Redistribution and Group Participation: Experimental Evidence from Africa and the UK*

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Abstract

We design an original laboratory experiment to investigate whether redistributive actions hinder the formation of Pareto-improving groups. We test, in an anonymous setting with no feedback, whether people choose to destroy or steal the endowment of others and whether they choose to give to others, when granted the option. We then test whether subjects join a group that increases their endowment but exposes them to redistribution. We conduct the experiment in three very different settings with a priori different norms of pro-social behavior:

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a university town in the UK, the largest slum in Nairobi, Kenya and rural Uganda. We find a lot of commonality but also large differences between sites. UK subjects behave in a more selfish and strategic way – giving less, stealing more. Kenyan and Ugandan subjects behave in a more altruistic and less strategic manner. However, pro-social norms are not always predictive of joining behavior: African subjects are less likely to join a group when destruction or stealing is permitted.

1. Introduction

Economic efficiency often cannot be achieved without team work. The provision of local public goods, for instance, typically requires voluntary participation in a group – be it a parent-teacher association (e.g., Coleman 1988, Pradhan et al. 2014), a community-based organization (e.g., Bernard et al. 2010), or a farmers' marketing cooperative (e.g., Cook 1995, Fafchamps and Hill 2005).

Building on the work of Olson (1971) and Ostrom (1990), a large literature has emerged that seeks to understand the root causes of the underprovision of beneficial local public goods. In this literature much attention has been devoted to certain possible causes, such as free-riding (e.g., Baland and Platteau 1995) and imperfect monitoring (e.g., Barr, Lindelow and Serneels 2009). The literature has also argued that equity considerations and redistribution pressures affect collective action in heterogeneous groups (e.g., Baland and Platteau 1995, Banerjee et al. 2005, Barr, Dekker and Fafchamps 2013). This is the mechanism we focus on, drawing on the experimental literature on other-regarding preferences (e.g., Fehr and Schmidt 1999, Charness and Rabin 2002). In particular we ask whether people would choose to eschew the returns to joining a group because of the ad hoc redistributive opportunities that arise once in the group.

We design an original laboratory experiment to investigate whether redistributive actions hinder the formation of Pareto-improving groups. The experiment is designed such that there is no room for free-riding, and imperfect monitoring is not an issue. Subjects derive a purely individual benefit from joining a group, but expose themselves to ad hoc redistribution when they join. Redistributive behavior is captured in three different, stylized ways described as 'confiscating', 'taking' and 'giving' to subjects and as 'burning', 'stealing', and 'giving' (respectively) in the related literature.

In 'burning' treatments, subjects who join the group are given an opportunity to destroy all

or part of the endowment of others who join (e.g., Zizzo 2003a, Zizzo and Oswald 2001, Kebede and Zizzo 2011). In 'stealing' treatments, subjects who join can appropriate all or part of the endowment of others who join (e.g., Zizzo 2003b). In 'giving' treatments, group members can give all or part of their endowment to other group members (e.g., Null 2011). Subjects must pay a price to destroy or appropriate someone else's endowment, or to transfer part of their endowment to others. This price varies across treatments. To eliminate reputational concerns and strategic considerations, play is anonymous throughout the experiment and subjects are not provided any feedback about others' play during or after the experiment. The purpose of the experiment is to elicit behavior towards anonymous members of the same subject pool.

The experiment is implemented with three different populations: students in Oxford, England; slum dwellers in Nairobi, Kenya; and farmers in Uganda. The purpose of using such a diverse subject pool is twofold. First, we are interested in obtaining generalizable results that are not limited to specific subject populations, e.g., students in top universities. Second, we wish to investigate whether human populations differ in their willingness to join efficiency-enhancing groups. The Oxford subject pool is chosen to facilitate comparison with other laboratory experiments, the majority of which involve university students in developed economies. The two African subject pools are chosen based on the commonly held perception that developing economies – and especially those of Africa – have a social capital deficit. Because of this deficit, opportunistic behavior is believed to weaken governance and to undermine the provision of local public goods. To the extent that social capital is facilitated by common values and ancestry, we expect the social capital deficit to be strongest among city dwellers in an urban slum. This is why we have chosen two sites in Africa, one rural, and the other urban.

We find many commonalities across the three subject pools: in all three, a few subjects give away part of their endowment; some subjects destroy the payoff of others; and many more

appropriate (part of) others' endowment. There are also important differences: stealing is more prevalent in the UK subject pool; giving is more common in the two African populations; and burning is least common among Nairobi slum dwellers. Although the three subject pools are not directly comparable, this nevertheless contradicts the commonly held view that Africans are particularly opportunistic in their relations with strangers.

We also investigate how burning, stealing and giving affect the formation of Pareto-improving groups. We find that subjects are less likely to join groups when such redistribution is possible, but we do not find that joining a group is uniformly less common in subject populations that redistribute more. In the burning and stealing treatments, joining a group is *less* common in Kenya and Uganda even though subjects in these countries burn and steal (weakly) *less*. In the giving treatment, there is no difference in the propensity to join a group between sites even though giving is observed more often in the two African experiments.

Although burning is uncommon in all three populations, a large proportion of African subjects refuse to join a group in the burning treatment, that is, when joining a group makes them vulnerable to the destruction of their endowment. This feature is less marked in the UK study population. In contrast, many UK subjects refrain from joining a group when joining enables them give some of their endowment away. This is true even though UK subjects are also the least likely to give among the three subject populations.

To investigate these findings further, we compare subjects' behavior to archetypes of selfish and other-regarding preferences discussed in the literature – i.e., altruistic and invidious preferences, inequality aversion, and warm glow. The choices of most subjects do no satisfy any of these archetypes. One in ten UK participants behaves consistently in a selfish manner, fewer in Uganda and Kenya. One in seven African participants behaves in a way consistent with altruist or warm glow preferences, compared to only one percent in the UK population. This confirms

that there is more fairness towards strangers in the two African sites. More importantly, it also implies that other-regarding preferences defined over final payoffs do a poor job of predicting behavior in our experiment. Preferences over the process by which final payoffs are determined seems to matter as well, suggesting a role for social norms.

At the end of the experiment, but before revealing payoffs, participants were asked to estimate other players' propensity to burn, steal, and give. We find that subjects massively overestimate burning and giving by other participants. They also overestimate the frequency of stealing, but to a lesser extent. Many subjects join a group in the stealing treatment, but are less likely to do so when they expect others to steal more. We also find that subjects who give more are more likely to join a group in the giving treatment, and subjects who steal more are more likely to join a group in the stealing treatment, suggesting that some subjects join a group in order to give or to steal.

Our results suggest that group formation can be hindered by the fear of endowment destruction by others, even if such destruction is uncommon. This may be because people find such destruction emotionally painful and seek to avoid it even if the financial cost of doing so is large. We also find that some people refrain from joining a group that makes it possible to give to others, a finding that resonates with that of Lazear et al. (2012). More research is needed on this issue, for which African and UK participants differ.

These findings complement the existing literature in several ways. Jakiela and Ozier (2016) use an experiment to show that social pressure to share income causes individuals to forgo investment returns. This is consistent with our finding that individuals are more likely to forgo the return to joining a group when they perceive forced redistribution to be more likely. Goldberg et al (2013) finds that the impact of a commitment savings product on saving behavior is related to the need to resist demands to give to others. This is consistent with our finding that some

people avoid situations (e.g., joining a group) that generate opportunities to give to others. This paper adds further insights to this finding, by showing that people also avoid situations even when giving is unsolicited and anonymous. One possible explanation is that individuals face an internal pressure to give, and are willing to incur a reduction in payoff to avoid this internal pressure and, presumably, the associated guilt (e.g., Battigali and Dufwenberg 2009). This avoidance is stronger among non-African subjects.

The findings have significant relevance for public policy, particularly in Kenya and Uganda where formalized social insurance systems are weak and where various forms of ad hoc redistribution are relied upon to help those in need. The widespread presence of redistribution within informal networks is a common justification given by Ugandan policy makers for not investing in formal, public insurance. The results of this work indicate that this is not always a good thing, and that it may discourage the formation of groups that bring about pareto-improving returns.

The paper is organized as follows. In Section 2 we present the experimental design in detail. A conceptual framework is introduced in Section 3 and is used to generate testable predictions about preference archetypes often used in economics. Experimental choices and joining decisions are analyzed in Section 4. Section 5 concludes.

2. Experimental Design

The ultimate objective of the experiment is to identify the motivations individuals have when they consider joining a group that raises individual payoffs but allows different types of redistribution among subjects. This is an extremely common situation that arises whenever people pool resources for the generation of a common good or service. Examples include ride sharing, coauthorship among researchers, and farmers' marketing cooperatives. Market transactions also

fall in this general category.[1] To keep the focus on individual motivations, we deliberately omit externalities, strategic interactions, reputation, and feedback. We also do our best to avoid contextualizing the choices people make so as to avoid framing effects.

Our focus is not on identifying trade-offs between equality and efficiency, a topic that has been well studied in the context of public good games. Rather we seek to understand how redistributive options affect willingness to join a mutually beneficial group. This is implemented by inviting subjects to join a group under three different redistributive treatments. Joining the group mechanically increases individual payoffs, but also allows subjects to affect the payoff of others in the group.

The experiment is divided into three parts.[2] Parts 1 and 2 prepare subjects for Part 3. In Part 1 subjects are given the opportunity to experiment with the choices offered in the different treatments. In Part 2 subjects observe that their payoff increases when they join a group. Part 3 combines the two types of decisions made in parts 1 and 2 and is the heart of the experiment. In addition to preparing subjects for the different treatments in Part 3, Part 1 also enables us to observe subjects' behavior in the three treatments free of self-selection into joining a group. Part 2 serves as a check on subjects' understanding of the usefulness of joining a group when there is no subsequent redistribution, and serves as benchmark to compare with Part 3 – i.e., if joining falls in Part 3 relative to Part 2, this constitutes evidence that the redistributive options offered by the different treatments serve as a disincentive to join a group.

Parts 1 and 3 are divided into 5 rounds. Part 2 consists of just one round. The three treatments are dubbed burning, stealing and giving. They are described in detail below. The overall structure of the experiment is summarized in Table 1. The treatments and the three

[1] A market transaction can be seen as the formation of a group of two individuals pooling resources (e.g., money and a good or service) to achieve mutually beneficial gains. Scope for redistribution arises in several ways, such as price bargaining, hold-up and renegotiation, or poor contractual performance.

[2] There were also three practice rounds (one for each treatment) in which individuals practiced the choices made in part 1. These do not affect final payoffs.

parts of the experiment are described in detail in the rest of this section.

	Part 1	Part 2	Part 3
Joining is a choice:	no	yes	yes
Number of rounds	5	1	5
Nber of burning rounds	2	0	2
Nber of stealing rounds	2	0	2
Nber of giving rounds	1	0	1

Table 1. Overall structure of the experiment

Note: The order of the burning, stealing and giving rounds is randomized within each part.

2.1. Part 1

In each round of the game, subjects are assigned to a set of three subjects – a triplet. This triplet changes at the beginning of each round – more about this in the implementation section. In Part 1, each subject is given the choice to destroy, appropriate, or transfer endowments within their triplet in a precise way described below.

At the beginning of each round t each subject i receives an endowment e_{it} for that round. The subject is informed both about the endowment they receive and the endowments of the two other triplet members. The distribution of income is believed to be an important determinant of redistributive actions. For this reason, we vary the endowment that subjects receive: one subject receives a low endowment; one receives a medium endowment (twice the low endowment); and one subject receives a high endowment (three times the low endowment). Who receives which endowment is varied randomly across rounds. This ensures that the value of endowments in previous rounds is orthogonal to play in the current round, and hence need not be controlled for in the analysis. We also include one round (out of five) in which all subjects receive the medium endowment.

After receiving their endowment for the round, each subject is informed about the redistribution opportunities for that round. The three treatments, dubbed here 'burning', 'stealing' and 'giving', all follow the same general design. In a given round t all subjects in the same group face the same treatment. This is common knowledge. Within a round, each player chooses an action independently of the others, as in a dictator game. One player is selected from each triplet at the end of the experiment, and the choices of the selected player determine the payoffs of the triplet in that round. It is never the case that a subject's payoff is affected by the decisions of more than one player, themselves included.

We now describe the payoffs to all three subjects if the choices of player i are selected to determine final payoffs. In the burning treatment, subject i chooses what share of subject j's endowment to destroy. This share is denoted τ_{ijt}, with $0 \leq \tau_{ijt} \leq 1$ for each j. The payoff of subject i can thus be written as:

$$\pi_{it} = e_{it} - \gamma_{bt} \sum_{j \in N_{it} ijt} \tau_{ijt} e_{jt} \tag{2.1}$$

and subject j's payoff is given as:

$$\pi_{jt} = e_{jt}(1 - \tau_{ijt}) \tag{2.2}$$

where N_{it} is the set of players in i's triplet in round t. Keeping in line with the dictator design, the actions of other subjects are set to 0 when considering i's choice. No feedback is given on other players' choices.[3] Parameter γ_{bt} captures the cost to i of destroying the endowment of j: it is the unit cost to i of reducing j's payoff by \$1. The value of γ_{bt} is randomly varied across

[3] This rules out situations in which players' choices are incompatible – as would arise if two players, say, were to spend all their own endowment to destroy the endowment of the others. In the z-tree code we further impose the restriction that $\pi_{it} \geq 0$ – a subject cannot spend more than his/her endowment e_{it} to destroy the payoff of other subjects. In practice, this restriction was never binding. No individuals chose to spend all of their endowment to destroy that of others.

rounds in order to vary the cost of burning and make redistribution more or less likely. It is common to all subjects in a given round t, and is common knowledge.

To illustrate, let $N_{it} = \{2, 3\}$, $e_{it} = 4$, $e_{2t} = 6$, $e_{3t} = 2$, $\gamma_{bt} = 0.1$, and $\tau_{i2t} = 50\%$ and $\tau_{i3t} = 0\%$. Payoffs are:

$$\begin{aligned} \pi_{it} &= 4 - 0.1 \times (0.5 \times 6 + 0 \times 2) = 3.7 \\ \pi_{2t} &= 6(1 - 0.5) = 3 \\ \pi_{3t} &= 2(1 - 0) = 2 \end{aligned}$$

In this example subject i has destroyed part of subject 2's endowment, ensuring that 2 now receives a payoff lower than his own. Burning is always wasteful since it reduces aggregate payoffs by $(1+\gamma_{bt}) \sum_{j \in N_{it}} \tau_{ijt} e_{jt}$. In the above example, the efficiency loss is 3.3 – what subject 2 loses plus what i pays to destroy subject 2's endowment. The higher is γ_{bt}, the larger is the trade-off the subject faces between efficiency and redistribution. Player 2 is also asked to independently make choices about τ_{2it} and τ_{23t}, and similarly for player 3.

In the stealing treatment, payoffs are given by:

$$\pi_{it} = e_{it} + (1 - \gamma_{st}) \sum_{j \in N_{it}} \tau_{ijt} e_{jt} \tag{2.3}$$

$$\pi_{jt} = e_{jt}(1 - \tau_{ijt}) \tag{2.4}$$

Here τ_{ijt} is the share of j's endowment that i appropriates and γ_{st} is the unit cost to i of stealing \$1 from j. Since $0 < \gamma_{st} < 1$ in our experiment, stealing is always wasteful and reduces aggregate efficiency. The value of γ_{st} is randomly varied across rounds, is common to all subjects in a given round t, and is common knowledge.

In the giving treatment, payoffs follow:

$$\pi_{it} = e_{it}(1 - \gamma_{gt} \sum_{j \in N_{it}} \tau_{ijt}) \tag{2.5}$$

$$\pi_{jt} = e_{jt} + \tau_{ijt} e_{it} \tag{2.6}$$

Here τ_{ijt} is the share of its own endowment that i gives to j and γ_{gt} is the unit cost to i of increasing j's payoff by \$1. If $\gamma_{gt} < 1$ giving is efficiency enhancing – it costs less than \$1 for i to transfer \$1 to j – and vice versa if $\gamma_{gt} > 1$. In the experiment, we always select a value of γ_{gt} less than one, which means that giving is always efficiency-enhancing. The value of γ_{gt} is also randomly varied across rounds, is common to all subjects in a given round t, and is common knowledge.

Table 2 details the different values of γ_{bt}, γ_{st} and γ_{gt} that were used in the experiment. These values were chosen so as to generate sufficient behavioral variation, based on an initial set of sessions run at Oxford University in Fall 2012.[4] Table 2 shows how the order of treatments are randomized across sessions to ensure that order effects cancel out in the analysis.[5] The values of γ_{bt}, γ_{st} and γ_{gt} are also randomized across sessions and rounds. All randomization details are common to all three countries.

[4] These sessions used essentially the same z-tree code but experimented with different parameter values. We observed a high prevalence of stealing even for large values of gamma/high cost of stealing, so we retained fairly large γ_{st} for the main sessions reported here. For burning, large values of γ_{bt} resulted in hardly any burning. Hence we retained reasonably low values of γ_{bt} to induce experimental variation. For the giving treatment, the initial Oxford sessions showed very low levels of giving, and hardly any giving at all for γ_{gt} values larger than 1, that is, when giving is inefficient. Hence we only retained fairly low values of γ_{gt} for the main sessions.

[5] Within a session the treatment order is the same for all subjects. This is necessary because triplets are reshuffled after each round, and hence it is the only way to ensure that all subjects play the same number of treatments.

2.2. Part 2

In the second part of the experiment, subjects are randomly allocated an endowment e_{it} and can elect to join a group. Subjects are told that if they join a group the endowment e_{it} will be multiplied by p_t and that the round will end. The value of p_t is always 1.5 in this part of the experiment. Subjects who do not join the group keep their initial endowment e_{it}; subjects who join receive $p_t e_{it}$ irrespective of whether others decide to join the group or not.[6] Play ends after the subject decides whether or not to join.

The purpose of this part is to introduce subjects to the new action of joining a group. Any subject who understands this part of the game should join the group. There is only one round of play in this second part.

2.3. Part 3

The third part combines parts 1 and 2, and, like part 1, consists of five rounds. Just as in part 1 subjects are randomly assigned to a triplet of players at the beginning of each round and are provided with an endowment e_{it}. Subjects can form a group with others in their triplet.

As in part 2, subjects are told that if they join a group their endowment will be multiplied by p_t. They are also told that, as in part 1, subjects who join a group will be given the opportunity to destroy, appropriate, or transfer within the group. Payoff formulas are amended by multiplying e_{it} and e_{jt} throughout by p_t – e.g., payoffs in the burning treatment now are:

$$\begin{aligned} \pi_{it} &= p_t \left(e_{it} - \gamma_{bt} \sum_{j \in N_{it} ijt} \tau_{ijt} e_{jt} \right) \\ \pi_{jt} &= p_t e_{jt} (1 - \tau_{ijt}) \end{aligned}$$

[6] In other words, subject i receives $p_t e_{it}$ even if i is the only one in the triplet to join a group.

and similarly for payoffs in the stealing and giving treatments.

We expect the decision to join to increase with the return from joining and to decrease or increase with the subject's desire to participate in redistributive actions – depending on the subject's preferences. p_t is randomized across rounds to vary the return from joining, and the treatments (burning, stealing and giving) and γ_t are also randomized across rounds, just as in part 1. The distribution of p_t and γ_t are given in Table 2. The order of treatments, p_t, and γ_t are randomized across sessions so that order effects cancel out and can be ignored in the analysis.

A subject chooses whether or not to join the group on the basis of the information provided. The subject then chooses how much to destroy, appropriate, or transfer within the group. Subjects who do not join the group keep their initial endowment e_{it}, just as in part 2. Subjects who join the group can only affect the endowment of triplet members who have also joined the group – which implies that they observe which members of their triplet have joined a group in this round. However, as in part 1, subjects are never told the burning, stealing, or giving choices of other participants. They are only told their final aggregate payoff at the end of the experiment which, as the following paragraph details, does not allow the choices of other participants to be deduced. Furthermore, the triplet sets are reshuffled each round so that, within part 3, participants never play against the same subjects twice. This rules out strategic play.

2.4. Implementation

In terms of implementation, the identity of all players is kept anonymous throughout the experiment. As explained earlier, in each round of the game, subjects are assigned to a set of three subjects – a triplet. Triplets are reshuffled for each round in such a way that, within each part, subjects never play against the same subject twice. Moreover, subjects never observe the

behavior of other subjects. The focus of the experiment is thus on individual decisions making, not on strategic interaction between subjects. Finally, there is no carry-over of earnings across rounds.

At the end of the experiment, three rounds are selected at random and payoffs are determined based on play during these three rounds only. Within each of the selected rounds, one of the subjects in each triplet is randomly selected. His or her choices in that round determine the payoffs of all three players in that triplet. The choices made by the selected player determine the payoffs of all three players in that round. This avoids contradictions and ensures that payoffs are always feasible. The purpose of this approach is to incentivize subjects to regard each round as a separate decision, independent of other decisions already made. This setup is akin to a three-player dictator game (with unit costs) implemented using a strategy method. It rules out any strategic interaction between players in burning, stealing and giving decisions.

Since there are three subjects in a triplet and three rounds are selected at random, in expectation each subject receives a payoff corresponding to one of their choices.[7] Players who, in parts 2 and 3, elect not to join a group receive a payoff $\pi_{it} = e_{it}$. All these features are explained to subjects at the beginning of the experiment, and illustrated through three practice games. Before being told their final payoff, subjects answer a short questionnaire about their expectations regarding burning, stealing and giving by other participants.

The experiment was implemented in Kenya, Uganda and the United Kingdom. In Kenya,

[7] Since selection of the decisive player is done independently for each of the three selected rounds, it is possible for one player's choice to be the selected one in more that one round. This raises the possibility that players may have considered all their decisions as part of a portfolio (as decribed in Bolton et al 1998). Given this, a better design to eliminate portfolio considerations may have been to set the experiment such that each player would have his/her decision selected only once. We did not do that to avoid causing confusion, mostly because of the difficulty of discussing probability concepts with less sophisticated experimental subjects. This being said, even if subjects were capable of computing probabilities, portfolio effects are quite small. The true probabilities implied by the description of our experimental setting to subjects is as follows: Pr(0 choices selected)= 29.6%; Pr(1 choice selected)= 44.4%; Pr(2 choices selected)= 22.2%; Pr(3 choices selected)= 3.7%. From this we see that, for subjects who understand probability well enough to calculate these values (something we were unable to do without a computer), they would conclude that the chance of affecting payoffs in multiple rounds is only 25.9%. From this we conclude that, while we cannot fully rule out portfolio effects, they are probably negligible.

11 sessions were run in March 2013 at the Busara laboratory in Nairobi. In Uganda, 9 sessions were run in Masaka in April 2013 with coffee growers from the Masaka district. In the United Kingdom, 4 sessions were run in September 2014 at the Centre for Experimental Social Sciences at Nuffield College, Oxford. The number of participants in each session was 18. The set of parameter vectors used in the experiments was the same in all sites as detailed in Tables 1 and 2.

The experiment is implemented using z-tree (Fischbacher 1999) and designed for use with touchscreen tablets, so that people who are not familiar with using computers can easily be instructed how to play. The screens are made as visual as possible to facilitate play by those with limited levels of formal education. In all sessions the instructions are read out to maximize the chance that they are properly understood. We did test whether including the education level of the subject is significantly predictive of play in the game, or whether controlling for education alters the findings. We find that education is not significant and that it does not explain play, suggesting that the games are well understood by participants with even limited education.

The words used to describe each treatment are selected to be as neutral as possible whilst being understandable by subjects from different backgrounds. This requires the use of more direct language than might have otherwise been used. In the burning treatment subjects are told that they have the opportunity to 'confiscate' some of the endowment of other players. This word was chosen after a short pilot in Kenya because players associate it with the action of, say, a primary school teacher who, by confiscating an object, de facto makes it unavailable to all. The term 'confiscate' is more neutral than 'destroy' which would have been understood as well, but has a more negative connotation. In the stealing treatment, subjects are told they have the opportunity to 'take' some of their group members' endowments. This is easier for the subjects to understand than 'appropriate', but more neutral than 'steal'. In the giving treatment subjects

are told that they have the opportunity to 'give'. This is less neutral but more understandable than 'transfer'.

An additional set of sessions were run in Oxford in which a protocol with more neutral words was used. Results from those sessions are briefly discussed in the empirical section. They show that our main findings for the UK hold across these two formulations of the experiment, suggesting that the framing did not significantly alter subject behavior, at least among UK students.[8]

In both sets of African sessions, the script was translated into the local language (Swahili in Nairobi and Luganda in Masaka). Considerable care was taken to keep the meaning of these words the same. This was achieved by discussing the script carefully with session leaders and by having the same experimental assistant present in all African sessions of the experiment.

3. Conceptual framework

In this section, we relate our experimental design to the literature and we present testable predictions on how participants are expected to behave. These predictions can be divided into two sets: predictions regarding burning, stealing, and giving, conditional on being in a group; and predictions regarding joining a group.

3.1. Burning, stealing and giving

Once subjects are in a group, our experimental design is closely related to the well-known dictator game (DG), a design that has often been used to measure altruism. In the standard DG, a player is provided with an endowment and is anonymously matched with another player in a one-shot interaction. The 'dictator' player must then decide how to divide the endowment

[8] The additional Oxford sessions were run in September 2012 at the same lab. They used a z-tree program with a more standard screen with no colors and neutral language throughout – e.g., 'to eliminate' rather than 'to confiscate', 'to appropriate' rather than 'to take'; and 'to transfer' rather than 'to give'.

between him/herself and the subject they have been matched with. In our setting too, players are pairwise matched with each other only once. In terms of decision over final payoffs, once players are in a group with others, the giving treatment is equivalent to a DG, albeit with a slightly different frame.

The stealing treatment is similar to a reverse-DG, that is, a DG in which the decision maker can take some of the endowment assigned to the other player – instead of giving some of his/her endowment. List (2007), Bardsley (2008), and Jakiela (2013) all use dictator games that allow for taking. If subjects only care about the distribution of final payoffs, DG and reverse-DG should yield equivalent behavior. The above cited papers show that they do not. The obvious interpretation is that subjects have preferences over process, e.g., they behave as if the endowment assignment process generates quasi-ownership rights. Preferences over process reflects internalized norms about what behavior is acceptable and which is not.

Our experiment differs from the standard DG and reverse-DG in that there is a cost of giving or taking, and this cost is varied across rounds. Conditional on being in a group, our giving treatment is identical to the modified DG used by Andreoni and Miller (2002) and Andreoni and Vesterlund (2001) in which the cost of giving is also varied. These authors find that the amount of money given falls as the cost of giving increases, a finding that is consistent with altruism.[9] Fisman et al. (2007) uses a three-person dictator game where the price of redistribution varies across rounds. To the best of our knowledge, no experiment has examined whether the amount taken in the reverse-DG responds to the cost of taking.

The burning treatment does not fit into a DG framework. It is included to investigate whether invidious preferences may affect group formation. Burning games were first studied by

[9] Andreoni and Vesterlund (2001) also find that, when giving is cheap, men are more altruistic. But they are more responsive to the price of giving so that, when giving is expensive, women are more altruistic.

Zizzo and Oswald (2001).[10] The available evidence indicates that a small but non-negligible proportion of experimental subjects choose to destroy part of the endowment of others. This behavior is more common when the player whose endowment is destroyed was initially allocated a higher endowment (e.g., Zizzo and Oswald 2001, Zizzo 2003a, Kebede and Zizzo 2011) – a finding that is broadly consistent with inequality aversion (e.g., Ferh and Schmit 1999).

In appendix we formally derive, for six preference functions commonly used in the literature, how players are expected to behave in the burning, stealing and giving treatments. These predictions are summarized as follows. Selfish players are predicted to give and burn nothing, and to steal everything. Altruistic players are predicted to burn nothing, to steal only when altruism is low and the price of stealing is high, and to give only when altruism is high and the price of giving is low. Efficient players burn and steal nothing, since doing so reduces aggregate efficiency. They give only when what they give is increased by the experimentalist ($\gamma_{gt} < 1$). Invidious players steal everything and give nothing. They burn everything if they are sufficiently invidious and the price of burning is low.

The predicted behavior of inequality averse players depends on whether their endowment is higher or lower than the other player. If it is lower, they behave in a way similar to invidious players; if it is higher they behave like altruistic players. Warm glow players give if the cost of giving is lower than the warm glow effect; they steal if the cost of stealing is lower than the warm glow effect.

Building on these predictions, we select parameters p and γ_b, γ_s and γ_g in such a way that if a player consistently follows one of the above archetypes, the combination of choices made during the experiment should reveal their type. Selected parameters were summarized in Table

[10] The option to destroy someone else's payoff has also been studied in the context of games in which subjects first observe the action of others. Destruction is then interpreted as punishment for violating a social norm. Here burning is decoupled from any punishment motivation.

2.

3.2. The decision to join

The decision to join depends on the action that subjects plan to take, and on what they expect other subjects to do. In the giving treatment, players should join if they have any of the six preference archetypes discussed so far. Those who give nothing should join because doing so multiplies their payoff by $p > 1$, even if they expect to receive nothing. Those who wish to give should join because doing so increases their material payoff while at the same time increasing their utility through giving and, possibly, receiving. It is, however, possible that some subjects wish to avoid environments in which giving is possible, as documented for instance by Lazear et al. (2012). For such individuals, not joining may serve a guilt aversion purpose (e.g., Battigalli and Dufwenberg 2007).

In the burning treatment, only invidious players – and inequality averse players with a low endowment – derive utility from burning. Other players join if the material gain from joining is larger than the expected loss from burning by other players. It follows that all players should be more likely to join if p is large and if they expect less burning by others.

In the stealing treatment things are more complicated. Players who plan to steal – according to Table A1 in appendix, this is most of them – derive an expected utility gain from joining if their choice determines final payoffs. But they also expect a utility loss if other players steal from them and their choice is not selected. It follows that the decision to join should increase in p and decrease in the expectation of stealing by others. It should also decrease with the player's initial endowment in the round because someone with a low endowment has more to gain, and less to lose, from stealing.

3.3. Preference over process

So far we have focused on choices predicted from preferences purely based on material outcomes, irrespective how these material outcomes are achieved. This ignores the possibility that subjects find certain choices more morally acceptable than others. Given our experimental design, three considerations are potentially relevant.

First, subjects may feel guilt from taking actions that they consider morally reprehensible, such as burning or stealing. This is true even though, in the presentation of the experiment, we endeavor to use more neutral language such as 'confiscate' and 'take' rather than burn/destroy and steal. People from developing countries are often thought to be more morally corrupt towards strangers (e.g., Fisman and Miguel 2007, Barr and Serra 2010). Based on this, we expect more burning and stealing in the African study populations than in the UK.

Second, subjects may anticipate feeling angry at discovering their endowment has been burned or stolen. Even if they cannot infer the actions of other players, they nevertheless realize that joining a group enables others to burn or steal their endowment. If they resent this possibility strongly enough, they may elect not to join a group even if the expected material gain from joining is positive. Put differently, people may attach a negative subjective utility to being burned or robbed such that even a small probability of such occurrence steers them away from joining a group.[11] If burning and stealing are more prevalent in Africa, people may have adjusted to it. If so, we expect the subjective cost of having endowment destroyed or stolen to be less pronounced there – and consequently, we expect subjects to join a group even when they expect a lot of burning and stealing.

Third, subjects may feel less inhibited to steal or burn the endowment of subjects who could

[11] Another illustration of the same idea is when people pay more to protect their assets than the anticipated loss from theft. Loss aversion is a related concept, but in principle devoid of consideration over process.

have chosen not to join the group. Their reasoning may be something like 'They joined to burn or steal my endowment, so why should I refrain from doing the same to them'. This line of reasoning is somewhat similar to the idea of reciprocity proposed by Charness and Rabin (2002) to describe preferences over process: 'I do to you what I believe you are doing to me'. Alternatively, they may reason that 'They could have avoided my burning or stealing by not joining the group. Having joined, they asked for it and they are fair game'. This second line of reasoning is distantly related to the literature on trolley experiments which argues that people feel less guilt when their actions affect outcomes via external devices or other people's choices (e.g., Greene 2012, Mikhael 2011).

4. Summary of experimental results

4.1. Descriptive tables

Table 3 summarizes average play in the three batches of experimental sessions. Table 4 summarizes answers to questions about expectations relative to other subjects' behavior.[12]

We first examine behavior in Part 1, that is, when subjects are automatically assigned to a group.[13] There are strong similarities across the three study populations: subjects burn little; they steal a lot; and they give very little. In the standard DG, players often give half of their endowment, de facto equalizing payoffs across players. Subjects in our giving treatment give much less than would be needed to equalize payoffs, even though giving is actually cheaper than in a DG game since giving $1 to another subjects costs less than $1. A salient difference with standard DG experiments is that, in our giving treatment, both players receive an endowment, even though endowments typically differ. This may blunt the pressure to share. Our subjects

[12] Some expectation questions were not asked to Kenyan participants in the first two sessions because of a technical glitch, hence the smaller number of observations.

[13] We observe slightly more burning and giving during the practice rounds, possibly because subjects are experimenting with the range of actions they can take.

also take much more than they give, a finding that is different from what has been observed in DG experiments: subjects who play both the DG and the reverse-DG tend to take less than they give (e.g., List 2007; Bardsley 2008; Jakiela 2013).

There are also strong differences between the three study populations. The UK participants steal more and give less than their African counterparts. Kenyan participants burn less and give less than Ugandans, but have a similar propensity to steal. At prima facie, these results contradict the view that Africans behave more opportunistically in an anonymous setting: if anything, our African subjects behave in less morally reprehensible way. Why this is the case is not entirely clear, but similar differences in levels of cooperation have been observed between student and non-student populations in other studies (e.g., Cardenas and Carpenter 2005; Visser and Burns 2015). We also find that the behavior of the two African subject populations is more similar to each other than to UK subjects, even though the two African subject pools are quite different in terms of education level and occupation.

In Part 2 of the experiment, joining increases the subject's payoff without affecting others, and is a dominant strategy. This is indeed what we observe: most participants join, although a significant proportion of Ugandan subjects do not. This could indicate that they understand the game less well (or trust the experiment less) than more experienced subjects from the UK and Kenya.

In Part 3, group participation drops in all three treatments across the three study populations. In the two African study sites, joining falls the most in the burning treatment. The decline is particularly pronounced in the Uganda population, with three fifth of the participants refraining from joining a group in spite of the large material gain associated with it. This fall in group participation could be either because participants expect more burning, or because they associate it with a larger subjective utility loss – or both.

Expectations of others' behavior are reported in Table 4. There are large differences in expectations between the three countries. For instance, we see that African subjects, and particularly Ugandan subjects, expect more burning than UK subjects. African subjects also expect more giving but less stealing than UK subjects. To compare expectations with behavior, we report, in the lower section of Table 4, the ratio of expectations relative to the actual play observed in Part 1. For all three groups, expected giving, stealing or burning is at least twice as large as actual giving, stealing or burning – often more.[14] Ratios are most similar across countries for stealing. For giving, UK subjects seem to be more optimistic than their African counterparts – even though the latter give more. In contrast, for burning African subjects are more pessimistic: there is much less burning by African subjects than they themselves anticipate. In fact, of the three countries burning is least prevalent in the Kenyan sample. One possible interpretation is that African subjects do not behave more opportunistically than UK subjects – in fact, as shown in Table 3, they often behave more fairly. But they are more pessimistic about burning, and this undermines the formation of efficiency-enhancing groups. In contrast, they are also optimistic about giving, albeit less so that UK subjects.

From Table 3 we see that, in the two African subject pools, there is more group participation in the stealing than in the burning treatment. In contrast, among UK subjects, participation is higher in the burning treatment. There are several possible explanations for this: (a) African subjects expect less stealing than UK subjects; (b) they hope to steal more; or (c) they strongly dislike the prospect of their endowment being destroyed by someone else. From Table 4 we see that African subjects expect less stealing than UK subjects, which suggests that reason (a) may explain the divergence. From Table 3 we note that African subjects steal less than UK subjects. This pretty much rules out explanation (b). It could also be the case that African subjects, who

[14] This is reminiscent of Prentice and Miller (1993) who, in a completely different context (i.e., beer drinking among college students), similarly find that expectations and social norms far exceed actual behavior.

expect more burning, have a strong dislike for such destruction (reason c), and this dislike is stronger than the dislike they have for having their endowment appropriated (but not destroyed) by others – which suggests some form of altruism.

Subjects in all study sites are equally likely to join in the giving treatment. As a result, for the Ugandan study pool, joining is almost twice as likely in the giving treatment than in the burning treatment. However, the amount given varies across locations. In the UK sessions, subjects hardly give anything at all. In contrast, a sizeable proportion of Kenyan and Ugandan subjects give to others. Kenyan and Ugandan participants also expect to receive more than those in the UK (Table 4), and those in Uganda expect to receive the most. It remains that the proportion of subjects who give is smaller than the proportion of subjects who expect to receive – or who state that others expect them to give (see Table 4). This means that there is a significant proportion of subjects who (often erroneously) expect to receive but do not give. This may help explain why they join a group.

4.2. Regression analysis of burning, stealing and giving

To verify the statistical significance and robustness of our results to clustering, we replicate the various panels of Table 3 in a regression format. Robust standard errors are reported throughout, clustered at the session level. We begin with burning, stealing, and giving choices. The dependent variable is τ_{it}, that is, the proportion of the endowment of the other players that is burned or stolen by i or the proportion of i's endowment that is given by i to the other players. We pool decisions taken under Part 1 – when joining is automatic – and Part 3 – when joining is optional. But we interact regressors with the optional joining dummy, which is equivalent to having different average decisions for Parts 1 and 3. The UK dummy is the omitted category.

Regression results, which are reported in Table 5, confirm that on average there is signif-

icantly less stealing and more giving by African subjects, with little difference between those two subject pools. There is also significantly more stealing when joining is optional (Part 3), a finding consistent with the idea that subjects feel less inhibited to steal from individuals who could have protected their endowment by opting out of the group. This finding is common to all three subject populations, but is strongest for the UK sessions. We also find significantly more giving in Kenya when joining is optional, which suggests that joining attracts those who wish to give.

In Table 6 we repeat the same analysis using as observations all individual choices τ_{ijt} made by experimental subjects.[15] We also introduce dyad-specific choice parameters as additional regressors. These parameters are organized into four groups: the price of burning, stealing or giving (γ_{bt}, γ_{st} or γ_{gt}); the initial endowment of the player e_{it}; the gain from joining the group $e_{it}(p_t - 1)$; and the endowment of the other player $p_t e_{jt}$. To correct for differences in average endowment across sessions, we normalize the initial endowment, gain from joining, and endowment of the other players by the average endowment $\overline{e}_S$ in session S.[16] Since all choice parameters are orthogonal to each other by construction, similar results are obtained if we limit the regressors to one set of choice parameters at a time. All choice parameters are interacted with batch dummies, except for the γ parameters which show too little variation for interaction coefficients to be identified. We also include a dummy for the order in which choices are made – by design, subjects are always first asked about the other player with the largest initial endowment. We estimate a separate regression for each treatment and we cluster standard errors by experimental session.

To facilitate comparison with Table 5, columns (1), (3) and (5) present results without choice

[15] In groups of 3, each subject makes two decisions, one for each of the other group members.

[16] Formally, analysis is performed by replacing e_{it} with $\widetilde{e}_{it} \equiv \frac{e_{it}}{\overline{e}_S}$ throughout, where $\overline{e}_S \equiv \frac{1}{N_{i,t\in S}} \sum_{i,t\in S} e_{it}$ for session S. The gain from joining and the endowment of the other players are similarly divided by $\overline{e}_S$.

parameters. Results are quite similar to those reported in Table 5: less stealing and more giving among African subjects; more stealing when joining is optional, mostly in the Oxford sessions; and more giving in Kenya when joining is optional. We also note less burning and less stealing from the second other player, the one with the lower endowment $p_t e_{jt}$ of the two.

Some results change once we control for choice parameters in columns (2), (4) and (6). We first observe that there is significantly less stealing when the price γ of stealing is high. This finding contradicts purely selfish preferences, which dictate stealing everything irrespective of the value of γ_s. Sensitivity of stealing to γ_s is consistent with altruist preferences, inequality aversion, or warm glow.

In contradiction with theoretical Table 2, we find no systematic variation in burning, stealing or giving as a function of one's own endowment. This is difficult to reconcile with inequality aversion, that is, with the idea that subjects seek to correct differences between their endowment and that of the other player. We find less stealing when the gain from joining the group is larger. We find more stealing from players who received a larger endowment in Uganda and the UK (but not in Kenya where the effect is, if anything, reversed). This is consistent with invidious preferences or inequality aversion. Finally, we find less giving to players with a large endowment, which again is consistent with altruism and inequality aversion.

All these results are robust to alternative specifications such as adding round dummies. There seems to be no learning across rounds, which is to be expected given that no information was fed back to participants during the experiment.

4.3. Preference archetypes

In this section we ask whether the behavior of experimental subjects is systematically predicted by preference archetypes often discussed in the literature. As formally demonstrated in appendix,

behavior in the burning, stealing and giving treatments can be used to infer the preference archetype of an individual subject, provided that each subject has consistent preferences across all treatments.

We report in Table 7 the result of such an effort. We proceed as follows. Based on model predictions summarized in appendix Table A1, we identify a series of choices that contradict a particular archetype. For instance, if a subject destroys (part of) the endowment of another subject, this person cannot be selfish, altruist, efficient, or warm glow – the subject can only be invidious or inequality averse. Similarly, anyone who does not burn always is not invidious, etc. Based on this, we can rule out that a subject has preferences corresponding to a given archetype if this person makes choices that sometimes contradict this archetype.

In the first panel of Table 7 we report the proportion of subjects whose choices violate 3, 4, 5 or all the 6 archetypes at least once. We find that, in all three subject populations, most subjects violate all six archetypes, i.e., make choices that are incompatible with consistently following one of our six archetypes. In the second panel of Table 7, we report the proportion of subjects who never violate a given archetype over the experiment. None of the six archetypes we investigate can account for a majority of the choices made by experimental subjects. In the UK sample, the archetype that 'fits' the largest proportion of subjects is the selfish and the invidious archetype, each followed by 9% of the subjects. This proportion falls to 4% in Kenya and Uganda. In these two populations, the altruist and warm glow archetypes fit the largest proportion of subjects.

In Table 8 we take a similar approach but focus on individual choices, not individual subjects. We report, for each country, the proportion of choices made that violate a particular archetype in each of the three treatments.[17] This approach allows for the fact that subjects

[17] Some treatments are not designed to rule out a given archetype, in which case the percent of choices that violate it is zero. Moreover, some of the choices have parameter values that cannot rule out certain archetypes.

make occasional mistakes. We find that the choices made by UK subjects are less likely to violate the selfish archetype than choices made in Kenya and Uganda. In contrast, choices made by African subjects are less likely to violate the warm glow archetype than UK subjects. The biggest difference between UK and African subjects is in the giving treatment where only 8% of UK subjects violate the selfish archetype – i.e., give something; the proportion is much larger in the two African countries. At the same time, the warm glow archetype is violated by 99% of UK subjects' choices, but only by 79% and 74% of the choices made by Kenyan and Ugandan subjects. These results confirm earlier findings: a sizeable though small proportion of African subjects behave consistently in a manner that indicates altruistic or, at least, warm glow preferences. This proportion among UK participants is negligible.

We also attempt to estimate a mixture model along the lines of Harisson and Rutström (2009).[18] Subjects may deviate from archetypes because of errors or hesitation between ideals and self-interest (e.g., Loomes 2005, Cappelen et al. 2007). By adding a variance parameter, the mixture model allows subjects to deviate from a given archetype in a random fashion. Identification nonetheless requires that subjects approximately follow one of the possible archetypes. If behavior is poorly predicted by all archetypes, variance parameters are large, which makes all archetypes de facto random and thus observationally equivalent. When this happens, estimation fails to converge, which is precisely what we find in our data. This further confirms that behavior across treatments is very hard to reconcile with standard models of preferences defined purely over final payoffs. The choices of participants must also depend on other considerations, such as what behavior is deemed acceptable in a particular context.

[18] See also Belot and Fafchamps (2014).

4.4. Regression analysis of joining

Next we turn to regression analysis to examine the extent to which joining a group varies with choice parameters and across the three study populations. We include the information known to the subject at the time the decision to join is made: the initial endowment of the subject e_{it}; the gain from joining, defined as before as $e_{it}(p_t - 1)$; and the price of burning, stealing or giving (γ_{bt}, γ_{st} or γ_{gt}), depending on the treatment.

Results are presented in Table 9 separately for each of the three treatments, using a linear probability model with robust standard errors clustered by experimental session. We find that, for the stealing treatment, subjects for all three populations are more likely to join if the payoff from joining $e_{it}(p_t - 1)$ is higher. This is consistent with theoretical predictions. For the giving treatment, $e_{it}(p_t - 1)$ increases the probability of joining among UK subjects, but has little or no effect on the probability of joining among African subjects. For the burning treatment $e_{it}(p_t - 1)$ has not effect on the UK subjects whilst joining becomes less likely for larger values of $e_{it}(p_t - 1)$ among Kenyan and Ugandan subjects. While the contrast is striking, for the giving treatment this behavior is consistent with theoretical predictions based on preferences defined over outcomes: everybody should join in the giving treatment, as long as the gain from joining is positive. UK subjects, however, are more likely to join when $e_{it}(p_t - 1)$ is higher which, combined with the fact that fewer UK subjects join in the giving treatment, suggest that there is some subjective cost to joining (e.g., Lazear et al. 2012) that can only be overcome by a larger material gain.

Next we observe that UK subjects are less likely to join a group in the stealing treatment when their initial endowment e_{it} is large. Since joining increases their endowment proportionally by a factor p_t, this finding seems to suggest that subjects expect to lose proportionally more in the stealing treatments when they have a large endowment. In other words, they expect

proportionally more stealing when their endowment is larger than that of other players – which is what we observe (Table 6). For the two African populations, the effect of e_{it} on joining in the stealing treatment is either small or not present: the coefficient on own endowment is more or less cancelled out by interaction terms with the Kenya and Uganda dummies. A similar pattern is observed in the burning treatment across countries, but the coefficients are mostly not significant. For giving, we find a similar pattern: less joining among UK subjects with a large endowment, but a smaller or non-significant effect among the two African populations. Since UK subjects give very rarely, this suggests that UK subjects with a large endowment incur a larger subjective disutility from joining, perhaps because they believe they should give more if they join. This again is consistent with the idea that UK subjects do not join to avoid the painful dilemma of deciding whether to give or not.

From Table 9 we see that participants are more likely to join a group in the burning treatment if the price of burning γ_b is high. This may reflect the fact that in that case individuals expect less burning from others, making it safer to join the group. We also observe that participants are less likely to join a group in the stealing treatment if the price of stealing γ_s is high. If subjects thought that a high γ_s would deter stealing by others, they should be more likely to join. Since we observe the opposite, this suggests that the average subject joins in the hope of stealing from others – and steals more when γ_s is low, as we have seen in Table 6. We also find that subjects are less likely to join in the giving treatment if the price of giving γ_g is high. What does this reveal about their motivation? We know that few people give, so that for most people the main benefit from joining is the increase in material payoff $e_{it}(p_t - 1)$. Since we control for $e_{it}(p_t - 1)$ independently, γ_g should have little or no effect of the probability of joining. From Table 4, however, we also know that many people expect to receive something from others. Perhaps they expect to receive less when γ_g is large (that is, when the cost of giving is high). Since joining is

materially beneficial for most players in the giving treatment, one way to explain this finding is that joining generates a negative subjective cost that must be compensated by the expectation of a larger material gain.

4.5. Introducing expectations

As discussed in Section 3, the decision to join should depend on how subjects expect other participants to behave. If they expect others to burn or steal their endowment, they should be more reluctant to join a group in these two treatments. In contrast, if they expect to receive a lot from others, they should be more willing to join in the giving treatment. To investigate this idea, we re-estimate Table 9 with additional regressors for the subject's expectation of play by other participants, on its own and interacted with country dummies.

For this regression to be fully convincing, we must control for the subject's intended play. To illustrate the issue, remember that people who intend to steal have an incentive to join in the stealing treatment. Now imagine that subjects who expect others to steal also steal a lot themselves. If we control for expectations but not own play, we may falsely assign to a high expectation of stealing by others a behavior that is in fact driven by an intention to steal from others. To correct for this, we construct a variable that summarizes each participant's burning, stealing, and giving decisions made in Part 1. Since subjects receive no feedback about others' play during the experiment, play in Part 1 should be a good proxy for intended play in Part 3.

Regression results are summarized in Table 10. We find no pattern regarding the stealing treatment. African subjects are slightly more likely to join in the giving treatment when they expect to receive more, but the effect is only significant for Kenya. Results are stronger in the burning treatment: joining is less likely for UK subjects who expect more burning, but the effect is absent or reversed in Kenya and Uganda. We also find that UK subjects are less likely to join

if they burned a lot in Part 1, but the effect is reversed for the other countries: in those sessions, subjects who burned more in Part 1 are more likely to join a group in the burning treatment, suggesting that their desire to burn partly motivates their decision to join.

In Table 11 we examine whether expectations of others' play help predict own play in Part 1 and Part 3 of the experiment. We find in the UK study population a strong association between own play and own expectation of others' play. This is true in all treatments and in both parts of the experiment. In the two African study pools, however, this association is weaker. This is particularly noticeable in the stealing treatment, for which both Kenya and Uganda have significantly negative coefficients on the interaction between expectations and the country dummy. Point estimates are also mostly negative in burning, although significantly so in one case only. Why this is the case is unclear.[19]

5. Conclusion and discussion

In this paper we have reported the results from a laboratory experiment conducted in the United Kingdom, Kenya, and Uganda, with three different subject pools. We test whether people in a group choose to destroy or steal the endowment of others, if given the option, and whether they choose to give some of their endowment to others. We also test whether subjects are less likely to join a group when doing so increases their endowment but exposes them to redistribution. The experimental setting precludes any feedback between subjects during and at the end of the experiment. Play is anonymous and subjects never play twice with the same subject within the same part of the experiment.

[19] The fact that subjects condition their own behavior on how they expect others to behave is suggestive of conditional cooperation. In a study of public good games in Russia, Gachter and Herrmann (2011) find that introducing conditional play in the form of punishment fails to increase cooperation because, in that study population, both low and high contributions are punished and these two effects cancel each other (see also Kocher, Martinsson and Visser 2012). We did investigate this possibility in our data, looking for a non-linear relationship between transfers and expectations, to see whether this could account for the findings in Uganda and Kenya. We find no such evidence in our data.

We find a lot of commonality across the three subject populations – little giving and burning, much more stealing. We also find differences between African and UK subjects. If anything UK student subjects behave in a more selfish and strategic way – giving less, stealing more. They also are less likely to join a group when doing so enables them to receive from others, and to transfer part of their endowment to others. Why this is the case is not entirely clear, but it could be because UK subjects prefer not to incur the moral cost of receiving without giving in return (e.g., Lazear et al. 2012).

In contrast, African subjects are more likely to behave in an altruistic manner. From Table 11, they also appear to play in a less strategic manner – in the sense that their actions are less dictated by what they expect others to do than UK subjects. Combined with the fact that African subjects give more and steal less in general, this suggests that the actions of the African subjects are more determined by general rules of behavior – e.g., morality – rather than by strategic considerations. In contrast, UK subjects play in a more individualistic and strategic manner – more in line with assumptions behind 'homo economicus'. Finally, we find that African subjects are less likely to join a group in the burning treatment and more likely to expect destruction by others than actually takes place. It is as if the African subjects, who behave in a more 'moralistic' manner than UK subjects, do not expect others to do the same.

What do these findings say about development? There is a literature that depicts less developed societies as characterized by within-group morality (e.g., within family or tribe), but showing little respect for contracts and property rights in anonymous interactions (Fukuyama 2011). It has often been argued (e.g., Polanyi 1944, North 1990, Platteau 1994, Bowles 1998) that strong norms of impersonal fairness are needed for trust to allow markets to blossom and development to take place. Putnam et al. (1993), for instance, argue that the difference in development levels between Northern and Southern Italy is due to historically determined

differences in trust and social capital. Based on this, we would have expected less stealing by UK subjects, which is not what we find.

Those who have compared fairness across societies have uncovered a strong positive correlation between norms of fairness and the level of market integration in a society (Heinrich et al 2010, House et al 2013). If this view is correct, we would have again expected to find UK subjects to be more pro-social towards strangers than Ugandan farmers or Kenyan slum dwellers, whose societies have only emerged from a pre-market, subsistence economy in a relatively recent past. We do not find such pattern in our data. Our findings thus provide no support for the argument that underdevelopment in Africa is due to a failure of generalized morality. If anything, we find that it is UK subjects who behave in a more opportunistic manner. What African subjects seem to be lacking is not morality but trust in each other.

It is important to emphasize that the results presented here rely on an experiment that does not allow for feedback between subjects. The purpose of this approach is to document how individuals approach redistribution in groups in the absence of any monitoring and punishment mechanism. Introducing feedback and sequential play may profoundly affect group cohesion. For instance, a leader may be able to reduce people's fear of expropriation, thereby facilitating group formation. Alternatively, groups formed by individuals hoping to steal from others are ultimately efficiency-reducing and thus unlikely to survive long. We also conjecture that individuals who base their actions on general moral principles may show less willingness to put up with the opportunistic and destructive behavior of others – i.e., such behavior may trigger moral outrage. This in turn could unravel group cohesion, making teamwork harder to sustain in a variety of market situations, be it within organizations (e.g., workers discipline) or in market exchange (e.g., breach of contract). More research is needed on these issues.

6. References

Andreoni, J. and L. Versterlund (2001). "Which is the fair sex? Gender differences in altruism", *Quarterly Journal of Economics*, 116(1): 293-312

Andreoni, J. and J. Miller (2002). "Giving According to GARP: An Experimental Test of the Consistency of Preferences for Altruism", *Econometrica,* 70(2): 737-753.

Baland, Jean-Marie and Jean-Philippe Platteau (1995), *Halting Degradation of Natural Resources: Is There a Role for Rural Communities?*, Food and Agriculture Organization; Clarendon Press, Oxford, England

Battigalli, Pierpaolo, and Martin Dufwenberg. (2007). "Guilt in Games." *American Economic Review*, 97(2): 170-176.

Banerjee, Abhijit, Lakshmi Iyer and Rohini Somanathan (2005), "History, Social Divisions and Public Goods in Rural India", *Journal of the European Economic Association*, 3(2-3): 639-47.

Bardsley, Nicholas (2008). "Dictator game giving: altruism or artefact?", *Experimental Economics*, 2008, 11(2): 122-33

Barr, Abigail, Markus Lindelow,and Pieter Serneels (2009). "Corruption in public service delivery: An experimental analysis," *Journal of Economic Behavior and Organization*, Elsevier, 72(1): 225-39, October.

Barr, Abigail and Danila Serra (2010). "Corruption and culture: An experimental analysis," *Journal of Public Economics*, Elsevier, 94(11-12): 862-869, December.

Barr, Abigail, Marleen Dekker and Marcel Fafchamps (2013), "The Formation of Community Based Organizations in sub-Saharan Africa: An Analysis of a Quasi-Experiment", Department of Economics, Oxford University, Oxford (mimeograph)

Battigalli, P. and Dufwenberg, M. (2009). "Dynamic psychological games", *Journal of Eco-*

nomic Theory, 144(1): 1-35

Bernard, Tanguy, Alain de Janvry and Elisabeth Sadoulet (2010), "When Does Community Conservatism Constrain Village Organizations?", *Economic Development and Cultural Change*, 58(4): 609-41

Bolton, Gary E., Elena Katok, Rami Zwick (1999). "Dictator game giving: Rules of fairness versus acts of kindness", *International Journal of Game Theory*, 27(2): 269-99, August

Bowles, S. (1998). "Endogenous Preferences: The Cultural Consequences of Markets and Other Economic Institutions", *Journal of Economic Literature*, 36(1): 75-111.

Brune, Lasse, Jessica Goldberg, Xavier Gine, and Dean Yang. (2010) "Commitments to Save: A Field Experiment in Rural Malawi", University of Michigan (mimeograph)

Cappelen, Alexander W., Astri Drange Hole, Erik O. Sorensen, and Bertil Tundgodden (2007). "The Pluralism of Fairness Ideals: An Experimental Approach", *American Economic Review*, 97(3): 818-27

Cardenas, Juan C., and Jeffrey P. Carpenter (2005). "Three Themes on Field Experiments and Economic Development", in Glenn W. Harrison, Jeffrey Carpenter and John A. List (ed.) *Field Experiments in Economics* (Research in Experimental Economics, Volume 10), Emerald Group Publishing Limited, 71-123.

Charness, Gary and Matthew Rabin (2002). "Understanding Social Preferences With Simple Tests," *Quarterly Journal of Economics*, 117(3): 817-69, August.

Coleman, James S. (1988), "Social Capital in the Creation of Human Capital", *American Journal of Sociology*, 94(Supplement): S95-S120

Cook, Michael (1995). "The Future of US Agricultural Cooperatives: A Neo-Institutional Approach", *Americal Journal of Agricultural Economics*, 77: 1153-9.

Fafchamps, Marcel and Ruth Vargas Hil (2005). "Selling at the Farmgate or Traveling to

Market," American Journal of Agricultural Economics", *Agricultural and Applied Economics Association*, 87(3): 717-34.

Fehr, Ernst and Klaus M. Schmidt (1999), "A Theory of Fairness, Competition and Cooperation", *Quarterly Journal of Economics*, 114(3): 817-68, August

Fischbacher, Urs (2007). "z-Tree: Zurich Toolbox for Ready-made Economic Experiments", *Experimental Economics,* 10(2): 171-178.

Fisman, Raymond and Edward Miguel (2007). "Corruption, Norms, and Legal Enforcement: Evidence from Diplomatic Parking Tickets", *Journal of Political Economy*, 115(6): 1020-48

Fisman, Raymond, Shachar Kariv, and Daniel Markovits. (2007). "Individual Preferences for Giving." *American Economic Review*, 97(5): 1858-1876.

Fukuyama, Francis (2011). *The Origins of Political Order: From Prehuman Times to the French Revolution*, Farrar, Straus and Giroux

Gächter, Simon, and Benedikt Herrmann (2011). "The limits of self-governance when cooperators get punished: Experimental evidence from urban and rural Russia." *European Economic Review*, 55(2): 193-210.

Greene, Joshua (2012). *For The Greater Good: How the Moral Brain Works and How it Can Work Better*, Penguin Press, New York

Harrison, Glenn W., and E. Elisabet Rutström (2009). "Expected Utility Theory and Prospect Theory: One Wedding and a Decent Funeral." *Experimental Economics*, 12(2): 133-158.

Henrich, Joseph, Jean Ensminger, Richard McElreath, Abigail Barr, Clark Barrett, Alexander Bolyanatz, Juan Camilo Cardenas, Michael Gurven, Edwins Gwako, Natalie Henrich, Carolyn Lesorogol, Frank Marlowe, David Tracer, John Ziker (2010). "Markets, Religion, Community Size, and the Evolution of Fairness and Punishment". *Science*, 327: 1480-4

Henrich, Joseph, Robert Boyd, Samuel Bowles, Colin Camerer, Ernst Fehr, and Herbert Gintis (2004). *Foundations of Human Sociality: Economic Experiments and Ethnographic Evidence from Fifteen Small-Scale Societies*, Oxford University Press, Oxford.

Henrich, J., Boyd, R., Bowles, S., Camerer, C., Fehr, E., Gintis, H., McElreath, R., Alvard, M., Barr, A., Ensminger, J., Henrich, N. Smith, Hill, K. Gil-White,F., Gurven, M. , Marlowe,F. W., Patton, J.Q., Tracer, D. (2005), "Economic man in cross-cultural perspective: Behavioral experiments in 15 small-scale societies", *Behavioral and Brain Sciences*, 28(6): 795-815.

House, Bailey R., Joan B. Silk, Joseph Henrich, H. Clark Barrett, Brooke A. Scelza, Adam H. Boyette, Barry S. Hewlett, Richard McElreath, Stephen Laurence. (2013) "Ontogeny of prosocial behavior across diverse societies". *Proceedings of the National Academy of Sciences.* August 19

Jakiela, Pamela. (2013) "Equity vs. Efficiency vs. Self-Interest: on the Use of Dictator Games to Measure Distributional Preferences," *Experimental Economics*, 16(2): 208-221

Jakiela, P. and O. Ozier. (2016). "Does Africa need a rotten kid theorem? Experimental Evidence from Village Economies". *Review of Economic Studies*, 83(1): 231-268

Kebede, Bereket and Daniel John Zizzo (2011). "Envy and Agricultural Innovation: An Experimental Case Study from Ethiopia," CSAE Working Paper Series 2011-06, Centre for the Study of African Economies, University of Oxford.

Kocher, Martin, Peter Martinsson, and Martine Visser (2012). "Social background, cooperative behavior, and norm enforcement." *Journal of Economic Behavior & Organization,* 81(2): 341-354.

Lazear, Edward P., Ulrike Malmendier, and Roberto A. Weber. (2012). "Sorting in Experiments with Application to Social Preferences." *American Economic Journal: Applied Economics*, 4(1): 136-63.

List, John A. (2007), "On the interpretation of giving in dictator games", *Journal of Political Economy*, 115(3): 482-93

Loomes, Graham (2005). "Modelling the Stochastic Component of Behaviour in Experiments: Some Issues for the Interpretation of Data", *Experimental Economics*, 8: 301-23

Mikhail, John (2011). *Elements of Moral Cognition: Rawls' Linguistic Analogy and the Cognitive Science of Moral and Legal Judgment*, Cambridge University Press, Cambridge

North, Douglas C. (1990). *Institutions, Institutional Change, and Economic Performance*, Cambridge University Press, Cambridge

Null, Clair (2011). "Warm glow, information, and inefficient charitable giving", *Journal of Public Economics*, 95(5-6): 455-65.

Office of National Statistics, United Kingdom. (2011). Table QS210EW, 2011 Census. http://www.ons.gov.uk/ons/guide-method/census/2011/index.html

Okada, Akira and Riedl, Arno (2005). "Inefficiency and social exclusion in a coalition formation game: experimental evidence," *Games and Economic Behavior*, 50(2): 278-311, February.

Olson, Mancur (1971), *The Logic of Collective Action: Public Goods and the Theory of Groups* (Revised edition), Harvard University Press, Cambridge MA

Ostrom, Elinor (1990), *Governing the Commons: The Evolution of Institutions for Collective Action*, Cambridge University Press, Cambridge

Platteau, Jean-Philippe (1994). "Behind the Market Stage Where Real Societies Exist: Part II - The Role of Moral Norms", *Journal of Development Studies*, 30(4): 753-815. July

Polanyi, Karl (1944). *The Great Transformation*, Holt, Rinehart, and Winston, New York

Pradhan, Menno, D. Suryadarma, A. Beatty, M. Wong, A. Gaduh, , A. Alishjabana, and R.P. Artha (2014), "Improving educational quality through enhancing community participation : results from a randomized field experiment in Indonesia," *American Economic Journal, Applied*

Economics (forthcoming)

Prentice, Deborah A., and Dale T. Miller (1993). "Pluralistic Ignorance and Alcohol Use on Campus: Some Consequences of Misperceiving the Social Norm." *Journal of Personality and Social Psychology*, 64(2): 243.

Putnam, Robert D., Robert Leonardi, and Raffaella Y. Nanetti (1993). *Making Democracy Work: Civic Institutions in Modern Italy*, Princeton University Press, Princeton

Visser, Martine, and Justine Burns (2015). "Inequality, Social Sanctions and Cooperation within South African Fishing Communities." *Journal of Economic Behavior & Organization.*

Zizzo, Daniel John and Andrew J. Oswald (2001). "Are People Willing to Pay to Reduce Others' Incomes?" *Annales d'Economie et de Statistique*, 63-64: 39-65.

Zizzo, Daniel John (2003a). "Money burning and rank egalitarianism with random dictators," *Economics Letters*, Elsevier, 81(2): 263-66, November.

Zizzo, Daniel John (2003b). "Inequality and Procedural Fairness in a Money Burning and Stealing Experiment," Economics Series Working Papers 155, University of Oxford, Department of Economics.

7. Appendix: play and preferences over outcomes

We consider five preference functions over final payoffs only (selfish, altruistic, efficient, invidious, and inequality averse). The sixth one (warm glow) contains an element of preference over process.

The first part of the experiment reveals information about individual preferences over final payoffs. The experiment was designed to distinguish among six preference archetypes commonly used in economics. To simplify the presentation, we drop the time index from the notation.

The first archetype, which we refer to as 'selfish', equates the utility of subject i with his or

her payoff π_i, i.e.:

$$U_i^S = \pi_i$$

The second archetype captures altruism a la Becker, represented as:

$$U_i^A = \pi_i + \frac{\alpha}{n_i} \sum_{j \in N_i} \pi_j$$

where $n_i = \{0, 1, 2\}$ is the number of subjects in group N_i. Parameter α represents the strength of altruism. Concern for aggregate efficiency (e.g., Charness and Rabin 2002) can be represented as:

$$U_i^E = \pi_i + \sum_{j \in N_i} \pi_j$$

It is equivalent to setting $\alpha = n_i$ in the altruism model.

Invidious (or rival or spiteful) preferences can be represented as:

$$U_i^R = \pi_i - \frac{\beta}{n_i} \sum_{j \in N_i} \pi_j$$

Here individuals derive dissatisfaction from others having a high payoff.[20] Following Okada and Reidl (2005), altruistic and invidious preferences can be combined into a single utility function characterized by inequality aversion (Fehr and Schmidt 1999):

$$U_i^I = \pi_i - \frac{\alpha}{n_i} \sum_{m_j > m_i} |\pi_j - \pi_i| - \frac{\beta}{n_i} \sum_{m_j < m_i} |\pi_i - \pi_j|$$

with $\alpha \geq 0$ and $\beta \geq 0$. These preferences nest altruistic and invidious preferences as follows.

[20] Unlike Blanchflower and Oswald (20XX), we write utility in levels, not in logs, but as long as the magnitude of payoffs is relatively similar across games, this should not matter in terms of inference. Using levels facilitates comparison with other utility functions.

Let $\beta = -\alpha$. We have:

$$\begin{aligned} U_i^I &= \pi_i - \frac{\alpha}{n_i} \sum_{j \in N_i} (\pi_j - \pi_i) \\ &= \pi_i(1+\alpha) - \frac{\alpha}{n_i} \sum_{j \in N_i} \pi_j \end{aligned}$$

from which we see that preferences are altruistic if $\alpha < 0$ and invidious if $\alpha > 0$.

We also consider the possibility of warm glow preferences defined as:

$$U_i = \left(\pi_i - \sum_{j \in N_i} g_{ij} \right) + \omega(1-G) \sum_{j \in N_i} g_{ij}$$

where ω is the warm glow parameter, g_{ij} is a transfer from i to j, and G is the Gini coefficient of the g_{ij}'s calculated over the neighborhood of i, N_i. It is clear that $1 - G$ is maximized when $G = 0$ and thus when all g_{ij}'s are equal. This last feature is inspired by Null (2011) findings regarding giving to charities.

Through straightforward though tedious algebra, it is possible to derive predictions for burning, stealing and giving as follows. To simplify the presentation, let us define an absolute transfer from j to i as $k_{ij} \equiv \tau_{ij} p e_j$ for burning and stealing, and $k_{ij} = \tau_{ij} p e_i$ for giving. Predicted choices of k_{ij} are summarized in Table A1 for different preference archetypes.

	Burning	Stealing	Giving
Selfish	0	$p\pi_j$	0
Altruist	0	$\gamma_s < \frac{\alpha}{n_i} \Rightarrow k_{ij} = p\pi_j$ $\gamma_s > \frac{\alpha}{n_i} \Rightarrow k_{ij} = 0$	$\gamma_g < \frac{n_i}{\alpha} \Rightarrow \sum_j k_{ij} = p\pi_i$ $\gamma_g > \frac{n_i}{\alpha} \Rightarrow k_{ij} = 0$
Efficient	0	0	$\gamma_g < 1 \Rightarrow \sum_j k_{ij} = p\pi_i$ $\gamma_g > 1 \Rightarrow k_{ij} = 0$
Rival	$\gamma_b < \frac{\beta}{n_i} \Rightarrow k_{ij} = p\pi_j$ $\gamma_b > \frac{\beta}{n_i} \Rightarrow k_{ij} = 0$	$p\pi_j$	0
Ineq. aversion $p\pi_j > p\pi_i$	$\gamma_b < \frac{\alpha}{\alpha + n_i} \Rightarrow k_{ij} = p\frac{\pi_j - \pi_i}{1-\gamma_b}$ $\gamma_b > \frac{\alpha}{\alpha + n_i} \Rightarrow k_{ij} = 0$	$p\pi_j$	0
Ineq. aversion $p\pi_j < p\pi_i$	0	$\gamma_s < \frac{\beta}{n_i - \beta} \Rightarrow k_{ij} > 0$ $\gamma_s > \frac{\beta}{n_i - \beta} \Rightarrow k_{ij} = 0$	$\gamma_g < \frac{n_i - \beta}{\beta} \Rightarrow k_{ij} > 0$ $\gamma_g > \frac{n_i - \beta}{\beta} \Rightarrow k_{ij} = 0$
Warm glow	0	$\gamma_s < \omega \Rightarrow k_{ij} > 0, \approx p\pi_{ij}$ $\gamma_s > \omega \Rightarrow k_{ij} = 0$	$\omega > 1 \Rightarrow k_{ij} = \frac{p\pi_i}{n_i}$ $\omega < 1 \Rightarrow k_{ij} = 0$

Table A1. Behavioral predictions from preference archetypes

Table 2: Treatment and parameter values across rounds

Session type:		A			B			C			D		
	round	**treatment**	**gamma**	**p**	**treatment**	**gamma**	**p**	**treatment**	**gamma**	**p**	**treatment**	**gamma**	**p**
Part 1	1	Burning	0.05		Stealing	0.5		Stealing	0.9		Stealing	0.9	
	2	Stealing	0.7		Stealing	0.7		Giving	0.7		Stealing	1.2	
	3	Stealing	1		Burning	0.05		Stealing	0.3		Giving	0.7	
	4	Stealing	0.9		Stealing	0.1		Stealing	1.2		Burning	0.05	
	5	Giving	0.4		Giving	0.4		Burning	0.05		Stealing	0.3	
Part 2	1			1.5			1.5			1.5			1.5
Part 3	1	Giving	0.4	1.25	Giving	0.05	1.05	Giving	0.9	1.05	Giving	0.9	1.05
	2	Burning	0.05	1.25	Giving	0.4	1.25	Burning	0.1	2	Stealing	0.5	1.25
	3	Stealing	0.9	1.05	Stealing	0.3	1.5	Stealing	0.5	1.25	Burning	0.1	2
	4	Giving	0.1	1.5	Burning	0.1	2	Giving	0.4	2	Giving	0.4	2
	5	Stealing	0.9	1.5	Stealing	0.5	1.25	Stealing	0.3	1.25	Stealing	0.3	1.25

Note: all session types (A, B, C and D) were repeated twice in Kenya and Uganda and once in the UK.

Table 3. Summary of play

Action	UK		Kenya		Uganda	
	Mean	N.obs.	Mean	N.obs.	Mean	N.obs.
Practice rounds [joining imposed]						
burning	14.1%	144	4.4%	198	17.3%	162
stealing	34.8%	144	26.0%	198	30.2%	162
giving	8.0%	144	11.5%	198	12.8%	162
Part 1: Joining imposed						
burning	7.8%	144	4.8%	198	10.7%	162
stealing	37.4%	432	23.4%	594	26.3%	486
giving	0.7%	144	4.6%	198	8.4%	162
Part 2: Joining only						
joining	95.8%	144	94.4%	198	82.1%	162
Part 3: Joining + transfers						
a. Joining in:						
burning game	82.6%	144	59.6%	198	42.0%	162
stealing game	64.6%	288	82.5%	360	74.8%	306
giving game	81.6%	288	75.7%	378	82.4%	324
b. Transfers						
burning	5.9%	111	6.7%	97	17.6%	39
stealing	70.3%	167	41.0%	284	38.5%	211
giving	0.8%	235	7.1%	286	8.2%	267

Table 4. Expectations of others' behavior

	UK		Kenya		Uganda	
	Mean	N.obs.	Mean	N.obs.	Mean	N.obs.
Percentage of subjects responding 'yes' when asked whether other will…						
Burn their endowment	29.6	144	42.4	198	51.5	145
Steal their endowment	76.9	144	53.6	126	54.7	145
Give to them	12.9	144	39.9	126	52.0	145
Percentage of subjects responding `yes' when asked whether others expect them to give.						
Giving norm	17.9	144	47.0	126	45.4	145
Ratio Expectation to Part 1 play						
Burning	3.8		8.8		4.8	
Stealing	2.1		2.3		2.1	
Giving	18.4		8.7		6.2	

Note: differences between Oxford and the two African samples are all highly significant using a t-test and joint significant tests in regressions of answers on country dummies, with session clustering

Table 5. Individual burning, stealing and giving choices

VARIABLES	(1) Burning	(2) Stealing	(3) Giving
Kenya	-0.0298	**-0.140*** **	**0.0390*** **
	(-1.435)	(-3.130)	(3.916)
Uganda	0.0289	**-0.111***	**0.0776*** **
	(0.962)	(-2.036)	(5.876)
Dummy for optional joining	-0.0101	**0.345*** **	0.00119
	(-0.767)	(7.681)	(0.366)
Kenya x optional joining dummy	0.0293	**-0.169*** **	**0.0238*** **
	(1.001)	(-3.273)	(3.035)
Uganda x optional joining dummy	0.0797	**-0.222*** **	-0.00395
	(0.771)	(-3.462)	(-0.479)
Constant	0.0779***	0.374***	0.00681**
	(4.418)	(9.179)	(2.433)
Observations	1,556	3,145	1,789
R-squared	0.012	0.090	0.058
F-test Africa = Oxford	2.906	4.904	23.642
Prob > F	**0.072**	**0.003**	**0.013**
F-test Africa x optional joining	0.757	7.068	5.094
Prob > F	0.479	**0.015**	**0.000**

t-statistics appear in parentheses and are based on robust standard errors clustered by session.
*** p<0.01, ** p<0.05, * p<0.1

Table 6. Average choices by treatment -- with choice parameters

VARIABLES	(1) Burning	(2) Burning	(3) Stealing	(4) Stealing	(5) Giving	(6) Giving
Kenya	-0.0298	-0.0689	**-0.140*** **	-0.0938	**0.0390*** **	0.0469
	(-1.435)	(-0.827)	(-3.131)	(-1.289)	(3.919)	(1.499)
Uganda	0.0289	-0.108	**-0.111***	**-0.147***	**0.0776*** **	0.0442
	(0.963)	(-1.148)	(-2.037)	(-1.750)	(5.880)	(1.278)
Dummy for optional joining	-0.0200	-0.0225	**0.322*** **	**0.181*** **	0.000770	0.000271
	(-1.517)	(-0.344)	(6.943)	(4.674)	(0.249)	(0.0526)
Kenya x optional joining dummy	0.0301	0.0515	**-0.154*** **	**-0.110****	**0.0275*** **	0.0161
	(1.083)	(0.867)	(-2.903)	(-2.095)	(3.059)	(1.524)
Uganda x optional joining dummy	0.0903	0.0683	**-0.205*** **	**-0.163*** **	0.00299	0.0106
	(0.754)	(0.918)	(-3.243)	(-2.826)	(0.329)	(0.695)
gamma		-1.865		**-0.319*** **		-0.00780
		(-1.033)		(-7.760)		(-0.349)
Initial endowment		-0.173		0.0961		0.00171
		(-1.440)		(0.866)		(0.349)
Kenya x initial endowment		0.0460		-0.116		-0.0195
		(0.462)		(-0.868)		(-0.830)
Uganda x initial endowment		-0.101		-0.128		0.0122
		(-0.672)		(-0.945)		(0.346)
Gain from joining		0.174		**-0.339***		0.00296
		(1.083)		(-1.797)		(0.337)
Kenya x gain from joining		-0.0129		0.317		-0.0228
		(-0.0883)		(1.304)		(-0.864)
Uganda x gain from joining		0.396*		0.307		0.0123
		(1.730)		(1.207)		(0.351)
Endowment of other player		0.0216		**0.0553*** **		**-0.0190****
		(1.025)		(3.208)		(-2.148)
Kenya x endowment of other player		-0.000960		**-0.0822*** **		0.0236
		(-0.0323)		(-4.667)		(1.388)
Uganda x endowment of other player		0.0343		0.0120		0.0139
		(0.814)		(0.508)		(0.848)
Dummy for rank = 2	**-0.0194*** **	-0.00271	**-0.0353*** **	-0.0223	-0.00292	-0.00536
	(-3.053)	(-0.230)	(-5.026)	(-1.491)	(-0.646)	(-1.077)
Constant	0.0876***	0.238*	0.392***	0.635***	0.00827**	0.0300
	(4.810)	(1.707)	(9.539)	(8.501)	(2.727)	(1.459)
Observations	1,426	1,426	4,112	4,112	2,290	2,290
R-squared	0.021	0.045	0.086	0.161	0.051	0.054
F-test country	2.907	0.662	4.908	1.536	23.673	1.703
Prob > F	0.072	0.138		0.234	0.000	0.267
F-test country#optional joining	0.829	0.504	5.870	4.346	4.679	1.386
Prob > F	0.447	0.459	0.015	0.376		0.201
F-test country#initial endowment		0.802		0.499		0.413
Prob > F		0.524		0.023	0.018	0.620
F-test country#gain from joining		2.134		1.013		0.486
Prob > F		0.610	0.008	0.613		0.666

t-statistics appear in parentheses and are based on robust standard errors clustered by session.
*** p<0.01, ** p<0.05, * p<0.1

Table 7. Compatibility of choices with utility archetypes

% of subjects whose choices violate:

	UK	Kenya	Uganda
3 archetypes	0.7%	1.0%	1.2%
4 archetypes	5.6%	16.2%	14.2%
5 archetypes	11.8%	3.0%	5.6%
6 archetypes	81.9%	79.8%	79.0%
N.subjects	144	198	162

% of subject who do not violate the archetype even once in the experiment

	UK	Kenya	Uganda
U.Selfish	9.0%	4.0%	3.7%
U.Efficient	0.7%	1.0%	1.2%
U.Altruist	1.4%	15.2%	14.2%
U.Invidious	9.0%	2.5%	1.9%
U.Warm glow	1.4%	15.2%	14.2%
U.Inequal. Averse	3.5%	0.5%	2.5%
N.subjects	144	198	162

Table 8. Proportion of choices that violate each archetype

	All	**Burning**	**Stealing**	**Giving**
A. UK 2014	%	%	%	%
U.Selfish	40%	18%	58%	**8%**
U.Efficient	54%	18%	52%	99%
U.Altruist	23%	18%	0%	99%
U.Invidious	44%	38%	58%	8%
U.Warm glow	23%	18%	0%	**99%**
U.Inequal. Averse	46%	41%	53%	29%
N.observations	720	144	432	144
B. Kenya	%	%	%	%
U.Selfish	44%	13%	58%	**30%**
U.Efficient	51%	13%	54%	79%
U.Altruist	18%	13%	0%	79%
U.Invidious	49%	40%	58%	30%
U.Warm glow	18%	13%	0%	**79%**
U.Inequal. Averse	49%	44%	57%	32%
N.observations	990	198	594	198
C. Uganda	%	%	%	%
U.Selfish	53%	36%	61%	**48%**
U.Efficient	61%	36%	65%	74%
U.Altruist	22%	36%	0%	74%
U.Invidious	54%	41%	61%	48%
U.Warm glow	22%	36%	0%	**74%**
U.Inequal. Averse	51%	56%	55%	33%
N.observations	810	162	486	162

Table 9. Joining by treatment -- with choice parameters

VARIABLES	(1) Burning	(2) Stealing	(3) Giving
Kenya	0.346	**0.467*** **	**0.389*** **
	(1.630)	(3.781)	(11.82)
Uganda	**-0.378*** **	-0.0792	-0.0259
	(-3.549)	(-0.809)	(-0.377)
Gain from joining	**-0.288** **	-0.0612	0.0800
	(-2.181)	(-0.505)	(1.184)
Kenya x gain from joining	**-0.474*** **	-0.0907	**-0.446*** **
	(-3.224)	(-0.219)	(-5.921)
Uganda x gain from joining	**-0.852** **	-0.452	**-0.446*** **
	(-2.310)	(-1.487)	(-6.903)
Initial endowment	-0.345	**-0.464*** **	**-0.110** **
	(-1.618)	(-4.762)	(-2.356)
Kenya x initial endowment	**0.586*** **	**0.385** **	**0.136** **
	(3.559)	(2.438)	(2.223)
Uganda x initial endowment	0.537	**0.353** **	0.0771
	(1.546)	(2.512)	(0.827)
Gamma	**4.376** *	**-0.251*** **	**-0.210*** **
	(1.840)	(-3.108)	(-3.150)
Constant	0.487**	1.010***	0.882***
	(2.100)	(10.76)	(17.53)
Observations	504	954	990
R-squared	0.161	0.069	0.055
F-test Africa	7.200	0.327	1.290
Prob > F	0.005	0.724	0.103
F-test Africa x gain from joining	6.627	1.110	34.618
Prob > F	0.003	0.022	0.292
F-test Africa x initial endowment	6.355	4.444	2.472
Prob > F	0.005	0.345	0.000

t-statistics appear in parentheses
and are based on robust standard
errors clustered by session.
*** p<0.01, ** p<0.05, * p<0.1
Gain from joining = (groupreturn-1) * initial endowment

Table 10. Joining, expectations, and past play

Regressor	(1) Game 1	(2) Game 2	(3) Game 3
Expected burning/stealing/receiving	**-0.268****	0.0288	-0.0664
	(-2.417)	(0.148)	(-0.679)
Kenya x expected burning/stealing/receiving	**0.440****	0.168	**0.219***
	(2.536)	(0.836)	(1.898)
Uganda x expected burning/stealing/receiving	**0.278***	0.0594	0.109
	(1.986)	(0.272)	(0.853)
Own past burning/stealing/giving	**-0.290****	-0.0211	0.298
	(-2.243)	(-0.173)	(0.755)
Kenya x own past burning/stealing/giving	**0.581****	0.193	0.0812
	(2.589)	(1.349)	(0.188)
Uganda x own past burning/stealing/giving	**0.539*****	0.307	-0.0203
	(2.913)	(1.675)	(-0.0484)
Kenya	**-0.520*****	**-0.220***	-0.116
	(-4.486)	(-1.926)	(-1.176)
Uganda	**-0.432*****	-0.185	0.0250
	(-3.481)	(-1.191)	(0.306)
Gain from joining	0.321	**0.442*****	**0.380*****
	(1.453)	(2.959)	(12.24)
Kenya x gain from joining	**-0.518*****	**-0.592*****	**-0.487*****
	(-3.350)	(-3.002)	(-7.018)
Uganda x gain from joining	**-0.520*****	-0.350	**-0.416*****
	(-2.964)	(-0.999)	(-8.159)
Initial endowment	**4.757****	**-0.350*****	**-0.231*****
	(2.133)	(-3.711)	(-3.828)
Kenya x initial endowment	-0.268	**-0.456*****	**-0.109****
	(-1.214)	(-5.047)	(-2.310)
Uganda x initial endowment	**0.551*****	**0.492*****	**0.176****
	(3.100)	(4.019)	(2.783)
Gamma	0.204	**0.315****	0.0805
	(0.884)	(2.463)	(0.792)
Constant	0.515**	1.047***	0.899***
	(2.373)	(10.79)	(18.56)
Observations	487	829	830
R-squared	0.214	0.098	0.083

t-statistics appear in parentheses and are based on robust standard errors clustered by session.
*** p<0.01, ** p<0.05, * p<0.1

Table 11. Burning, stealing and giving -- controlling for expectations

	Burning		Stealing		Giving	
Regressors	Part 1	Part 3	Part 1	Part 3	Part 1	Part 3
Expected burning/stealing/receiving	**0.167***	**0.249****	**0.518*****	**0.965*****	0.0167	**0.0564***
	(1.894)	(2.700)	(5.921)	(7.074)	(1.036)	(2.059)
Kenya x expected burning/stealing/receiving	-0.0959	**-0.188***	**-0.365*****	**-0.613*****	0.0390	0.0793
	(-0.994)	(-1.826)	(-3.536)	(-3.842)	(0.747)	(1.304)
Uganda x expected burning/stealing/receiving	-0.165	0.0470	**-0.392*****	**-0.736*****	-0.0376	-0.0761
	(-1.426)	(0.195)	(-3.717)	(-4.034)	(-0.785)	(-1.595)
Kenya	-0.0437	0.0633	0.133	**0.315****	-0.0501	0.0580
	(-0.702)	(0.619)	(1.485)	(2.320)	(-1.613)	(1.538)
Uganda	0.0546	-0.151	**0.258****	0.156	0.0586	**0.0902****
	(0.544)	(-0.671)	(2.555)	(0.841)	(1.162)	(2.696)
Difference in endowment	**0.0623*****	0.00751	**0.0844*****	0.0368	**-0.0177***	-0.0165
	(3.866)	(0.424)	(4.300)	(0.901)	(-1.973)	(-1.610)
Kenya x difference in endowment	-0.0186	-0.00755	-0.0535	-0.0864	**0.0333****	0.0418
	(-0.736)	(-0.171)	(-1.647)	(-1.251)	(2.766)	(1.538)
Uganda x difference in endowment	**-0.0554****	0.162	-0.0239	**0.151***	0.0215	0.00799
	(-2.086)	(1.451)	(-0.953)	(1.823)	(0.910)	(0.606)
Endowment of other player	-0.0150	0.0132	0.0318	0.0119	-0.0175	-0.0124
	(-0.382)	(0.498)	(0.613)	(0.258)	(-1.543)	(-1.189)
Kenya x endowment of other player	0.0321	-0.0228	0.0654	-0.0631	**0.0852*****	-0.0161
	(0.692)	(-0.307)	(1.120)	(-0.569)	(3.680)	(-0.677)
Uganda x endowment of other player	0.0167	0.213	-0.0201	0.150	0.0414	0.0185
	(0.259)	(1.322)	(-0.324)	(1.369)	(0.814)	(0.867)
Gamma		-0.0880	**-0.340*****	0.0303	**-0.0907****	**-0.0304***
		(-0.104)	(-7.192)	(0.231)	(-2.463)	(-1.896)
Constant	0.0439	-0.0137	**0.189***	-0.0586	**0.0725*****	**0.0245***
	(0.855)	(-0.157)	(2.040)	(-0.429)	(3.171)	(1.902)
Observations	974	399	2,490	925	830	1,080
R-squared	0.056	0.157	0.175	0.240	0.075	0.099
F-test country	0.676	0.444	3.294	2.892	2.194	4.887
Prob > F	0.517	0.353	0.003	0.076	0.532	0.017
F-test country#difference in endowment	2.178	1.086	1.376	3.347	3.835	1.197
Prob > F	0.133	0.146	0.273	0.053	0.037	0.320
F-test country#expected burning/stealing/rec.	1.017	2.082	7.776	9.181	0.650	2.918
Prob > F	0.375	0.646	0.055	0.001	0.134	0.074

t-statistics appear in parentheses and are based on robust standard errors clustered by session.

*** p<0.01, ** p<0.05, * p<0.1