Does one size fit all? An experimental test of household models in East Uganda.

by

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Abstract:

We test core theories of the household using variants of a public good game and experimental data from 240 couples in rural Uganda. Spouses do not maximise surplus from cooperation and realise a greater surplus when women are in charge. This violates assumptions of unitary and cooperative models. When women control the common account, they receive less than when men control it; this contradicts standard bargaining models. Women contribute less than men and are rewarded more generously by men than vice versa. This casts doubt on postulates in Sen (1990). We also find strong evidence for opportunism. The results are put in a socioeconomic context using survey data and follow-up interviews, which provides hints of the external validity of our findings; more so for contribution than for allocation behaviour. Taken together, our findings suggest that a 'one-size fits all' model of the household is unlikely to be satisfactory.

1. Introduction

Experimental economics has acquired a reputation for testing directly the assumptions of economic models. Yet while aspects of the subject, such as individual choice have been addressed by a steady stream of experiments, there is a scarcity of experimental work within economics on household decision making.[1] This is all the more surprising given that most humans live and make decisions within households.

The paucity of experimental research on household decision-making is not compensated by a profusion of insightful market or survey data. Much information is only available at the household level, making inference about intra-household behaviour problematic, though not impossible. For instance, results on aggregate data typically repudiate the unitary model in which household members act as if maximizing a single set of preferences (e.g. Alderman et al, 1995, Browning and Chiappori, 1998, Lundberg et al, 1997). However, such aggregate data are less useful for identifying the more appropriate among competing household models and clarifying the micro-structure of household decisions.

Experiments offer novel opportunities to test the causes of the failure of the unitary model and for comparing the performance of alternative household theories. In short, experimental data provide a way around the problem that different household models often produce identical reduced form expressions and predictions, making the models indistinguishable using available non-experimental data.[2]

At the same time, experiments involving married couples are fundamentally

[1] Three exceptions discussed below are Peters et al (2004), Bateman and Munro (2003) and Ashraf (2005).
[2] There is a shortage of empirical work testing the performance of *alternative* theories of the household. See Folbre (1984) and Rosenzweig and Schultz (1984) for an early debate on predictions, and Senauer et al (1988) on the issue of identical reduced form expressions. See also Haddad et al (1997).

different from those with anonymous play between strangers, since couples care more about each other's well-being, interact repeatedly and are better placed for making conjectures about each other's behaviour. Experiments involving spouses therefore have their own methodological hazards, created by differences between actual contexts and formal household theories.[3]

We tackle these methodological issues using a suite of variants on classical public good games and a sample of married couples from Uganda to conduct the first experimental test of the assumptions and predictions of several classes of household models. Our experiment, discussed in more detail below, generates tests of surplus maximization, the influence of endowments and control on individual payoffs, and opportunism. Furthermore we obtain evidence on the sharing rules that female and male spouses implement.[4]

Our main results can be summarized thus: surplus maximization is decisively rejected, while the identity of the decision-maker matters for efficiency - a greater proportion of the surplus is realised when women are in charge of the common account. These findings violate crucial assumptions of unitary models and cooperative models. Moreover, when women control the common account, they receive less than when men control it; and vice versa. This contradicts all standard bargaining models.

[3] The repeated nature of real-world interactions implies that some actions within the experiment may be undone by subsequent behaviour. To make robust inferences it is therefore important to have acts which cannot be wholly undone by subsequent and unobserved transfers between partners. Furthermore, since decisions within the experiment are likely to be influenced by equilibrium household behaviour outside the laboratory, it is valuable to have socio-economic data on likely correlates of the actions that do take place under the gaze of the experimenters.

[4] In a world of certainty, a game played between husband and wife may generate an allocation as its equilibrium prediction. When uncertainty is present, this household equilibrium may be a *sharing rule* – a mapping from the set of possible incomes for each partner to the allocation of that income to its different uses (Ligon 2002). Different sharing rules may support or undermine efficiency in the household. Farmer and Tiefenthaler (1995) review the limited evidence on sharing rules, suggesting that alongside efficiency concerns, norms of fairness and equity play a role in their determination.

Intriguingly, women's contributions are rewarded more generously by men than vice versa, and women contribute less to the household account than men do. This casts doubt on Sen's (1990) postulates of the undervaluation of female contributions and a female tendency to identify more closely with household interests, although to be fair he does not claim that these would hold in all contexts. Finally, we find strong evidence for opportunism – the tendency to hide initial endowments from one's partner even when one is in charge of the common account.

For the purpose of gaining insights into the external validity of these findings, we place our results in a socioeconomic context using data from an exit survey that covered all couples who participated in the experiments and in-depth follow-up interviews with 51 couples. Using the former, we find strong support for socio-economic effects on contribution behaviour in the experiments. From the latter we obtain some evidence that game allocation behaviour mirrors roughly analogous normal-life decision making.

In Section 2 the main classes of household models tested are introduced and the predictions that we focus on spelt out. Section 3 presents our experimental design in terms of tests of hypotheses implied by these models. Section 4 reports on the research sites, and on the implementation of the experiments. Section 5 presents univariate and bivariate tests of our hypotheses and Section 6 examines the socio-economic context and reflects on the implications. Section 7 concludes.

2. Background and motivation

Most formal models of household behaviour can be classified under the

rubrics *unitary, Pareto-efficient* or *cooperative* and *non-cooperative* models (Alderman et al. 1995, Haddad et al. 1997). In the unitary approach (Samuelson 1956, Becker 1991), the household is modelled as a single agent with a unified set of preferences: all income is therefore pooled and the identity of the income recipient does not affect household decisions. The key feature of cooperative models (McElroy and Horney 1981, Manser and Brown 1980) is the assumption of Pareto efficiency, usually within a context of bargaining where power depends on 'threat-points' and control of the allocation. Empirically, therefore, a key difference between unitary and cooperative models is that in the latter, the identity of the individual controlling resources affects decisions, with individual rewards increasing in the share of household resources.[5] Meanwhile, in non-cooperative models (Ulph 1988, Woolley 1988), household members make their contributions to household public goods separately in the standard format of a non-cooperative game. Efficiency is not a prediction of static, non-cooperative models, but income pooling can be - so that individual rewards may or may not be increasing in the individual shares of household income.

A number of models step beyond this simple classification, such as Lundberg and Pollak (1993)'s separate-spheres theory and Sen's (1990) cooperative conflict model, an influential hybrid theory tailored for developing country contexts. In the latter, the *perceived interests* and *perceived contributions* of a household member also affect intra-household distribution. In particular he postulates that women identify more closely than men with the household's interests and should be expected to invest

[5] Basu (2006) shows that this relationship runs both ways, and that household decisions may also affect the balance of power, but that the effect of, say, female labour force participation is not instantaneous. In a dynamic perspective, spouses will tend to behave strategically which may result in inefficiency also within so-called collective models.

more, but these female contributions also tend to be undervalued. This undervaluation will 'vary from one society to another' with its effect being 'more regressive for women in some societies' (1990: 137).

Early empirical tests focused on the income pooling assumption in unitary models and the notion that intrahousehold allocations are independent of the identity of the person earning income or controlling an asset (e.g. Schultz 1990, Thomas 1990, Browning et al, 1994, Hoddinott and Haddad 1995). These studies found a strong impact of gender identity on labour supply and on the health outcomes of children, thus rejecting the pooling assumption. Meanwhile, Phipps et al. (1998) suggest that husbands and wives pool incomes for some but not other categories of consumption. While the evidence against the unitary model is fairly consistent, that for cooperative models is less clear-cut. Browning and Chiappori (1998) conclude in favour of Pareto efficiency, while Jones' (1983) research for Cameroon and Udry's (1996) analysis of the multi-plot farming systems in Burkina Faso cast doubt on the empirical soundness of the Pareto efficiency assumption.

There are a small number of recognisably economic experiments on household decision-making. In common with the non-experimental literature, the results of these papers reject the unitary model. Using a common pool game with a voluntary contribution mechanism, Peters et al. (2004) compare free-riding behaviour among household members with a control group of strangers in the USA and find contributions within family groups to be higher and reductions over time weaker.[6] In Peters et al.'s samples, many family groups were missing one or more of their adult members, but typically include children in the game. In contrast, Bateman and Munro

(2003) use only couples. Using data from a series of incentivised choices, they reject Pareto-efficiency, income pooling and the unitary model for their sample of UK households, but do not quantify the inefficiency they observe. Finally, in Ashraf's (2005) study of saving and consumption decisions in the Philippines, individual spouses receive an endowment that must be invested in a joint account, in a private account or taken as a private gift certificate subject to alternative experimental conditions. She does not test directly income pooling or efficiency, but she finds men's saving behaviour to be strategic and responsive to whether information about endowments, payoffs and behaviour is private or public, and to whether communication is allowed. Women's behaviour, in contrast, is largely invariant to changes in the experimental conditions.

In short, therefore, none of the preceding experiments provide a quantitative test of household efficiency or income pooling on a proper sample of couples using an incentive compatible design. Our design overcomes these deficiencies, examines hypotheses associated with Sen's theory and tests for household sharing rules.

3. Design

As we noted above, experiments on households are rare and present new challenges to experimental methodology. As such it is worth setting up a general theoretical framework for household decisions, before introducing the specifics of our design.

[6] Frolich et al (2004) argue that adding social context and familiarity to an anonymous experimental setting tends to increase contributions and reduce free-riding behaviour.

Let there be H members of the household. Endowments are E (a vector) and prices are p. We will refer to the first H elements of E as income, denoted E_k, k=1,…,H with corresponding prices normalised to 1. C(E,p) is the feasible set, typical members of which are c, a vector (typical element c_i) listing the consumption, including supply and time use of each household member . Preferences are defined over c. The within-household allocation is a vector $c^* \varepsilon$ C. A sharing rule or equivalently an allocation rule is a mapping from (E,p) to c*. A disturbance is defined as a perturbation of (E,p). We say a disturbance is *neutral* if C′ = C(E′,p′) = C(E,p) and we say that C' *dominates* C if C is a subset of C' and $\forall$ c ε C, $\exists$ c'ε C' such that c<c'.[7]

Different theories of the household represent different notions about the properties of the sharing rule and, in particular, how disturbances affect consumption patterns. Each sharing rule may have many properties, some of which can be common to a variety of different theories of the household. For instance, a household sharing rule satisfies the principle of *monotonicity* if when C' dominates C, c*' is weakly preferred to c* by each member of the household and for at least one person c*' is strictly preferred to c*.

Meanwhile, a household *income pools* if $\forall$ (E,p), (E′,p′) s.t.(1) p=p′; (2)

$\sum_{k=1}^{k=H} E_k = \sum_{k=1}^{k=H} E_k'$, (3) $E_k = E_k'$, $k > H$, c*=c*′.

Similarly, the sharing rule satisfies *Pareto efficiency* if $\forall$ C, there is no c ε C with c ≠ c* such that c is Pareto preferred to c*.

[7] By c<c'. we mean $c_i \leq c_i'$ with at least one i such that $c_i < c_i'$.

Acts are interim decisions made by household members that do not directly affect preferences. As such acts represent a particular class of disturbances. They may include transfers or temporary within-household loans of liquidity. More broadly they are any decisions made by members of the household that a) can affect endowments (and possibly prices) and b) do not affect preferences. Thus if a household member obtains a warm glow from making a transfer then this would not be considered an act. For the purposes of what follows it will be useful to distinguish between investment acts, which we denote by x, and acts of reallocation which we label z. Generally we write the consumption set as C(E,p,x,z). Some acts will affect the possible consumption set, but others will be neutral disturbances – for instance a transfer of money between partners that could be reversed prior to any acts of consumption expenditure. This latter class of acts we term *reversible*. [8]

Experiments on households typically fit the definition of a disturbance, because they alter the endowments and prices faced by households rather than consumption directly (though this is in theory possible). Typically the behaviour observed in experiments also represents interim acts rather than final consumption behaviour. Thus in order to have tests of theories of household behaviour we need to make links between

[8] Whether an act is reversible will depend both on the type of act and the set of acts that are subsequently feasible. For instance, suppose £10 is transferred to a child just as they depart on a bus. If there are no subsequent opportunities for repaying the money or for reallocating responsibilities for expenditure then the transfer can be irreversible.

observed acts and theoretical predictions about consumption. For acts that are not reversible we use the principle of monotonicity as the linking assumption.[9]

Suppose for instance, we observe acts x, z, some parts of which are non-reversible such that C(E,p,x,z) is dominated by C(E,p,x*,z*) where the acts x* and z* are also feasible. By the principle of monotonicity, the household is not Pareto efficient in its actions.

Consider two treatments that produce two different endowments (E,p) and (E',p) with the difference between them satisfying properties (1)–(3) stated in the definition of income pooling. Suppose in one treatment we observe acts x and z with x' and z' in the second. If C' = C(E',p,x',z') dominates C = C(E,p,x,z) then as long as the principle of monotonicity holds, the property of income pooling fails.

Although one might not trust reversible behaviour observed in an experiment to the same degree as that attached to irreversible acts, nevertheless it may be unwise to dismiss it entirely. It is clear though that when acts are reversible, no firm inferences can be made about household theories in the absence of further assumptions. One such assumption is the 'principle of face value' – i.e. that behaviour observed in the laboratory is not affected by the fact that it takes place in an artificial context and under the watchful eyes of researchers. On the whole, many experimental economists have been rightly sceptical about taking behaviour at face value with Levitt and List (2007) as a notable critique in this line of thinking.

[9] The principle of monotonicity is an assumption made implicitly in most experiments on individual choice where subjects receive rewards in cash that are not then consumed in the presence of the experimenter.

In Levitt and List's (2007) organising model, experimental subjects place weight on their monetary payoffs and on being moral. When scrutiny of their actions is higher they are more likely to behave morally. Similarly when stakes are relatively low, a greater weight may be placed on moral acts. If we take this model and apply it specifically to the issue of reversible acts, then it has three predictions. First acts which are moral will receive greater weight in a laboratory setting than in real contexts. Secondly, differences in behaviour between groups (e.g. men versus women) with equal scrutiny may either be the result of differences in underlying preferences or due to differences in the response to scrutiny. Thirdly, when comparing behaviour between two treatments with equal scrutiny, the signs of differences between acts are unaffected by the level of the scrutiny.

The vehicle for our hypothesis tests is the following set of variants of a two-person game with four stages. At stage 1, each spouse i is endowed with endowment E_i, where $E_1+E_2 = 4000$ and $E_i \in \{0,2000,4000\}$. In the second stage she or he makes a contribution of x_i ($0 \leq x_i \leq E_i$) to a common pool. In the third stage total contributions are multiplied by 1.5 and in the final stage either one individual decides on the allocation of the common pool or the pool is split 50:50. The payout to individual i is z_i so that an individual's monetary payoff is $E_i - x_i + z_i$ while the total value of the pool is y ($= 1.5(x_1+x_2) = z_1 + z_2$). In terms of our general theoretical framework, the x acts are not reversible, since any money that is not invested cannot be recovered at a later stage. Conversely, the z acts are transfers that may be undone (at least in theory) after the experiment. Hence they fit the definition of reversible acts.

There are nine possible variants of the game and they are summarised in Table 1. Cells lower in the table represent variants with larger female endowments while cells to the right represent variants with greater female control over the division of the common pool. The 50:50 variants are common pool games. Variants where one person has the entire endowment while also controlling the allocation are dictator games, whereas variants where the identity of the investing individual and the allocating individual differ are games of trust.

TABLE 1 ABOUT HERE

In table 1, two of the variant cells do not contain numbers. These are dictator games that were omitted from the final design because of the lack of interaction between partners and our desire to examine issues of trust. The numbers listed in the other cells label the variants used in the experiment. Two cells contain two numbers because these variants were conducted in both study sites.

Let us now consider the predictions in Table 2 where the numbering corresponds with the tests we propose. In line with the framework presented above, we divide hypotheses into two groups, concerning acts which are in turn irreversible and reversible. Our design provides firm evidence for the former group. For the latter group, the evidence provides suggestive material which we interpret in the light of Levitt and List's (2007) organising model.

TABLE 2 ABOUT HERE

In all variants of the game, total surplus maximization (I) implies that each player should set $x_i = E_i$. The null hypothesis that efficiency is independent of the identity of the allocator (II) can be tested for by comparing total contributions, i.e. x_1

+ x_2, in the games with female and male control in each of the two sites, i.e. 3 with 5 and 8 with 9. The hypothesis that control raises payoffs (III) implies that $E_i - x_i + z_i$ should be higher with control than without. Alternatively, since one agent has no control over their partner's contribution we test the hypothesis that z_i/y is higher with control, when i is in control of the allocation, by comparing behaviour in variant 2 with 6, 3 with 5 and 8 with 9. Meanwhile, the hypothesis that endowment raises payoffs (IV) implies that $E_i - x_i + z_i$ should increase with E_i and can be tested by comparing behaviour in variant 2 (female control, zero female endowment) with 5 (female control, equal endowments) and behaviour in 3 (male control, equal endowments) with 6 (male control, zero male endowment). [10]

We define the degree of reciprocity, or contribution-based sharing, as the responsiveness of the allocation of the common account by one spouse to the contribution made by the partner. We are able to test the null hypothesis that reciprocity is zero (V) in variants 2, 3, 5, 6, 8 and 9. In the same variants gender differences in contribution-based rewards, and in particular a potential undervaluation of female contributions (VI), may be detected. Meanwhile if a household sharing rule exists then the responsiveness of men to female contributions should be equal to the responsiveness of women to male contributions.

If women anticipate, correctly or not, that their contributions will be undervalued, they may contribute less to the common pool than men even if they would have contributed more had they anticipated that their contributions would be valued equally. The only clear indication of an intrinsic female preference for contributing to the common pool (VII) is therefore provided in the variants in which

[10] This test mixes the x and z variables. We place it in the reversible group, while noting that the x

the sharing rule is fixed (50:50 split of the common pool), by comparing male with female behaviour in variants 1 and 7, respectively, as well as in 4.

In all the games, the private endowment E_i was known only to individual i. The common account and the final allocation from that account was common knowledge. In the {4,000: 0} games both partners were told that one of them received nothing, and the other some amount between zero and 4,000 Ugandan shillings. Meanwhile, in the {2,000: 2,000} games both partners were told that they received some, potentially different amounts between 100 and 4,000 shillings.

We did not reveal full information about each individual's endowment, in part as a response to ethical concerns about the creation of family disputes if all information was revealed. Theories of household behaviour have had little to say on the impact of asymmetric information on outcomes, despite the widespread evidence of its presence within the household (e.g. Pahl 1990, Woolley 2000). Indeed, in follow-up interviews with 51 couples that participated in our experiments, we find imperfect knowledge of spousal finances to be common, at least in wives' accounts.[11] A total surplus maximizer has no incentive to withhold contributions, even with asymmetric information. Other types of players may wish to hide some or all of their endowment from their partner. In the experiment, they could achieve this by not placing it in the common pool, but because there are other motives for not investing which would apply even if endowments were common knowledge, we cannot simply interpret all failures to invest as evidence of attempted deception. For instance a selfish player in variants 1, 4 or 7 (with 50:50 split) may not invest any sum because

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choices cannot be undone.

[11] 72 percent of men claim full knowledge of wives' finances, and 92 percent that their wives fully know theirs. In wives' accounts these figures are startlingly different: 21 and 14 percent, respectively.

the net private return to a common pool investment would be negative. The clearest evidence of attempts to deceive is therefore provided in variants where the potential investor also controls the allocation. In this context we measure *opportunism* as the difference $E_i - x_i$ in games where player i has $E_i > 0$ and is the allocator. In variants 3, 5, 8 and 9, we test the null hypothesis that opportunism is zero (VIII).

4. Context

Research sites

Bufumbo sub-county and Sironko District are on the slopes of Mt Elgon in south eastern Uganda. This is a densely settled area with an average population density of 284 per km^2 and average farm size of 1.4-1.5 ha and rainfall of about 1186mm (Wakamire 2001). Livelihoods are predominantly agricultural, but still complex and diverse with overlapping production units engaged in crop production, livestock rearing, labouring, petty trading and services, and both joint and individual enterprises are pursued by household members. Both districts have mainly fertile volcanic loams but Sironko is flat, low-lying and has a greater proportion of sandy loam soils suited for maize, beans, soya, groundnuts and sunflower cultivation. Its nucleated centre has more diverse non farming livelihoods, better housing and infrastructure, including electricity, than its outer villages. Bufumbo is higher, wetter, poorer and hillier than Sironko and lacks electricity.

We chose to locate the experiments in these two areas partly because of the expectation that we would see distinctive forms of conjugality determined by the predominantly Christian nature of Sironko and the Muslim character of Bufumbo. However, on closer inspection we formed the impression that other differences such

as in cropping patterns, and therefore gender divisions of labour, are possibly more likely to explain the variations between the two sites in gender relations. Bananas and coffee dominate the upland Bufumbo farming system, and maize and beans the lowland Sironko farming system. The gender division of labour is likely to be very different in each location, with a lower level of women's labour involved in perennial coffee and banana, and a more sex segregated pattern of labour and control, and a higher level of more sex sequential operations in maize and bean cultivation.[12]

Most residents of Sironko and Bufumbo are Bagisu, a group known for very high levels of violence which is predominantly within kin groups, perpetrated by men on other men, and closely linked to accusations of thieving and witchcraft (Heald 1998, Roscoe 1924, La Fontaine 1959). According to Heald (1998), this is driven by intense conflict over access to resources, and gender ideals of male provider roles which are increasingly difficult for men to fulfil. Her emphasis on the absence of trust between male kin is echoed in broader research on comparative social capital, in which the district emerges as having extremely low levels of expressed trust, low levels of voluntary activity, and a low social capital index compared to seven other Ugandan locations (Widner and Mundt 1998).

If kinship, for men, is infused with mistrust, marriage is a comparative haven of trust despite the instability of marriage amongst the Gisu. Gender relations are expressed formally in terms of absolute male control, but in reality women have considerable freedom to marry whom they choose, divorce and remarry readily when marriage is unsatisfactory, and generally exercise the power that comes from men's dependence on marriage for managing their reputations, and achievement of an

[12] See Whitehead (1985). Elements of agricultural production may be gendered at the level of the whole crop, i.e. sex segregated, or through interdigitated processes in a single enterprise, i.e. sex sequential

important element of adult masculinity. The marital histories of 51 couples interviewed in some depth in the weeks after the experiments show that the great majority of divorces are initiated by wives. Also, very few men said they had thought about divorcing their current spouses but 74 percent of women said they had, and whilst 23 percent of women reckoned they could be better off unmarried, only 4 percent of men entertained similar thoughts. Marital failure has very dramatic consequences for men, and may be fatal, since bachelors and divorced men are socially ridiculed, suspected of sorcery and theft, and ultimately sanctioned with violence (Heald 1998).

Implementation of the experiments

The experiments in Sironko took place on consecutive days in March 2005 with experiments implemented in Bufumbo on the following day. The venues were a multi-purpose village hall (Sironko) and the headquarters of the sub-county (Bufumbo). LC1 chairmen (leaders of a village council) were approached two weeks beforehand and asked to recruit, by advertising widely through word-of-mouth, between 225 and 270 married couples (25 to 30 per game times the number of games). If the required number was exceeded (it was), they were instructed to give preference to those who took part in a previous survey, and to first-comers – in that order. Survey participants had at the time been randomly selected. The main source of bias in our sample is probably due to self-selection, which one would *a priori* expect to skew it towards those with a lower opportunity cost of time. Compared with the original randomly distributed survey, non-farmers are overrepresented in the experiments as

(e.g. maize where men plough, women plant, women weed, both sexes harvest, women process and men market).

are the educated and people with children, whereas age does not affect the probability of taking part.

One game was played at the time and the only people present in the hall were couples playing that game and the game organisers. Instructions and examples took approximately 30 minutes on average. The local game organisers are well-qualified for implementing experiments even of considerably greater complexity than the one on which we report here (Humphrey and Verschoor 2004; Mosley and Verschoor 2005) and were satisfied with subjects' understanding of the game. Indeed, in spontaneously offered feedback immediately after the game and in the follow-up interviews, no respondent said they had found the game unclear or confusing. Each spouse received an envelope after the game had been explained and demonstrated. The contents of the envelope were such that any multiple of 100 shillings could be left in it. At the time of the experiment, the exchange rate to the pound was approximately 2,850 Ugandan shillings, and to the US dollar 1,730. A typical agricultural daily wage was between 1,000 and 1,500 shillings for women and between 1,500 and 2,000 for men. The range of possible couples' total payoffs of between 4,000 and 6,000 shillings thus provided substantial incentives.

Secrecy was ensured by calling one couple at a time with the husband going to one corner of the hall and his wife to the other; each spouse removed from their envelope what they wanted to keep for themselves, with the remainder left for the common account. A helper then collected their envelopes and recorded the decisions. Collusion within a single game was avoided by a threat of exclusion (which proved to be highly effective); collusion between games on the same day was avoided by

keeping waiting groups apart in a school (Sironko) or separately on the grass (Bufumbo). Collusion across days (relevant for Sironko only) was mitigated by playing the unequal-endowment games on the first day and the equal-endowment games the next day.

5. Results

We first present an overview of the basic results, with simple univariate and bivariate hypotheses tests. In line with the theoretical framework introduced in Section 3, we distinguish between irreversible findings and those that are, at least in principle, reversible. Findings 1, 2, 3, 4, 7 and 9 are in this terminology irreversible since they relate exclusively to contribution behaviour: a failure to contribute the entire endowment to the common pool represents an efficiency loss that cannot be recovered subsequent to the experiment. Findings 5, 6 and 8 relate at least in part to allocation behaviour and are thus termed reversible. Since post-experiment compensating transfers, reneging on normal spending responsibilities, and so forth cannot be ruled out, it follows that scrutiny by the experimenters would affect subjects' allocation decisions, which can be reversed for the reasons mentioned, more than their contribution decisions, and generalizability of the former type of decisions is more problematic (cf. Levitt and List, 2007). The issue of external validity is tackled in the next section. Using the linking assumption that socio-economic characteristics are orthogonal to response to scrutiny in the experiments, we present evidence on the extent to which both contribution and allocation decisions are predicted and mirrored by contextual variables.

Tests of surplus maximisation (I)

Finding 1: Surplus maximisation is rejected

Table 3 and the accompanying figure 1 give an overview of the results from the 240 couples (49 from Bufumbo, 191 from Sironko). In the table, the columns headed 'Female x/E' and 'Male x/E' give the mean fraction of endowments invested by women and men respectively. The next two columns show mean payoffs (including the portion of the endowment not invested). Mean y/max y is the fraction of the total available surplus which is generated by the household with the accompanying sample standard deviation in the adjoining column. The final column reports a t-test for the null hypothesis that households maximize total surplus. This null hypothesis is decisively rejected in all variants.

TABLE 3 ABOUT HERE

FIGURE 1 ABOUT HERE

Finding 2: For the equivalent variants, total contributions are higher in Sironko than in Bufumbo.

Figure 1 shows the distribution of total surplus, measured as a fraction of the potential total for the 9 different variants. Reinforcing the message of Table 3, there are compelling contrasts between the variants, but in a narrow majority of observations the total surplus is not realised. However, in all variants except 8 and 9 (the Bufumbo variants) the modal surplus is 1, and in variants 1, 2, 4, 5 and 7 the median surplus is 1. Overall, in Sironko a clear majority of couples (56.5%) maximize total surplus, but in Bufumbo no couple realises more than 90% of the total surplus. Using a two-sided, unequal variances t-test we examine the null hypothesis that

location makes no difference to the surplus generated, by comparing outcomes in games 8 and 9 with 3 and 5 respectively. In both comparisons the null hypothesis is rejected with p values of 0.0050 and 0.0004 respectively. In short therefore, the realisation of cooperative potential and thus the size of efficiency losses in the two locations are very different and this is one of the major lessons of our paper.

Finding 3: A fixed sharing rule does not alter contribution levels

We test whether control of the allocation of the common pool makes a difference to contribution levels in two ways. First we compare variants with a 50:50 split to ones where one partner controls the allocation. There are four comparisons of this kind (see Table 4) and the tests are two-sided since there are arguments on both sides about how transferring control (decision-making power) might impact on contributions. In this table 'Mean y/max y' is the fraction of the total available surplus realised in the game. Results for the test (the t-statistic and below it the associated probability value) are given in the final column of the table. In general the null is not rejected.[14]

TABLE 4 ABOUT HERE

Finding 4: When women control allocation both male and female contributions are higher

Secondly we compare levels of contribution in the variants where the man controls the allocation of the common pool to levels of contribution in variants where the woman makes the decision (see the second part of Table 4). Again the test is two-

[14] Whether a fixed sharing rule outperforms discretionary allocations by spouses with regard to efficiency is likely to depend on the chosen sharing rule. In terms of incentive provision, the adopted 50/50 split is a primitive rule; even so Sironko spouses fail to outperform the 50/50 split.

sided. The null (hypothesis II) is rejected at the 5% level in Sironko and rejected at the 10% level in Bufumbo. In both sites, total surplus is higher when women control the allocation (games 5 and 9).

Obviously total contribution is the sum of the contributions by the two partners, so we can dig deeper by analysing the impact of control on individual contributions. Table 5 summarises the six comparisons, four of which involve variants in which both partners received endowments and two where one partner received the entire endowment.

The column headed 'Mean x' shows mean contribution levels, x, by gender for the relevant variants. The adjacent column shows respectively the t statistic and probability value for a two tailed independent samples test that the mean values of x are the same in each pair of variants being compared. For each comparison, wives control the allocation for the second variant listed and in each case female control leads to higher contribution by both sexes. In short, both men and women invest more when women are in charge of the allocation. In one case (women in Bufumbo) the difference between games is significant at the 1% level. In two other cases it is significant at the 10% level with a two sided test. The final two columns depict the fraction of the final payoff received by each gender and then the mean payoff. The asterisks indicate significant differences at standard significance levels, but to save space the values of the t-statistic and associated p values are not reported. A common pattern emerges: contrary to predictions of standard bargaining models and hypothesis III, *greater* control is associated with the receipt of a *lower* fraction of total payoffs and simultaneously a lower absolute level of payoff.

TABLE 5 HERE.

Tests of the impacts of endowments on payoffs (IV)

Finding 5: While allocations made by men vary with changes in endowments female allocation do not.

Above we found that decision-making power or control was not associated with higher payoffs. We now turn the attention to another potential source of power, namely that associated with resource control or endowments. To identify the effect of initial endowments on total receipts from the game when the same spouse decides the split, female receipts in games 2 and 5 are compared and male receipts in games 3 and 6. In games 5 and 2 the allocation is decided by the wife while the wife's endowment falls from 2000 to 0. The mean receipts for women now decreases from 2832 to 2532. In games 3 and 6 control of allocation is in the hands of husbands while the endowment of the men decreases from 2000 to 0. Here the mean receipts for men fall from 2318 to 1119. The observed difference is significant only for husbands in games 3 and 6 (p-value 0.01). Hence, while male allocators respond to endowment changes in accordance with theoretical predictions, the response for female allocators is not significantly different from zero (only possible to test in Sironko).

Tests of contribution-based sharing (reciprocity) (V)

Finding 6: We find evidence for male reciprocity in Sironko, but not in Bufumbo and no evidence for female reciprocity

For the relevant variants figure 2 summarises the extent to which spouses repay the contribution of their partners. It plots the allocation to the non-controlling spouse against individual contribution levels together with lines of best fit.

FIGURE 2 ABOUT HERE

The fitted lines, estimated using OLS, are summarised in table 6. While the lines are upwards sloping (suggesting positive responses to the partner's contribution), the statistical conclusions are weaker. In general, we conclude in favour of male reciprocity in Sironko (i.e. games 3 and 6), but find no evidence of similar behaviour among female allocators. It is also unclear whether there is a net return for the investors, i.e. whether the slopes are greater than 1. The implications for theories of household behaviour are intriguing and suggest the absence of household-level contribution-based sharing rules.

TABLE 6 ABOUT HERE

Tests of gender differences in contributions and relative valuations of contributions (VI and VII)

Finding 7: We find no evidence that women contribute more to the common pool than men do

For the variants in which the sharing rule is fixed, so that contributions cannot be interpreted as being influenced by expectations of the spouse's generosity, we find no statistically significant differences in contribution levels (Table 7).

TABLE 7 ABOUT HERE

Finding 8a): In Sironko, male allocators contribute more and award themselves less than their wives, while female allocators contribute less and award themselves the same as their husbands.

In other comparisons using observations on female and male contributions and payoffs in table 5, the results are more nuanced. Again we do not find support for the

unconditional hypothesis of greater female contributions. In game 3 where men control the allocation, women receive more than men (p=0.07, one tailed t-test) while contributing less (p=0.04, one tailed t-test). In game 5, when Sironko women have control, women continue to contribute less than men – this difference is again statistically significant (p=0.049, one-tailed t-test). At the same time the receipts from the game for the two spouses are indistinguishable.

Finding 8b): In Bufumbo, male allocators contribute the same and award themselves the same as their wives, while female allocators contribute more and award themselves the same as their husbands.

Turning to Bufumbo, women contribute slightly less and receive more than men when men are in control, but neither of these differences is statistically significant. With female control men receive more from the game than women and contribute less, with only the latter being statistically significant (p=0.035, one-tailed t-test). It would thus seem that Sen's concepts of perceived interests and contributions perform rather poorly, especially in Sironko but also in Bufumbo. Inequality in these variants is driven not by exploitation of the spouse by the party in control – but rather by generosity by the spouse in control vis-à-vis the partner. Where inequality in receipts emerges, more power thus has the opposite effect of what most theories would predict.

Test of opportunism (VIII)

Finding 9: The null of no opportunism is rejected

We can also use Table 5 to test for opportunism. If there is no opportunism, the value of mean x for male players in games 3 and 8 should equal 2000, as should

the value of mean x for female players in games 5 and 9. In all cases the null hypothesis is rejected, with p values of 0.000.

6. Socio-economic effects

In this section we obtain some clues about the external validity of the findings presented above by contextualising contribution and allocation decisions using socio-economic characteristics for all subjects from an exit survey and, for 36 couples only, from follow-up interviews.[15] The presence of socio-economic effects is taken as evidence for external validity but at the same time, and as noted above, we expect allocation more than contribution behaviour to be affected by issues that may limit external validity.[16]

Tables 8 and 9 respectively regress contribution and allocation rates on a set of socio-economic characteristics and game dummies.[18] The sign, size and significance of the coefficients on the game dummies are consistent with the tests reported on in the previous section, and will not be discussed here. The primary lesson to take from a comparison of Tables 8 and 9 is that whereas a large number of socio-economic effects are apparent for contribution behaviour, these are conspicuous through their absence for male (but not for female) allocation behaviour. If it is reasonable to assume that the variables used are orthogonal to response to scrutiny in the

[15] The relevant variables could not be constructed for the remaining 15 couples that were interviewed.
[16] External validity may also be affected by the representativeness of the sample. When we correct for sample selection bias, results do not change in any meaningful way. When we correct for this bias in game behaviour regressions on socio-economic characteristics following Heckman's approach to correct for self-selection, coefficients hardly change and the inverse mills ratio is not significant (although it comes close to significance in one specification; $p = 0.111$.)
[18] Diagnostic tests for multicollinearity, omitted variable bias and heteroscedasticity indicate the existence of only the last-mentioned. Robust standard errors, estimated using interval regression, are computed to mitigate this problem.

experiments, then this remarkable contrast confirms our suspicion that the external validity of contribution decisions is greater than that of allocation decisions. Put differently, since socio-economic variables predict the former to a greater extent than the latter, we are more reasonably confident that the former correspond with analogous every-day decision making than that the latter do. At the same time, there is an intriguing suggestion here that male response to scrutiny in the experiments is greater than that of females.[19]

TABLE 8 ABOUT HERE

TABLE 9 ABOUT HERE

Specifically, overall and spousal contributions are, ceteris paribus, between 10 and 23 percent lower in Bufumbo than in Sironko; the difference is always statistically significant. Anecdotal evidence suggests that one reason for the inter-site difference may be the less cooperative marital arrangements in Bufumbo than in more placid Sironko, possibly rooted in the sex-segregated (Bufumbo) rather than sex-sequential (Sironko) nature of agricultural practices (see Section 4). We tested this (not reported here) by interacting a "both are farmers" dummy with a site dummy, and also by running regressions separately for each site, and obtained limited but not conclusive support for this hypothesis.[20] Table 8 also suggests that, for reasons not known to us, spousal or own education and occupation significantly affect contribution behaviour in various ways; female teachers are particularly cooperative.

[19] This is consistent with Cecile Jackson's interpretation of male behaviour in our experiments based on her observation of the games and follow-up interviews: men more than women engaged in "display behaviour" designed to impress the experimenters.

[20] Note further that since individual games are controlled for in Table 8, the significance of the site dummy is not likely due to the fact that only some of the variants played in Sironko were played in Bufumbo. Indeed, variant-specific regressions (not reported here) if anything exacerbate the difference between sites.

Where spouses have the same occupation or (more pronounced so) education, contribution rates tend to rise, although the effect is not always statistically significant, and never very large (7 percent at most). Some limited support is thus obtained for the hypothesis that assortative matching improves household efficiency (Becker 1991). The statistically strongest effect is found for the age of the husband: both wives and husbands contribute less to the common pool when husbands are older. By contrast, husbands contribute more the older they are than their wives, which may hint at a marriage market effect.[21]

The point of the econometric exercise is not so much to be able to explain game behaviour using contextual variables but rather to get a sense of the presence of socio-economic effects in contribution and allocation regressions. Unlike their abundant presence in contribution regressions, no socio-economic effects are significant in the male allocation regressions (Table 9). By contrast, women *ceteris paribus* reward male contributions more generously in Bufumbo [*sic*] and when their husbands are older (irrespective of their own age), and less generously when they are married to farmers and when they are younger than their husbands.

A similarly measured assessment of correspondence between normal life and allocation behaviour in the games derives from 36 follow-up interviews. Such behaviour in the games does reflect the identity of the person with overall control of the household budget, at least when wives are asked to identify this person (Table 10). When according to wives their husbands have such control in their homes, they receive about 60 percent of the common pool in the games, wives 40 percent; the

[21] The age of the wife could not be included separately because of multicolinearity.

situation is almost exactly symmetrical when wives (again in their own judgment) have such control. In both cases, the difference in receipts between husbands and wives is statistically significant. Husbands' views on the same matter are not correlated with allocation behaviour in the games, which is intriguing and may reflect the reluctance of some to admit that their wives hold the purse-strings. In any event, we obtain some suggestive evidence here that game allocation behaviour, although far from predictable using contextual variables, nonetheless mirrors roughly analogous real-life behaviour.[23]

TABLE 10 ABOUT HERE

7. Conclusion

To sum up: although surplus maximization is the most common outcome in the experiment the majority of partners do not contribute their full endowment to the common pool, which repudiates unitary and cooperative models. In Bufumbo no couple achieves the maximum available surplus. We find clear evidence of opportunism and that, contrary to the predictions of standard bargaining models, having control of the allocation reduces the payoff. On the other hand, limited support for bargaining models is obtained in that higher endowment does lead to higher payoffs; but there is a noted gendered difference in whether this prediction holds or not, with (conditional on control) male but not female receipts increasing in the level of endowments. A finding that no household model we are aware of would predict is that there is evidence that female control leads to greater contribution for both sexes.

[23] Further support for this claim is that in the follow-up interviews (with 51 couples), 56 percent of women and 92 percent of men said the way they shared money in the game was similar to everyday practice.

Finally, we find no evidence that women are intrinsically more inclined to contribute to the common pool than men, nor that their contributions are undervalued by men, which casts doubt on postulates in Sen (1990).

We have devoted some of the analysis to the external validity of these findings. The greater presence of socio-economic effects that we find in contribution than in allocation regressions is consistent with the hypothesis introduced in Section 3 that subjects' response to scrutiny in the experiments would exert a larger influence on allocation decisions, and thereby limit their external validity to a greater extent. As expected, we are on safer grounds when examining contribution behaviour, although the final part of the analysis in Section 6 clearly hints at some correspondence with normal life also for allocation behaviour. To the extent, then, that our experimental findings can be generalised to the real world of couples' cooperation and sharing and lack thereof, it is obvious that no single model can accommodate the diverse evidence reported here. As far as theories of the household are concerned, one size does clearly not fit all.

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Table 1. Variants of the game played.

Endowment to woman (given total endowment of 4000) ↓	How pool is split→	Male controls allocation	50:50	Female controls allocation
0			1	2
2000		3, **8**	4	5, **9**
4000		6	7	

(Numbers in bold denote variants played in Bufumbo)

Table 2. Predictions.

Null Hypothesis	Formal statement.	Reversible
I. Total surplus is maximized	$x_i = E_i$	No
II. Household efficiency is independent of the identity of allocator	x_1+x_2 is identical under male and female control	No
III. Control does not raise payoff share	z_i / y no higher with control	Yes
IV. Endowment does not raise net payoff	$E_i - x_i + z_i$ does not rise with E_i	Yes
V. No contribution-based sharing	z_i / y does not increase in x_i	Yes
VI. No undervaluation of female contributions	z_i / y increases equally in x_i for female and male	Yes
VII. Women do not contribute more to the common pool	x_i no higher for i = female	No
VIII. No opportunism	$E_i - x_i = 0$	No

Note: Games 1 (50:50) and 2 (F) are male-only, 6 (M) and 7 (50:50) female-only, and 3&8 (M), 4 (50:50), 5&9 (F) equal endowment games, where F denotes female control, M male control and 50:50 an equal split of the common pool. Variants 8 and 9 are played in Bufumbo, all others in Sironko.

Table 3. Sample size, contribution and payoffs for the 9 variants.

Game	Sample size	Female x/E	Male x/E	Female payoff	Male payoff	Mean y/max y	Std. Dev.	t-test for *H0: Total = 1* p-value
1 {0} (50:50)	26	-	0.904	2711	3096	0.904	0.201	-2.440 0.022**
2 {0} (F)	25	-	0.940	2532	3348	0.940	0.109	-2.753 0.011**
3 {2} (M)	27	0.648	0.787	3122	2318	0.718	0.242	-6.072 0.000***
4 {2} (50:50)	30	0.755	0.783	2797	2740	0.769	0.255	-4.955 0.000***
5 {2} (F)	25	0.790	0.900	2832	2860	0.845	0.202	-3.840 0.001***
6 {4} (M)	26	0.833	-	4554	1119	0.833	0.193	-4.412 0.000***
7 {4} (50:50)	32	0.887	-	3113	2660	0.887	0.189	-3.394 0.002***
8 {2} (M)	24	0.510	0.558	2675	2458	0.534	0.199	-11.469 0.000***
9 {2} (F)	25	0.676	0.596	2436	2860	0.639	0.188	-9.608 0.000***
	240	0.788	0.790	2978	2605			

*** indicates significant at 1% level, ** indicates significant at 5% level

M denotes male control, F female control, and {FE} female endowments in thousands of shillings (male endowments are 4000 minus FE)

Note: Following Godfrey (1988) and Moffat and Peters (2001), the p-values reported and critical values used for this test are for a 2 sided test even though the test itself is one-sided. This is because the null is on the boundary of the possible parameter distribution (i.e. efficiency cannot be greater than 1).

Table 4. Control of the allocation and total contribution levels.

Comparison	Variant	N	Mean y/max y	Std. Deviation	T statistic p value
50:50 split (first variant) versus control by an individual (second variant).					
1 {0}	1	26	0.904	0.201	-0.794
	2 (F)	25	0.940	0.109	0.431
2 {2}	4	30	0.769	0.255	-0.781
	3 (M)	27	0.718	0.242	0.438
3 {2}	4	30	0.769	0.255	-1.204
	5 (F)	25	0.845	0.202	0.234
4 {4}	7	32	0.887	0.189	-1.072
	6 (M)	26	0.833	0.193	0.288
Control by husband (first variant) versus control by wife (second variant).					
Comparison	Variant	N	Mean y/max y	Std. Deviation	T statistic p value
1 {2}	3 (M)	27	0.718	0.242	-2.054**
	5 (F)	25	0.845	0.202	0.045
2 {2}	8 (M)	24	0.534	0.199	-1.910*
	9 (F)	25	0.639	0.188	0.065

** indicates significant at 5% level, 2 tailed test

* indicates significant at 10% level, 2 tailed test

M denotes male control, F female control, and {FE} female endowments in thousands of shillings (male endowments are 4000 minus FE)

Table 5. Control, individual contribution levels and payoffs.							
Comparison	Gender of recipient /investor recorded here	Variant	N	Mean x	T p-value	Payoff fraction	Mean payoff
Sironko							
1 {2}	Female	3 (M)	27	1296	-1.863*	0.570	3122
		5 (F)	25	1584	0.068	0.491	2832
2 {2}	Male	3 (M)	27	1574	-1.708*	0.430	2318
		5 (F)	25	1800	0.094	0.509	2860
Bufumbo							
3 {2}	Female	8 (M)	24	1021	-2.97***	0.523	2675
		9 (F)	25	1352	0.005	0.458	2436
4 {2}	Male	8 (M)	24	1117	-0.602	0.477	2458
		9 (F)	25	1204	0.550	0.542	2860
Sironko							
5 {4}	Female	6 (M)	26	3331	-	0.800***	4554***
{0}		2 (F)	25	-	-	0.420	2532
6 {4}	Male	6 (M)	26	-	-	0.200***	1119***
{0}		2 (F)	25	3760	-	0.580	3348

* indicates significant at 10% level, 2 tailed test

** indicates significant at 5% level, 2 tailed test

*** indicates significant at 1% level, 2 tailed test

M denotes male control, F female control, and {FE} female endowments in thousands of shillings (male endowments are 4000 minus FE)

Table 6. Evidence on reciprocity in 6 variants.						
Variant	Gender of allocator	Constant t-statistic	Slope t-statistic	R^2	Slope = 0?	Slope = 1?
Sironko						
3 {2}	Male	702 1.202	1.324 3.238	0.295	No	Yes
6 {4}	Male	-1808 -1.927	1.709 6.220	0.617	No	No
2 {0}	Female	2491 0.705	0.164 0.176	0.001	Yes	Yes
5 {2}	Female	950 0.810	0.950 1.493	0.088	Yes	Yes
Bufumbo						
8 {2}	Male	1056 2.269	0.606 1.448	0.087	Yes	Yes
9 {2}	Female	1127 2.065	0.785 1.851	0.092	Yes	Yes
'No' =hypothesis rejected at 95% level; 'Yes' = hypothesis not rejected at 95% level. {FE} denotes female endowments in thousands of shillings (male endowments are 4000 minus FE)						

Table 7. Male and female contributions when sharing rule is 50:50.					
Comparison	Gender of contributor	Variant	N	Contributions	p-value
1	Male	1 {0}	26	3615	0.614
	Female	7 {4}	32	3547	
2	Male	4 {2}	30	1567	0.552
	Female	4 {2}	30	1510	

p-values from a 2-tailed t-test with unequal variances

{FE} denotes female endowments in thousands of shillings (male endowments are 4000 minus FE)

Table 8: Tobit estimates of contribution rates on socio-economic characteristics of spouses (with robust standard errors)

Variables	Pooled			Husbands			Wives		
	Coefficient	Robust se	dy/dx	Coefficient	Robust se	dy/dx	Coefficient	Robust se	dy/dx
Bufumbo	-0.248***	0.061	-0.136	-0.486***	0.093	-0.235	-0.162**	0.069	-0.100
Husband-farmer	-0.005	0.060	-0.003	0.034	0.089	0.017	-0.041	0.072	-0.026
Wife-farmer	0.038	0.059	0.021	0.029***	0.088	0.014	0.062	0.070	0.039
Husband-teacher	0.009	0.115	0.005	0.042	0.232	0.020	0.062	0.138	0.038
Wife-teacher	0.548***	0.214	0.301	2.559	0.156	1.237	0.496*	0.262	0.307
Same occupation	0.086	0.055	0.047	0.078	0.085	0.038	0.121*	0.063	0.075
Husband-educated	0.011	0.056	0.006	-0.029	0.082	-0.014	0.075	0.069	0.046
Wife-educated	0.001	0.054	0.000	0.054	0.074	0.026	-0.032	0.064	-0.020
Same education	0.105**	0.046	0.058	0.145**	0.072	0.070	0.047	0.053	0.029
(log) Husband age	-0.184**	0.088	-0.101	-0.247*	0.133	-0.119	-0.195*	0.109	-0.121
Age difference	0.003	0.004	0.001	0.011**	0.005	0.005	-0.000	0.004	-0.000
Constant	1.605***	0.343		1.809***	0.495		1.493***	0.411	
No of observations	240			182			189		
LR chi^2	105.450			86.910			66.890		
Prob > chi^2	0.000			0.000			0.000		

Note: Contribution rates are measured as contribution to the common pool divided by the initial endowment; dy/dx are the unconditional marginal effects; *** 1% significance level; ** 5% significance level; * 10% significance level; game dummies are included but not reported**.**

Table 9: Tobit estimates of allocation rates on socio-economic characteristics of spouses (with robust standard errors)

	Male allocation (female receipts divided by female contribution)			Female allocation (male receipts divided by male contribution)		
Variables	Coefficient	Robust se	dy/dx	Coefficient	Robust se	dy/dx
Bufumbo	0.490	0.336	0.464	0.925***	0.208	0.903
Husband-farmer	0.108	0.335	0.101	-0.473*	0.244	-0.462
Wife-farmer	-0.328	0.339	-0.310	-0.096	0.244	-0.094
Husband-teacher	0.231	0.587	0.219	0.124	0.280	0.121
Wife-teacher	-0.505	0.532	-0.457	0.224	0.351	0.220
Same occupation	0.069	0.240	0.064	0.022	0.224	0.021
Husband-educated	-0.198	0.370	-0.187	0.011	0.287	0.010
Wife-educated	-0.012	0.500	-0.011	-0.078	0.212	-0.076
Same education	-0.005	0.239	-0.005	0.086	0.194	0.084
(log) Husband age	-0.308	0.570	-0.289	1.016**	0.420	0.988
Age difference	-0.012	0.018	-0.011	-0.035**	0.016	-0.034
Constant	3.039	2.299		-1.927	1.523	
No of observations	76			75		
LR chi^2	5.78			26.90		
Prob > chi^2	0.888			0.005		

Note: Allocation rates are measured as receipts from the common pool divided by contributions to the common pool; dy/dx are the unconditional marginal effects; *** 1% significance level; ** 5% significance level; * 10% significance level. Game dummies are included but not reported.

Table 10: Male and female share from common pool and household money management

	Wives responses					
	Who is mainly in charge of household money?	No. of obs.	Mean	Std. err.	t-stats	p-value
Husbands' share	Husband	16	0.603	0.049	2.408	0.022
	Wife	20	0.429	0.043		
Wives' share	Husband	16	0.396	0.053	-2.329	0.026
	Wife	20	0.591	0.062		
	Husbands' responses					
Husbands' share	Husband	17	0.511	0.059	0.122	0.904
	Wife	19	0.501	0.051		
Wives' share	Husband	17	0.491	0.059	-0.286	0.777
	Wife	19	0.517	0.067		

Note: "Husband/wife mainly in charge of household money" condenses five forms of budget control identified in the follow-up interviews: wife keeps all money, husband requests for personal use (1); wife keeps most money, husband retains for personal use (2); husband keeps all money, wife requests for household and personal use (3); husband keeps most money and gives wife an allowance (4); husband keeps all money and does all purchasing (5). Female overall budget control corresponds with categories 1 and 2, male with 3, 4 and 5.

Figure 1. Proportion of total surplus realised in each of the games.

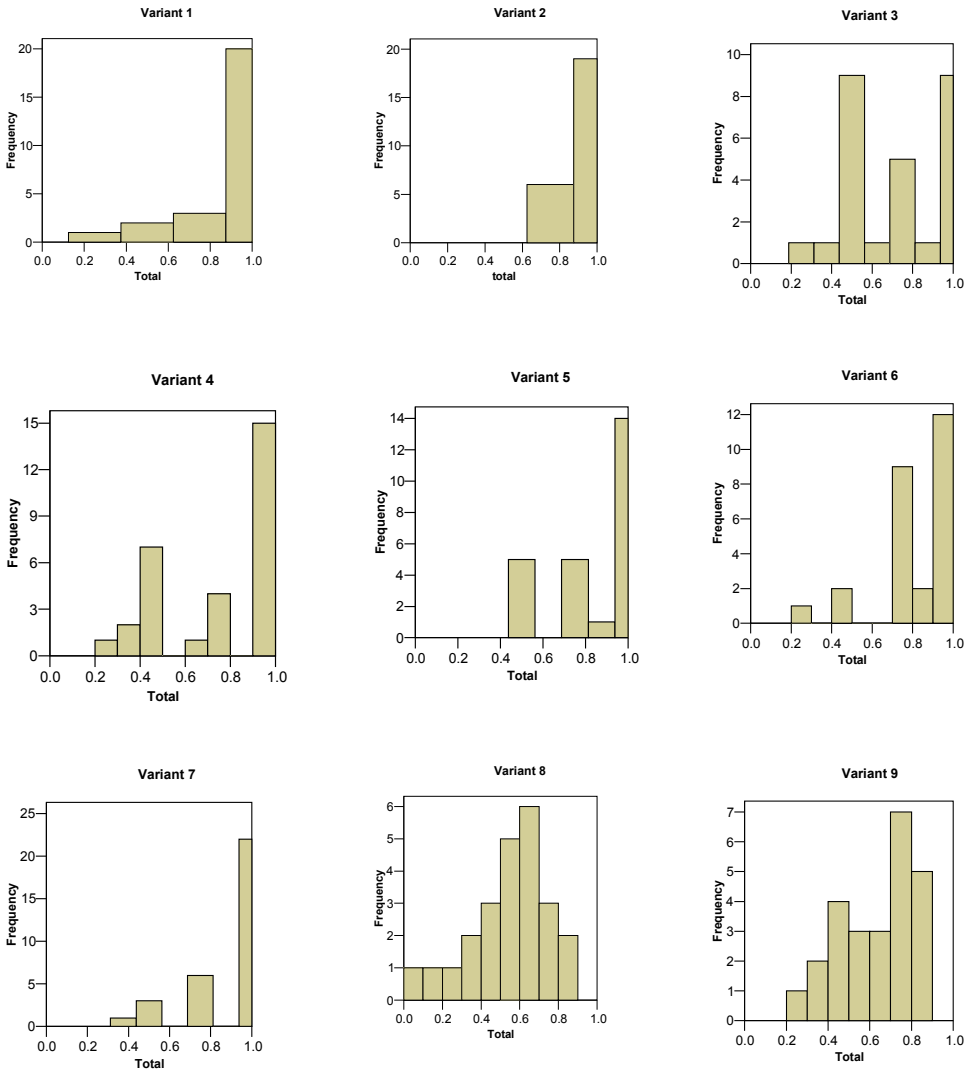

Figure 2. Rewards and Contributions