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Spousal Control and Efficiency of Intra-Household Decision Making: Experiments among Married Couples in India, Ethiopia and Nigeria[1]

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ABSTRACT

We examine whether the nature of gender relations matters for the effects on household efficiency of exogenous variation in spousal control over the intra-household allocation of resources. Experiments testing for efficiency were conducted among married couples in eight sites representing a range of conjugal cultures: from an extreme form of separate spheres in northern Nigeria to (male) centralised control in North India, along with a variety of intermediate cases. Inefficiency is widespread, varies greatly and tends to be lower when wives control the allocation. The exception is a site in northern Nigeria where female control over resources is well established.

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

JEL Classification: D13, J12, J16, O15

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1. Introduction

A central question in economics is whether households are efficient in their resource allocation decisions.[2] In unitary and collective models of the household, efficiency is a model outcome or assumption, whereas in some cooperative bargaining models and all non-cooperative models, efficiency is not guaranteed.[3] In these models, when household members have divergent preferences, coordination failures may result in inefficiency.[4] The desire to exert individual control over the intra-household allocation of resources is thus a potentially important determinant of its inefficiency. In this study, we investigate what happens to the efficiency of intra-household resource allocation in response to exogenous variation of control over that allocation, using lab-in-the-field experiments.

We selected eight sites in three countries to represent typical gender relations: from unified households in North India to households in northern Nigeria resembling households in non-cooperative models, along with a variety of intermediate cases. For selecting these sites, we made extensive use of ethnographies that document a region's conjugality, i.e. typical salient features of spousal relations.

In each of the eight sites purposively selected on conjugality, we conducted identical variants of a public goods game, using a voluntary contribution mechanism. Husbands and wives would each choose to divide an individual endowment between a private account and a joint account – the common pot. Money deposited in the common pot earned 50 per cent interest, so is akin to contributing to a household public good. Any money deposited in the private account represents allocative (Kaldor-Hicks) inefficiency: the interest that could have been earned and made both spouses better off is forfeited.

We then manipulated the control of resources by making either the husband or the wife in charge of the allocation of the common pot. In addition to the base version of the public goods game, we thus have two treatments, which we implemented in a between-subject design. The questions that this design enables us to answer are (a) does the

[2] Throughout the paper, we mean by efficiency 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, it leads to *conceivable* Pareto improvements.

[3] See for instance the survey of this literature in Apps and Rees, 2009.

[4] Possible inefficiency results from individual utility maximisation subject to individual budget constraints in non-cooperative models, and from the endogeneity of bargaining power as well as time inconsistency in cooperative models; see Section 2.1 for a brief account.

efficiency of intra-household resource allocation respond to which spouse controls the allocation, and (b) does the response vary across different local conjugal cultures?

In answering these questions, we fill a gap in the literature. Much of the evidence for the claim that spousal control is a determinant of inefficiency is for West African farm households, in which husbands and wives pursue separate economic activities and seem to fail to take mutually beneficial resource allocation decisions (Jones, 1983; Udry, 1996; Akresh, 2008) or insure each other completely (Duflo and Udry, 2004). The studies cited are based on surveys collecting naturally occurring data. A limitation of most evidence based on naturally occurring data is that it may suffer from omitted variables bias. Such bias is exceedingly difficult to avoid however carefully plot characteristics and other potential confounds are controlled for. For example, the often cited study by Udry (1996) for Burkina Faso did not control for fallow duration, which is very important in the farming systems in that country and the omission of which in the analysis could drive the reported result of apparent inefficiency (cf. Goldstein and Udry, 2008).[5]

We used lab-in-the-field experiments in which spousal control over the allocation of resources is exogenously altered, which side-steps the problem of omitted variables bias. We thus contribute to the burgeoning literature that uses lab-in-the-field experiments to investigate the efficiency of married couples' resource allocation decisions. Some studies have simply investigated whether or not such decisions *are* efficient, without implementing treatments designed to identify sources of inefficiency. Castilla (2015), using a trust game among married couples in India, finds that on average only 57 per cent of endowments are sent, with 97 per cent of married couples failing to reach the socially efficient outcome. Cochard et al. (2015), in a sample of married and co-habiting couples from France, find in a prisoner's dilemma game that one in four couples do not achieve the mutually beneficial resource allocation.

Other experimental studies have looked at sources of inefficiency using treatments. One source of inefficiency considered in these studies is asymmetric information. Mani (2011) among married couples in India finds widespread inefficiency when spouses

[5] When omitted variables bias is ruled out, in a natural field experiment in Mexico in which women's income was varied randomly as part of an evaluation of the PROGRESA programme, the evidence favours the interpretation that husbands and wives are efficient in their resource allocation decisions (Bobonis, 2009; Attanasio and Lechene, 2014). Clearly, Mexico is not in West Africa and a natural field experiment not always feasible in a site that is of research interest.

choose between investment options in which personal control is obtained at the expense of household income; however, when she experimentally manipulates access to information about spousal choices, this does not affect efficiency. In another experimental study that manipulates access to information, Hoel (2015) in a sample of married couples from Kenya finds a heterogeneous response to spouses observing each other's choices. In a dictator game in which tokens are worth 20 Kenyan shillings if kept and 30 if donated to one's spouse, about half of subjects are not affected by whether or not their decisions are made in secret, whereas 36 per cent give less in secret and 14 per cent give more. Munro et al. (2014) among married couples in India find in a public goods game that when endowments are public knowledge, female contributions but not male contributions are higher compared to a variant of the game in which endowments are known by the individual spouse alone.[6]

The main other source of inefficiency considered in experimental studies among married couples is spousal control.[7] One influential study strongly suggests that spousal control matters for the efficiency of intra-household allocation of resources but does not causally establish it (as that was not the study's primary aim). Ashraf (2009) among clients of a rural bank in the Philippines and their spouses offered experimental subjects the choice between depositing an endowment in an account (either a private account or a joint/the spouse's account) and consuming the money (received as a gift certificate or cash). In an auxiliary treatment, she finds that 21 per cent of subjects sacrifice cash in order to ensure that it went to an account of their choosing. The motive of gaining control over the cash is plausible, but was not experimentally investigated.

Other experimental studies have directly investigated spousal control as a source of inefficiency. Each of these have used a public goods game with a voluntary contribution mechanism, in which spousal control is altered experimentally in a between-subject design. Iversen et al. (2011) among married couples in Uganda finds that both male and female contributions (and thus efficiency) go up when wives control the allocation of the

[6] In experimentally manipulated exogenous shocks to spouses' income among married couples in Ghana, Castilla and Walker (2013) find that the visibility of these shocks affects their use: public shocks translate into more household expenditures, whereas private shocks into more in-kind gifts (husbands) and savings (wives). As they acknowledge, they cannot be certain that this is evidence of inefficiency.

[7] Other sources of inefficiency looked at in lab-in-the-field studies among married couples are whether private resources are worked for, so earned rather than simply received (Munro et al., 2014), and whether budgets are separate or single (Lopez et al., 2015).

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.

Our contribution to the literature is to examine the effect of spousal control on efficiency systematically across a range of purposively selected local conjugal cultures. We have no variation across our eight sites in experimental design and implementation, randomly assign couples to treatment in each site (we control for inadvertent selection too), and using survey data, we corroborate our motives for site selection. Differences in treatment effects across sites should thus be due to differences in spousal relations across sites.

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.

Wives controlling the allocation of the common pot has a large number of robust treatment effects. It lowers female contributions in two sites, raises female contributions in one site, lowers male contributions in two sites, and lowers efficiency (male plus female contributions) in four sites. By contrast, husbands controlling the allocation of the common pot has no robust treatment effects: not on female contributions, not on male contributions, and not on efficiency. This contrast between many, generally negative effects of wives' control of the allocation on male and female contributions on the one hand, and no such effects of husbands' control on the other hand is 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. For that reason, giving wives such control in the experiments may be unsettling, for both spouses, which causes them to lower their contributions. Indeed, in the one site where giving wives control of the allocation *raises* female contributions (among the Hausa in northern Nigeria), female

control over resources is well-established in daily life: women are from their homesteads very active, financially independent traders (see Section 3.1).

In regression analysis we find that expectations of spousal contributions are an important determinant of own contributions. We also find that in the (relatively rare cases) when wives control household finances in real life, husband contributions to the common pot in the experiments go up. The last-mentioned finding provides an interesting contrast with Ashraf (2009)'s findings for the Philippines, which we discuss in the paper in terms of the markedly lower responsibility for financial management that women have in our sites compared to the Philippines.

We see as our main finding that existing spousal relations interact with effects on household efficiency of altering spousal control over the intra-household allocation of resources. The implication for policy that we take from the contrasting treatment effects we find is that attempts to influence wives' control over intra-household resource allocation may be unsettling and may therefore – in the cases of friction with existing norms – cause spouses to reduce their contributions to the household (become more private and less joint) at least until new norms are properly established. In theoretical terms, such interventions may increase the likelihood of an inefficient separate spheres equilibrium, as opposed to the efficient income pooling one (cf. Lechene and Preston, 2011).

The paper proceeds as follows. In Section 2, we present theoretical considerations, our experimental design and the framework for the analysis. In Section 3, we motivate site selection in terms of the ethnographic record and describe the fieldwork implementation. In Section 4 subject characteristics are presented, followed by information on assignment to treatment and balancing tests, and an analysis of behaviour in the games first without and then conditioning on socio-economic characteristics. In Section 5 we summarise our findings, compare them with the related literature, and spell out implications for theory and policy. Section 6 contains a brief conclusion.

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. 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. 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, 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 and suggesting future developments of theory, in particular for non-cooperative models of the household and cooperative bargaining models that allow for inefficiency. We reflect on implications for theory in Section 5.3.

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. First, decision-making took place in private. Husbands and wives were escorted to separate rooms, and communicated their decisions orally to one of the research assistants, who recorded it for them.[8]

Second, 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).

Third, 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.[9]

Fourth, and as detailed in Section 3.1, we selected eight sites purposively on conjugality. Within each site, couples were randomly assigned to treatment, but the sites themselves are thought of as further treatments: they are observable dimensions of

[8] Since literacy levels are low in many of the sites (cf. Table 2) we could not ask subjects to write down their decisions.

[9] All scripts are available from the authors.

subject heterogeneity that we interacted *ex ante* with game manipulations (cf. List et al., 2011, pp. 443 ff.).

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

Sixth, married couples were randomly assigned to treatments. Moreover, each treatment was played in every session, and each couple participated in one treatment 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 $S_j, j = 0,1, \dots, 7$. 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 treatment dummies T_k, including base version T_0, 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*, conditioned on observed subject/couple characteristics X^c. The null hypothesis that treatment effects conditioned on X^c 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 $\overline{\alpha} \mid T_k = \overline{\alpha} \mid S_j = 0$. In the estimation, we cluster standard errors by session and correct for heteroscedasticity.

3. Site selection and fieldwork implementation

We next motivate site selection in terms of the ethnographic record and outline how the fieldwork was implemented.

3.1 Encouraging variation in conjugality through purposive site selection

For the purpose of this study, we needed adequate variation in conjugality and we have tried to achieve this by selecting sites that have divergent marital norms and practices in respects that are relevant for us. Specifically, we have purposively selected sites that according to ethnographic literature could be taken to resemble various economic models of the household. In unitary models of the household, 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, 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; Callaway, 1987; Pittin, 2002).

In between the extremes of unitary and non-cooperative models, there are cooperative bargaining models. 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 (Sopher, 1980; Miller, 1981; Dyson and Moore, 1983; Jejeebhoy, 2001; Jejeebhoy and Sathar, 2001; Agnihotri et al., 2002) 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, 1969, 1972; Jackson, 1978; Schildkrout, 1982; Callaway, 1987; 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 Kebede et al (2014), Munro et (2010), (2014). 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).

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 conditioning on socio-economic characteristics (Section 4.5).

4.1 Subject characteristics

TABLE 1 ABOUT HERE

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 home makers (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 home makers, whereas across the Nigerian sites, this figure ranges from 7 to 23 per cent. In North India, 46 per cent of wives are home makers 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 and balancing tests

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.[10] Table 2 shows the distribution of the 965 married couples across the treatments and sites.

TABLE 2 ABOUT HERE

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. Nonetheless, inadvertent selection due to chance remains a possibility, which may bias the measurement of treatment effects. We investigated this in two ways (see Table 3). First, for each site we compare observed subject characteristics between the couples in the treatments considered here and the full sample in that site. We look at female age, female education, male age, and male education, all in years, and compare variable means using a two-sided *t*-test between the full site-specific sample and the sub-sample comprising the three treatments considered here. None of the four variables times eight sites equals thirty-two comparisons reported in Table 3 is statistically significant, suggesting no inadvertent selection has taken place at this level.

TABLE 3 ABOUT HERE

Second, for each of the three treatments separately, for each site, we conducted a logistic regression of assignment to treatment on male and female age and education. Table 3 reports for each of the 24 site/treatment-specific regressions the X^2 test statistic of the null hypothesis that all four coefficients are jointly equal to zero, and corresopnding *p*-values. Of the 24 test statistics only two are significant at the 10 per cent level, suggesting that inadvertent selection to treatment by site is at most a minor issue. To deal with it, we control for observed socio-economic characteristics when investigating treatment effects.

[10] 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.

4.3 Aggregate patterns of behaviour in the experimental games

Table 4 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 4, efficiency is highest in urban North India, lowest in our two West African sites, and in between these extremes in our other sites.

TABLE 4 ABOUT HERE

Before spouses' contributions were revealed to each other, we asked them how much they expected their spouse to contribute. Recall that we did not reveal to subjects the precise endowment their spouse had received, so we asked this question hypothetically: "Supposing your spouse has received X, how much do you think s/he will contribute to the common pot?" In practice, we mentioned here the actual amount received, which equates to the maximum amount in the range of amounts mentioned as possibilities; see Section 2.2 for our reasons.

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).

When it comes to distributing the common pot (after interest was added), wives in treatment "female control" allocate 53 per cent to themselves on average. This ranges from 44 per cent among the Maguzawa to 59 per cent in rural Uttar Pradesh, in North India. Husbands in treatment "male control" allocate 40 per cent to themselves on average. This ranges from 24 per cent in rural Tamil Nadu, in South India, to 49 per cent in Mehal Meda, in rural Ethiopia.

Although the apparent relative generosity of husbands is quite striking, 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.

FIGURE 1 ABOUT HERE

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. We address this question in Section 5 when comparing our findings with those of the related literature.

"Female control" treatment effects

We next turn to testing whether treatment effects are significant. In Table 5, 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.

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).

TABLE 5 ABOUT HERE

When controlling for socio-economic characteristics (Tables 7, A1 and A2), 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.

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 (Tables 7, A1 and A2) 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 6). 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 7). 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 6, and is no longer significant in

Table 7. The combined effect (male plus female contributions) is never consistently significant at the 5 per cent level either (Table 6). 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 7, the results of estimating Eq. (1) are reported, using tobit regressions. The results of using OLS and ordered probit are in Tables A1 and A2. 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.

We first comment on site dummies. All 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).

The performance of the treatment times site dummies has been commented on above, and has informed the results presented there.

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 (Tables A1 and A2). 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

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 PGG we obtain a measure of how "good" husbands and wives are at realising the potential joint surplus that their marriage embodies. For unrelated strangers, the individual income-maximising strategy in a PGG is to contribute nothing to the common pot.[11] By contrast, husbands and wives are in an on-going relationship. If they are confident that the appropriate redistributing mechanisms are in place in the "meta-game" of their on-going relationship, then there is no tension between the individually and jointly optimal strategy: they should both contribute everything. This remains the case in each of the treatments considered in this paper. Since forfeited opportunities to fully realise the joint surplus cannot be undone after the experiment (the 50 per cent the experimenters might have added to un-contributed endowment is permanently lost), their magnitude is a measure of Kaldor-Hicks allocative inefficiency and indicates inefficiencies in the on-going relationship of the married couple.

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. Within sites, couples are randomly assigned to treatments, so if a treatment has an effect on contributions to the common pot, then we may infer that aspects of their on-going relationship with their spouse cause subjects to revise their expectations of a private return under the influence of this particular game manipulation. If treatment effects are heterogeneous across sites, then this indicates a role of the local conjugal culture.

We next summarise our findings, compare them with the related literature, and spell out implications for theory and policy.

5.1 Summary of findings

[11] Peters et al. (2004) compare contributions to a public good, using a voluntary contribution mechanism, between groups containing family members only and groups containing unrelated strangers also; they do indeed find higher contributions in the former groups.

Our findings may be summarised as follows. First, using survey data, we found evidence broadly corroborating our motives for site selection. As expected, marriage of spouses' own volition and divorce are more frequent in our African than in our Indian sites. Also as expected, wives are more likely to be home makers in our East African than in our West African sites, and in our North Indian than in our South Indian sites. In line with expectations, wives in East Africa have lower autonomy in the domain of personal consumption decisions than those in West Africa; but the usually expected lower autonomy in North than in South India in personal consumption is not confirmed, in line with the very similar findings of Rahan and Rao (2004). Broadly speaking, site selection has encouraged variation in conjugality consistent with the ethnographic record summarised in Section 3.1: from a situation approaching unified household decision-making in North India to one approaching spouses maintaining completely separate economies among the Hausa in northern Nigeria, with the Ethiopian sites representing intermediate regimes (some distinctly joint, some distinctly separate resource allocation decisions), and the South Indian site and the Maguzawa in northern Nigeria representing toned-down versions of, respectively, the more starkly unified decision-making processes in North India and the separate spheres of control over resources found among the Hausa. Also important for positioning our findings in relation to previous literature (see below) is that female control over household finances is rare in all our sites, unlike the prevailing practice in many south-eastern Asian countries (Ashraf, 2009).

Second, 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.

Third, "female control" has a large number of robust treatment effects. It lowers female contributions in two sites (Varanasi and Mehal Meda), it raises female contributions in one site (among the Hausa), it lowers male contributions in two sites (Varanasi and Hadiya), and it lowers efficiency (male plus female contributions) in four sites (Varanasi, Mehal Meda, Hausa and Tamil Nadu). By contrast, "male control" has no

robust treatment effects: not on female contributions, not on male contributions, and not on efficiency.

Fourth, in regression analysis we find that the signs of the coefficients on site dummies are in line with motives for site selection; expectations of spousal contributions are an important determinant of own contributions; and when wives control household finances in real life, husband contributions to the common pot in the experiments go up. The last-mentioned finding provides an interesting contrast with Ashraf (2009)'s findings for the Philippines; we comment on it below.

5.2 Comparison with the directly related literature

In previous lab-in-the-field studies using married couples in which the exertion of individual spousal control is examined as a potential determinant of the inefficiency of the intra-household allocation of resources, 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, which suggests a role for the local context, as we will argue below. For giving husbands control over resources (called the "male control" treatment in our study), 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).[12] 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

[12] Ashraf (2009), in an auxiliary treatment, finds that 21 per cent of subjects sacrifice cash in order to ensure that their endowment goes to an account of their choosing. The mechanism for this efficiency loss is not causally established, but interpreted to be a desire for control.

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. 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 the one normally in charge may be unsettling when corresponding obligations and expectations of obligations are not (yet) established. 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).

Finally, a remarkable feature of our findings, similarly found by Iversen et al. (2011), Kebede et al. (2014), and Munro et al. (2014), is that spouses do not contribute their entire endowment to the common pot even when they themselves are in charge of allocating it, and thus would seem to be in a position to guarantee a positive return on their investment. This suggests that endowment (secretly) retained is regarded differently from money allocated to oneself from the common pot: perhaps the latter is thought of as more fungible than the former, in the sense that it may be more susceptible to spending adjustments by one's spouse in response to one's windfall income.

5.3 Main lessons for theory and policy

The most important insight for policy that we take from these contrasting treatment effects is that attempts to influence wives' control over intra-household resource allocation may be unsettling and may therefore – in the cases of friction with existing norms – cause spouses to reduce their contributions to the household (become more private and less joint) at least until new norms are properly established. For that reason, evidence from naturally occurring data that spouses' independent pursuit of separate

activities tends to be inefficient because the weaker spouse misses out on access to productive inputs (Udry, 1996; World Bank, 2011) should not be interpreted as meaning that successfully promoting the latter's access to such inputs will, on its own, make the household more efficient.

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). Modelling spouses' optimal response to a shift in the balance of power that results from such an intervention, or more generally from a change in extra-environmental parameters, should realistically allow for spouses who have lost power seeking to regain it, as well as spouses who have gained it seeking to hold onto it, through modifying their contributions to the household (cf. Basu, 2006).

6. Conclusion

Previous lab-in-the-field experiments that study the determinants of household efficiency, although implemented in a variety of conjugal cultures, do not systematically relate treatment effects to cultural variation. The sources of inefficiency that they point to may be limited to their particular cultural setting. Moreover, a fruitful comparison of their findings is hindered by differences in design and details of implementation, as well as by the fact that variation in conjugality is accidental, not built into the design.

We therefore purposively varied conjugality and implemented in identical fashion a consistent experimental design. This increases our confidence that any heterogeneity in treatment effects is due to differences in the local conjugal culture. We selected two sites in North India to represent unified households, and a site in South India with a somewhat greater degree of separation in economic activities between spouses than in North India. Three sites were selected in Ethiopia to represent a mixture of joint and separate activities akin to those in cooperative bargaining models, with a hoe economy site presenting less separation than the site with a plough economy. Finally, we selected two sites in northern Nigeria to represent separate spheres, again with less separation in one of the two sites because of some joint agriculture. Site selection thus ensured variation in conjugality.

We find that inefficiency is widespread and tends to be higher when separation between spouses is higher. Furthermore, we find that giving husbands control over the

allocation of resources has no robust treatment effects, whereas giving wives such control has a large number of robust treatment effects. In particular, both male and female contributions, and therefore household efficiency, tend to be lower when wives are given control over the allocation. However, among the Hausa in northern Nigeria, whose women in daily life are active, financially independent traders from their homesteads, female contributions go up when wives control the allocation in the experiment.

Policies that attempt to increase women's control over the intra-household allocation of resources should therefore not expect improvements in household efficiency as a matter of course. When such control is not yet well established, husbands and wives may reduce their contributions to the household.

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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
Balancing tests 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)
Female age, mean # years	39.0	43.2	40.6	36.6	33.7	36.4	25.0	29.4
	(.60)	(.30)	(.56)	(.39)	(.83)	(.36)	(.92)	(.44)
Male age, mean # years	43.5	47.4	47.8	42.2	42.4	44.8	37.1	38.9
	(.66)	(.39)	(.72)	(.13)	(.84)	(.32)	(.86)	(.58)
Female education, mean # years	4.2	3.2	4.5	7.4	2.8	3.8	3.5	3.7
	(.96)	(.69)	(.67)	(.38)	(.89)	(.71)	(.91)	(.75)
Male education, mean # years	6.8	7.6	5.2	9.4	4.11	5.6	5.1	5.4
	(.82)	(.34)	(.72)	(.44)	(.79)	(.30)	(.77)	(.96)
Tests for inadvertent selection in random assignment to treatment:								
Base								
χ^2test statistic	2.73	6.88	6.30	1.91	1.85	13.06	8.10	5.67
p-value	.60	.14	.10	.75	.76	.01	.09	.22
"female control"								
χ^2test statistic	4.68	5.97	4.29	1.27	7.23	7.77	3.22	.15
p-value	.32	.20	.37	.87	.12	.10	.52	.99
"male control"								
χ^2test statistic	4.48	3.35	6.96	1.80	5.92	5.08	1.75	5.17
p-value	.35	.50	.14	.77	.21	.28	.78	.27

Notes: Variable means by site are for the married couples that were randomly assigned to the game versions considered in the paper (see Table 2). Figures in parentheses are *p*-values for a two-sided *t*-test of variable means for subjects in these game versions being equal to variable means in the full site-specific sample. χ^2test statistics and *p*-values are reported for logistic regressions by site of assignment to treatment on male and female age and education.

Table 4
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)
Wife allocation to self (fraction of common pot)	.53 (.24)	.59 (.14)	.59 (.20)	.58 (.09)	.53 (.06)	.50 (.02)	.46 (.08)	.44 (.07)	.53 (.14)
Husband allocation to self (fraction of common pot)	.25 (.28)	.34 (.21)	.24 (.13)	.30 (.20)	.49 (.12)	.48 (.08)	.57 (.08)	.55 (.08)	.40 (.21)
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 5
"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 6
"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 7
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
	(.0034)	(.0035)
Male education in years	.0032	.0070**

	Contribution of wife (fraction of endowment)	Contribution of husband (fraction of endowment)
	(.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.

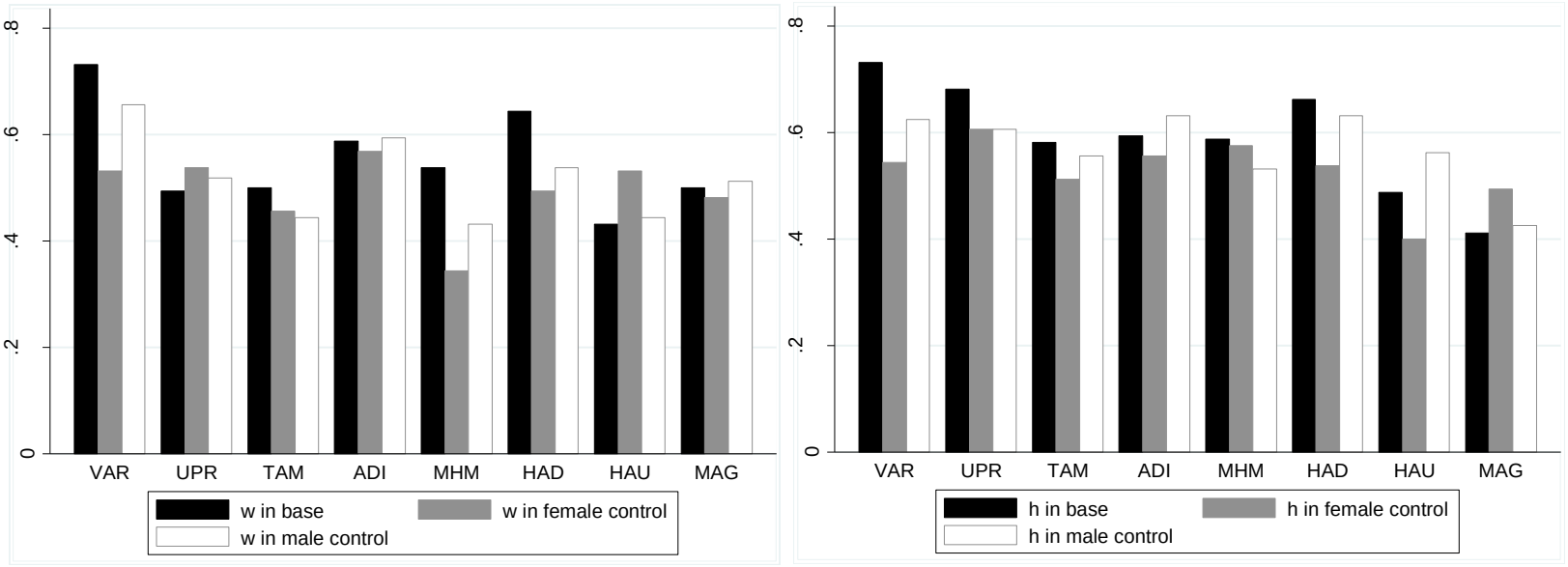

Fig. 1. Control and mean contributions to the common pot by site (w-wife; h-husband)

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

ONLINE APPENDIX

This online appendix contains a sample experimental script and Tables A1 and A2.

Experimental Instructions[13]

[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 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.

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

[Instructions for wives][14]

[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.

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.

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

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][15]

[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.]

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

[15] [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.

[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][16]

[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.]

[16] [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.

Table A1
Regression analysis of spouses' contribution behaviour (estimated using OLS)

	Contribution of wife (fraction of endowment)	Contribution of husband (fraction of endowment)
Varanasi (VAR)	.2537***	.1930***
	(.0669)	(.0728)
Uttar Pradesh (UPR)	.0457	.1263
	(.0563)	(.0987)
Tamil Nadu (TAM)	.1029**	.0405
	(.0475)	(.0761)
Addis Ababa (ADI)	.1339**	.0391
	(.0531)	(.0779)
Mehal Meda (MHM)	.1620**	.0982
	(.0733)	(.0904)
Hadiya (HAD)	.2271**	.1320
	(.1005)	(.0796)
Hausa (HAU) (omitted)		
Maguzawa (MAG)	.1396	-.0830
	(.1170)	(.0674)
VAR x "female control" (FC)	-.1821**	-.1964***
	(.0708)	(.0352)
UPR x FC	.0839	-.0223
	(.0677)	(.0753)
TAM x FC	-.0722	-.0769
	(.0575)	(.0741)
ADI x FC	-.0171	-.0397
	(.0474)	(.0557)
MHM x FC	-.2227***	-.0180
	(.0729)	(.0652)
HAD x FC	-.1140	-.0955**
	(.1044)	(.0373)
HAU x FC	.0861**	-.1032
	(.0356)	(.0620)
MAG x FC	-.0716	.0486
	(.1143)	(.0484)
VAR x "male control" (MC)	-.0553	-.0763
	(.1156)	(.0829)
UPR x MC	.0566	-.0044
	(.0650)	(.1011)
TAM x MC	-.0808***	-.0117
	(.0220)	(.0344)
ADI x MC	.0400	.0252
	(.0550)	(.0551)
MHM x MC	-.1341	-.0871
	(.0938)	(.0826)
HAD x MC	-.0751	-.0289
	(.1660)	(.0637)
HAU x MC	.0699	-.0046
	(.0535)	(.0859)
MAG x MC	-.0808	.0355
	(.0996)	(.0550)
Female age in years	.0020	-.0017
	(.0014)	(.0013)
Male age in years	-.0022*	.0012
	(.0012)	(.0011)

	Contribution of wife (fraction of endowment)	Contribution of husband (fraction of endowment)
Female education in years	-.0014	.0042
	(.0026)	(.0027)
Male education in years	.0032	.0060**
	(.0023)	(.0026)
Arranged marriage (=1)	-.0196	-.0011
	(.0255)	(.0290)
Times married (husband, #)	-.0032	.0007
	(.0147)	(.0154)
Wife is primarily home maker (=1)	.0019	-.0042
	(.0218)	(.0171)
Wife needs permission to buy dress/sari (=1)	.0007	.0125
	(.0181)	(.0193)
Wife primarily decides on spending household income (=1)	.0239	.0503*
	(.0352)	(.0277)
Wife expectations of husband withholding (fraction of endowments)	-.2959***	-.0152
	(.0461)	(.0385)
Husband expectations of wife withholding (fraction of endowments)	-.0789	-.3291***
	(.0533)	(.0586)
Constant	.6284***	.6259***
	(.0705)	(.0760)
R-squared	.1792	.2112
N	847	847

Notes: Estimated using OLS. 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.

Table A2
Regression analysis of spouses' contribution behaviour (ordered probit)

	Contribution of wife (fraction of endowment)	Contribution of husband (fraction of endowment)
Varanasi (VAR)	1.0409***	.9047***
	(.2959)	(.3351)
Uttar Pradesh (UPR)	.1799	.5861
	(.2507)	(.4608)
Tamil Nadu (TAM)	.4551**	.1950
	(.2185)	(.3414)
Addis Ababa (ADI)	.5917***	.1880
	(.2281)	(.3448)
Mehal Meda (MHM)	.6933**	.4668
	(.3176)	(.4059)
Hadiya (HAD)	.9841**	.6353*
	(.4150)	(.3562)
Hausa (HAU) (omitted)		
Maguzawa (MAG)	.5631	-.3691
	(.5253)	(.3052)
VAR x "female control" (FC)	-.7889***	-.9051***
	(.2870)	(.1627)
UPR x FC	.3816	-.1039
	(.2854)	(.3454)
TAM x FC	-.3508	-.3680
	(.2579)	(.3288)
ADI x FC	-.0706	-.1824
	(.1856)	(.2534)
MHM x FC	-1.0498***	-.0814
	(.3614)	(.2961)
HAD x FC	-.4820	-.4426**
	(.4315)	(.1719)
HAU x FC	.3651**	-.4859*
	(.1781)	(.2776)
MAG x FC	-.2532	.2182
	(.5073)	(.2138)
VAR x "male control" (MC)	-.2267	-.3764
	(.5311)	(.3910)
UPR x MC	.2380	-.0035
	(.2890)	(.4774)
TAM x MC	-.3810***	-.0600
	(.0910)	(.1482)
ADI x MC	.1300	.1286
	(.2261)	(.2611)
MHM x MC	-.5999	-.4200
	(.4203)	(.3769)
HAD x MC	-.3792	-.1492
	(.7469)	(.2904)
HAU x MC	.3421	-.0231
	(.2443)	(.3965)
MAG x MC	-.3270	.1427
	(.4716)	(.2524)
Female age in years	.0093	-.0078
	(.0066)	(.0059)
Male age in years	-.0101*	.0059
	(.0053)	(.0051)
Female education in years	-.0053	.0200

	Contribution of wife (fraction of endowment)	Contribution of husband (fraction of endowment)
	(.0122)	(.0125)
Male education in years	.0129	.0269**
	(.0102)	(.0121)
Arranged marriage (=1)	-.0783	-.0074
	(.1094)	(.1316)
Times married (husband, #)	-.0231	.0017
	(.0645)	(.0702)
Wife is primarily home maker (=1)	.0077	-.0260
	(.0967)	(.0797)
Wife needs permission to buy dress/sari (=1)	.0033	.0561
	(.0804)	(.0898)
Wife primarily decides on spending	.1215	.2364*
household income (=1)	(.1594)	(.1251)
Wife expectations of husband withholding	-1.3910***	-.0919
(fraction of endowments)	(.2287)	(.1748)
Husband expectations of wife withholding	-.3340	-1.5662***
(fraction of endowments)	(.2349)	(.2992)
Pseudo R-squared	.0696	.0835
N	847	847

Notes: Ordered probit model estimated using maximum likelihood. 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.