(4.257)	(4.076)	(4.268)	(4.077)
Male	-0.123	0.153	-0.117	0.152
	(0.282)	(0.280)	(0.282)	(0.280)
Age	0.0461	0.0322	0.0418	0.0330
	(0.0453)	(0.0463)	(0.0455)	(0.0465)
Income1	-0.197	0.368	-0.273	0.374
	(0.529)	(0.536)	(0.531)	(0.537)
Income2	0.0153	0.00895	-0.107	0.0217
	(0.545)	(0.547)	(0.553)	(0.551)
Income3	-0.469	-0.357	-0.596	-0.346
	(0.549)	(0.553)	(0.560)	(0.555)
Income4	-0.309	-0.0135	-0.423	-0.00249
	(0.627)	(0.621)	(0.635)	(0.623)
Profit			0.400	-0.0626
			(0.332)	(0.341)
cut1				
_cons	-2.831	-4.998**	11.80	-7.296
	(1.598)	(1.748)	(12.23)	(12.63)
cut2				
_cons	-2.421	-3.369*	12.21	-5.668
	(1.545)	(1.500)	(12.22)	(12.60)
N	170	170	170	170

Dependent variables. Columns 1 and 3: satisfaction about the game. Columns 2 and 4: satisfaction about one's own behaviour. Legend for regressors: see Table 6. Standard errors in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6: Legend of Tables

Variable	Description
PlayerNonCoopChoiceSharee	Share of player's cooperating choices (choices of product B) in the 20 experiment rounds
AvgGroupNonCoopChoiceShare	Share of player's cooperating choices (choices of product B) of all the 10 players in the 20 experiment rounds in a given session
PlayerNonCoopChoiceShareDweak	Share of player's cooperating choices (choices of product B) in the 20 experiment rounds multiplied for a 0/1 dummy taking value one if the player is a weak cooperator (has a share of cooperative choices below median)
AvgGroupNonCoopChoiceShareDweak	Average share of cooperating choices (choices of product B) of all the 10 players in the 20 experiment rounds in a given session multiplied for a 0/1 dummy taking value one if the player is a weak cooperator (has a share of cooperative choices below median)
Male	Dummy taking value of one if the player is male
Age	Player's age
Profit	average monetary payoff per round for the individual player
NegReciprocity	AvPlayerChoice/AvgGroupChoice
NoRedPlayerNonCoopChoiceShare	Share of player's cooperating choices (choices of product B) in the 20 experiment rounds multiplied for a 0/1 dummy taking value one for rounds in no redistribution treatments
NoRedAvgGroupNonCoopChoiceShare	Average share of cooperating choices (choices of product B) of all the 10 players in the 20 experiment rounds in a given session multiplied for a 0/1 dummy taking value one for rounds in no redistribution treatments
RedPlayerNonCoopChoiceShare	Share of player's cooperating choices (choices of product B) in the 20 experiment rounds multiplied for a 0/1 dummy taking value one for rounds in redistribution treatments
RedAvgGroupNonCoopChoiceShare	Average hare of cooperating choices (choices of product B) of all the 10 players in the 20 experiment rounds in a given session multiplied for a 0/1 dummy taking value one for rounds in redistribution treatments
NoRedPlayerNonCoopChoiceShareDWeak	Share of players' cooperating choices (choices of product B) in the 20 experiment rounds multiplied for a 0/1 dummy taking value one for rounds in no redistribution treatments, multiplied for a 0/1 dummy taking value one if the player is a weak cooperator (has a share of cooperative choices below median)
NoRedAvgGroupNonCoopChoiceShareDWeak	Average share of cooperating choices (choices of product B) of all the 10 players in the 20 experiment rounds in a given session multiplied for a 0/1 dummy taking value one for rounds in no redistribution treatments, multiplied for a 0/1 dummy taking value one if the player is a weak cooperator (has a share of cooperative choices below median)
RedPlayerNonCoopChoiceShareDWeak	Share of player's cooperating choices (choices of product B) in the 20 experiment rounds multiplied for a 0/1 dummy taking value one for rounds in redistribution treatments, multiplied for a 0/1 dummy taking value one if the player is a weak cooperator (has a share of cooperative choices below median)
RedAvgGroupNonCoopChoiceShareDWeak	Average share of cooperating choices (choices of product B) of all the 10 players in the 20 experiment rounds in a given session multiplied for a 0/1 dummy taking value one for rounds in redistribution treatments, multiplied for a 0/1 dummy taking value one if the player is a weak cooperator (has a share of cooperative choices below median)

Table A1: Costs and benefits in the Base Vote-with-the-Wallet game (VWG) experiment. *Source: Becchetti, Pelligra and Salustri (2015).*

	Payoff	
Endowment	20	20
Your Choice	Product A	Product B
Cost	-10	-5
Benefit (from the choice of the other players)	+3 for each player choosing product A	+3 for each player choosing product A

Table A2: Players' payoff in the Base VWG experiment conditional to other players' choices. *Source: Becchetti, Pelligra and Salustri (2015).*

	When you buy good A				When you buy good B			
How many players choose good A	Endowment	Cost	Benefit	**TOTAL**	Endowment	Cost	Benefit	**TOTAL**
			3 X *n* =				3 X *n* =	
10	20	-10	30	**40**	-	-	-	-
9	20	-10	27	**37**	20	-5	27	**42**
8	20	-10	24	**34**	20	-5	24	**39**
7	20	-10	21	**31**	20	-5	21	**36**
6	20	-10	18	**28**	20	-5	18	**33**
5	20	-10	15	**25**	20	-5	15	**30**
4	20	-10	12	**22**	20	-5	12	**27**
3	20	-10	9	**19**	20	-5	9	**24**
2	20	-10	6	**16**	20	-5	6	**21**
1	20	-10	3	**13**	20	-5	3	**18**
0	-	-	-	-	20	-5	0	**15**

Table A3: Costs and benefits in the Base Vote-with-the-Wallet game (VWG) experiment. *Source: Becchetti, Pelligra and Salustri (2015).*

	Payoff	
Endowment	20	20
Your Choice	Product A	Product B
Cost	-10	-5
Benefit (from the choice of the other players)	+3 for each player choosing product A	+3 for each player choosing product A
Redistribution effect	2.5 tokens times the number of players who choses product B, divided by the number of those who choses product A	-2.5

Table A4: Players' payoff in the VWG experiment with Redistribution, conditional to other players' choices. *Source: Becchetti, Pelligra and Salustri (2015).*

	When you buy good A					When you buy good B				
How many players choose good A	Endowment	Cost	Benefit	Redistribution	TOTAL	Endowment	Cost	Benefit	Redistribution	TOTAL
			3 X *n* =					3 X *n* =		
10	20	-10	30	-	**40.0**	-	-	-		-
9	20	-10	27	0.3	**37.3**	20	-5	27	-2.5	**39.5**
8	20	-10	24	0.6	**34.6**	20	-5	24	-2.5	**36.5**
7	20	-10	21	1.1	**32.1**	20	-5	21	-2.5	**33.5**
6	20	-10	18	1.7	**29.7**	20	-5	18	-2.5	**30.5**
5	20	-10	15	2.5	**27.5**	20	-5	15	-2.5	**27.5**
4	20	-10	12	3.8	**25.8**	20	-5	12	-2.5	**24.5**
3	20	-10	9	5.8	**24.8**	20	-5	9	-2.5	**21.5**
2	20	-10	6	10.0	**26.0**	20	-5	6	-2.5	**18.5**
1	20	-10	3	22.5	**35.5**	20	-5	3	-2.5	**15.5**
0	-	-	-	-	-	20	-5	0	-2.5	**12.5**

Table A5: Treatments and Sessions. *Source: Becchetti, Pelligra and Salustri (2015).*

Treatment	Phase 1 (10 rounds)	Phase 2 (10 rounds)	Phase 3	Subjects no.
BR	Base	Redistribution	Questionnaire	30
RB	Redistribution	Base	Questionnaire	30
BR1	Base Frame 1	Redistribution Frame 1	Questionnaire	30
RB1	Redistribution Frame 1	Base Frame 1	Questionnaire	30
BR2	Base Frame 2	Redistribution Frame 2	Questionnaire	30
RB2	Redistribution Frame 2	Base Frame 2	Questionnaire	30

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