Spousal Control and Efficiency of Intra-Household Decision Making: Experiments among Married Couples in India, Ethiopia and Nigeria

ABSTRACT

Given the importance of the household as a resource allocation mechanism, considerable interest exists in its efficiency. Most of the non-experimental evidence for inefficiency comes from West African farm households in which husbands and wives pursue separate productive activities. Using experiments, we test for efficiency of spouses' resource allocation decisions in a range of household types. In North India, we selected households that are unified, in northern Nigeria households characterised by separate spheres of economic decision making. Our other sites occupy carefully selected intermediate positions on the spectrum from unitary to separate-spheres household types. We find that, the more separate is decision making in real life, the less efficient is resource allocation in the experiments. Moreover, female control of resource allocation tends to lower efficiency, in contrast to male control. The exception is a site in northern Nigeria where female control of resource allocation is well established.

Key words: intra-household efficiency; spousal control; economic experiments; India; Ethiopia; Nigeria

1. Introduction

People marry the world over, but the nature of the partnership between husbands and wives varies considerably across regions. This shows in the ways in which spouses organise their economic activities, in particular in the degree to which these take place in separate spheres. At one end of the spectrum, husbands and wives act as one, an approximation of which may be found in some parts of North India. At the other end, marital partners pursue largely separate economic activities, for instance in most of rural West Africa.

Do these differences matter for the efficiency of the households run by husbands and wives? This is an important question, since a large part of humankind's consumption and production is organised within households. Survey evidence for West Africa suggests that because spouses pursue separate economic activities, they could have both been better off by coordinating their activities better (Jones, 1983; Udry, 1996; Duflo and Udry, 2004; Akresh, 2008). In other words, the fact that husbands and wives exert individual control over resource allocation decisions makes these decisions inefficient; a benevolent dictator could have improved the wellbeing of both spouses if these would have agreed to renege individual control.

Of recent, the link between individual spousal control and efficiency has begun to be studied in lab-in-the-field experiments; see Munro (2018) for a review of such intra-household experiments. Spouses' wishes to exert individual control over money are clearly an important determinant of the efficiency of resource allocation decisions. Mani (2011) among married couples in India finds widespread inefficiency when spouses choose between investment options in which personal control is obtained at the expense of household income. The opportunity to hide resources does not affect efficiency in her study. In other evidence for the importance of control, Hoel (2015) finds an almost universal failure to achieve efficiency in a sample of married couples from Kenya using a dictator game in which tokens are worth 20 Kenyan shillings if kept (so under one's own control) and 30 if donated to one's spouse. Echoing Mani's (2011) findings, most of her subjects give the same in secret as in public (although a minority gives more in public), suggesting that the motive of securing control does not require secrecy to be effective.

At the same time, the link between efficiency and control appears to differ from culture to culture. Using public goods games, Iversen et al. (2011) among married couples in

Uganda find that both husbands' and wives' contributions (and thus efficiency) go up when wives control the allocation of the common pot, whereas Kebede et al. (2014) in Ethiopia and Munro et al. (2014) in India find that male and female contributions, when they do respond, go down when wives are in charge of the allocation. Husbands controlling the allocation has no effect on contributions in the three studies cited.

For this study, we designed a public goods game for investigating the link between spousal control and efficiency of resource allocation decisions. Our contribution to the literature is that we selected eight sites purposively on conjugality, i.e. the prevailing nature of spousal relations. In particular, we tried to have variation across sites in the degree of separateness of economic activities that spouses pursue, from low separateness in North India to high in Nigeria, with our other sites occupying an intermediate position.

We find that the more separate decision-making is in real life, the lower efficiency is in the experiments. As to the effect of control, wives controlling resource allocation tends to lower efficiency, whereas husbands controlling the allocation has no effect on it. This contrast is very striking. We think this may be because husbands' control over the allocation of household resources is the norm in most of our sites (for which we present survey evidence), so giving wives such control may be unsettling. Indeed, in the one site where giving wives control of the allocation *raises* contributions to the common pot (among the Hausa in northern Nigeria), female control over resources is well-established in daily life.

The paper proceeds as follows. In Section 2, we define efficiency and present the experimental design. In Section 3, we motivate site selection in terms of the ethnographic record and describe the fieldwork implementation. In Section 4 we present the analysis of the experimental and survey data. Section 5 compares our findings with the related literature and concludes.

2. Theory and experimental design

In this section we first sketch in Section 2.1 how inefficiency of intra-household resource allocation may arise in economic models of the household, and then present in Section 2.2 the experiments designed to test for a particular source (spousal control) of inefficiency, followed in Section 2.3 by the framework for the analysis.

2.1 Inefficiency of intra-household allocation of resources in economic theory

The notion of efficiency tested for in this study is that of the Kaldor-Hicks variety: a shift of resources could bring about a situation in which those who gain are in a position to compensate those who lose. In other words, when a shift of resources is possible that leads to *conceivable* Pareto improvements, then Kaldor-Hicks efficiency has not been attained. Economic models of the household differ radically in terms of possible inefficiency and its sources. In unified models of the household (a representative example is Becker, 1974), centralised control ensures efficiency. By contrast, in non-cooperative models, introduced by Ulph (1988) and Woolley (1988), efficiency is not guaranteed. Central to these models is individual utility maximisation subject to individual budget constraints, with interdependence of decisions resulting from household public goods and caring preferences. Consumption and production decisions are not necessarily optimally coordinated and household public goods may be underprovided, the more so when exiting the marriage is easier.

In between these two extremes, there are the collective models introduced by Chiappori (1988, 1992) and Apps and Rees (1988), which assume Pareto efficiency but do not contain much structure besides; and cooperative bargaining models. Some of the latter could be seen as collective models with some more structure imposed and the assumption of Pareto efficiency retained, such as the seminal cooperative bargaining models of Manser and Brown (1980) and McElroy and Horney (1981). In others, the Pareto property is satisfied that the household welfare function is strictly increasing in each member's consumption but neither Pareto nor Kaldor-Hicks efficiency is necessarily attained. Reasons for inefficiency in cooperative models include feedback loops from anticipated shifts in the balance of power that result from contemplated household resource allocation decisions (Basu, 2006); and the inability to make binding agreements because spouses' commitments are not renegotiation-proof (Lundberg and Pollak, 2003; Apps and Rees, 2009, pp. 81 ff.).

Interestingly, the realism of each main class of models is geographically restricted, for which ample ethnographic evidence exists (see Section 3.1). We selected sites in North India that resemble unified models of the household, sites in northern Nigeria that resemble non-cooperative models and sites in Ethiopia to typify relations between spouses that are

essentially cooperative but with ample scope for mechanisms that preclude efficiency. The site selection thus ensures that we have variation in local conjugal culture. In each site we test whether exogenously altering control over the intra-household allocation of resources (letting either the husband or the wife be in charge) matters for the efficiency of that allocation. The sites are then thought of as dimensions of subject heterogeneity (subjects differ in terms of the local conjugal culture) that we interacted with altering control over the allocation (in experimental treatments).

Finding that resource allocation is inefficient would reject unified and collective models of the household. However, our main interest is in investigating how efficiency of resource allocation is affected by the local conjugal culture (i.e. site), the identity of the spouse in charge of allocation, and spousal control and conjugality interacted. Investigating this does not constitute a direct test of any particular model of the household. We see this investigation as exploratory. We reflect on implications for theory in Section 5.

2.2 Experimental design

Married couples played variants of a public goods game (PGG) in a between-subject design. In the base of the PGG, each spouse receives endowment E, and then chooses an investment I^h (husband, I^w for wife) from the set $\{0, \frac{1}{4}E, \frac{1}{2}E, \frac{3}{4}E, E\}$. The contributions to the common pot $(I^h + I^w)$ are then multiplied by 1.5 and distributed evenly between the two spouses who each receive $0.75(I^h + I^w)$.

We have two treatments that each entail precisely one change from the base. In the first treatment, "female control", the wife decides on the distribution of the common pot. Both spouses contribute to the common pot knowing that the wife will decide on its allocation, i.e. the wife will decide how much the husband receives and how much she herself receives.

In the second treatment, "male control", the husband decides on how the common pot is distributed, which both spouses know when they make their contribution decisions.

The other main design features are as follows. Both spouses are told before they make their contribution decisions that the size of the common pot will be known to both spouses.

Decision-making took place in private. Husbands and wives were escorted to separate rooms, were then instructed about the rules of the game, and communicated their decisions orally to one of the research assistants, who recorded it for them.

Subjects were not informed about the precise size of their spouse's endowment. We instead informed them about a range of monetary amounts in which their spouse's endowment would fall. In practice, in the treatments considered in this paper, the amount of money received was always equal to the maximum amount in this range. We avoided deception through taking advantage of the fact that we simultaneously conducted other treatments in which subjects received a lower amount. So for example, in the "female control" treatment in Ethiopia, wives were told:

> In a moment I will give you an envelope containing money. The exact amount will vary between people, but you will receive something between Birr 0 and Birr 40. [Show the envelope.] Your husband will receive a similar envelope and he will also receive an amount of money between Birr 0 and Birr 40. He doesn't know how much you have in your envelope and you won't be told how much he has in his envelope.

Since in treatments not considered in this paper the amount subjects received could indeed vary from Birr 0 to Birr 40, the information given here is correct. The reasons we wanted subjects to be uninformed about the precise amount their spouses had received were (a) to give them plausible deniability if they wanted to contribute less than the full amount, and (b) to mimic real-life conditions of intra-household resource allocation (see Section 3.1).

Before spouses' contributions were revealed to each other, we asked them how much they expected their spouse to keep for themselves, so withhold from contributing to the common pot. Recall that we did not reveal to subjects the precise endowment their spouse had received, so we asked this question hypothetically, e.g.: "If your husband had Birr 40 in his envelope, how much do you think he would take out?" In practice, we mentioned here the actual amount received, which equates to the maximum amount in the range of amounts mentioned as possibilities.

Instructions were orally delivered and read out from a script. These scripts were identical in each of the eight sites. They were translated into the local language and then back-translated in order to check that the intended meanings had survived the process of translation. The experimental instructions as delivered to subjects in the "female control" treatment in Ethiopia are presented in the online appendix. Instructions for other treatments and other sites are straightforward adaptations of these appended instructions.

Monetary incentives were sufficient. Endowments were calibrated to be equal to twice the local daily wage for semi-skilled labour.

Married couples were randomly assigned to treatments. Moreover, each treatment was played in every session, and each couple participated in one game version only, i.e. in the base version of the game or in "female control" or in "male control".

2.3 Framework for the analysis

The bulk of the analysis is simple comparison-of-means tests of investment $I^p, p = h, w$ in the base version of the PGG, T_0, and treatment $T_k, k = 1,2$ in site $S_j, j = 0,1, ... ,7$. We use two-sample two-sided t-tests for these comparisons, and a non-parametric alternative, i.e. Mann-Whitney, to check for the influence of distributional assumptions on the test statistic.

In order to control for inadvertent sub-sample heterogeneity and session-level influence on behaviour, we condition on control variables X^c in the estimation framework provided by Equation (1), whose parameters may differ between husbands and wives.

$$I_i = \alpha_i + X_i^c \beta + \delta_0 + S_j \delta_{j>0} + S_j T_k \tau_{j,k} + \varepsilon_i \qquad (1)$$

The focus of the analysis is on whether conditional on site S, treatment T varies in its effect on subject's i investment I_i (contribution to the common pot). There are three game version dummies T_k, including base version T_0 and two treatment dummies, and eight site dummies S_j with S_0 being the reference site. δ_0 is mean investment in reference site S_0 in the base version of the PGG, $\delta_0 + \delta_{j>0}$ is mean investment in the base of the PGG in site j, and $\delta_0 + \delta_{j>0} + \tau_{j,k}$ is mean investment in treatment k in site j, controlling for observed subject/couple characteristics X^c: expectations about a spouse's contributions, features of the marriage, and so forth.   The null hypothesis that treatment effects are uniform across sites, i.e. $\tau_{j,k} = 0 \; \forall \, j, k$ is tested first using simple OLS of (1); next using tobit to check whether it matters that the dependent variable is left and right censored; and finally using ordered probit to check whether it matters that the dependent variable is not continuous.

α_i is a person-specific unobserved effect, which may include unobserved features of the couple, with overall mean $\overline{\alpha} = 0$ and conditional means $\overline{\alpha} \, | \, T_k = \overline{\alpha} \, | \, S_j = 0$. In the estimation, we cluster standard errors by session and correct for heteroscedasticity.

3. Site selection and fieldwork implementation

3.1 Site selection

For the purpose of this study, we have tried to obtain variation across sites in the separateness of spouses' economic activities. Our site selection strategy has been to purposively select sites that according to ethnographic literature could be taken to resemble various economic models of the household. In unitary models of the household (e.g. Becker, 1974), control of resources is centralised. We selected sites in North India to exemplify this, with arranged marriages, practically no divorce and female subordination to the male household head (Dyson and Moore, 1983; Jejeebhoy and Sathar, 2001).

By contrast, in non-cooperative models (introduced by Ulph, 1988, and Woolley, 1988), consumption and production decisions are not necessarily optimally coordinated, the more so when exiting the marriage is easier. West African farming households are often cited as examples of husbands and wives forming separate consumption and production units (e.g. Hill, 1975; Tambiah, 1989). We selected sites in northern Nigeria, with frequent divorce and intra-household spheres of economic activities clearly demarcated along gender lines, to resemble non-cooperative models (Hill, 1972; Jackson, 1978; Pittin, 2002).

In between the extremes of unitary and non-cooperative models, there are cooperative bargaining models (Manser and Brown, 1980; McElroy and Horney, 1981; Lundberg and Pollak, 2003). We selected sites in Ethiopia to typify relations between spouses that are essentially cooperative but with obvious and ample scope for mechanisms that preclude efficiency. Unlike the dominant pattern in West African farm households of separate production units, the typical agricultural production system in Ethiopia is one of separate tasks for men and women in a joint agricultural enterprise (Seebens and Sauer, 2007). However, women frequently undertake extra activities for additional income and men are responsible for selling crops: despite extensive consultation of husbands and wives on agricultural matters being common, evidence exists of spouses' substantial hiding of income from each other (Frank, 1999).

We thus selected sites that differ in terms of degree of separation of spouses in economic activities, with those in North India representing jointness, those in northern Nigeria

separateness, and those in Ethiopia an intermediate regime. For more nuance, we added within-country contrasts and ended up with the following eight sites, each of which is denoted using a short acronym (e.g. UPR).

In India, in addition to a rural site in the northern state of Uttar Pradesh (UPR), we selected a southern rural site, in Tamil Nadu (TAM), to capture the greater female autonomy in the South compared to the North (Dyson and Moore, 1983; Jejeebhoy, 2001; Jejeebhoy and Sathar, 2001) and therefore scope for separate activities.

In northern Nigeria, in the Emirate of Kano, we selected the Hausa (HAU) people, whose women, despite female seclusion, are from their homesteads very active traders, highly independent and involved in activities entirely separate from those of their husbands, with whom they have a transactional relationship that often involves monetary payments (Hill, 1972; Jackson, 1978; Pittin, 2002). In contrast, we also selected in the same part of Nigeria a site where pre-Muslim Hausa, the Maguzawa (MAG), reside, albeit in dwindling numbers (Clough, 2009). Among them, a wife is typically given a plot to cultivate by her husband, but also joins him to work on the gandu (ancestral land), along with his married sons and their wives (Greenberg, 1946; Abdulwahid, 2006). Separation is thus not nearly as extreme among the Maguzawa as it is among the Hausa.

In Ethiopia, we sought to achieve a similar contrast in rural sites in terms of relative female involvement in the household's farm, to capture degree of separation of spouses in economic activities, based on the broadly accurate pattern of a larger female agricultural role in plough than in hoe economies (Boserup, 1970; Alesina et al., 2011). Representing plough economies and thus a greater degree of separation between spouses is our rural site of Mehal Meda (MHM), in the north of the country, and the hoe economies that of Hadiya (HAD), in the south.

Finally, to capture a potential dilution of traditional contrasts under the influence of modernity, we selected two urban sites, one in India, Varanasi (VAR) in Uttar Pradesh (so in the same state as our rural site in North India) and the other the capital of Ethiopia, Addis Ababa (ADI).

3.2 Sample selection and fieldwork implementation

The details of sample selection and fieldwork implementation in each of our eight sites are presented in detail in AUTHORS (2014a,b, 2018). Here we briefly summarise them. With the help of key informants, we purposively selected in every site a typical region (e.g. a district) and in every region five clusters of villages (wards in urban areas) in which game sessions could be organised, sufficiently far apart to avoid cross-contamination.

In each cluster, we took a census of all married couples, which provided us with a sampling frame. Couples were randomly selected and randomly replaced in case of non-availability (which was rare), of which we kept a record. The total sample in our eight sites consisted of 3,068 married couples, of which 965 couples were randomly assigned to the treatments considered in this paper (see Section 4.2). We report on other treatments in AUTHORS (2014a,b, 2018).

For each treatment played in a site we thus had five sessions (one per cluster), and across all sites, eight sites times five sessions equals forty sessions in total.

In the weeks that followed a game session, a survey was administered among all husbands and wives who participated in the experiments. Both spouses were interviewed, each by a separate interviewer and with the other spouse not present whenever possible (we recorded who were present during the interview). Husbands and wives were asked an overlapping but distinct set of questions about their socio-economic characteristics, role in the household, relevant values and freedoms, marital history, and details about their relations with their spouse and their kinsfolk.

4. Results

In this section, we first present subject characteristics by site (Section 4.1), followed by information on assignment to treatment and balancing tests (Section 4.2), aggregate patterns of behaviour in the experimental games (Section 4.3), and an analysis of behaviour in the games through comparisons of mean female and male contributions by treatment and site, first without (Section 4.4) and then controlling for socio-economic characteristics (Section 4.5).

4.1 Subject characteristics

Conjugality indicators by site are presented in Table 1, which is based on the 965 married couples assigned to the treatments considered in this paper. A clear India/Africa contrast can be observed in the incidence of arranged marriage, as well as divorce. The incidence of arranged marriage ranges from 85 per cent to 94 per cent across the three Indian sites, and from 4 to 23 per cent across the five African sites. As to divorce, it is very rare for husbands in the Indian sites to have been married more than once: the mean number of times they have been married ranges from 1.00 to 1.05. By contrast, across the African sites, the number of times husbands have been married ranges from 1.08 to 1.61. These figures for divorce and arranged marriage are consistent with the reason we had selected sites both in India and in Africa. We had expected both marriage of spouses' own volition and divorce to be more frequent in Africa than in India, which is confirmed here.

A second motive for site selection is variation in female economic independence. Our purpose was to encourage such variation both through the East Africa/West Africa and through the North India/South India contrast. In line with this, women are much more frequently primarily homemakers (responsible for household chores so as a rule not economically independent) in our East African than in our West African, and in our North Indian than in our South Indian sites. In the Ethiopian sites, 64 – 74 per cent of wives are primarily homemakers, whereas across the Nigerian sites, this figure ranges from 7 to 23 per cent. In North India, 46 per cent of wives are homemakers in rural Uttar Pradesh and 58 per cent in Varanasi; in rural Tamil Nadu the figure is as low as 16 per cent.

On another indicator of (absence of) female economic independence, the inability to make independent consumption decisions, the East vs. West Africa contrast is again confirmed, but the North vs. South India contrast is not. The percentage of wives who need permission to buy a dress is, as expected, much higher in our East African (almost 90 per cent) rural sites than in the West African ones (21 – 42 per cent). However, 68 per cent of wives in rural Tamil Nadu in South India need permission to buy a sari, whereas the corresponding figures for rural and urban (Varanasi) Uttar Pradesh are 47 and 42 per cent, respectively. For very similar deviations from the previously expected North/South India contrast in female autonomy in spending decisions, see Rahan and Rao (2004).

For comparison with the related literature, we also report how often wives primarily decide on spending household income. Unlike in South East Asia, where female control over household finances is common and held responsible for husbands hiding resources from their wives (Ashraf, 2009), women deciding on how household income is spent is always rare in our sites: never more than 15 per cent and usually considerably lower.

Overall, the contrasts in conjugality indicators observed here are broadly consistent with the expected differences in wives' independence and control over resources – greater in West than in East Africa, in Africa than in India, and (with the exception of personal consumption) in South than in North India. This suggests a low degree of separation between spouses in economic activities in India – especially North India, a high degree of such separation in northern Nigeria, and an intermediate degree in Ethiopia, which is consistent with our motives for site selection presented in Section 3.1. Put cautiously, site selection clearly has produced substantial between-site variation in conjugality, which is broadly in line with the ethnographic record.

4.2 Assignment to treatment

As outlined in Section 3.2, the sample of 965 married couples of interest in this study is drawn from a larger sample of 3,068 couples, about equally distributed across the eight sites. The couples were randomly assigned to treatments, so that for any treatment conducted in a site, each couple has the same chance of taking part in that treatment. Our original plan was to assign 40 couples per site to each treatment. We deviated from that plan only in one instance, among the Maguzawa in northern Nigeria, where 45 couples were assigned to the base version of the experimental game. This was done for pragmatic reasons.[1] Table 2 shows the distribution of the 965 married couples across the treatments and sites.

In each session conducted in a site, all three treatments were played, so that random assignment to treatment took place at the level of the couple. We investigated inadvertent selection due to chance, and found this to be unproblematic.

4.3 Aggregate patterns of behaviour in the experimental games

Table 3 contains summary statistics by site of variables capturing contribution and allocation behaviour in the experimental games, as well as expectations of spouses' behaviour. Female contributions range from 44 per cent of endowments in Mehal Meda, a rural site in Ethiopia, to 64 per cent in Varanasi, our urban site in North India. On average, wives contribute 52 per cent of endowments. Male contributions range from 44 per cent among the Maguzawa in northern Nigeria to 63 per cent in Varanasi. On average, husbands contribute 56 per cent of endowments: somewhat higher than wives' contributions, which is also the case in six out of our eight sites (exceptions are the Maguzawa and Varanasi).

When female and male contributions are combined, in order to obtain a measure of efficiency of intra-household decision making, contributions range from 47 per cent among the Maguzawa to 64 per cent in Varanasi. Among the Maguzawa this implies inefficiency of about 18 per cent: 53 per cent of endowments are not contributed so household earnings are $(.47 * 1.5 + .53)/1.5 \approx 82$ per cent of what they could have been. In Varanasi, inefficiency is about 12 per cent. As may be seen in Table 3, efficiency is highest in urban North India, lowest in our two West African sites, and in between these extremes in our other sites.

Wives' expectations of how much husbands would withhold from contributing to the common pot were 50 per cent of endowments on average. In reality, husbands withheld 44 per cent on average (100 – 56 per cent contributed), so wives somewhat overestimated how much husbands would withhold. Wives' expectations of husbands withholding ranged from 39 per cent in Varanasi to 60 per cent in Hadiya in rural Ethiopia.

Husbands' expectations of wives withholding endowments ranged from 42 per cent in rural Tamil Nadu, in South India, to 53 per cent among the Maguzawa in northern Nigeria. The average expectations of withholding 47 per cent were close to the actual of 48 per cent. We will make use of expectations of spousal contributions in the regression analysis of contribution behaviour (Section 4.5).

We do not focus on allocation behaviour in this paper. The reasons are, first, that these allocations can be undone after the experiment, which we do not observe. Second, we do not know what the money will be spent on: household goods, private goods, gifts to household members, gifts to others, and so forth. For that reason we cannot equate

experimental receipts with ultimate benefits. Third, and related, spouses may influence each other's spending. In an extreme case of power imbalance, the dominant spouse could simply instruct their partner what to spend the money received in the experiment on.

By contrast, money not contributed to the common pot could have earned interest that is voluntarily forfeited. This represents an efficiency loss that cannot be regained after the experiment. Contribution behaviour is therefore final in a sense that allocation behaviour is not. We will next analyse how contribution behaviour responds to the identity of the spouse in charge of allocation of the common pot.

4.4 Contributions to the common pot by treatment

Figure 1 displays male and female contribution rates (as a percentage of endowments) by treatment and site. Comparing contribution behaviour in the "female control" treatment with that in the base version of the experiment shows that in six out of eight sites, female contributions are lower in the "female control" treatment than in the base, and in two sites higher. In that same treatment, so when wives control the allocation of the common pot, male contributions are lower than in the base in seven out of eight sites, and higher in one.

On the face of it, "male control" suppresses contributions somewhat less than "female control". In four out of eight sites, "male control" lowers female contributions, and in the other four it raises them, compared to the base. When men control the allocation of the common pot, male contributions are lower than in the base in five out of eight sites, and higher in the remaining three.

It is striking that when spouses are in charge of the allocation of the common pot, they do not contribute their entire endowment, with own contribution rates among those in charge of allocation even frequently being lower than in the base. This raises the question why, when individuals can secure a positive return on investment by allocating to themselves a commensurate share of the common pot, they do not do so. Perhaps endowment (secretly) retained is regarded differently from money allocated to oneself from the common pot; this needs investigation in future research.

"Female control" treatment effects

We next turn to testing whether treatment effects are significant. In Table 4, female contributions, male contributions and household efficiency (male contributions plus female contributions) are compared between the "female control" and the base version of the game, by site. For assessing statistical significance, we use a two-sided two-sample t-test, and the Wilcoxon rank-sum test, a non-parametric alternative based on the order in which the observations from the two samples fall. We use a non-parametric alternative to the t-test to check for the influence of distributional assumptions on the test statistic.

To begin with female contributions in the "female control" treatment, these are significantly lower than in the base, by between 15 and 20 percentage points, in three sites: Varanasi, Mehal Meda and Hadiya. Varanasi in North India was selected because it represents centralised male control over intra-household resource allocation, whereas the two rural Ethiopian sites represent, to differing degrees, intermediate regimes between separate spheres and unified decision making: men and women pursue some joint agricultural activities but also some separate income-earning activities.

When it comes to husbands' contributions, "female control" lowers these statistically significantly, compared to the base, in Varanasi (by 19 percentage points) and in Hadiya (by 12 percentage points); it raises them among the Maguzawa (by 8 percentage points).

When controlling for socio-economic characteristics (Table 6), the treatment effect of "female control" retains statistical significance for Varanasi (both for male and female contributions), for female contributions in Mehal Meda, and for male contributions in Hadiya; both the effect on female contributions for Hadiya, and the effect on male contributions among the Maguzawa lose significance, which we therefore do not think of as robust treatment effects.

We summarise the robust treatment effects in two results.

Result 1. Female control over the intra-household allocation of resources lowers female contributions in two out of eight sites. They are Varanasi, a city in North India selected to represent centralised male control of household resources; and Mehal Meda, a site in rural Ethiopia in which husbands and wives farm together while also controlling their own independent income streams.

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Result 2. Female control lowers male contributions in two out of eight sites. They are Varanasi and Hadiya. Hadiya like Mehal Meda is characterised by a mixture of joint agriculture and spouses' separate pursuit of income-earning activities; the difference with Mehal Meda is that women's involvement in agriculture is traditionally greater.

As a result of the suppressing effect on male or female contributions, the combined effect is statistically significant in each of the three sites featured so far: male plus female contributions as a percentage of endowments go down by 19 percentage points in Varanasi, 10 percentage points in Mehal Meda, and 15 percentage points in Hadiya. The combined effect, although small (6 percentage points) is significant in rural Tamil Nadu, in South India, too. We sum this up in our third result.

Result 3. Female control lowers efficiency of intra-household resource allocation in four out of eight sites, two of them in India, and two in rural Ethiopia.

In marked contrast to the suppressing effects on contributions commented on so far, the "female control" treatment significantly raises female contributions, by 10 percentage points, in Hausaland. This treatment effect is robust to controlling for socio-economic characteristics (Table 6) and is thus an instance of heterogeneous treatment effects. Interestingly, the one site where female control significantly raises female contributions is also the one site where the ethnographic record is one of wives being firmly in charge of substantial independent income streams (Hill, 1969, 1972; Jackson, 1978; Schildkrout, 1982; Pittin, 2002). The fact that more control does not apparently give women (with the exception of the Hausa) the confidence to contribute more to the household, is worth noting. We summarise this finding for the Hausa in the next result.

Result 4. Female control raises female contributions in one out of eight sites. This is among the Hausa in rural northern Nigeria, the site where female control over resources is most firmly established.

As implied above, this result does not carry through to male plus female contributions, so to household efficiency being significantly higher.

"Male control" treatment effects

In marked contrast to "female control", "male control" has little effect on either male or female contributions (Table 5). The apparent effect in Mehal Meda on female contributions is significant at the 10 per cent level only in the case of the *t*-test; and loses statistical significance when socio-economic characteristics are controlled for (Table 6). Likewise, the apparent effect in Varanasi on male contributions is significant at the 10 per cent level in the case of both tests reported in Table 5, and is no longer significant in Table 6. The combined effect (male plus female contributions) is never consistently significant at the 5 per cent level either (Table 5). We summarise as follows.

Result 5. Male control over the intra-household allocation of resources has no robust effects in any of our eight sites on female contributions to a household public good, nor on male contributions nor on the efficiency of intra-household resource allocation.

Before discussing the effects of socio-economic characteristics on spousal contributions, one implication of the findings discussed so far is worth spelling out. For neither of the two treatments in any of our eight sites does efficiency ever increase compared to the base version of the game. A simple 50/50 allocation rule is never outperformed by leaving the allocation of the common pot to either spouse: male plus female contributions are in four cases significantly lower (all four in the "female control" treatment) but never significantly higher than in the base version of the game. This gives rise to our next result.

Result 6. Neither "male control" nor "female control", compared to the base version of the game, raises efficiency of intra-household resource allocation in any of our eight sites.

4.5 Regression analysis

In Table 6, the results of estimating Eq. (1) are reported, using tobit regressions.[2] We first comment on site dummies. The coefficients on site dummies are potentially influenced

by confounds such as different experimenter teams, which is why we focus in the paper on the performance of the treatment effects by site: treatment times site dummies in the regression analysis have been commented on above, and have informed the results presented there. The coefficients on site dummies are nonetheless suggestive.

All coefficients on site dummies are positive, suggesting higher contributions than in the reference site, among the Hausa. For male contributions, only Varanasi is statistically significant. For female contributions, Varanasi, rural Tamil Nadu and all three Ethiopian site dummies are statistically significant. The contrast is quite striking. Conditional on subject characteristics, female contributions are statistically significantly higher in five sites in India and Ethiopia than among the Hausa in northern Nigeria; male contributions only in one site (Varanasi).

When it comes to the role of expectations, these have a sizeable and statistically significant effect on contributions. The coefficient of .3350 on wives' expectations of husbands contributing implies that for every ten percentage points increase in expectations of contributions, own contributions increase by 3.35 percentage points. On average wives expect husbands to contribute 50 per cent of endowments, whereas they themselves contribute 52 per cent. An increase in expectations of husbands contributing from 50 to 60 per cent would correspond with an increase in wives' contributions from 52 to over 55 per cent. The coefficient of .4045 on husbands' expectations of wives' contributions implies an even larger effect. We summarise this in our next result.

Result 7. Expectations of spousal contributions to the common pot are a strong determinant of own contributions, both for wives and for husbands.

Most socio-economic characteristics are not statistically significant. There are three exceptions: more highly educated males contribute more, wives of older men contribute less, and when wives decide on spending, their husbands contribute more. Although the last mentioned is significant only at the 10 per cent level, it retains significance across estimation methods, i.e. OLS and ordered probit. Whereas in another cultural context, wives' control over household finances has been found to be a potential source of husbands

withholding private money, and thereby potentially a source of inefficiency (Ashraf, 2009), we do find evidence to the contrary.

Result 8. Wives controlling spending of household income is associated with husbands' contributions to the household public good being higher in the experimental game.

5. Discussion and conclusion

The question we asked in this paper is: Do the effects on the efficiency of intra-household resource allocation of exogenously altering the control of resources vary across local conjugal cultures? Using a public goods game (PGG), we obtain a measure of how "good" husbands and wives are at realising the potential joint surplus that their marriage embodies. Sites were selected to encourage variation in conjugality, along a spectrum running from marriages resembling the unitary household model, in North India, to those resembling separate spheres, in West Africa.

We find that female plus male contributions to the common pot in the experiments range from 47 per cent of endowments to 64 per cent, implying inefficiency of 12 – 18 per cent. Contributions are highest in urban North India, lowest in our two West African sites, and in between those two extremes in our other sites. Broadly speaking, the more separate decision-making is in real life, the lower spousal contributions are to the common pot in the experiments.

In previous lab-in-the-field studies using married couples, giving wives control over resources has sometimes been found to be a source of inefficiency (Kebede et al., 2014; Munro et al., 2014) and sometimes to make households more efficient (Iversen et al., 2011). For "female control" we find a large number of robust effects: negative effects in two sites on male contributions, negative effects in two sites on female contributions, and negative effects in four sites on efficiency. However, for the Hausa, we find a robust positive effect of "female control", on female contributions. For giving husbands control over resources ("male control"), the studies cited do not find any robust treatment effects; nor do we, in any site.

The effect of female control over resources on efficiency appears to be culture-specific. In the Philippines, where female control over household finances is common, the absence

of such control appears to increase efficiency (Ashraf, 2009). The interpretation of this finding is that husbands have incentives to hide some of their income from their wives if their wives are in control of household finances (ibid.: 1267).

In a similar vein, in PGG experiments in eastern Uganda, giving women control over the allocation increased both male and female contributions to the common pot (Iversen et al., 2011). Jackson (2013: 34) in her reflections on these findings suggests that in this research site, women being in charge of the common pot implies that the money in it is regarded as reserved for household consumption – corresponding with a well-established female role obligation.

By contrast, in our sites, in which such female control over resources is rare, its experimentally induced presence, when it does have an effect, tends to decrease both male and female contributions and thereby lower household efficiency. The suppressing effect of "female control" on female contributions is remarkable too: for women, holding on to the private endowment may be safer than being seen to allocate it to oneself unless allocating to oneself is a well-established practice in spouses' relations outside the experiment, as it clearly is among the Hausa (see references in Section 3.1).

Overall, the strong effects for "female control", when compared with the absence of effects for "male control", suggest that transferring control to the spouse who is not normally in charge may be unsettling when corresponding obligations and expectations of obligations are not (yet) established. In theoretical terms, such interventions may increase the likelihood of a separate spheres equilibrium, with concomitant inefficiency, as opposed to the efficient income pooling one (cf. Lechene and Preston, 2011).

Conflict of interest statement: On behalf of all authors, the corresponding author states that there is no conflict of interest.

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[1] The Maguzawa sample was smaller than originally intended; we decided to scrap some treatments not considered in the paper, and allocated a residue of 5 couples to the base version.

[2] The results of using OLS and ordered probit are available from the authors. These results lead to the same conclusions as the tobit models about which treatment effects are robust, commented on above. They also lead to the same conclusions about statistical significance of site dummies, expectations of the other spouse's contributions and socio-economic correlates of contribution behaviour, commented on next.

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Table 1
Summary statistics of conjugality indicators by site

	India North		South	Ethiopia Capital	North	South	Nigeria Northern (Muslim)	Northern (non-Muslim)
	Urban Varanasi (VAR)	Rural Uttar Pradesh (UPR)	Rural Tamil Nadu (TAM)	Urban Addis Ababa (ADI)	Rural Mehal Meda (MHM)	Rural Hadiya (HAD)	Rural Hausa (HAU)	Rural Maguzawa (MAG)
Arranged marriage (=1)								
Mean	.85	.94	.86	.04	.23	.15	.20	.06
Standard deviation	.36	.24	.35	.20	.42	.36	.40	.25
Times married (husband, #)								
Mean	1.05	1.03	1	1.28	1.61	1.08	1.43	1.10
Standard deviation	.27	.16	0	.64	.94	.31	.94	.48
Wife is primarily home maker (=1)								
Mean	.58	.46	.16	.66	.64	.74	.23	.07
Standard deviation	.50	.50	.37	.48	.48	.44	.42	.26
Wife needs permission to buy dress/sari (=1)								
Mean	.42	.47	.68	.59	.88	.89	.42	.21
Standard deviation	.50	.50	.47	.49	.33	.31	.50	.41
Wife primarily decides on spending household income (=1)								
Mean	.11	.07	.15	.03	.02	.02	.01	0
Standard deviation	.31	.25	.36	.18	.13	.13	.09	0
N (number of married couples)	120	120	120	120	120	120	120	125

Notes: The table is based on household survey data for the 965 married couples that were randomly assigned to treatments considered in this paper (see Table 2).

Table 2
Assignment to treatment, by site

	India North		South	Ethiopia Capital	North	South	Nigeria Northern (Muslim)	Northern (non-Muslim)	
	Urban Varanasi (VAR)	Rural Uttar Pradesh (UPR)	Rural Tamil Nadu (TAM)	Urban Addis Ababa (ADI)	Rural Mehal Meda (MHM)	Rural Hadiya (HAD)	Rural Hausa (HAU)	Rural Maguzawa (MAG)	All
N (number of married couples)	120	120	120	120	120	120	120	125	965
By game version:									
Base	40	40	40	40	40	40	40	45	325
"female control"	40	40	40	40	40	40	40	40	320
"male control"	40	40	40	40	40	40	40	40	320

Table 3
Mean values of variables capturing game behaviour and expectations, by site (Std. Dev. in parentheses)

	India North		South	Ethiopia Capital	North	South	Nigeria Northern (Muslim)	Northern (non-Muslim)	
	Urban Varanasi (VAR)	Rural Uttar Pradesh (UPR)	Rural Tamil Nadu (TAM)	Urban Addis Ababa (ADI)	Rural Mehal Meda (MHM)	Rural Hadiya (HAD)	Rural Hausa (HAU)	Rural Maguzawa (MAG)	All
Female contributions (fraction of endowments)	.64 (.31)	.52 (.24)	.47 (.20)	.58 (.25)	.44 (.26)	.56 (.28)	.47 (.21)	.50 (.25)	.52 (.26)
Male contributions (fraction of endowments)	.63 (.27)	.63 (.28)	.55 (.20)	.59 (.27)	.56 (.27)	.61 (.21)	.48 (.27)	.44 (.21)	.56 (.26)
Female + male contributions (fraction of endowments)	.64 (.22)	.57 (.19)	.51 (.14)	.59 (.21)	.50 (.20)	.58 (.21)	.48 (.18)	.47 (.15)	.54 (.20)
Wife expectations of husband withholding (fraction of endowments)	.39 (.28)	.50 (.25)	.51 (.22)	.48 (.21)	.56 (.22)	.60 (.23)	.51 (.18)	.50 (.18)	.50 (.23)
Husband expectations of wife withholding (fraction of endowments)	.48 (.27)	.46 (.26)	.42 (.19)	.45 (.25)	.49 (.25)	.47 (.18)	.49 (.18)	.53 (.17)	.47 (.23)
N (number of married couples)	120	120	120	120	120	120	120	125	965

Notes. Expectations of spouse withholding endowment were elicited for the maximum possible endowment. Allocation to self in the "female control" and "male control" treatment, respectively, was elicited using a strategy method: for each possible contribution a spouse could have made, the person in charge of allocation was asked how they wanted to divide the common pot. The figures reported are average allocations across each possible contribution a spouse could have made.

Table 4
"Female control" treatment and contributions to the common pot (percentage of endowments)

Site	Description	Base	Treatment	t-statistic	P-value	z-statistic	P-value
India	*Wife mean contributions*						
Varanasi (VAR)	Urban, North	73.1	53.1	3.142	.002	3.031	.002
Uttar Pradesh (UPR)	Rural, North	49.4	53.8	-.864	.391	-.793	.428
Tamil Nadu (TAM)	Rural, South	50.0	45.6	.961	.340	1.038	.299
Ethiopia							
Addis Ababa (ADI)	Capital city	58.8	56.9	.399	.691	.058	.953
Mehal Meda (MHM)	Rural, northern	53.8	34.4	3.500	.001	3.510	.000
Hadiya (HAD)	Rural, southern	64.4	49.4	2.671	.009	2.666	.008
Nigeria							
Hausa (HAU)	Rural, northern	43.1	53.1	-2.001	.049	-1.779	.075
Maguzawa (MAG)	Pre-Muslim Hausa	50.0	48.1	.368	.714	-.394	.693
India	*Husband mean contributions*						
Varanasi (VAR)	Urban, North	73.1	54.4	3.260	.002	3.090	.002
Uttar Pradesh (UPR)	Rural, North	68.1	60.6	1.186	.239	1.387	.165
Tamil Nadu (TAM)	Rural, South	58.1	51.3	1.497	.139	1.208	.227
Ethiopia							
Addis Ababa (ADI)	Capital city	59.4	55.6	.653	.516	.867	.386
Mehal Meda (MHM)	Rural, northern	58.8	57.5	.216	.830	.392	.695
Hadiya (HAD)	Rural, southern	66.3	53.8	2.970	.004	2.420	.016
Nigeria							
Hausa (HAU)	Rural, northern	48.8	40.0	1.591	.116	1.297	.195
Maguzawa (MAG)	Pre-Muslim Hausa	41.1	49.4	-2.069	.042	-1.805	.071
India	*Wife + husband mean contributions*						
Varanasi (VAR)	Urban, North	73.1	53.8	4.313	.000	3.872	.000
Uttar Pradesh (UPR)	Rural, North	58.8	57.2	.393	.696	.453	.651
Tamil Nadu (TAM)	Rural, South	54.1	48.4	1.842	.069	1.803	.071
Ethiopia							
Addis Ababa (ADI)	Capital city	59.1	56.3	.666	.507	.450	.653
Mehal Meda (MHM)	Rural, northern	56.3	45.9	2.727	.008	2.719	.007
Hadiya (HAD)	Rural, southern	65.3	51.6	3.319	.001	3.063	.002
Nigeria							
Hausa (HAU)	Rural, northern	45.9	46.6	-.150	.881	-.049	.961
Maguzawa (MAG)	Pre-Muslim Hausa	45.6	48.8	-1.072	.287	-1.445	.148

Notes: *P*-values and test statistics for a two-sided two-sample *t*-test and two-sample Wilcoxon rank-sum (Mann-Whitney) test of the null hypothesis that for a particular site mean contributions to the common pot are equal in the base version and the "female control" treatment of the PGG.

Table 5
"Male control" treatment and contributions to the common pot (percentage of endowments)

Site	Description	Base	Treatment	t-statistic	P-value	z-statistic	P-value
India	*Wife mean contributions*						
Varanasi (VAR)	Urban, North	73.1	65.6	1.119	.267	.921	.357
Uttar Pradesh (UPR)	Rural, North	49.4	51.9	-.442	.660	-.166	.868
Tamil Nadu (TAM)	Rural, South	50.0	44.4	1.297	.199	1.163	.245
Ethiopia							
Addis Ababa (ADI)	Capital city	58.8	59.4	-.100	.921	.005	.996
Mehal Meda (MHM)	Rural, northern	53.8	43.1	1.842	.069	2.112	.035
Hadiya (HAD)	Rural, southern	64.4	53.8	1.639	.105	1.518	.129
Nigeria							
Hausa (HAU)	Rural, northern	43.1	44.4	-.309	.758	-.269	.788
Maguzawa (MAG)	Pre-Muslim Hausa	50.0	51.3	-.211	.834	-.623	.534
India	*Husband mean contributions*						
Varanasi (VAR)	Urban, North	73.1	62.5	1.782	.079	1.696	.090
Uttar Pradesh (UPR)	Rural, North	68.1	60.6	1.152	.253	1.330	.184
Tamil Nadu (TAM)	Rural, South	58.1	55.6	.597	.552	.459	.646
Ethiopia							
Addis Ababa (ADI)	Capital city	59.4	63.1	-.634	.528	-.359	.720
Mehal Meda (MHM)	Rural, northern	58.8	53.1	.891	.376	.958	.338
Hadiya (HAD)	Rural, southern	66.3	63.1	.603	.548	.502	.615
Nigeria							
Hausa (HAU)	Rural, northern	48.8	56.3	-1.239	.219	-1.468	.142
Maguzawa (MAG)	Pre-Muslim Hausa	41.1	42.5	-.295	.769	.665	.506
India	*Wife + husband mean contributions*						
Varanasi (VAR)	Urban, North	73.1	64.1	1.933	.057	1.763	.078
Uttar Pradesh (UPR)	Rural, North	58.8	56.3	.545	.588	.759	.448
Tamil Nadu (TAM)	Rural, South	54.1	50.0	1.362	.177	1.321	.187
Ethiopia							
Addis Ababa (ADI)	Capital city	59.1	61.3	-.431	.668	-.005	.996
Mehal Meda (MHM)	Rural, northern	56.3	48.1	1.751	.084	2.276	.023
Hadiya (HAD)	Rural, southern	65.3	58.4	1.386	.170	1.560	.118
Nigeria							
Hausa (HAU)	Rural, northern	45.9	50.3	-1.145	.256	-1.241	.215
Maguzawa (MAG)	Pre-Muslim Hausa	45.6	46.9	-.362	.718	-.555	.579

Notes: *P*-values and test statistics for a two-sided two-sample *t*-test and two-sample Wilcoxon rank-sum (Mann-Whitney) test of the null hypothesis that for a particular site mean contributions to the common pot are equal in the base version and the "female control" treatment of the PGG.

Table 6
Regression analysis of spouses' contribution behaviour (tobit model)

	Contribution of wife (fraction of endowment)	Contribution of husband (fraction of endowment)
Varanasi (VAR)	.2920***	.2283***
	(.0855)	(.0842)
Uttar Pradesh (UPR)	.0390	.1414
	(.0654)	(.1194)
Tamil Nadu (TAM)	.1025*	.0187
	(.0546)	(.0821)
Addis Ababa (ADI)	.1502**	.0295
	(.0624)	(.0843)
Mehal Meda (MHM)	.1743**	.1093
	(.0808)	(.1031)
Hadiya (HAD)	.2603**	.1485
	(.1224)	(.0932)
Hausa (HAU) (omitted)		
Maguzawa (MAG)	.1729	-.1023
	(.1417)	(.0710)
VAR x "female control" (FC)	-.2203***	-.2312***
	(.0798)	(.0458)
UPR x FC	.0950	-.0370
	(.0726)	(.0965)
TAM x FC	-.0765	-.0853
	(.0572)	(.0746)
ADI x FC	-.0345	-.0323
	(.0593)	(.0609)
MHM x FC	-.2420***	-.0190
	(.0867)	(.0828)
HAD x FC	-.1296	-.1267**
	(.1268)	(.0524)
HAU x FC	.0971**	-.1341*
	(.0439)	(.0656)
MAG x FC	-.1084	.0560
	(.1340)	(.0557)
VAR x "male control" (MC)	-.0457	-.0974
	(.1505)	(.1060)
UPR x MC	-.0808	.0038
	(.0666)	(.1344)
TAM x MC	-.0900***	-.0089
	(.0204)	(.0336)
ADI x MC	-.0556	.0578
	(.0656)	(.0675)
MHM x MC	-.1372	-.1053
	(.1069)	(.1046)
HAD x MC	-.0953	-.0391
	(.2067)	(.0777)
HAU x MC	.0756	-.0231
	(.0629)	(.0963)
MAG x MC	-.1173	.0513
	(.1247)	(.0564)
Female age in years	.0023	-.0021
	(.0018)	(.0016)
Male age in years	-.0026*	.0016
	(.0014)	(.0013)
Female education in years	-.0007	.0053

	Contribution of wife (fraction of endowment)	Contribution of husband (fraction of endowment)
	(.0034)	(.0035)
Male education in years	.0032	.0070**
	(.0027)	(.0032)
Arranged marriage (=1)	-.0194	-.0020
	(.0294)	(.0336)
Times married (husband, #)	-.0025	-.0007
	(.0160)	(.0184)
Wife is primarily home maker (=1)	.0055	-.0057
	(.0256)	(.0203)
Wife needs permission to buy dress/sari (=1)	.0008	.0166
	(.0209)	(.0233)
Wife primarily decides on spending household income (=1)	.0306	.0580*
	(.0395)	(.0348)
Wife expectations of husband withholding (fraction of endowments)	-.3350***	-.0173
	(.0558)	(.0479)
Husband expectations of wife withholding (fraction of endowments)	-.1072*	-.4045***
	(.0633)	(.0720)
Constant	.6648***	.6709***
	(.0834)	(.0857)
Pseudo R-squared	.2458	.2881
N	847	847

Notes: Censored regression analysis (tobit model). Standard errors are in parentheses and are robust and clustered at the session level. *** indicates significant at the 1%, ** at the 5% and * at the 10% level. The lower N than all participating couples reflect missing values for some of the control variables.
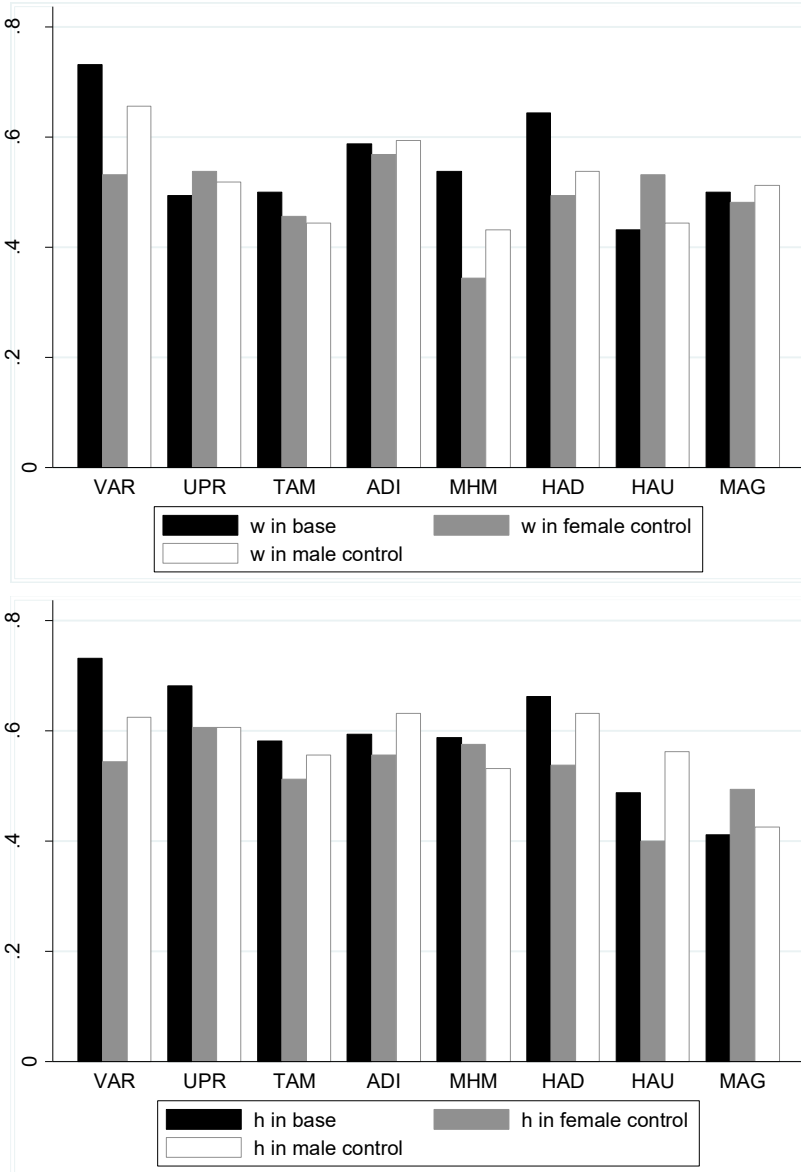
Fig. 1. Control and mean contributions to the common pot by site (w-wife; h-husband)

ONLINE APPENDIX

This online appendix contains a sample experimental script.

Experimental Instructions[1]

[STEP 1: General introduction]

Welcome. Thank you for taking the time to come today. [Introduce EXPERIMENTERS and the assistants.] You can ask any of us questions during today's programme. We have invited you here because we want to learn about how married couples in this area take decisions. All of you are going to be asked to do a task for money. We will then ask each of you what you want to do with the money you earn. Whatever money you gain today will be yours to keep. You will be asked very simple questions. Questions that do not have a correct answer, they are just about the way you think. For example, what is your favourite colour [ask someone in the room]? We cannot say that this answer is right or wrong. It is just your opinion and it can be different from the opinion of others in this room. However it is important to think seriously about your answers because they will affect how much money you will take home.

What you need to do will be explained fully in a few minutes. But first we want to make a few things clear. First of all, this is not our money. We belong to a research organization, and this money has been given to us for research. Secondly, this is a study about how *you* make decisions. Therefore you should not talk with others. This is very important. Please be sure to obey this rule because it is possible for one person to spoil the activity for everyone. I'm afraid that if we find you talking with others, we will have to send you home, and you will not be able to earn any money here today. Of course, if you have questions, you can ask one of us. Thirdly, the study has two parts: today's exercise is one, but we will also visit you in your homes in the coming weeks to ask both the husband and the wife a

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[1] These are for the treatment *female control* in Ethiopia. The instructions for other treatments and other countries are identical apart from fairly obvious modifications.

number of questions. Finally, make sure that you listen carefully to us. You will be able to make a good amount of money here today, and it is important that the instructions are clear for you so that you can follow them.

[Instructions for wives][2]

[STEP 2: Wives in a separate room – "Treatment Instructions" - To be read to ALL wives at the same time]

In a moment I will give you an envelope containing money. The exact amount will vary between people, but you will receive something between Birr 0 and Birr 40. [Show the envelope.] Your husband will receive a similar envelope and he will also receive an amount of money between Birr 0 and Birr 40. He doesn't know how much you have in your envelope and you won't be told how much he has in his envelope.

You have to decide how much money to take out of the envelope and how much to leave in. Any money you take out of the envelope is yours to keep. Your husband will be making the same decision with his envelope. You can only take nothing, Birr 10, Birr 20, Birr 30 or Birr 40 out of the envelope. Other amounts are not allowed. So please remember: you can only take nothing, Birr 10, Birr 20, Birr 30 or Birr 40 out.

After you have made your decision and your husband has made his decision we will bring you together again. We will put all the money that you and your husband have left in your envelopes into one envelope. We call it, the common envelope. To whatever is in the common envelope we will add another half again. So, if there are Birr 20 in the common envelope we will add another Birr 10 to make the total Birr 30. If there are Birr 80 in the common envelope we will add another Birr 40 to make a total of Birr 120 and so on.

Both of you will know the total amount of money in the common envelope.

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[2] Instructions for husbands appear later in the document.

After that you will decide how to split the money in the common envelope. You have to decide how much to give to your husband and how much to keep for yourself.

In a moment we will give you some time to think about how much money you want to leave in your envelope. After you have made your decision, we will ask you some questions about how you want to divide the money in the common envelope between yourself and your husband.

[STEP 3: To be read to EACH wife INDIVIDUALLY – "Control Questions"]

Let me ask some questions to check whether you understood the instructions.
1. If you have Birr 40 in your envelope and you take out Birr 20 how much will be left in the envelope? [record the answer, correct participant if necessary]
2. If you put Birr 20 into the common envelope and your husband puts in Birr 20 how much will there be in total (before we add anything)?
3. How much we will add if there is Birr 40 in the common envelope?
4. How much will you receive if there is Birr 60 in the common envelope?

[Record each answer, correct participant if necessary][3]

[STEP 4: To be read to EACH wife INDIVIDUALLY – "Making the decision 1" - Once the experimenter is sure that the participant has understood the activity, give HER THE ENVELOPE AND some time to make her decision IN PRIVATE. Don't forget to write down the decision in the data entry sheet.]

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[3] [Responses to common questions: THE FOLLOWING QUESTIONS ARE TO BE USED ONLY IN CASE PEOPLE ASK.]
1. If you are asked whether the husband and wife will have the same amounts in their envelopes, answer: possibly, possibly not.
2. If you are asked what 'what should I do', you should say that it is 'your decision and I am not allowed to offer advice'
3. If you are asked precise arithmetical questions then answer them precisely. E.g if I put in Birr 40 and my husband puts in nothing how much will you add to the total?' Answer: Birr 20.

[STEP 5: To be read to EACH wife INDIVIDUALLY – Once the participant has taken the decision, continue reading the instructions]

[Continuation of instructions for wives]

You have left Birr [Y] in the envelope. In a few minutes we will put the money into one envelope, the common envelope.

[For the questions which follow, read off the amounts from these tables.

Amount added to common pool					
Y↓	Husband→ 0	10	20	30	40
0	0	5	10	15	20
10	5	10	15	20	25
20	10	15	20	25	30
30	15	20	25	30	35
40	20	25	30	35	40

Total amount in the common pool					
Y↓	Husband→ 0	10	20	30	40
0	0	15	30	45	60
10	15	30	45	60	75
20	30	45	60	75	90
30	45	60	75	90	105
40	60	75	90	105	120

1. Remember: if your husband put no Birr into the envelope, we add Birr [0.5Y] to the Birr [Y] that are already in the common envelope. There will then be Birr [1.5Y] in the common envelope.

2. If your husband put Birr 10 into the envelope, we add Birr [read off first table] to the Birr [10 +Y] that are already in the common envelope. There will then be Birr [read off second table] in the common envelope.

3. If your husband put Birr 20 into the envelope, we add Birr [read off first table] to the Birr [Y+ 20] that are already in the common envelope. There will then be Birr [read off second table] in the common envelope.

4. If your husband put Birr 30 into the envelope, we add Birr [read off first table] to the Birr [Y+30] that are already in the common envelope. There will then be Birr [read off second table] in the common envelope.

5. If your husband put Birr 40 into the envelope, we add Birr [read off first table] to the Birr [Y+40] that are already in the common envelope. There will then be Birr [read off second table] in the common envelope.

[STEP 6: To be read to EACH wife INDIVIDUALLY –"Making the decision 2"]

You now have to decide how to split the money for each of these possibilities. You cannot change your mind later on.

1. If your husband put Birr 0 into the envelope, so that there is Birr [read off second table] in the common envelope, how do you want to split the money? How much for you [write down]; and how much for your husband [Write down & check sums]?

2. If your husband put Birr 10 into the envelope, so that there is Birr [read off second table] in the common envelope, how do you want to split the money? How much for you [write down]; and how much for your husband [Write down & check sums]?

3. If your husband put Birr 20 into the envelope, so that there is Birr [read off second table] in the common envelope, how do you want to split the money? How much for you [write down]; and how much for your husband [Write down & check sums]?

4. If your husband put Birr 30 into the envelope, so that there is Birr [read off second table] in the common envelope, how do you want to split the money? How much for you [write down]; and how much for your husband [Write down & check sums]?

5. If your husband put Birr 40 into the envelope, so that there is Birr [read off second table] in the common envelope, how do you want to split the money? How much for you [write down]; and how much for your husband [Write down & check sums]?

Is there any answer that you would like to change?

[Review and change as is necessary]

[STEP 7: To be read to EACH wife INDIVIDUALLY – Once the participant has taken the decision, conduct post-experiment questionnaire]

1. If your husband had Birr 40 in his envelope, how much do you think he would take out?

Thank you. We will now rejoin you and your husband and put the money from your two envelopes into the common envelope.

[Bring husband and wife together & resolve the game.]

[Experimenter looks up the allocation decision and executes it. Subjects are given their money and thanked]

[Instructions for husbands]

[STEP 2: Husbands in a separate room – "Treatment Instructions" - To be read to ALL husbands at the same time]

In a moment I will give you an envelope containing money. The exact amount will vary between people, but you will receive something between Birr 0 and Birr 40. [Show the envelope.] Your wife will receive a similar envelope and she will also receive an amount of money between Birr 0 and Birr 40. She doesn't know how much you have in your envelope and you won't be told how much she has in her envelope.

You have to decide how much money to take out of the envelope and how much to leave in. Any money you take out of the envelope is yours to keep. Your wife will be making the same decision with her envelope. You can only take nothing, Birr 10, Birr 20, Birr 30 or Birr 40 out of the envelope. Other amounts are not allowed. So please remember: you can only take nothing, Birr 10, Birr 20, Birr 30 or Birr 40 out.

After you have made your decision and your wife has made her decision we will bring you together again. We will put all the money that you and your wife have left in your envelopes into one envelope. We call it, the common envelope. To whatever is in the common envelope we will add another half again. So, if there are Birr 20 in the common envelope we will add another Birr 10 to make the total Birr 30. If there are Birr 80 in the common envelope we will add another Birr 40 to make a total of Birr 120 and so on.

Both of you will know the total amount of money in the common envelope.

After that your wife will decide how to split the money in the common envelope. She has to decide how much to give to you and how much to keep for herself. In a moment we will give you some time to think about how much money you want to leave in your envelope.

[STEP 3: To be read to EACH husband INDIVIDUALLY – "Control Questions"]

Let me ask some questions to check whether you understood the instructions.
1. If you have Birr 40 in your envelope and you take out Birr 20 how much will be left in the envelope? [record the answer, correct participant if necessary]
2. If you put Birr 20 into the common envelope and your wife puts in Birr 20 how much will there be in total (before we add anything)?
3. How much we will add if there is Birr 40 in the common envelope?

[Record each answer, correct participant if necessary][4]

[STEP 4: To be read to EACH husband INDIVIDUALLY – "Decision Making" - Once the experimenter is sure that the participant has understood the activity, GIVE HIM THE ENVELOPE AND some time to make his decision IN PRIVATE. Don't forget to write down the decision in the data entry sheet.]

[STEP 5: To be read to EACH husband INDIVIDUALLY – Once the participant has taken the decision, conduct post-experiment questionnaire]

1. If your wife had Birr 40 in her envelope, how much do you think she would take out?

Thank you. We will now rejoin your wife and put the money from your two envelopes into the common envelope.

[Resolution and payment as per above.]

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[4] [Responses to common questions: THE FOLLOWING QUESTIONS ARE TO BE USED ONLY IN CASE PEOPLE ASK.]
1. If you are asked whether the husband and wife will have the same amounts in their envelopes, answer: possibly, possibly not.
2. If you are asked what 'what should I do', you should say that it is 'your decision and I am not allowed to offer advice'
3. If you are asked precise arithmetical questions then answer them precisely. E.g if I put in Birr 40 and my wife puts in nothing how much will you add to the total?' Answer: Birr 20.