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**Social capital dynamics and collective action: the role of subjective satisfaction in a common pool resource experiment**

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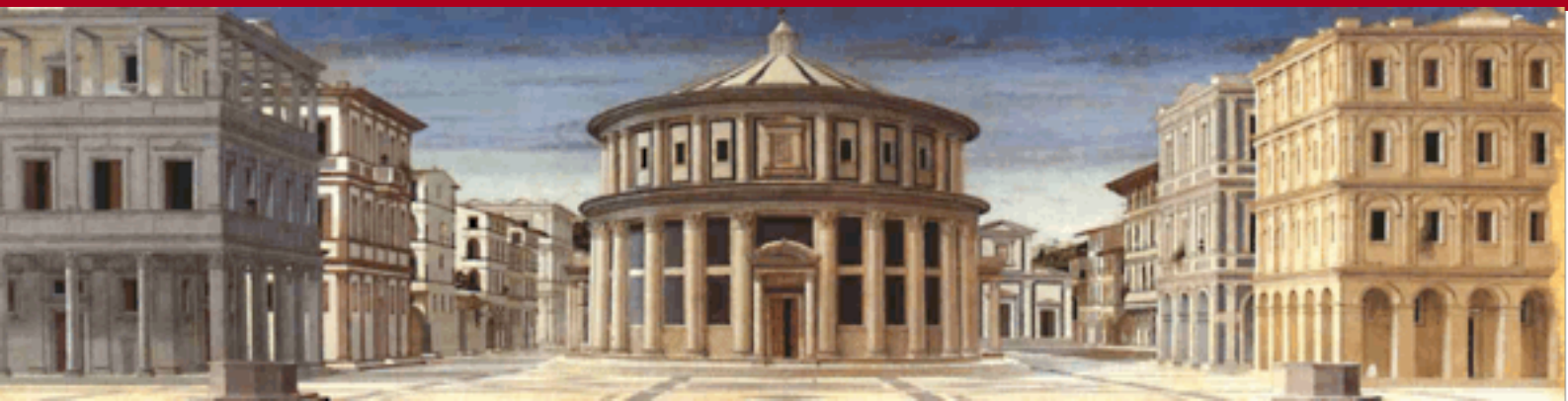
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Social capital dynamics and  
collective action: the role of  
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Working papers



# **Social capital dynamics and collective action: the role of subjective satisfaction\***

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## **Abstract**

In low income countries grass-root collective action is a well known substitute for government provision of public goods. In our research we wonder what is its effect on the law of motion of social capital, a crucial microeconomic determinant of economic development. To this purpose we structure a “sandwich” experiment in which participants play a public good game (PGG) between two trust games (TG1 and TG2). Our findings show that the change in trustworthiness between the two trust game rounds generated by the PGG treatment is crucially affected by the subjective satisfaction about the PGG rather than by standard objective measures related to PGG players’ behavior. These results highlight that subjective satisfaction after collective action has relevant predictive power on social capital creation providing information which can be crucial to design successful self-organized resource regimes.

**Keywords:** trust games, public good games, randomized experiment, social capital, subjective wellbeing.

**JEL numbers:** O12, C93, Z13.

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## 1. Introduction

There is widespread consensus in the literature about the role and importance of social capital as “lubricant of economic activity” (Arrow, 1974). Most social and economic relationships occur in a framework of asymmetric information and incomplete contracts and are made by sequential moves in which investors make themselves vulnerable to others’ action (Bohnet and Greig, 2008). As a consequence, the levels of trust and trustworthiness (a crucial dimension of social capital) are fundamental to reduce “social risk” and foster interchange and cooperation which, in turn, ensure higher creation of economic value. In essence, trust acts as a substitute of formal contracts, significantly reducing transaction costs in social and economic interactions<sup>1</sup>. In absence of high levels of trust and social capital economic transactions would most often be feasible but surely less profitable. Given the relevance of this topic, the research on the determinants and consequences of social capital has become an important field of inquiry in the last two decades.<sup>2</sup>

Based on what considered above we focus on studying the law of motion of social capital in the Nairobi slum of Kibera, a particularly relevant context to run trust and public good games given the extreme local scarcity of social capital. Such scarcity is

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<sup>1</sup> In their study on the role of social capital on financial development Guiso, Sapienza and Zingales (2004) provide an excellent example when reporting that Jewish diamond merchants in New York save a substantial amount of lawyers’ fees by conducting informally their economic transactions. The power of the community is sufficient to enforce informal contracts since a merchant’s misbehaviour would damage his reputation and exclude him from future transactions.

<sup>2</sup> The positive effect of the level of trust on economic growth and institutions has been documented by a number of studies (see among others, Knack and Keefer, 1997 and Zak and Knack, 2001 on the first point and Putnam, 1993 and La Porta et al., 1997 on the second). Trust and trustworthiness have been shown to impact positively on firm productivity (Fullenkamp and Chami, 2002). The lack of trust and trustworthiness prevents the development of economic relationships among individuals belonging to different ethnic groups and is therefore one of the microeconomic causes of poor economic performance (see, among others, Alesina, Baqir and Easterly, 1999; Gradstein and Justman, 2002; Gradstein, 2003 and Montalvo and Reynal-Querol, 2005a and 2005b). On the positive side microfinance membership as a signal of trustworthiness may create a virtuous circle between social capital and economic performance for borrowers (Becchetti and Conzo, 2010).

confirmed by recent empirical findings. Cassar and Wydick (2010) show in a microfinance game carried on in low income areas of five different countries (Armenia, Philippines, India, Kenya and Guatemala) that the levels of contribution are lowest in the African country and, more specifically, in Nairobi slums. Bohnet and Greig (2009) find similar results in a one shot trust game<sup>3</sup>.

The novelty of our experiment is in the investigation of the dynamics of social capital by evaluating how public good game-like activities affect changes in trustworthiness among players in trust games. To this purpose we devise a “sandwich” experiment in which the introduction of a modified Public Goods Game (hereon PGG) treatment between two trust game (hereon TG) rounds is meant to analyse the effects of the community provision of local public goods, a typical phenomenon in socioeconomic environments of developing countries like Kenya, on trust and trustworthiness. Due to the scarcity of government resources the practice of *harambee* ("let's pull together" in Swahili), that is, the local cooperation for the realisation of small infrastructures in the slums, is a well known feature in Nairobi. In this large city community fundraising and gratuitous effort provide fundamental support to build school, clinics, water spouts (Bohnet and Greig, 2009),<sup>4</sup> infrastructures like roads, bridges, systems to generate and carry electricity and churches (Wilson, 1992)<sup>5</sup>. In this respect we wonder whether and under what circumstances this practice (and, more in general, activities

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<sup>3</sup> The reasons are both structural and related to specific recent historical events (the civil unrest following the December 2007 elections). Among structural elements two main factors are the huge demographic pressure from the rural areas and the circular migration patterns which weaken the ties among slum dwellers. As documented by Beguy, Bocquier and Zulu (2010), the majority of Nairobi slum dwellers spend on average less than 3 years in the area and a quarter of them stay for less than twelve months.

<sup>4</sup> Fund raising for community projects can be either private or public. Private *harambees* typically raise funds from family and friends for funerals and weddings, college fees and medical bills. Public *harambees*, instead, raise funds for development projects of common interest such as schools, health centres and water projects.

<sup>5</sup> For an analysis of *harambee* activities carried on in Kenya between 1980 and 1999 see Transparency International Kenya (2001).

with public good game features) may affect social capital, thereby contributing to strengthen an important factor of economic development.

This paper is divided into six sections (introduction and conclusions included). In the second section we illustrate the hypothesis under investigation. In the third section we describe our experiment design. In the fourth we discuss non parametric tests and in the fifth we present and comment econometric findings. The sixth section concludes.

## **2. The role of satisfaction in PGG-like activities**

The specific hypothesis tested in our experiment is the importance of subjective satisfaction vis-à-vis standard objective measures of PGG dynamics in producing changes in social capital.<sup>6</sup>

Our investigation is motivated by the fact that the standard approach to economics relates individual utility almost uniquely to measurable objective economic outcomes (income, consumption, savings), even though the latter are only part of it. It is in fact well known that the same level of consumed goods or perceived income may generate completely different levels of satisfaction due to concurring factors related to motivation, development and side circumstances of the economic actions which led to a given objective result.

Roughly speaking, the same basket with two apples (or, in our case, the same objective payoffs in the PGG game) may correspond to completely different levels of satisfaction for the individuals who enjoy them. Such difference may be determined by the

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<sup>6</sup> The literature on determinants of life satisfaction has boomed in recent years for several reasons. First, it helped economists to investigate at aggregate level why subjective wellbeing does not always coincide with standard objective measures and, at micro level, to identify non objective factors affecting utility beyond standard objective measures. Finally, life satisfaction estimates with the compensating surplus approach provided relevant contributions on the measure of the shadow value of non market goods (for a survey see, among others, Frey and Stutzer, 2002 and 2010; Clark et al., 2006).

capacity of the objective outcome to satisfy/not satisfy complex psychological elements of individual preferences (positional competition, other-regarding preferences, conformity, search for exclusivity, kindness, etc.), heterogeneous goals and motivations of the action, its development and circumstances, perceived intentionality beyond other people decisions,<sup>7</sup> the gap between expectations and realizations or the quality of the relationships among people. Marketing managers are well aware that these non objective factors are crucial for predicting patterns of subsequent objective behavior and they use consumer satisfaction surveys as a main instrument of inquiry, together with analysis of objective evidence on actual consumption patterns.

From what considered above we understand that many factors may affect the gap between objective outcome and subjective satisfaction. The easiest and most parsimonious way to take them into account in our experiment is by asking directly satisfaction about other players' behaviour in the PGG game and testing how much it matters vis-à-vis objective characteristics in the second trust game.

Since a subjective evaluation of the experiment treatment such as PGG satisfaction cannot obviously be randomized ex ante, it may be argued that a third driver may affect the observed correlation between satisfaction itself and changes in social capital. For this reason in our experiment we control for endogeneity by: (i) randomizing ex-ante the participation to the PGG/no PGG treatment; (ii) looking at changes in trustworthiness between the two TG rounds, that is, by eliminating the effect of time invariant idiosyncratic components by use of first differences; (iii) controlling ex-post

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<sup>7</sup> Intentionality implies that appreciation for a counterpart's action depends not just on the observed choice but also on the set of the discarded alternatives. Recent empirical findings have shown for instance in gift exchange models that the same amount received can trigger more reciprocity in response when the receiver knows that the sender did it without knowing the existence of a second round (Stanca, 2008).

that balancing properties on observable characteristics are met between more and less PGG very satisfied; (iv) using propensity score weights in WLS.

It is important to underline that, even under the extreme case in which, after all these checks, we might still conceive the existence of complex unobservable components interacting with game situations (but not affecting ex-ante trustworthiness levels) and producing the observed outcome, our policy implications would remain. In fact, in order to enhance social capital creation in disadvantaged economic environments such as those examined in our experiment, our findings suggest the usefulness of identifying those individuals who, for the same given observable dynamic of public good activities, are more apt to be positively affected in terms of changes in social capital.<sup>8</sup> This identification can be done by extracting (via satisfaction surveys) subjective factors related to the process of creation of public goods. If individuals more prone to find positive elements in these activities are properly selected for participation to the most important processes of creation of public goods in crucial socio-economic frameworks (i.e. individuals to be elected in boards of collectively managed commons, in local political institutions, etc.), the learning to trust benefits arising from PGG-like activities may be magnified with significant effects on the reduction of transaction costs of social and economic relationships at a wider community level.

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<sup>8</sup>The qualifying difference between alternative interpretation of our findings (in presence or not of endogeneity) is that, if the observed significant change in social capital is produced by the PGG game, situations of that kind significantly affect the creation of social capital for the special types of (more satisfied) individuals identified in the experiment. If, on the contrary, the observed finding depends on unobservable ex-ante invariant components (endogeneity), extraction of satisfaction is fundamental to identify and select more cooperative subjects.



An interesting application of our results is in the management of common pool resources. According to established theoretical and empirical evidence (Ostrom, 1990 and 2000) the first principle which makes the difference between a “tragedy of the common” and a well managed self-organized resource regime is a “boundary rule” (i.e. the selection of a small core group of users who identify each other based on the reliability of their social attitudes). Since such successful resource regimes depend on large part from endogenous levels of trust and reciprocity, understanding how public good game activities reinforce or weaken such endogenous levels and identifying individuals for which the relationship is less strong is of fundamental importance.

### **3. Experimental design**

Experiments were conducted in July-August 2010 in Kibera (Nairobi, Kenya), the second biggest slum in the world. For this project we created a sample of 404 randomly selected slum dwellers. The experiment consists of two identical *individual* sessions (trust games) where participants play the game face-to-face only with the instructors, and an in-between *group* session, where participants interact also with their peers in groups of four members each (public good game). The sequence of the sessions is: (i) *Trust Game 1* (TG1) aimed at measuring ex-ante trust and trustworthiness levels (individual session); (ii) *Modified Public Good Game* (PGG) aimed at observing cooperation dynamics over five rounds (group sessions); (iii) *Trust Game 2* (TG2) in which participants repeat the TG1; (iv) demographic survey (see Figure 1). In order to prevent confounding effects 100 individuals participate only to the two trust games without being involved in the PGG: we call this sample the “control” group. In this

way we are able to casually attribute any change in the players' trust/trustworthiness (from the first to the second trust game) to the outcomes of the PGG group sessions.

Experiments have been carried on by local field assistants who have been informed about details and procedures only after the selection of the sample and just before the beginning of the games. This was meant to avoid potential word-of-mouth phenomena and strategic or collusive behaviour among players. In each session experimenters have been rotating for two reasons: (i) to exclude confounders such as psychological pressure when playing two rounds with the same experimenter; (ii) to prevent a possible bias arising from different experimenters' attitudes or their previous relationships with some players.

Players ignored both the sequence of the games and the payoffs of the first trust game (but not that of the PGG) until the end of the whole experimental session. The following subsections explain the games in detail.

### *3.1 Trust Game*

Our trust games are standard two-player investment games (see Berg, Dickhaut and McCabe, 1995) where players are matched with a counterpart of unknown identity. People selected to be trustors receive 50 Kenyan shillings at the beginning of each TG and have to decide how much to give to the counterpart (trustee), knowing that this value gets tripled. Those selected to be the trustees receive an initial endowment of 50 Ksh well and have to decide ex-ante, without knowing the amount sent by the trustor, how much to give back to the first player. The use of this "strategy method" allows carrying on the experiment in a non-simultaneous framework without any loss of

information about the trustee's overall response strategy.<sup>9</sup> Ex-post surprise questions capture the so-called first and second order beliefs (respectively FOBs and SOBs).

### 3.2 *Public good game*

We rely on a modified version of the public good game<sup>10</sup> where players face a trade-off between individual and collective benefits. This variant is usually referred to as *Common-Pool Resource game*<sup>11</sup>.

We randomly compose 76 groups of four people each (304 people in total) who sit in a circle around a pile of 600 KSh (€ 6.18 in the month of the experiment). Participants are allowed to withdraw any amount between zero and 150 KSh from the pile and keep it, the amount left being doubled and divided equally among the four participants. In order to replicate a simultaneous setting each player writes down on a sheet how many KSh he/she wants to withdraw. Then, experimenters make the calculations and write down the individual payoffs: that is, the sum of the withdrawn amount and one fourth of the common capital (the money left by all players multiplied by two)<sup>12</sup>. The PGG is repeated five times but the number of rounds is known only to

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<sup>9</sup> On pros and cons about using the strategy method vis-à-vis actual choices see, among others, Brandts and Charness (2000); Cason and Mui (1998) and Casari and Cason (2009).

<sup>10</sup> Camerer and Fehr (2003) summarize some stylized facts: in one-period PGG most subjects contribute either everything or nothing, the average being roughly half the endowment, while in repeated games the average contribution declines. An important determinant of players' contribution is their expectation about other people's behaviour in the game (Fischbacher, Gächter and Fehr, 2002). Therefore, the disappointment about the other people's cooperative behaviour determines a progressive decline in players' behaviour. On the contrary, when players are allowed to punish their counterpart the pattern is reversed (Gächter and Fehr, 2001).

<sup>11</sup> See Henrich and Smith (2004) for a Common Pool Resource field experiment among tribes of the Peruvian Amazon.

<sup>12</sup> Experimenters explain the game with few examples highlighting different potential scenarios. We do not believe that such examples may enhance strategic learning among players since the latter do not know other player's strategy but simply the potential payoff distributions in some of the potential scenarios. Moreover, since the game may sound too unfamiliar to them, we have to help them anyway in achieving a fair level of comprehension necessary to participate in the game.

experimenters. Players are informed at the beginning of the game that they will be paid just for one randomly-chosen round.

In order to control for public approval/fear of punishment half of the sample, 38 out of the 76 groups, play the game in the anonymous/private version (PGG-A, where each person does not see how much the other players receive), the remaining half playing in the non-anonymous/public version (PGG-NA). In the PGG-A, the experimenter calculates the payoffs and distributes the money in envelopes while in the PGG-NA each player has to announce how much he/she decides to withdraw and payments are visible to everybody.<sup>13</sup> To be sure that all participants fully understand the other players' payoffs, these are announced by the experimenter at the end of each round. During the five rounds payments are made with fiches and reported on a sheet with its corresponding round number (from 1 to 5). At the end of the whole game each player extracts a number from a black bag containing numbers from 1 to 5. The number extracted will indicate the round for which the player's payoff gets converted into real money.<sup>14</sup>

As in most field experiments the maximum potential payoff (800 Ksh from the two trust games, the public good game, and survey and show up fees) is very high on relative terms. The amount at stake is roughly the average weekly wage in the area

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<sup>13</sup> A main difference between our common pool resource game and standard PGGs is that we depart from a fully anonymous setting and let players see each other. This procedure is intended to mimic more closely the reality of common pool management in a given area where individuals know each other. Our A/NA variant is intended to allow for the two reasonable possibilities that players are or not perfectly informed about non cooperative behaviour of other members due to the presence/absence of a monitoring process.

<sup>14</sup>We deem such complexity necessary in order to measure the change in trustworthiness determined by (anonymous or not anonymous) group activities in which participants may experience the opportunistic behaviour of the other participants. Consider in fact that a simple multistage dynamic TG, in which round specific payoffs are revealed at the end of each stage (hence without strategy method), would have made impossible the verification of the net effect of the group activity on trustworthiness of TG participants. This is because, in the second round of the TG, the players' behaviour would have been affected not just by the impact of the PGG game experience but also by the outcomes of the first round of the TG revealed to the players.

which, considering also the low local standard of living, ensures that players will take seriously monetary rewards in the game.<sup>15</sup>

## 4. Descriptive statistics

### 4.1 Description of the variables used and summary statistics of the whole sample

Tables 1a and 1b describe respectively the variables related to the trust and public good games and the socio-economic variables used as controls in the regression analysis, while Table 2a provides socio-demographic summary statistics. Participants to the experiment are very young and gender is balanced in the sample. The majority of them are single. Average schooling years are eleven, unemployment rate and employment in the informal sector are high with several ethnic groups living in the same district. Half of the sample volunteers more than once a month and/or is member of a microfinance institution. Impatience, risk and betrayal aversion<sup>16</sup> are frequent psychological attitudes.

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<sup>15</sup> Average weekly salaries are extremely low and a relevant share of the sample is unemployed. Furthermore, in Nairobi slums around 50 percent of adult and child population face hunger and, more generally, around 70 percent live below the poverty rate (Faye, Baschieri, Falkingham and Muindi, 2010).

<sup>16</sup>By collecting experimental measures of betrayal aversion, Bohnet and Greig (2008) show that individuals are generally less willing to take risks when the uncertainty is due to another person rather than nature. In order not to complicate further the game and expose participants to an additional (and stressful) experimental activity, we collect survey measures of betrayal aversion by asking questions on negative reciprocity (see the questionnaire in the appendix). Those measures should be proxy for betrayal aversion as argued by Fehr (2010), “[...] *Betrayal aversion means that people dislike non-reciprocated trust [...] People with a strong preference for negative reciprocity (i.e., a preference for punishing non-reciprocal behavior) are, ceteris paribus, more likely to feel betrayed in case of non-reciprocated trust [...]*” (p. 247). In the questionnaire betrayal aversion is calculated by looking at the level of consent to the following two questions: i) *If I suffer a serious wrong, I will take revenge as soon as possible, no matter what the costs;* ii) *If someone offends me, I will also offend him/her.*

Table 2b contains summary statistics of the variables related to the experiment. The amount given by the trustor (around 25 Ksh) is roughly the same in the first and second trust game. Hence, the change from the first to the second session is on average zero but ranges from -30 to +45, with a standard deviation equal to 8.61.<sup>17</sup> During the five sessions of the public good game players withdraw around 69 percent of their money from the common pile, ranging from a minimum of 23 to a maximum of 97 percent. The difference between the amount withdrawn by the player and the average of her/his group varies significantly (standard deviation equal to 26.63 Ksh.).

The declared level of players' satisfaction in the public good game can range from a minimum of one (not at all satisfied) to a maximum of five (top satisfied). We aggregate the five classes into three categories, very satisfied (score four or five), followed by pretty satisfied (score three) and not satisfied (score one or two). The level of satisfaction about the outcome of the public good game is high, since 70 percent of players declare themselves very satisfied, 19 percent pretty satisfied and only 11 percent not satisfied.

#### *4.2 Balancing properties*

We test non parametrically whether there are significant differences among the three groups (Table 3a). When comparing very satisfied versus the rest of the sample we find that the former are younger and married in higher proportion (p-value around

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<sup>17</sup>This first descriptive results suggest some insights for the debate on the persistence of social capital. According to some authors social capital does not vary much in the short run and its geographical distribution is affected by long run historical phenomena (Guiso et al., 2008). However our descriptive evidence shows that short run aggregate invariance (confirmed by our findings) may conceal relevant changes at individual level whose determinants deserve further inquiry.

.03), while betrayal averse<sup>18</sup> in lower proportion. When comparing very satisfied and pretty satisfied versus non satisfied we find that the latter are more risk averse, less betrayal averse, have higher propensity to volunteer and higher food expenditure per day (p-values between .01 and .05). Note however that, when we compare very satisfied versus non satisfied (excluding pretty satisfied from the sample), the null of no difference on the observed characteristics is never rejected at 5 percent level.

In Table 3b we look at balancing properties in the randomization of participants to the PGG and the control group and do not find significant differences for any of the considered variables.

#### *4.3 The PGG behavior*

The dynamic behaviour of all subjects in the PGG documents that cooperation decreases over rounds, with cooperation being measured in each round at individual level as players' withdrawal ratio ( $\$ \text{ withdraw}/150$ ) and at group level as the left-in-the-pot ratio ( $\$ \text{ left by the group}/600$ ). The decrease is however much smaller than what usually observed, consistently with the fact that we do not inform participants about the number of PGG rounds in order to avoid PGG end game effects on social capital formation.<sup>19</sup> The mean withdrawal ratio is on average 68.6 percent, moving from 65.2 in the first to 70.7 percent in the fifth round. Participants seem to observe the behaviour of the group members and react strategically to it: if one or more than one defect in a round, others also do in the following round. The overall scarce degree

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<sup>18</sup>For details on how the betrayal averse variable is defined see footnote 16.

<sup>19</sup> We take this decision since, consistently with the goal of mimicking the effect of ongoing PGG-like activities on social capital formation, we prefer not to introduce the influence on the latter of PGG end game effects.

of cooperation in our sample is consistent with the one found by Cassar and Wydick (2011).

When comparing the two PGG treatments, we find that the decrease in cooperation is larger when the anonymity condition is removed. Withdrawal ratios in fact increase over rounds more when players are informed about peers' withdrawal decisions and payoffs in each round; similarly, the amount left in the pot decreases more over rounds in the non-anonymous PGG than over rounds in anonymity.

#### *4.4 Hypothesis testing*

When we look at levels of trustworthiness in the two different TG rounds and the change in trustworthiness between the two TGs (before and after the PGG) we find that PGG satisfaction significantly affects the change, even though it does not produce the same effect on trustworthiness levels (Table 4a). This is because PGG very satisfied start with lower trustworthiness levels in the first round and end up with higher levels in the second round vis-à-vis the rest of the sample. More specifically, when we compare very satisfied versus rest of the sample we find that the former have a change of .33 Ksh against a -5.85 of the latter with the difference being highly significant (p-value .004). The two values are -10.81 against -.002 (p-value .004), if we compare non satisfied with rest of the sample, .33 against -10.34 (p-value .003) if we compare very satisfied versus non satisfied (excluding pretty satisfied from the sample) and, consequently, -10.34 against -.02 (p-value .004) when we compare very and pretty satisfied versus the rest of the sample. Note that the maximum difference between two groups of differently PGG very satisfied players is around 10 Ksh, that is, about 25 percent of the (pre-PGG) first TG level of trustworthiness in the overall sample. Since we use the strategy method in the TG to extract trustees' contributions,



results reported above refer to averages of responses conditional to the 10 possible trustors' contributions (from 5 to 50 Ksh). When we repeat the non parametric tests on each individual trustee's conditional response we find that PGG satisfactions make a difference for trustors contributions between 10 and 30 (with p-values below 0.01) (Table 4b).

## **5. Econometric findings on the determinants of trustworthiness dynamics across TG rounds**

In presence of a well-structured randomization process parametric and non parametric tests are usually considered as sufficient empirical evidence by experimentalists. Nevertheless, we decide to perform econometric estimates because we want to evaluate the magnitude of our effects, isolate them from other confounding factors and control for the anonymity/non anonymity feature of the PGG. In Table 5a we report a baseline regression in which we test the effect of three main variables (the first TG contribution, anonymity of the PGG treatment and control dummy) on the change in trustworthiness between the two PGG rounds with inclusion/omission of all the socio-demographic variables listed in Table 1a. The negative coefficient of the first round contribution suggests the existence of a convergence mechanism which makes the more "generous" players in the first round increase less. Finally, everything else being equal, not having participated to the PGG negatively affects the change in contribution from the first to the second trust game. This suggests a positive effect of the PGG on the process of creation of social capital. The only significant (negative) variable among socio-demographic controls is daily food expenditure, probably documenting that the marginal utility of money is lower for less poor players. In

Table 5b we restrict the sample to the treatment group and introduce subjective (very satisfied and pretty satisfied dummies) and objective (individual and group withdrawal ratios, individual payoffs) PGG indicators controlling as well for ethnic and gender fragmentation with and without the inclusion of socio-demographic variables.<sup>20</sup> We find that subjective indicators are significant (positive effect of PGG satisfaction with a magnitude of more than 8Ksh, roughly equal to the variable's standard deviation) while objective indicators are not. Among other regressors note that gender fragmentation has a strong economic impact (in line with Bohnet and Greig, 2009), even though it is significant only at 10 percent level).

Table 5c provides a robustness check of our main results by using alternative *relative* objective indicators as controls (ranking in withdrawal ratios, average and specific round differences between individual and group contributions and payoffs). Objective indicators remain not significant while the significance of subjective indicators is unaltered.<sup>21</sup>

Tables 6a and 6b illustrate how econometric results on average trustees' contributions translate into results on trustees' conditional responses for two of the specifications adopted in estimates reported (Tables 5b, columns 4 and 5). The area of the strongest significance of the PGG very satisfied dummy (p-value below .001) is for trustors contributions between 5 and 35Ksh, consistently with evidence from non parametric tests (the highest magnitude is around 12Ksh in correspondence of trustor contribution of 30 Ksh). The significance of the pretty satisfied dummy is weaker and the magnitude is smaller (with the exception of the right end estimates where the

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<sup>20</sup> Results on socio-demographic variables are omitted for reasons of space. Full details on these results are available upon request.

<sup>21</sup> We also check directly in a separate estimate whether PGG satisfaction is affected by demographics and objective outcomes of the game and find that it is not. The interpretation being again that subjective satisfaction may be idiosyncratic or it may depend from many non objective factors (see section 2) Since none of the regressors is significant results are omitted and available upon request.

magnitude is higher but significance declines). Results on trustees conditional contributions for different specifications are omitted for reasons of space and available upon request.

A potential source of bias in the previous estimates may come from selection. For example, individuals with better pro-social attitudes may be more likely to declare a higher satisfaction level about the PGG with respect to individuals with worse ones. In order to control for this and similar sources of bias, we re-estimate the models 11 and 12 of Table 5b with Weighed Least Squares (WLS) where the weights are the inverse of the individuals' propensity score of PGG satisfaction.<sup>22</sup> More specifically, in a first specification we exclude PGG pretty satisfied individuals and estimate on the remaining sample the propensity score (PS) of reporting a high satisfaction level (variable *PGG very satisfied*)<sup>23</sup>; then we use the PS measure to weight the outcome regression of PGG very satisfied on the change in trustee's average trustworthiness between the two TG rounds ( $\Delta TG$ ). As a second specification we compute the propensity score measure using as dependent variable a dummy equal to one if individuals were pretty or very satisfied (*satisfied*) and then we compute the outcome WLS regression of the latter on  $\Delta TG$ . Results in Table 7 highlight two important facts, i.e. i) variables proxy for pro-social characteristics do not have predictive power on declared satisfaction, and ii) the positive effect of PGG satisfaction on the change in trustworthiness is confirmed either both when excluding PGG pretty satisfied

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<sup>22</sup>In particular, for each individual, the weights are:  $\frac{s}{pscore_{(s)}} + \frac{1-s}{1-pscore_{(s)}}$ , where *pscore* is a non-parametric estimate of the propensity score and *S* is the satisfaction dummy (PGG very satisfied or satisfied). For details on this strategy see, among others, Blattman and Annan (2010) and Hirano, Imbens and Ridder (2003).

<sup>23</sup> Note that for the computation of the propensity score we use also variables that can be proxy of the individuals' pro-social characteristics such as a trust index (constructed using the GSS questions on trust) and a sociability dummy (see Fehr, 2010). Further details about these variables are reported in the variable legend (Table 1).

(columns 1-2) and when pretty and very satisfied are jointly summarized in the broader defined *satisfied* variable (columns 3-4). These results support us in claiming the robustness of our baseline estimates to selection.

## **6. Conclusions**

We investigate with a “sandwich” experiment how public good activities affect changes in social capital in the Nairobi slum of Kibera, one of the poorest socioeconomic contexts in which previous research documented that social capital is at its lowest levels around the world. Results of our experiment document that limiting oneself to the use of objective PGG results to predict future objective outcomes in terms of social capital creation is extremely poor since it rules out essential invisible non objective factors which crucially drive future trust game behavior.

The contribution of the paper is twofold. First, from an experimental economics viewpoint it documents the strong explanatory power of subjective satisfaction when measuring the effect of PGG activities on changes in social capital. Second, it suggests from a normative point of view that satisfaction measures may help to select individuals whose participation to public good activities may maximise effects in terms of social capital creation.

We believe that interesting implications may be drawn from our policy experiment since there are several reasons why our PGG treatment mimics features which are important for the local socioeconomic environment. Roads, water and sanitation are provided in these slums by local infrastructure community development projects in PGG-like situations in which where people from local community donate money and/or labour in order to build the public good. Second, all individuals in Kenya experience

widespread political corruption which may be viewed as an extreme of the opportunistic behaviour of participants to PGG. In this respect information on subjective satisfaction may be useful to predict dynamics of social capital formation and to identify individuals who may magnify effects of cooperation in public good activities. Selection of such individuals may be crucial to identify management positions in political and economic processes or to develop pilot development projects aimed at create virtuous circles between public good management and social capital. Third and final, our findings support the hypothesis that boundary rules are important to design grass-root management of the commons, consistently with the well known theoretical literature on this point. In this respect they document the validity of a subjective satisfaction based selection rule which may help to reinforce links between public good management and endogenous creation of social capital, which is fundamental to make the governing processes of common resources self-sustainable.

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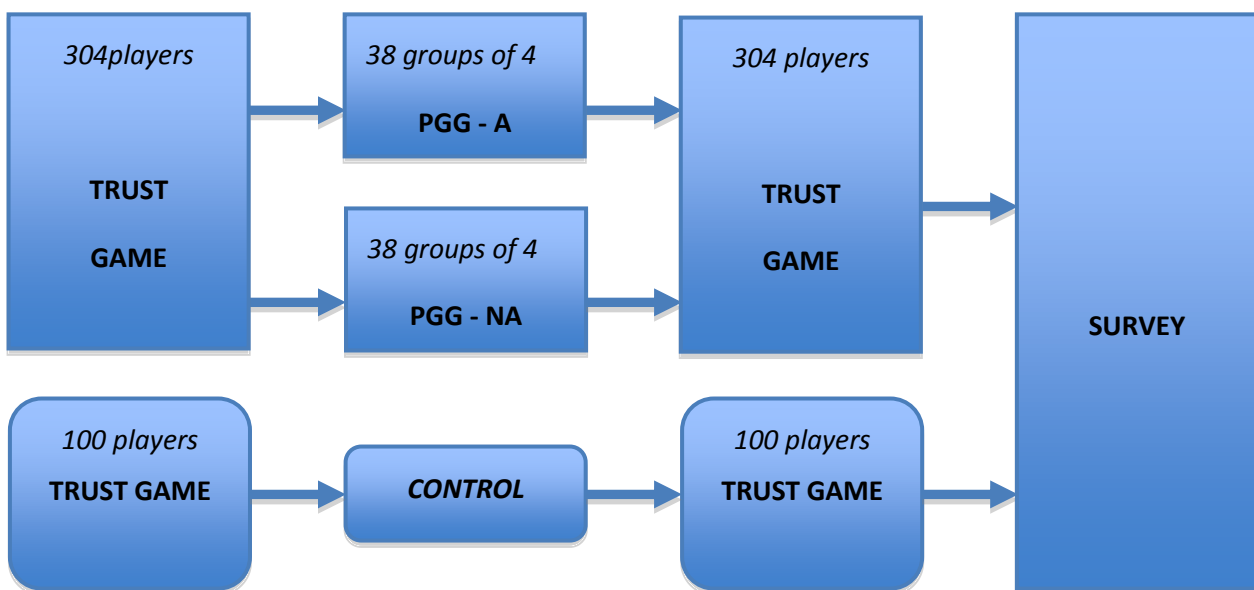
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**Figure 1. The experiment design**





**Table 1. Variable legend**

1a. Experiment variables		1b. Socio-demographic variables	
Trustee	Dummy variable (DV)= 1 if the respondent played as trustee in the TG	Age	Respondent's age
TG1	Player's contribution in the I round of trust game	Female	DV=1 if the respondent is female
TG2	Player's contribution in the II round of trust game	Married	DV=1 if the respondent is married
ΔTG	Difference between the player's contribution in the second and first round of the trust game	Widowed	DV=1 if the respondent is widowed
PGG Withdrawal ratio	Amount withdrawn by the participant in the PGG divided by the maximum the individual can withdraw (150 KSh)	Separated	DV=1 if the respondent is separated
PGG Group withdrawal ratio	Amount withdrawn by the three remaining participants in the PGG divided by the maximum they can withdraw (450 KSh)	Years of schooling	Respondent's years of schooling
PGG Diff Group R1	Difference between the amount withdrawn by the player and the average amount withdrawn by the other players in the 1st round of the PGG	Children	Number of children
PGG Diff Group R2	Difference between the amount withdrawn by the player and the average amount withdrawn by the other players in the 2nd round of the PGG	House members	Number of house components
PGG Diff Group R3	Difference between the amount withdrawn by the player and the average amount withdrawn by the other players in the 3rd round of the PGG	Food expenditure day	daily food expenditure for the respondent's family
PGG Diff Group R4	Difference between the amount withdrawn by the player and the average amount withdrawn by the other players in the 4th round of the PGG	Unemployed	DV= 1 if the respondent is unemployed
PGG Diff Group R5	Difference between the amount withdrawn by the player and the average amount withdrawn by the other players in the 5th round of the PGG	Kikuyo	DV=1 if the respondent is from the ethnic group "Kikuyo"
PGG Mean Diff Group	Average difference between the amount withdrawn by the player and the average amount withdrawn by the other players in the five rounds of the PGG	Luo	DV=1 if the respondent is from the ethnic group "Luo"
PGG NA	DV=1 if the respondent participates in the PGG non-anonymity treatment	Lubian	DV=1 if the respondent is from the ethnic group "Lubian"
PGG Very Satisfied	DV =1 if the the participant to the PGG declared a satisfaction level in the game equal to 4 or 5	Luhya	DV=1 if the respondent is from the ethnic group "Luhya"
PGG Pretty Satisfied	DV =1 if the the participant to the PGG declared a satisfaction level in the game equal to 3	Muslim	DV=1 if the respondent is Muslim
Trust index	Average of the answers to the five questions on trust	Mfi	DV= 1 if the respondent is member of a microfinance institution
Sociability	DV = 1 if the respondent devotes time to friends, leisure time and cultural events on a weekly or daily basis	Volunteer	DV= 1 if the respondent volunteers more than once a month
Friends	Number of people known by name in the PGG	Risk averse	DV=1 if the respondent is risk averse (has chosen lotteries with the payoffs at closer distance - see questionnaire)
Ethnic fragmentation	Ethnic fragmentation index in PGG groups measuring the likelihood that four randomly drawn members belong to different ethnic groups = $1 - \sum(\text{fraction of members belonging to each of the ethnic groups})^2$ . NB: if =0, fully ethnic-homogeneous group; if =1, fully ethnic-heterogeneous group	Sociability	DV= 1 if the if the respondent meets at least daily or weekly with "friends, relatives, or neighbors (see questionnaire).
		Betrayal averse	DV= 1 if the respondent is more betrayal averse. Betrayal aversion is "high" if respondents circle on average 6-7 on the Likert Scale for negative reciprocity (see questionnaire).
Gender fragmentation	Gender fragmentation index in PGG groups measuring the likelihood that four randomly drawn members belong to different gender groups = $1 - \sum(\text{fraction of members belonging to each of the two gender groups})^2$ . NB: if =0, fully gender-homogeneous group; if =0.50, fully gender-heterogeneous group	Impatient	DV=1 if the respondent is highly impatient (has chosen the lottery with payoffs at higher distance, i.e. need higher payoff in the future to be willing to wait - see questionnaire)
Control	DV=1 if the respondent has not played the PGG between the two TGs	PGG payoff	Respondent's payoff for the PGG randomly selected round.

**Table 2: Summary statistics**

<b>2a. Experimental variables</b>						<b>Socio-demographic variables</b>		
<b>Variable</b>	<b>Obs.</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>	<b>Variable</b>	<b>Obs.</b>	<b>Mean</b>
TG1	202	24.16	11.25	5	60	Age	404	27.84
TG2	201	25	11.17	5	50	Female	404	0.52
$\Delta$ TG	201	0.82	8.61	-30	45	Married	404	0.33
PGG Withdrawal ratio	303	0.69	0.25	0	1	Widowed	404	0.04
PGG Group withdrawal ratio	303	0.69	0.17	0.23	0.97	Separated	404	0.05
PGG Diff Group R1	303	0.17	39.55	-112.5	112.5	Years of schooling	403	11.33
PGG Diff Group R2	303	0	34.53	-103.75	112.5	Children	404	1.36
PGG Diff Group R3	303	0.1	37.39	-110	112.5	House members	404	4.53
PGG Diff Group R4	303	0.18	35.23	-101.25	112.5	Food expenditure day	403	269
PGG Diff Group R5	303	0.14	37.88	-112.5	112.5	Unemployed	404	0.25
PGG Mean Diff Group	303	0.12	26.63	-75	112.5	Kikuyo	404	0.09
PGG NA	303	0.51	0.5	0	1	Luo	404	0.4
PGG Very Satisfied	303	0.7	0.46	0	1	Lubian	404	0.15
PGG Pretty Satisfied	303	0.19	0.39	0	1	Luhya	404	0.19
Trust index	401	1.87	0.48	1	3.4	Muslim	404	0.22
Sociability	403	0.76	0.43	0	1	Mfi	404	0.52
Friends	403	0.3	0.63	0	3	Volunteer	404	0.41
Ethnic fragmentation	303	0.55	0.15	0	0.75	Risk averse	404	0.46
Gender fragmentation	303	0.4	0.11	0	0.5	Betrayal averse	404	0.22
						Impatient	404	0.45
						Trustee	404	0.5

**Table 3a: Non-parametric tests of the difference in mean for groups of different satisfaction w.r.to the PGG**

	<i>Group</i>	<b>A. Very sat. (1) vs rest of sample (0)</b>			<b>B. Very and Pretty sat. (1) vs Not sat. (0)</b>			<b>C. Very sat. (1) vs Not sat. (0)</b>		
		<i>Obs.</i>	<i>Mean</i>	<i>z, p</i>	<i>Obs.</i>	<i>Mean</i>	<i>z, p</i>	<i>Obs.</i>	<i>Mean</i>	<i>z, p</i>
<i>Age</i>	0	47	30.35	2.33	73	26.99	-0.79	23	30.40	1.28
	1	105	27.22	0.02	129	27.79	0.43	105	27.22	0.20
<i>Female</i>	0	47	0.53	-0.34	73	0.48	-1.29	23	0.43	-1.10
	1	105	0.56	0.73	129	0.57	0.20	105	0.56	0.27
<i>Married</i>	0	47	0.47	2.31	73	0.36	0.55	23	0.43	1.49
	1	105	0.28	0.02	129	0.32	0.58	105	0.28	0.14
<i>Separated</i>	0	47	0.13	1.49	73	0.05	-0.61	23	0.09	0.53
	1	105	0.06	0.14	129	0.08	0.54	105	0.06	0.59
<i>Widowed</i>	0	47	0.02	-0.54	73	0.05	0.83	23	0.04	0.12
	1	105	0.04	0.59	129	0.03	0.41	105	0.04	0.90
<i>Years of schooling</i>	0	47	10.87	-0.07	73	11.74	2.09	23	11.39	0.70
	1	105	11.10	0.94	129	10.97	0.04	105	11.10	0.48
<i>House members</i>	0	47	4.68	-0.59	73	4.08	-2.13	23	4.61	-0.50
	1	105	4.78	0.56	129	4.77	0.03	105	4.78	0.62
<i>Food expenditure day</i>	0	47	0.70	0.88	73	0.49	-2.08	23	0.70	0.60
	1	105	0.63	0.38	129	0.64	0.04	105	0.63	0.55
<i>Unemployed</i>	0	47	0.55	1.64	73	0.56	1.63	23	0.52	0.98
	1	105	0.41	0.10	129	0.44	0.10	105	0.41	0.33
<i>Muslim</i>	0	47	0.26	1.20	73	0.18	-0.40	23	0.17	0.03
	1	105	0.17	0.23	129	0.20	0.69	105	0.17	0.98
<i>Mfi now</i>	0	47	0.38	-1.06	73	0.34	-1.69	23	0.35	-1.12
	1	105	0.48	0.29	129	0.47	0.09	105	0.48	0.26
<i>Volunteer</i>	0	47	0.64	0.66	73	0.36	-3.17	23	0.65	0.63
	1	105	0.58	0.51	129	0.59	0.00	105	0.58	0.53
<i>Risk averse</i>	0	47	0.17	0.94	73	0.27	3.01	23	0.26	1.82
	1	105	0.11	0.35	129	0.11	0.00	105	0.11	0.07
<i>Betrayal averse</i>	0	47	0.34	-2.62	73	0.34	-2.42	23	0.39	-1.56
	1	105	0.57	0.01	129	0.52	0.02	105	0.57	0.12

Legend: The third comparison (C) is between the sample of very satisfied vs that of not satisfied, without considering the pretty satisfied individuals.

**Table 3b. Non-parametric tests for difference in mean: PGG participants (1) vs. control (0)**

<b>Variable</b>	<b>Group</b>	<b>Obs.</b>	<b>Mean</b>	<b>z, p</b>
Age	1	50	25.41	-1.76
	0	152	28.18	0.08
Female	1	50	0.50	-0.65
	0	152	0.55	0.52
Married	1	50	0.32	-0.20
	0	152	0.34	0.84
Separated	1	50	0.04	-0.94
	0	152	0.08	0.35
Widowed	1	50	0.06	0.85
	0	152	0.03	0.40
Years of schooling	1	50	11.90	2.06
	0	152	11.03	0.04
Foodexpenditureday	1	50	254.90	0.07
	0	151	249.27	0.94
Kikuyo	1	50	0.08	-0.12
	0	152	0.09	0.90
Luo	1	50	0.42	-0.01
	0	152	0.42	0.99
Lubian	1	50	0.14	0.53
	0	152	0.11	0.59
Luhya	1	50	0.24	0.86
	0	152	0.18	0.39
Muslim	1	50	0.18	-0.27
	0	152	0.20	0.79
Mfi	1	50	0.58	1.54
	0	152	0.45	0.12
Volunteer	1	50	0.34	-1.33
	0	152	0.45	0.18

**Table 4a. Non-parametric tests of the difference in mean of trustees' contribution for groups of different satisfaction w.r.to the PGG**

		TG1		$\Delta$ TG	
		0	1	0	1
<b>Very sat. (1) vs rest of sample (0)</b>	<i>Obs</i>	47	105	47	105
	<i>Mean</i>	43.91	40.56	-5.85	0.33
	<i>Non-par test (z, p)</i>	1.81	0.07	-2.09	0.04
<b>Very sat. (1) vs not sat. (0) (excluding pretty sat)</b>	<i>Obs</i>	23	105	23	105
	<i>Mean</i>	43.91	40.56	-10.34	0.33
	<i>Non-par test (z, p)</i>	1.81	0.07	-2.11	0.03
<b>Very and pretty sat. (1) vs rest of sample (0)</b>	<i>Obs</i>	23	129	23	129
	<i>Mean</i>	44.55	41.06	-10.34	-0.02
	<i>Non-par test (z, p)</i>	0.79	0.43	-2.06	0.04
<b>Not sat. (1) vs rest of sample (0)</b>	<i>Obs</i>	130	22	130	22
	<i>Mean</i>	40.96	45.33	-0.02	-10.81
	<i>Non-par test (z, p)</i>	-1.06	0.29	2.10	0.04

**Table 4b. Non-parametric tests of the difference in mean of trustees' contribution for groups of different satisfaction w.r.to the PGG (conditional trustees' responses)**

	<i>Group</i>	Very satisfied (1) vs rest of sample (0)			Very sat. (1) vs No sat. (0) (excl. Prettysat.)			Very and Pretty sat. (1) vs. rest of sample (0)		
		<i>Obs.</i>	<i>Mean</i>	<i>z, p</i>	<i>Obs.</i>	<i>Mean</i>	<i>z, p</i>	<i>Obs.</i>	<i>Mean</i>	<i>z, p</i>
<i>TrSend 5</i>	0	47	-2.28	-0.84	23	-2.30	-1.10	23	-2.30	-1.14
	1	105	-2.59	0.40	105	-2.59	0.27	129	-2.52	0.25
<i>TrSend 10</i>	0	47	-4.47	-4.49	23	-5.74	-3.77	23	-5.74	-3.43
	1	105	-0.69	0.00	105	-0.69	0.00	129	-1.16	0.00
<i>TrSend 15</i>	0	47	-4.93	-3.32	23	-7.00	-3.11	23	-7.00	-2.96
	1	105	0.57	0.00	105	0.57	0.00	129	-0.09	0.00
<i>TrSend 20</i>	0	47	-6.34	-3.44	23	-9.87	-3.16	23	-9.87	-2.94
	1	105	1.65	0.00	105	1.65	0.00	129	0.79	0.00
<i>TrSend 25</i>	0	47	-7.12	-3.75	23	-10.87	-3.18	23	-10.87	-2.87
	1	105	1.67	0.00	105	1.67	0.00	129	0.70	0.00
<i>TrSend 30</i>	0	47	-9.96	-3.53	23	-13.43	-2.42	23	-13.43	-2.01
	1	105	1.68	0.00	105	1.68	0.02	129	0.13	0.04
<i>TrSend 35</i>	0	47	-7.62	-1.65	23	-13.70	-1.47	23	-13.70	-1.35
	1	105	-0.95	0.10	105	-0.95	0.14	129	-1.10	0.18
<i>TrSend 40</i>	0	47	-6.06	-1.33	23	-13.65	-1.38	23	-13.65	-1.32
	1	105	0.65	0.18	105	0.65	0.17	129	0.75	0.19
<i>TrSend 45</i>	0	47	-5.76	-0.76	23	-13.11	-0.89	23	-13.11	-0.85
	1	105	1.63	0.45	105	1.63	0.37	129	1.57	0.39
<i>TrSend 50</i>	0	47	-4.00	-0.13	23	-13.70	-0.75	23	-13.70	-0.83
	1	105	-0.29	0.90	105	-0.29	0.45	129	0.75	0.40

**Table 5a: Baseline regression, full sample (control group included)**

<b>Regressor</b>	<b>Coef.</b>	<b>S.E.</b>	<b>Coef.</b>	<b>S.E.</b>
Constant	22.84***	9.02	19.13***	3.78
Age	-0.17	0.15		
Female	1.31	1.62		
Married	0.90	1.82		
Widowed	3.20	4.45		
Separated	1.23	3.45		
Years of schooling	-0.09	0.34		
House members	-0.28	0.38		
Food expenditure day	0.01**	0.01		
Unemployed	1.85	2.02		
Kikuyo	-3.55	3.05		
Luo	1.02	2.43		
Lubian	-4.43	3.48		
Luhya	0.40	2.51		
Muslim	2.30	3.15		
Mfi	-0.27	1.80		
Volunteer	1.31	1.78		
Risk averse	-3.50*	1.87		
Betrayal averse	-3.31	2.44		
Impatient	0.72	1.57		
TG1	-0.51***	0.09	-0.48***	0.09
PGG NA	0.21	1.99	-0.23	1.93
Friends	-0.70	1.05	-1.05	1.07
Control	-4.65**	2.12	-3.31*	1.81
N	201		202	
R <sup>2</sup>	0.4132		0.3405	

Note: Regressions are run with OLS and clustered robust standard errors and include all the trustees, including those who did not participate the PGG (control group). The dependent variable is the change in average trustee's contribution from the first to the second TG.

**Table 5b. PGG individual and group withdrawal ratios, only treatment sample**

<b>Regressor</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>	<b>(5)</b>	<b>(6)</b>	<b>(7)</b>	<b>(8)</b>	<b>(9)</b>	<b>(10)</b>	<b>(11)</b>	<b>(12)</b>
PGG NA	0.552 (2.195)	1.103 (2.074)	1.863 (1.916)	1.841 (1.979)	2.391 (1.838)	1.705 (2.002)	-0.918 (2.063)	-0.431 (2.020)	0.421 (1.844)	-0.0301 (1.935)	0.544 (1.823)	-0.0758 (1.940)
Friends	-1.106 (1.070)	-1.072 (1.085)	-1.017 (1.021)	-1.012 (1.023)	-1.176 (1.020)	-1.244 (1.049)	-1.043 (1.090)	-0.983 (1.090)	-0.948 (1.081)	-0.936 (1.088)	-0.982 (1.075)	-1.136 (1.112)
TG1	-0.477*** (0.0902)	-0.467*** (0.0905)	-0.460*** (0.0843)	-0.461*** (0.0850)	-0.464*** (0.0846)	-0.469*** (0.0841)	-0.472*** (0.0983)	-0.463*** (0.0998)	-0.455*** (0.0929)	-0.453*** (0.0922)	-0.456*** (0.0931)	-0.461*** (0.0929)
Ethnic fragmentation		-2.433 (7.426)	0.0867 (7.297)	0.266 (7.488)	0.554 (7.504)	0.887 (7.735)		-2.852 (5.611)	-1.515 (5.885)	-1.894 (5.861)	-1.338 (5.894)	-1.403 (5.876)
Gender fragmentation		-14.34* (8.648)	-14.56 (8.858)	-14.97* (8.780)	-15.32* (8.828)	-15.98* (8.555)		-13.92* (7.819)	-13.16* (7.559)	-13.05* (7.735)	-13.31* (7.586)	-13.56* (7.533)
PGG withdrawal ratio	-2.324 (6.328)	-2.728 (6.411)		-2.631 (6.160)		-9.682 (7.742)	-5.199 (6.126)	-5.513 (6.143)		-4.821 (5.950)		-10.78 (6.793)
PGG group withdrawal ratio	5.091 (7.249)	4.237 (7.373)		1.908 (7.558)		16.14 (11.76)	10.02 (7.294)	9.670 (7.431)		7.684 (7.591)		19.90* (10.36)
PGG very satisfied			8.605** (3.459)	8.626** (3.557)	8.703** (3.410)	8.384** (3.452)			8.530*** (3.245)	8.323** (3.276)	8.576*** (3.242)	8.282** (3.245)
PGG pretty satisfied			8.388** (3.374)	8.451** (3.425)	8.217** (3.355)	8.055** (3.500)			8.140** (3.594)	7.951** (3.633)	8.132** (3.609)	7.627** (3.702)
PGG playoff					0.0215 (0.0183)	0.0477* (0.0271)					0.00614 (0.0197)	0.0404 (0.0252)
Socio- demographic controls	YES	YES	YES	YES	YES	YES	NO	NO	NO	NO	NO	NO
N	151	151	151	151	151	151	152	152	152	152	152	152
R <sup>2</sup>	0.456	0.467	0.504	0.505	0.509	0.518	0.358	0.371	0.407	0.412	0.408	0.423

Note: Regressions are run with OLS and clustered robust standard errors and include only the trustees who participated the PGG (treatment group). The dependent variable is the change in average trustee's contribution from the first to the second TG. Socio-demographic controls include all regressors of Table 5a which are not explicitly mentioned. Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.



**Table 5c PGG difference with the group mean, only treatment sample**

<b>Regressor</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>	<b>(5)</b>	<b>(6)</b>
PGG NA	2.458 (1.823)	2.300 (1.831)	2.243 (1.881)	0.970 (1.822)	0.505 (1.822)	0.548 (1.825)
Friends	-1.427 (1.067)	-1.193 (1.036)	-1.168 (1.048)	-1.321 (1.112)	-1.012 (1.106)	-1.015 (1.119)
Ethnic fragmentation	-1.510 (8.261)	1.429 (7.834)	1.368 (7.909)	-2.460 (5.934)	-1.004 (6.052)	-0.989 (6.058)
Gender fragmentation	-15.91* (8.581)	-16.31* (8.701)	-15.85* (8.661)	-13.78* (7.413)	-13.87* (7.553)	-14.06* (7.502)
PGG very satisfied	8.347** (3.362)	8.829** (3.455)	8.634** (3.412)	8.563*** (3.113)	8.604*** (3.267)	8.693*** (3.332)
PGG pretty satisfied	7.941** (3.384)	8.277** (3.424)	8.245** (3.408)	7.813** (3.568)	7.913** (3.654)	7.953** (3.681)
PGG payoff	0.0234 (0.0263)	0.0334 (0.0224)	0.0340 (0.0227)	0.00970 (0.0250)	0.0199 (0.0213)	0.0197 (0.0217)
PGG Diff. Group R1	0.0263 (0.0347)			0.0212 (0.0324)		
PGG Diff. Group R2	-0.0393 (0.0406)			-0.0341 (0.0408)		
PGG Diff. Group R3	-0.0148 (0.0401)			-0.0469 (0.0366)		
PGG Diff. Group R4	0.0132 (0.0409)			0.0455 (0.0402)		
PGG Diff. Group R5	-0.0107 (0.0397)			-0.0210 (0.0351)		
TG1	-0.445*** (0.0832)	-0.470*** (0.0853)	-0.473*** (0.0864)	-0.440*** (0.0883)	-0.463*** (0.0939)	-0.461*** (0.0932)
PGG Mean Diff. Group		-0.0416 (0.0520)	-0.0534 (0.0562)		-0.0455 (0.0473)	-0.0375 (0.0535)
PGG Mean Diff. Group PGG NA			0.0356 (0.0957)			-0.0235 (0.103)
Socio-demographic controls	YES	YES	YES	NO	NO	NO
N	151	151	151	152	152	152
R <sup>2</sup>	0.519	0.512	0.513	0.430	0.412	0.413

Note: Regressions are run with OLS and clustered robust standard errors and include only the trustees who participated the PGG (treatment group). The dependent variable is the change in average trustee's contribution from the first to the second TG. Sociodemographic controls include all regressors of Table 5a which are not explicitly mentioned. Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 6a: Trustees' conditional responses for each of the possible trustor contributions**

<b>Regressor</b>	<b>TR send 5</b>	<b>TR send 10</b>	<b>TR send 15</b>	<b>TR send 20</b>	<b>TR send 25</b>	<b>TR send 30</b>	<b>TR send 35</b>	<b>TR send 40</b>	<b>TR send 45</b>	<b>TR send 50</b>
Constant	5.53* (2.96)	7.80* (4.66)	7.22 (7.22)	10.63 (8.10)	3.51 (7.61)	15.81 (11.12)	9.50 (11.33)	3.79 (10.86)	15.08 (11.73)	31.52* (16.05)
TG1	-0.71*** (0.08)	-0.59*** (0.11)	-0.45*** (0.12)	-0.44*** (0.10)	-0.43*** (0.09)	-0.48*** (0.11)	-0.58*** (0.10)	-0.51*** (0.09)	-0.47*** (0.08)	-0.54*** (0.09)
PGG NA	0.12 (0.98)	0.81 (1.27)	2.04 (1.70)	1.93 (1.92)	1.40 (1.98)	0.31 (3.01)	-0.97 (3.21)	-0.71 (3.36)	-1.22 (3.77)	-5.13 (4.86)
Friends	-0.31 (0.36)	-1.61*** (0.61)	-0.65 (0.70)	-1.19 (0.87)	-0.41 (1.36)	-0.75 (1.42)	-0.64 (2.23)	-1.37 (1.95)	-0.89 (1.92)	-0.68 (2.26)
Ethnic fragmentation	-1.70 (2.73)	-3.34 (4.13)	-1.33 (4.64)	-2.86 (4.27)	-1.57 (5.55)	-1.73 (5.97)	-5.52 (7.13)	-3.56 (8.20)	-6.95 (8.86)	-0.89 (10.82)
Gender fragmentation	1.23 (2.00)	1.72 (2.17)	2.17 (3.48)	2.26 (4.03)	3.77 (4.02)	-1.24 (7.19)	6.41 (6.98)	7.52 (7.22)	0.78 (8.37)	-4.29 (10.93)
PGG Very Satisfied	1.52** (0.62)	3.81*** (1.16)	6.77*** (1.86)	9.84*** (2.58)	10.47*** (3.02)	12.46*** (4.17)	10.92** (4.69)	9.69* (5.31)	10.53* (5.70)	8.89 (8.26)
PGG Pretty Satisfied	-0.13 (0.60)	1.33 (1.16)	3.27* (1.87)	5.10* (2.68)	6.26* (3.25)	6.82 (4.46)	12.80** (5.10)	13.39** (6.11)	13.38** (6.70)	17.96* (9.47)
PGG Withdrawal ratio	-1.15 (2.08)	-5.38 (4.00)	-2.96 (4.05)	-9.84 (6.11)	-6.14 (6.50)	-11.66 (9.35)	6.63 (8.37)	2.60 (8.64)	-10.28 (10.55)	-9.03 (13.88)
PGG Group withdrawal ratio	-0.20 (3.63)	3.52 (6.30)	-3.76 (6.44)	1.11 (9.56)	6.79 (6.65)	6.02 (10.27)	6.18 (12.81)	16.93 (12.92)	26.95* (13.80)	17.53 (17.57)
N	152	152	152	152	152	152	152	152	152	152
R <sup>2</sup>	0.62	0.53	0.34	0.35	0.36	0.34	0.43	0.39	0.36	0.36

Note: Regressions are run with OLS and clustered robust standard errors and include only the trustees who participated the PGG (treatment group). The dependent variable is the change in average trustee's contribution from the first to the second TG. Std. Err. are in brackets. Regressions are run separately for each level of trustor's contribution and do not include socio-demographic controls.

**Table 6b. Trustees' conditional responses for each of the possible trustor contributions**

Regressor	TR send 5	TR send 10	TR send 15	TR send 20	TR send 25	TR send 30	TR send 35	TR send 40	TR send 45	TR send 50
PGG NA	0.0128 (0.936)	0.680 (1.157)	1.450 (1.443)	1.318 (1.677)	1.693 (1.879)	0.0205 (2.601)	0.804 (3.014)	1.412 (3.292)	0.539 (3.696)	-3.891 (4.627)
Friends	-0.304 (0.349)	-1.590** (0.625)	-0.623 (0.714)	-1.183 (0.847)	-0.462 (1.342)	-0.749 (1.387)	-0.948 (2.295)	-1.534 (1.977)	-0.908 (1.910)	-0.799 (2.257)
TG1	-0.714*** (0.0753)	-0.591*** (0.111)	-0.436*** (0.121)	-0.439*** (0.105)	-0.430*** (0.0942)	-0.469*** (0.115)	-0.585*** (0.0976)	-0.523*** (0.0946)	-0.475*** (0.0845)	-0.541*** (0.0902)
Ethnic fragmentation	-1.748 (2.786)	-3.400 (4.367)	-1.716 (4.776)	-3.003 (4.247)	-1.107 (5.589)	-1.648 (5.796)	-3.546 (7.283)	-1.867 (8.395)	-5.781 (9.136)	0.375 (10.86)
Gender fragmentation	1.258 (2.072)	1.681 (2.342)	2.532 (3.423)	2.054 (3.937)	2.876 (4.070)	-1.813 (7.223)	3.469 (7.233)	5.421 (7.741)	-0.921 (8.668)	-6.410 (11.09)
PGG payoff	0.000173 (0.00727)	-0.00359 (0.0127)	0.000903 (0.0120)	0.00438 (0.0185)	0.00589 (0.0185)	0.00224 (0.0254)	0.0383 (0.0338)	0.00952 (0.0356)	-0.0123 (0.0366)	0.00983 (0.0488)
PGG very satisfied	1.484** (0.590)	3.834*** (1.161)	6.642*** (1.778)	9.784*** (2.443)	10.66*** (2.999)	12.54*** (4.069)	11.50** (4.583)	10.31* (5.248)	11.21** (5.673)	9.437 (8.157)
PGG pretty satisfied	-0.110 (0.594)	1.469 (1.082)	3.284* (1.788)	5.271** (2.442)	6.451** (3.172)	7.082* (4.273)	12.76** (5.172)	13.57** (6.159)	13.95** (6.747)	18.35* (9.472)
N	152	152	152	152	152	152	152	152	152	152
R <sup>2</sup>	0.613	0.512	0.324	0.323	0.353	0.329	0.427	0.378	0.349	0.354

Note: Regressions are run with OLS and clustered robust standard errors and include only the trustees who participated the PGG (treatment group). The dependent variable is the change in average trustee's contribution from the first to the second TG. Std. Errors are in brackets. Regressions are run separately for each level of trustor's contribution and do not include socio-demographic controls.

**Table 7. WLS Estimates: where weights are the inverse of the propensity score**

	(1) PGG very satisfied	(2) $\Delta$ TG	(3) PGG satisfied	(4) $\Delta$ TG
Age	-0.0460** (0.0188)		-0.0350** (0.0171)	
Female	0.452 (0.297)		0.415 (0.278)	
Years of schooling	-0.106* (0.0577)		-0.0887* (0.0535)	
Betrayal averse	-0.706* (0.362)		-0.678** (0.341)	
Sociability	0.110 (0.414)		0.0926 (0.379)	
Trust index	-0.268 (0.294)		-0.281 (0.286)	
Impatient	0.503* (0.306)		0.280 (0.285)	
Risk averse	-0.423 (0.307)		-0.315 (0.287)	
Food expenditure day	-0.000912 (0.00106)		-0.000942 (0.00100)	
PGG NA		-1.819 (2.090)		-1.872 (1.884)
Friends		0.912 (1.211)		0.531 (1.110)
TG1		-0.658*** (0.109)		-0.653*** (0.105)
Ethnic fragmentation		-0.137 (7.076)		-2.595 (6.236)
Gender fragmentation		-20.57** (10.38)		-18.38* (9.688)
PGG payoff		0.0540** (0.0273)		0.0403* (0.0237)
PGG very satisfied		7.003*** (2.342)		
PGG satisfied				6.234*** (2.181)
Observations	127	127	149	149
R <sup>2</sup>		0.622		0.604

Standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1-

Note: Regressions are run with WLS and include only the trustees who participated the PGG (treatment group). The weights are the inverses of the individuals' propensity score (PS). PS results are reported in columns 1 and 4 while WLS estimates in columns 3,4,5,6. The dependent variables in the WLS regressions are the change in average trustee's contribution from the first to the second TG ( $\Delta$ TG). The dependent variables in the PS models are i) PGG very satisfied - column1 -excluding PGG pretty satisfied individuals and ii) Satisfied - column 4-, a dummy = 1 for individuals very or pretty satisfied.