Cooperation in polygamous households. Experimental evidence from northern Benin

Doux Baraka Kusinza, Catherine Guirkinger

July 23, 2024

DeFiPP Working Paper 2024-03

DeFiPP
Development Finance & Public Policies
defipp.unamur.be

UNIVERSITÉ DE NAMUR

Cooperation in polygamous households. Experimental evidence from northern Benin.

Doux Baraka Kusinza* and Catherine Guirkinger*

July 23, 2024

Abstract

In the literature, polygamy is frequently associated with intra-household inefficiencies, commonly attributed to a lack of cooperation between co-wives. In this paper, we challenge this claim by investigating the extent to which co-wives are inclined to cooperate when mutual gains are at stake. Additionally, we examine whether the lack of voice in intra-household decision-making contributes to explaining commonly observed inefficiencies. Using public good games in northern Benin, we find that co-wives are not more prone to cooperate with their husband than with each other. Moreover, when they share mutual interests, they tend to coalesce and play against their husband's interests. These findings are particularly strong in the case of women with low levels of agency. We argue that co-wives with low agency have more incentive to unite to collectively improve their access to household resources since, individually, they are marginalized. Finally, the comparison of monogamous and polygamous households reveals that efficiency levels and the determinants of cooperative behavior are similar in both types of households (at least when household members themselves set the rules regarding the allocation of the public good).

JEL Classification: ***D13, C93, J16***
Keywords: ***Polygamy, Cooperation, Household, Gender, Agency, Public Good Games***

*This research project received financial support from the Banque Nationale de Belgique (BNB), Fond Spécial de Recherche (FSR, University of Namur) and the European Research Council under the H2020 research and innovation programme ERC grant agreement 759294. We are grateful to the NGO Îles-de-Paix for successful collaboration in the field. We thank the participants of the DeFiPP/CRED and Doctoral workshops for their insightful remarks. We thank in particular Jean Marie Baland, Julia Vaillant, Jordan Loper, Guilhem Cassan and Amma Panin for comments on previous versions. We are grateful to our team of enumerators in the field. This project was approved by the ethical committee of the University of Namur (id: 2023/3).

*Center for Research in the Economics of Development (CRED), University of Namur, Belgium
Doux Baraka Kusinza: doux.barakakusinza@unamur.be
Catherine Guirkinger: catherine.guirkinger@unamur.be

1 Introduction

Polygamy is widespread in Western Africa with, for example, 40% of married women living in polygamous marriages in Benin according to the 2018 Demographic and Health Survey. Polygamy has been shown to be an obstacle to development in the macro (Tertilt, 2005) and microeconomic literature (Edlund & Lagerlöf, 2006; Edlund & Lagerlöf, 2012). In the latter, polygamy is typically associated with intra-household inefficiencies. Co-wives lack of cooperation is typically seen as responsible for these inefficiencies as they fail to contribute to household public goods (Barr et al., 2019), compete in fertility (Rossi, 2019), or engage in destructive rivalries.

While in some dimensions like inheritance and fertility, conflicts of interest between wives are evident (see discussion by Rossi, 2019 in Senegal), they may also share a common interest in cooperating with each other, possibly to jointly gain better access to collective resources. In fact, the ethnographic literature documented cases of cooperation among co-wives in Sub-Saharan Africa (Madhavan, 2002; Jankowiak et al., 2005). Cooperation between co-wives may be particularly strong when each has a low level of bargaining power. In such cases, they may initially have limited cooperation with their husband, reducing the potential loss when they choose to ally with each other at his expense. Baland & Ziparo (2018) discuss how a very unbalanced distribution of bargaining power hinders cooperation between husband and wife because the gains from cooperation are reaped almost entirely by just one spouse. In that case, if there is any cost associated with bargaining or cooperating (such as time cost or potential tension), the low-empowered partners may forgo cooperation together. We posit here that, in polygamous households, a very low level of bargaining power for women may decrease their incentive to cooperate to household public goods, yet may foster cooperation with the co-wife who has similarly low power (especially if they have mutual interest). We thus see inefficiencies in polygamous households as the result of the very low agency of women in these marriages, rather than fierce competition between them.

To test these ideas, we conducted lab-in-the-field games with monogamous and polygamous couples in Benin with three main objectives. The first is to investigate cooperative behavior in polygamous households and co-wives' willingness to unite (possibly at the expense of the husband). The second is to explore whether the extent of cooperation among co-wives is higher when women have limited agency in the household. The third is to compare overall efficiency and cooperative behavior across monogamous and polygamous households.

In practice, we conducted multiple rounds of public good games with monogamous and polygamous households, where each participant received an initial endowment and could privately contribute to a common pot. The funds in the common pot were then multiplied by 1.5 and distributed among players. The household efficient outcome is that all invest the full amount while keeping all to oneself is the non-cooperative equilibrium. In the first set of games, the common pot is equally shared among players, while in the second set of games,

players set the sharing rule. In one game, mirroring daily life in Benin, husbands privately determined the sharing rules. In a second game, all spouses jointly decided on the rules, while in a third game, wives decided on the sharing rule (jointly in polygamous households) in the absence of the husband.[1] Observing sharing rules and contributing behavior in the two latter games reveals whether wives' participation in the decision (a dimension of agency) increases their share and their contributions. The last game also indicates to what extent co-wives are willing to coalesce at the expense of the husband.

Three main conclusions arise from the analysis. First, co-wives are *not* willing to cooperate more with the husband than with each other and are willing to ally to secure a high share of collective resources at the expense of the husband. Second, when they lack agency (whether in the game or in real life) their willingness to cooperate with each other (rather than with the husband) is further enhanced. In line with this outcome, increasing women's involvement in the decision-making process increases cooperation and enables to reach higher levels of efficiency. Third, levels of cooperation and efficiency are not significantly higher in monogamous households (compared to polygamous ones) when household members themselves decide about the allocation of the collective pot (in fact households behave remarkably similarly).

This paper contributes to several strands of literature. First, we contribute to the literature on the functioning of polygamous households. Our findings diverge from Barr et al. (2019) and Munro et al. (2019) who also conducted several rounds of public good games with polygamous couples and found that wives are less likely to cooperate among themselves than with husbands. We believe that the low level of agency of women in our setting and the fact that, in our experiment, household members themselves set sharing rules contribute to explaining the difference. We also go one step further and investigate whether wives are willing to coalesce against the husband's interests and whether their level of bargaining power influences their willingness to cooperate with the husband and among themselves. Second, we contribute more generally to the literature on intrahousehold resource allocation, by assessing whether intrahousehold cooperation differs across members and households depending on the prevailing balance of power. While the lack of voice or bargaining power is stated as a possible reason behind household inefficiency in developing country context by Baland & Ziparo (2018), we are not aware of papers that formally test this idea.

The remainder of this paper is organized as follows. In Section 2, we review the existing literature about intrahousehold cooperation and efficiency. Section 3 provides insights into the context and details the experimental design. The main results of the experimental games are presented in Sections 4, 5, and 6, while Section 7 briefly concludes.

[1] Figure 3 in the appendix presents a comprehensive summary of games played with monogamous and polygamous couples.

2 Related Literature

2.1 Intra-household cooperation in public good games

"Cooperation could be defined as the act of contributing to a common, mutually beneficial goal although behaving selfishly would be individually better, irrespective of whether others cooperate or not, as captured by stylized game-theoretic paradigms as the Prisoner's Dilemma and Public Good Games." (Alós-Ferrer & Garagnani, 2020)

Public Good Games (PGGs) are frequently used to measure cooperation. In a PGG, participants receive an initial endowment that can be either retained privately or invested in a collective public good. The amounts invested in the public good are multiplied by a factor greater than one and shared among the players. The game's final payoff for each player consists of the sum of the privately retained amount and the share received from investments in the common pot. As noted by Munro (2023), PGGs involving couples differ fundamentally from games with strangers due to the shared life experience that exists both before and after the experiments. While in PGG with strangers, free-riding is a maximizing strategy, the inherent interdependence in consumption within households implies that, in games involving couples, the Pareto-efficient strategy is to maximize household surplus by investing the entire endowment, irrespective of individual levels of altruism.[2] However, in the majority of experimental studies involving couples, individuals choose to keep part of their endowment for themselves instead of investing it all in the common pot. Furthermore, conditional (or reciprocal) cooperation among spouses is typically observed, whereby contributions depend on beliefs regarding the partners' willingness to cooperate (Iversen et al., 2011; Barr et al., 2019). Barr et al. (2019) find that polygamous spouses tend to have more reciprocal motives in their contribution behaviors compared to monogamous spouses, who tend to exhibit more altruistic behaviors.

Some experiments directly investigate how the control over collective resources may affect cooperation within households. Results are mixed. Iversen et al. (2011) and Verschoor et al. (2019) report that in Uganda and northern Nigeria, household efficiency tends to increase when wives control the allocation of common resources. In contrast, they show that in India and Ethiopia, women's control tends to lower efficiency compared to men's control (see also Kebede et al., 2014). They conclude that, overall, experiments that challenge existing social norms tend to lower efficiency, particularly in patriarchal societies where giving wives control over resources generally leads to lower contributions from both women and men (Verschoor et al., 2019).

[2]This behavioral pattern is typically observed when comparing games involving strangers with those played by spouses. Notably, individuals tend to invest more when their spouse is their game partner, as opposed to when they are playing with strangers (Barr et al., 2019; Munro et al., 2019).

Baland & Ziparo (2018) review the reasons why allocations within households may not be efficient, leading to substantial losses, in particular in poor countries. They cite power imbalances, high adult mortality rates, the prevalence of early and arranged marriages, and the prevalence of extended households as key factors undermining efficiency. One important idea they develop is that when women have limited outside options and low decision-making power in the household, they may adopt passive non-cooperative behavior since they would gain little from cooperating, leading to efficiency losses in the household.

2.2 Cooperation in polygamous unions

Regarding cooperation in polygamous households, economic evidence indicates that wives often engage in competition, resulting in reduced cooperation. In Côte d'Ivoire, for instance, Mammen (2004) found that this competition results in inefficient investment in children. Additionally, in Senegal, Rossi (2019) demonstrates that co-wives inefficiently increase their fertility in a competitive manner to increase their claim over household resources. An important finding of experiments with polygamous households is that the level of cooperation may differ across sub-sets of players. In Nigeria, Munro et al. (2019) and Barr et al. (2019) found that co-wives exhibit lower levels of cooperation with each other, but tend to cooperate more when playing with the husband. Junior wives, in particular, are in a relatively disadvantageous position as husbands tend to cooperate less with them compared to senior wives. Furthermore, when the husband controls the allocation of resources, junior wives receive a disproportionately lower share (Munro et al., 2019). This situation may induce them to contribute less to household public goods.

In summary, several empirical and experimental studies in economics suggest that inefficiencies within polygamous households stem from competition and low cooperation among co-wives. An exception is Akresh et al. (2016) who, with the help of a game-theoretical framework provides an interesting perspective on cooperation among co-wives, arguing that the lower level of altruism between co-wives (than between husband and wife) helps sustain cooperation because it makes punishment more credible. They show that the pattern of productive efficiency levels across household types matches their theoretical predictions, whereby polygamous households tend to be more efficient in their allocation of productive inputs across fields.

Interestingly, the ethnographic literature provides a more nuanced perspective on cooperation in polygamous households and suggests that social norms and perceptions play a pivotal role in shaping the relationships among co-wives. For instance, in Mali, Madhavan (2002) highlights that in certain ethnic groups, cooperation among co-wives is considered a valuable trait in women, elevating their social status. This, in turn, fosters cooperative behaviors among co-wives, in contrast to ethnic groups where such norms do not apply. Mulder (1992) insists on women's positive attitude towards polygamy and their willingness

to cooperate with their co-wife in several East African societies. Jankowiak et al. (2005) review the anthropological literature and take a cross-cultural perspective to investigate the factors that heighten competitive behavior and undermine cooperation between co-wives. Their comparison of 69 cultures suggests that the two most important triggers of conflict are inequalities related to children's access to resources and rivalries regarding sexual and emotional access, while aging decreases conflict and favors supportive relationships.

It is rather obvious that co-wives' incentives to cooperate will depend on the circumstances and the stakes. An important possibility is that co-wives may have incentives to join forces to secure a higher share of collective resources, especially in a context where they have, individually, very little say. This possibility is suggested by the theory of coalition formation in contests (De Jaegher, 2021). According to this theory, in a game involving three players competing for a prize, two players may join forces and compete against the third if it enhances their chances of winning collectively and subsequently sharing the prize. When the player with a higher individual chance of winning finds it more advantageous to leave the coalition, coalitions typically arise among players with equal probabilities of winning. While the theory of coalition formation in contests does not directly apply to our setting because we do not use a "winner takes all" structure in the games, the main idea that players in a similar disadvantageous situation may be more willing to coalesce against the third resonates with our context. In polygamous households with strong patriarchal norms, husbands typically enjoy extensive decision-making authority, so that co-wives may have incentives to coalesce to improve their access to resources, provided they have a foundation of mutual trust. Otherwise, a coalition among co-wives is less likely to emerge since each co-wife fears that the other could be disloyal and report her to the husband.

3 Context and Experiment Design

3.1 Data collection

The experiment took place in April and May 2023 across 21 villages in three municipalities in the department of Atacora in northern Benin: Boukoumbé, Cobly, and Matéri.[3] In practice, we visited one village per day with a team of four enumerators and organized two sessions in each village, one with polygamous couples and one with monogamous ones.[4] In our sample,

[3]The experiment took place in villages where a Belgian NGO, Iles de Paix, is supporting agricultural production and women's entrepreneurship through various interventions. Some of the households in the experiments were surveyed in 2020, as part of an effort to evaluate the impacts of the women's entrepreneurship intervention.

[4]One year before the experiment (February 2022), we conducted a qualitative survey, consisting of individual interviews with 38 participants. This phase provided valuable insights into the context, aiding us in refining the experiment's design. In April 2023, the experiment was tested with 10 couples, further refining our approach in alignment with our research objectives.

polygamous couples consist of one husband and two wives. Very few husbands have more than two wives in this area.

On average, sessions with polygamous couples lasted 2 hours and were followed by a 1.5-hour individual post-game interview where we asked detailed questions about household organization. Sessions with monogamous couples were shorter and lasted 1.5 hours, followed by a 1-hour interview. In total, 172 couples participated in the experiment, with half of them (86) being polygamous, resulting in a total of 430 individuals involved. Throughout the paper, we denote "Wife 1" as the wife who entered the polygamous union first, while "Wife 2" refers to the wife who entered later.

3.2 Context

According to the 2018 Demographic and Health Survey (DHS), 38% of married women in the department of Atacora are in polygamous marriages, with the majority being arranged unions. The region is characterized by deep-rooted patriarchal norms, instilled in men and women through obligatory initiation rituals (for more details, see Kaucley N'Koué, 2015). In this context, women's agency is very limited as illustrated by the following facts.

First, women have limited choice regarding marriage: as reported in Table 1, 26% of married women live in an extreme form of arranged marriage known as *"exchange marriages,"* where families simply exchange their daughters (without their consent), either simultaneously or on a credit basis.[5] A direct consequence of these unions is that women have limited exit options: separation in one union is supposed to imply the undoing of all other marriages from the exchange. Another consequence is that women often find themselves in marriages with a large age gap (as illustrated in Table 1, ranging from 7 to 14 years). Polygamous wives are more likely than monogamous wives to be in exchange marriages (28% versus 21%, difference not significant) and the age gap between husbands and wives is greater in polygamous unions (10 years versus 6.7 years).

Second, while wives have a strong obligation to work in household (collective) fields, they have limited influence over the allocation of resulting proceeds, which are primarily under the authority of the husband. As Table 1 illustrates, only 33% of women report having a say in decision-making regarding the collective field. Husbands decide unilaterally on the

[5]Interviews we conducted in February 2022 revealed that families may be involved in long-term loans of women that extend beyond 20 years. In these situations, whenever a girl is born into a borrowing family, she is automatically designated to repay the loan. Occasionally, if the borrowing family fails to have a woman available for the exchange, the daughter of the originally exchanged wife might be returned to her maternal family to fulfill the loan repayment. It is crucial to emphasize that in this system, a woman has no right to refuse the exchange, regardless of the age of the husband imposed upon her. Also, in the event of a separation, all the exchanged women are expected to return to their respective families of origin. We were told of cases where exchanged women refused to do so, with the support of their husbands. Yet, both women and their husbands faced social sanctions.

crop to cultivate, and the allocation of labor and harvest (how much to sell, how much to save in granary). This fact is more observed in polygamous households: 70% of women in polygamous households report lacking agency in collective field decisions compared to 60% in monogamous ones.

Finally, children and all assets (even when financed by the wife) are considered to be the property of the husband. In the event of a divorce, the wife has no legal claim to either assets or children. Relatedly, even if wives participate in financing household expenses (including house embellishments, daily expenditures, and durable goods), they declare that they need their husband's approval before making any purchase. This necessity is particularly emphasized in polygamous households, where husbands seek to mitigate "undesirable" inequalities among co-wives.[6]

A wife's status also depends on her position in marriage: second wives are typically considered at a disadvantage. Social norms command that husbands have to maintain the superiority of senior wives whom they should entrust with greater responsibilities. When the husband is not present, the senior wife typically assumes the responsibility of managing the granary (this situation concerns 74% of households, see Table 1). In addition, first wives are more likely to participate in decisions regarding food allocation[7] (50%) than second wives (28%) in cases where the husband is not the one in charge of food allocation (33% of household).

In this context of limited women's agency, co-wives report cooperating in several aspects. Specifically 69% of them report assisting each other in financial matters, domestic tasks, and agricultural activities (Table 1). Moreover, 54% of women report being part of the same entrepreneurship group, which also suggests some level of collaboration.

Other descriptive statistics are reported in Table 1. There appears to be no significant difference in the number of children per woman in polygamous and monogamous households. Education levels are extremely low with only 58% and 32% of men and women (respectively) with any education. All households rely on agricultural production for their living and many men (52%) and most women (88%) have other income-generating activities (IGA) such as transformation of rice, fonio, and soy. Concerning religious practices, the majority of husbands (56% in monogamous and 66% in polygamous households) follow traditional religions that strictly adhere to the cultural norms described above. However, among wives, Christianity emerges as the most practiced religion, followed by traditional beliefs. Regarding living arrangements, 52% of polygamous women reside in the same compound as their co-wives (cohabiting households), with husbands typically cohabiting with their wives.

[6]Inequality accepted by social norms is often tied to the rank within the household structure: first wives are typically accorded more privileges than those of higher rank.

[7]Participation implies that the wife decides on the allocation alone or with her co-wife.

3.3 Experimental Design

To assess cooperation among players, we conducted multiple rounds of public good games with polygamous and monogamous household members. We began each session by explaining the objectives and principles of the game to the participants using real-life examples (for more details, see Script in Section B in appendix). This was followed by discussions to ensure participants understood the rules. After the group training, each household (husband and wife - or wives) was isolated, and one enumerator was assigned to them. Before playing, every player had to pass a test of comprehension (see Subsection B.B in appendix). As shown in Table 1, 75% of participants passed the test of comprehension on the first attempt, the remaining participants passed it on the second or third attempt before starting to play.

In each round, every spouse received an initial endowment of 2000 CFA Francs (equivalent to about 3 euros) and had to decide how much to keep for her/himself and how much to allocate to a common pot. The common pot was materialized by a box that was isolated from other players (and the enumerator) and to which each player would go to make her / his contribution in private. The total amount contributed to the common pot was subsequently multiplied by 1.5 and then distributed among the participating players.[8] For each treatment, a player's total revenue comprised the sum of the amount retained privately and the share received from the common pot. For the final payment, a random game was selected, and the corresponding earnings were awarded to the player. Importantly, both the contributions and the payments were kept private, with players remaining unaware of the treatment chosen for the final payment to avoid potential retaliation.[9] These principles were communicated and explained to all players before the games began. Communication between spouses during the games was strictly controlled and occurred only when the game protocol explicitly allowed it. Each game session had two parts, which differed in terms of the rules for the allocation of the common pot.

In the first part of the game session, the revenue in the common pot was shared *equally* among participating players. Each player played several rounds of PGG (four rounds for polygamous players and two for monogamous) that differed in terms of the identity of the partner(s). We started with *bilateral* games where each player played with her/his spouse(s). Whereas monogamous couples played only one game in this phase (between the husband and

[8]To provide players with a familiar analogy, we said the collective pot was akin to a family field. Players could buy inputs for the family fields and the revenue in the common pot (contribution*1.5) could represent the proceeds from the field. These proceeds would be allocated to players according to a sharing rule. This analogy helped players understand the game and resonates with decisions they make in life since (1) agriculture is the principal source of income for these households and (2) the collective field represents the most important common good for the household, often requiring investment from each spouse in terms of the labor force, seed, and other inputs.

[9]One round was played with an anonymous player from another household, so players did not know whether the payoff was the result of decisions taken by other household members or an anonymous person.

the wife), in polygamous couples three games took place, one between the husband and the first wife, one between the husband and the second wife, and one between co-wives. The sequence of these games was randomized to be able to control for the influence of previous rounds on contributions. Second, each player participated in a round with an unknown partner selected randomly from those present at the session to test whether individual players in monogamous versus polygamous unions had different propensity to cooperate with an unknown partner.[10] Third, polygamous couples played in a three-players game, with the same principle of equal sharing. After the first part of equal sharing games, all households gathered for training on the principles of the second part of the session.

In the second part, the allocation of the common pot across players (the shares accruing to each) was set by players. Depending on the round, different combinations of players were responsible for setting the shares for all household members. Then all household members contributed, aware of who defined the rules but not aware of the shares set (unless the player was directly involved in setting them). The money in the common pot was divided according to the rules set by the decision-maker (again other players would not learn about the outcome). In practice, to define the rules, three scenarios with varying amounts of real money in the common pot (6000, 4000, and 2000 CFA Francs) were presented to the decision-maker, who had a maximum of five minutes to allocate the money among the players. We call the share (in percent) the average of the portions attributed by the decision-maker for each scenario.

In the first treatment (T1), mirroring everyday life, the husband made the rules in isolation from his co-wives. In the second treatment (T2), all spouses jointly determined the rules through a discussion (with all players then aware of the sharing rules). In the third treatment (T3), the co-wives were isolated from their husband and jointly decided on the sharing rules, which remained unknown to the husband. The objective of including these treatments was twofold: first, to test whether involvement in defining the sharing rules influenced contributions, and second, to analyze whether co-wives in polygamous marriages could form a coalition and potentially play against their husbands, in the sense that they would depress his share and increase their shares.

One challenge in household experiments is the "undoing problem" whereby household members may "undo" any allocation in the experiment by subsequent transfers (Munro, 2018). Note that, if undoing is at play, players should not be sensitive to the sharing rules (since they could always undo the allocation reached in the game) and should be more likely to contribute the full amount to the common pot. As detailed below, this is not the case here: contributions are a function of the rule-setting procedure. Furthermore, the severity

[10]This comparison helps rule out that there is a selection of less cooperative individuals in polygamy. As suggested by Barr et al. (2019), there should be no difference in contribution levels between monogamous and polygamous players should be observed when playing with strangers, if there is no selection based on cooperative behavior in polygamy.

of the undoing problem is limited by the fact that no player learns about the contributions of other players or the payoffs obtained.

4 Cooperation in polygamous households

4.1 Two-people games: comparing cooperation among co-wives with husband-wife pairs

In all the games we played with spouses, the household cooperative (and efficient) outcome is for members to contribute their full endowment to the collective pot, given that these contributions are then multiplied by 1.5. Yet if individuals maximize their *individual* payoff, their incentive to contribute to the common pot depends on the share they obtain from the collective pay-off and their expectation about the contribution of others. Given the multiplier chosen, it is only if their individual share is above $\frac{2}{3}$ that individual payoff maximizers would contribute a strictly positive amount, in fact, their full endowment.[11] In other words, unless they are sure to obtain at least $\frac{2}{3}$, the individual pay-off maximizing contribution in our static games is null.[12] In this subsection, we analyze two-people games, with the objective to compare individual contributions across dyads (when the husband plays with the first wife, with the second wife, or when the two wives play with each other).

As detailed in Section 2, an element put forward in the literature on polygamous households is that cooperation between co-wives is typically lower than between a wife and the husband (contributing to explain the lower level of efficiency in these households). To explore this conjecture in our context, we estimate the following simple linear equation with individual fixed effects, where the dependent variable $Y_{i,g}$ is the contribution to the collective pot:

$$Y_{i,g} = \alpha + \beta * coplayer_{i,g} + I_i + \epsilon_{i,g} \tag{1}$$

where the indices i and g represent the player and the game, respectively. The variable

[11] Let α be the fraction of the endowment e allocated to the collective pot, C the contribution of other players and s the share obtained from the collective pot. A member maximizing her individual payoff chooses α that maximizes $(1-\alpha)e+\frac{3}{2}s(\alpha e+C)$. The first derivative of this expression with respect to α is $-e+\frac{3}{2}se$. This expression is strictly positive if $s > \frac{2}{3}$ - implying that the member would contribute the maximum amount possible e - and negative otherwise, implying a zero contribution. This reasoning is abstract from risk considerations, if there is uncertainty about s and C and individuals are risk averse, the threshold above which full contribution obtains will be strictly higher than $\frac{2}{3}$.

[12] To elaborate on this, let us consider a bilateral game with equal shares (share=$\frac{1}{2}$). Suppose one player contributes the full endowment of 2000 FCFA while the other contributes nothing. In the common pot, there will be a total revenue of 3000 FCFA ($2000FCFA \times 1.5$), to be equally divided, resulting in 1500 FCFA for each player. Consequently, the player who contributed everything ends up losing 500 FCFA, while the non-contributing player gains 1500 FCFA, bringing his total revenue to 3500 FCFA.

coplayer designates the person with whom i is playing (for a wife it is either the co-wife or the husband; for a husband, it is the first or second wife). I denotes the individual fixed effect. Standard errors are bootstrapped and clustered at the village level to account for potential error correlation, as players within each village played in the same game sessions.

Table 11 in the appendix reports descriptive statistics regarding the rates of contribution to the collective pot for each possible dyad (the dependent variable). Regression results are reported in Table 2 and reveal that contributions are not lower when co-wives play with each other than when they play with the husband, in fact, they tend to be higher. While the difference is not significant when we pool first and second wives (Column (1) of Table 2), second wives contribute significantly larger amounts when playing with first wives than with husbands (Column (3) of Table 2). First wives contribute similar amounts when playing with their co-wife and with the husband. Interestingly, husbands make a larger contribution when playing with the first wives in line with the existing norm favoring them in polygamous households (Column (4) of Table 2). This confirms that second wives have a dual disadvantage regarding access to common resources as they face both gender and rank disadvantages. Second wives' behavior suggests that they are more willing to cooperate with the spouse with whom they share at least one dimension of disadvantage. In the next section, we delve into whether co-wives can prioritize their own interests at the expense of their husbands' interests.

4.2 Three-people games: who sets the shares matters!

We now turn to games where co-wives and husbands jointly contribute so that the collective pot is shared among three players. Our objective is to examine how individual behavior responds to the decision-making rule regarding the allocation of the collective pot. We are interested in particular in co-wives' willingness to depress the husband's share when given the opportunity. As detailed in Subsection 3.3, households played three public good games where the shares accruing to each member were set by one, some, or all household members. In game T1, the husband privately set the shares (they were not communicated to the other players). In game T2, all members (husband and wives) discussed and decided on the shares and in game T3 the wives jointly decided on the shares (and again they were not communicated to the husband).

Table 3 displays descriptive statistics for the average share of each partner in each type of game in polygamous households. The first column of Table 5 compares women's shares across treatments in a regression framework.[13] Three main findings emerge from these tables. First, husbands' share is larger than wives' share, except in the case where wives decide alone on the allocation (T3), which is the treatment furthest from the usual functioning of these

[13]Estimating equation 1 with *share* as the Outcome Y, and including an interaction between coplayer and the type of game.

households.

Second, across treatments, individuals obtain a larger share of the collective pot when they have been associated to the decision process. As a result, the most equitable shares are reached in T2. While women obtain more in T2 than in T1, the allocation in T2 remains more strongly in favor of husbands: they secure a share of 0.40 on average (more than 10 percentage points more than the second wife).

Finally and importantly, when given the opportunity to set the rules, wives strongly depress the husband's share (to 0.25 on average) as compared to his share in T1 or T2 (where it is 0.45 or 0.40). This is an important finding because it reveals that co-wives are ready to coalesce to decide on a rule that is in their favor, and very different from the rule set in the husband's presence. While such behavior may be expected in a classic experimental setting where two players have an interest in coalescing against a third, this finding is remarkable in a polygamous context. This is because, if co-wives would be very untruthful and in a very conflict-prone relationship, we may expect them to simply follow the husband's rule[14] and not agree to change it in their favor.[15] Note that we are not in a position to compare the shares set in T3 with an alternative treatment where one of the wives and the husband would have decided over shares together (in the absence of the other wife).[16] We thus cannot compare the propensity to coalesce with a co-wife and with the husband (yet, in our opinion, this does not undermine the argument that co-wives' cooperation is non-trivial). The cooperation between co-wives in this game is further confirmed by the amounts of their contributions (Table 4 and Column 2 of Table 5): they contribute substantially more in T3 than in T1 or T2 (recalling that, even if shares are larger, the individual pay-off maximizing behavior remains to contribute nothing).

A more systematic analysis of contributions (Table 4 and Columns 2 of Table 5) reveals that husbands tend to contribute more than women and that women's contributions are higher when they are associated to the decision (and their share in the pot is higher). This is true of husbands as well, although they appear less sensitive to the share they secure: although their share is lower in T2 than in T1 they do not contribute less on average. It

[14]For example the sharing rule established in T2, where all spouses jointly decide and are therefore all aware of the allocation.

[15]One might argue that the reduction in the husband's share when women decide on rules (T3) could be a result of game-related retaliation, as the husband retains a larger share in the joint decision game (T2). We can use the game randomization to investigate this possibility and check whether the husband's share in T3 is a function of his share in T2, depending on the game order. Specifically, we run an OLS regression with the husband's share in T3 as the dependent variable and as the main variable of interest, an interaction between game order and the husband's share in T2. Results are in Table 17 in the appendix. The interaction is not significantly different from zero suggesting that game-related retaliation is not present.

[16]We had to choose among treatments to maintain the duration of a session below two hours to limit players' fatigue. Choosing this alternative treatment would have meant playing it successively with each wife (increasing the number of games by 2) to avoid any presumption of more favorable treatment of one wife.

is only in T3 (where they were not involved in rule setting) that husbands substantially decrease their contribution. It may be because, while ignorant of the wives' decision, they anticipate a sharp decrease in their share.

In sum, results presented in this section suggest that co-wives tend to cooperate with each other, at least as much as with their husband: in bilateral games, they are at least as cooperative (and sometimes more) with their co-wife than with the husband and, when given the opportunity, they coalesce to depress the husband share of resources. Furthermore, household members tend to cooperate more in games where they had a chance to participate in setting shares (and receive larger share).

5 Women's agency and cooperative behavior

The question we take up now is whether the cooperation across games highlighted above is a function of the wives' agency, both in the game and in real life. As suggested in Section 2, individual members' incentive to cooperate may be low when they have low agency, because they have less say over the allocation of collective resources and little to gain from cooperation.

5.1 Agency in the games

The level of agency of individual players differs across games, depending on whether or not they are involved in deciding over shares, in the sense that participating in the decision increases control over the allocation process. The descriptive analysis presented above suggests that individuals tend to contribute more when they participate in the decision-making regarding shares. Yet they also secure larger shares in this case, and may simply react to this increased stake in the collective pot. To explore more systematically whether contributions to the household public good are sensitive to the decision-making process (controlling for its effect on shares), we turn to a regression framework and estimate the following regression with individual fixed effect, where $contribution_{i,g}$ is the fraction of his/her endowment that player i contribute to the common pot in the player-set rules game g:

$$contribution_{i,g} = \alpha * participation_{i,g} + \beta * share_{i,g} + \gamma * belief_{-i,g} + I_i + \epsilon_{i,g} \qquad (2)$$

The binary variable $participation_{i,g}$ takes the value 1 if the individual took part in the decision-making process in game g (T1 and T2 for the husband; T2 and T3 for wives). The variable $share_{i,g}$ corresponds to the share of the collective pot accruing to player i in-game g. We also control for beliefs regarding others' contributions, $belief_{-i,g}$. This is because, as detailed in Section 2, household members are typically conditional cooperators in the sense

that their contribution is positively correlated with their expectation of others' contributions. It is interpreted as a form of reciprocity.

Results are reported in Table 6. Individual contributions appear strongly correlated with participation in the decision and also with individual shares and beliefs about others' contributions. It is striking that the coefficients on all three variables are quite similar for husbands and wives (columns 2 and 3 of Table 6): having taken part in the decision regarding shares increases contributions by 7 percentage points for men and 6.7 for women, suggesting that there is more to participation than just securing a higher share of the resources. Participating in the decision on individual shares empowers members to have a voice in the setting of the rule and may thereby trigger additional incentives to cooperate, beyond the share obtained in the division of the collective pot. This participation likely gives both a sense of control of collective resources and a sense of commitment (Dannenberg et al., 2014).[17]

Furthermore, men and women increase their contribution (by 0.27 and 0.29 respectively) when the share they obtain from the collective pot increases by 1 percentage point. This is not surprising since the "cost of contribution", measured as the loss of individual pay-off, is decreasing in the share. Finally, men and women also increase their contribution by 0.36 and 0.41 percentage points respectively when they expect their partners to contribute 1 more percentage point, a behavior termed "conditional cooperation" by the literature (see Section 2).

When we further distinguish between the behavior of the first and second wife in polygamous unions (Column 3 to 5 of Table 16 in appendix), it appears that second wives and husbands are more sensitive to the participation in the decision than first wives (coefficients A+C). Second wives, as described above, are typically the least empowered individuals in the household and may particularly value this participation, which is more disruptive from their daily life in the household (and strikingly the coefficient on "share" is much reduced in their case once participation is taken into account, coefficient D+F). The same argument could apply to explain the strong effect of participation for polygamous husbands (column 5): they are typically setting the rules and when deprived of this prerogative they substantially decrease their contribution, even after controlling for the share they expect to obtain. This discussion suggests that individual voice in the decision-making process is of importance for collective behavior (in contrast to a classic collective model of the household, where efficiency is reached regardless of the distribution of shares). In the next section, we delve more directly into this possibility, focusing on the correlation between the agency of co-wives in

[17] Another (related) reason why participation may increase contribution is that it implies that there is no uncertainty about one's share. When a player is not part of the decision-making process, s/he does not learn about the share actually chosen, s/he only knows who decided. Risk-averse players may be more reluctant to contribute when they are uncertain about the return from their investment in the common pot. In some sense, uncertainty in that case may be interpreted as a lack of control and therefore of agency. Note also that maximizing household income requires full contribution in all treatments, regardless of who decides over shares.

real life and their cooperative behavior.

5.2 Women agency in life

In real life, households differ in women's level of agency and we now explore whether women's cooperative behavior in the game is correlated with their agency in life. More specifically, we construct household-level indicators of (lack of) women's agency using survey information and we investigate whether women with lower levels of agency tend to behave more cooperatively with each other and less with their husbands. Because we expect alliances between wives to be particularly strong when they both lack agency in their household, our preferred indicators of "lack of agency" take value one when *both* wives are deprived of agency in the dimension considered.[18] In the appendix, we also report results with alternative indicators of lack of agency, constructed at the individual wife level (we comment briefly on these results at the end of the section).

To measure the lack of agency, we build four indicators based on survey questions, two aggregate indexes and we use the husband share in T1 and T2 as measures of his bargaining power (higher husband power implies lower wives power).[19] The first indicator, "Have no say on collective fields", is based on women's participation in agricultural decisions and takes value 1 if the two wives declared having no say in the management of collective fields. The second indicator, "Do not manage food", takes value 1 if the wives rarely manage the distribution of cereals (when the husband declared being the only one to distribute cereals among co-wives). The third indicator, "Exchange marriage", takes value 1 if both wives' marriage were based on an arrangement between families that avoids bride-price and precludes separation (see details in Section 3). The fourth indicator, "Do not know husband's savings" takes value 1 if wives declare having no information on husbands' savings.[20] We aggregate the four variables in one index which is a simple mean of the four variables. In addition, because the measure of "Have no say on collective fields" is not available for all households, we build an alternative aggregate index based on the last three measures of lack

[18] If one wife is deprived of agency but the co-wife is not, the later may have more say in the household and more to lose in allying with the woman with low agency against the husband (who may have the power to deprive her of the control she has over resources).

[19] While the latter measure is based on game-behavior, we take it as an indicator of women bargaining power in real life and include it in this sub-section where we focus on inter-household heterogeneity, rather than in the previous section that focused on inter-game heterogeneity in agency.

[20] The first two indicators may be considered important measures of women's agency in our agricultural context, where the collective field is the primary common resource and cereals are the main nutritional product. The exit option, often cited in the literature as a proxy for the agency, is severely limited in exchange marriages within our context. Interviews have shown that husbands unilaterally manage household finances, including income from selling collective production. Therefore, lacking information on household finances may be regarded as a proxy for agency.

of agency.[21]

To understand whether wives' agency influences their level of cooperation with each other, we exploit both bilateral games and games with endogenously set shares. In bilateral games, we investigate whether women with low agency tend to cooperate more with their co-wive than with their husbands and estimate the same model as in Equation 1, interacting the identity of the coplayer with an indicator of lack of agency.

Table 7 reports the results and weakly confirms our intuition. With three indicators of agency, we find that the interaction between the agency indicator and playing with the husband (HpWp) is negative and significantly different from zero, suggesting that women with low agency tend to contribute relatively less when playing a public good game with their husband (relative to their contribution with their co-wife). For example, women who report having no say in collective field decisions decrease their contributions by an additional 4.5 percentage points when playing with their husbands (column 1). Yet with other indicators, the estimated coefficient on the interaction term is not significantly different from zero.

Turning to games with endogenously set shares, we investigate whether women with low agency take more advantage of the opportunity to decrease their husband's share from the collective pot (suggesting that they are more willing to ally against the husband). While women participate in decisions regarding shares in T2 and T3, it may be easier for them to depress the husband's share in T3 since he is absent and does not learn about it. In practice, we estimate the following equation with household fixed effects:

$$husband\_share_{h,g} = \alpha * game_g + \beta * game_g \times agency_h + H_h + \epsilon_{h,g} \quad (3)$$

where the indices h and g represent the household and the game. The dependent variable indicates the share of the collective pot accruing to the husband in game g. The variable *agency* equals 1 if the two co-wives report lacking the agency indicator. H denotes the household fixed effects. Standard errors are bootstrapped and clustered at the village level.

Table 8 reports the results. If women with low agency are more likely to ally and depress the husband's share, we would expect the interaction between T3 and the low agency indicator to be negative. This is the case for all eight measures we use and for five indicators the estimated coefficient on the interaction term is significantly different from zero. The effect of lack of agency is large. For example, results reported in column 5 (using a mean agency indicator) suggest that, in a household where co-wives lack agency according to the three indicators, co-wives depress the husband's share by an additional 19 percentage points in T3, compared to a household were co-wives would not jointly lack agency according to any of the three indicators. The results using the husband's share in T1 or even in T2 (columns 7 and 8) also confirm that women agree to decrease his share substantially when they have low bargaining power to start with. This last point is further illustrated by Figures 1 and

[21] A mistake in the questionnaire implied that women with no individual fields, about 15%, were not asked this question.

2 in the appendix which plot the cumulative distribution of the difference in the husband share in T3 and T2 (Figure 1) and T3 and T1 (Figure 2), separately for women with a low agency indicator and other women (for the various binary indicator measures). It is striking that the cumulative distribution for women with relatively lower levels of agency almost always first-order stochastically dominates the distribution for women with relatively higher levels of agency: the formers are more likely to decrease the husband share when they decide among themselves about it.

Finally, Table 19 and 20 in the appendix provide similar analyses when we use indicators of lack of agency defined at the woman level (instead of household indicators of lack of agency for both women). If only one wife has a low level of agency, it is not clear that cooperation among co-wives will be particularly strong.[22] The results confirm this intuition: while the signs of the estimated coefficients suggest that women with low agency tend to be relatively more cooperative with their co-wife, the coefficients on the interaction terms are less often significantly different from zero.

Taken together, our results suggest that, when mutual interests are at stake, co-wives with low agency exhibit relatively higher levels of cooperation (compared to their cooperation with the husband). Additionally, to protect their interests, they are more inclined to form coalitions and undermine their husbands' interests. We argue that since co-wives lack agency, they have little to gain by cooperating with the husband (as he likely appropriates most of the surplus from cooperation) and more to gain by cooperating with each other (as they increase their chances of improved access to common resources).

6 Overall cooperation and household efficiency: a comparison of monogamous and polygamous households

Our analyses so far suggest that, in polygamous households, the co-wives' cooperation level is not lower than the cooperation between husband and wife and that women's joint lack of agency is an important determinant of co-wives' cooperation. In polygamous households, whether in the games or in life, husbands control an important share of collective resources. This implies that co-wives may have little to gain from cooperating with the husband (but may instead have incentives to ally with the co-wife).

In this section, we turn to a comparison of polygamous and monogamous households to investigate whether cooperative behavior fundamentally differs across household types. First, we compare overall cooperation levels between monogamous and polygamous households. We then explore whether the determinants of cooperation differ across monogamous and polygamous households, focusing on the share of the collective pot obtained by individual members, their participation in the decision regarding shares, and the belief about other's

[22] See Footnote 18.

contribution.[23]

To quantify effective cooperation in households, we rely on the household average contribution to the collective pot (expressed in percent). This average is equivalent to the ratio of the effective household gain from cooperation to the maximum achievable gain and can thus be interpreted as a measure of household efficiency.[24]

Table 9 provides descriptive statistics of household efficiency in each game, distinguishing between monogamous and polygamous couples. T-tests of equality of means are reported at the bottom of the table. Table 10 provides the same evidence in a regression framework, corresponding to the following linear equation:

$$efficiency_{h,g} = \alpha * game_g + \beta * game_g \times monogamous_h + X_h + \epsilon_{h,g} \quad (4)$$

where X_h represents game and household characteristics, including enumerator fixed effect (FE), village FE, game order, number of children, husband age, husband ethnicity, husband religion, husband education, whether husband works outside the household, household assets, whether husband has an income generating activity.[25] Standard errors are clustered at the village level. Columns 1 and 2 focus on bilateral games with equal shares (without and with household control variables) while column 3 includes games with player-set shares (with T1, where husbands decide alone about shares as the excluded category).[26]

The comparison of monogamous and polygamous households reveals that efficiency levels are higher in monogamous households, yet only in equal share games. Indeed figures reported in Panel A of Table 9 (and columns 1 and 2 of Table 10) reveal that for all two-by-two games in polygamous couples (husband playing with either wife or wives playing with

[23]Systematic differences across monogamous and polygamous households may be due to differences in the incentive to cooperate but also to differences in the "type of individuals" who are monogamous versus polygamous household members. In other words, the selection of specific members into one or another type of household could drive systematic differences. To investigate the potential selection of more cooperative individuals in monogamous households (for example), we compare the propensity to cooperate with a stranger (in a Public Good Game) across household types (Barr et al., 2019). Results in Table 18 in the appendix indicate that contribution rates when playing with strangers do not depend on the type of household for both men and women, suggesting the absence of selection. It can also be noted that polygamy is often a transitory situation for an individual, following and/or followed by periods of monogamy.

[24]Let $\bar{\alpha}$ be the average fraction of their endowment that household members contributed to the collective pot. In a polygamous household, the net gain to the household of this average level of contribution is $0.5 * 3 * \bar{\alpha}e$ (with e being the individual endowment). The ratio of effective to maximum gain is then $\frac{0.5*3*\bar{\alpha}e}{0.5*3*e} = \bar{\alpha}$. The same reasoning applies to monogamous couples. $\bar{\alpha}$ thus represents the share of potential gain actually realized by the household.

[25]For descriptive statistics of control variables, see Table 1

[26]It is important to clarify that T1 is consistent across both polygamous and monogamous households, as the husband decides sharing rules. T2 involves joint decision-making by both spouses in monogamous households and by all three spouses in polygamous households. In T3, in monogamous households, the sole wife makes the allocation decision, while in polygamous households, decisions are made jointly by the two co-wives.

each other), efficiency is significantly lower in polygamous households. In contrast, the differences between monogamous and polygamous households vanish in games with players-set shares (Table 9, pairwise ttest (1) vs (5)). The lack of difference between monogamous and polygamous households in the second set of games is an important result, as these games are more likely to reflect real-life situations, where gains from cooperation are not equally shared across household members and where sharing rules are household-specific. Taken at face value, this result suggests that willingness to cooperate in a classic public good game (with equal shares) may not reflect actual cooperation levels when household-relevant shares are applied.

The contrast between monogamous couples' behavior in equal-share games and their behavior in player-set games is intriguing. Our discussion about incentives to cooperate (in polygamous households) suggests that if players expect lower share of the public good, they may decrease their contribution. Table 12 in the appendix reports shares across treatments in monogamous households and suggests that, on average, these remain more balanced than in polygamous households. Yet these averages may hide heterogeneity and we now test whether members of monogamous households respond to the same incentives to cooperate as members of polygamous households.

To this end, we estimate again Equation 2 including monogamous households and interacting the determinants of cooperation with a binary variable for polygamous households. Results are reported in Table 15 in the appendix. It is striking that members of monogamous and polygamous households react similarly to their participation in the decision-making process and to the share[27] they obtain in the games: the interaction terms between polygamous and these variables are not significantly different from zero (even if the size of the interaction between participation and polygamy is not small and suggest that members of polygamous households may be more sensitive to this aspect).

An interesting contrast emerges for the role of belief about other's contribution: it is a stronger determinant of contribution in polygamous than in monogamous households. In three-player games (in polygamous households), we observe that each co-wife's contribution depends on her belief regarding the other co-wife's contribution, rather than on her belief regarding the husband's contribution. As for the husband's contribution, it is positively correlated with his belief regarding the first wife's contribution and is independent of his belief about the second wife's contribution (see Table 16, columns 4 and 5 in appendix). The contrasted effect of belief about co-wife versus belief about husband contribution on polygamous women contribution echoes with findings by Barr et al. (2019) in Nigeria. They conclude that reciprocity motivates co-wife cooperation while the husband-wife relationship is more likely altruistic.

All in all, our comparison of monogamous and polygamous household suggest that overall

[27]Even if shares are not known by all players (except in T2), it is likely that they form expectations regarding these shares and contribute accordingly.

levels of cooperation are not fundamentally different across these household types (especially when household members themselves set sharing rules, as is the case in real life). This finding contrasts with the existing literature on public good games in polygamous versus monogamous households. Yet this literature relies on PGG with equal shares, which, as seen above, trigger more cooperative behavior than games with endogenously set shares (which are more likely to reflect reality). Furthermore, individual stakes in collective gains (shares) are very important determinants of cooperative behavior, both for monogamous and polygamous household members and they are overall quite sensitive to their participation in the decision-making process. The only strong difference between household types relates to the role of belief: it seems that polygamous household members are more likely to be conditional cooperators than monogamous members, possibly because altruism levels are lower.

Finally, a last important conclusion of the analysis is that, when women are involved in setting the shares (T2 and T3), efficiency levels are higher. Indeed, T1 corresponds to the lowest level of efficiency for both types of households (even if, in monogamous households, the difference in efficiency between T1 and T2 or T3 is not significantly different from zero): when husbands decide on their own on the share allocated to others (in line with the prevailing norm), the average contribution in the household is the lowest (column 3 of Table 10).

7 Concluding discussion

Our analyses reveal that in polygamous households in northern Benin, co-wives are more cooperative with each other than with their husband. In comparable public good games, Barr et al. (2019) and Munro et al. (2019) found the opposite in northern Nigeria. We hypothesize that the difference may stem both from the fact that we allow for player-set allocation rules and from the very low level of agency of women in Benin that increases incentives for wives to cooperate with each other more than with their husbands. Our findings suggest that, within our sample, women with less agency are more willing to coalesce and play against their husband's interests. As discussed by Baland & Ziparo (2018), these women have relatively little to lose by being less cooperative with their husbands. Co-wives who face challenges in obtaining better access to resources individually will be more likely to form a coalition and play against the husband (as suggested by theories of coalition formation in contests detailed in Section 2).

Another important result is that when women participate in the decision regarding sharing rules, they tend to contribute more to the public good even if husbands retain the highest share of common resources. Efficiency levels in polygamous households are high in this case. In this regard, our findings contrast those of Verschoor et al. (2019) who suggest that allocations deviating from prevailing social norms result in lower levels of contribution and effi-

ciency in public good games. Indeed in our case, granting women decision-making authority increases their willingness to cooperate among themselves, consequently leading to greater efficiency (even if the husband's contribution significantly decreases in that case).[28] This conclusion somehow echoes randomized control trials aimed at promoting joint management of collective resources in developing countries (see Pierotti et al., 2023 for a comprehensive review). In the majority of cases, these interventions lead to improved intrahousehold dynamics, with women participating more in decision-making regarding collective resources. Findings from Côte d'Ivoire suggest that cooperation induced by the intervention can lead to increased efficiency in agricultural production (Donald et al., 2022).

[28] If there is some reluctance of women to deviate from prevailing decision-making processes, cooperation levels elicited in our games may be a lower bound estimate of their willingness to cooperate.

References

Akresh, R., Chen, J. J., & Moore, C. T. (2016). Altruism, cooperation, and efficiency: Agricultural production in polygynous households. *Economic Development and Cultural Change*, *64*(4), 661–696.

Alós-Ferrer, C., & Garagnani, M. (2020). The cognitive foundations of cooperation. *Journal of Economic Behavior & Organization*, *175*, 71–85.

Baland, J.-M., & Ziparo, R. (2018). Intra-household bargaining in poor countries. *Towards gender equity in development*, *69*(1).

Barr, A., Dekker, M., Janssens, W., Kebede, B., & Kramer, B. (2019). Cooperation in polygynous households. *American Economic Journal: Applied Economics*, *11*(2), 266–283.

Dannenberg, A., Lange, A., & Sturm, B. (2014). Participation and commitment in voluntary coalitions to provide public goods. *Economica*, *81*(322), 257–275.

De Jaegher, K. (2021). Common-enemy effects: Multidisciplinary antecedents and economic perspectives. *Journal of Economic Surveys*, *35*(1), 3–33.

Donald, A. A., Goldstein, M. P., & Rouanet, L. M. (2022). *Two heads are better than one: Agricultural production and investment in côte d'ivoire* (Tech. Rep.). The World Bank.

Edlund, L., & Lagerlöf, N.-P. (2006). Individual versus parental consent in marriage: Implications for intra-household resource allocation and growth. *American Economic Review*, *96*(2), 304–307.

Edlund, L., & Lagerlöf, N.-P. (2012). Polygyny and its discontents: Paternal age and human capital accumulation. *Working Paper*.

Iversen, V., Jackson, C., Kebede, B., Munro, A., & Verschoor, A. (2011). Do spouses realise cooperative gains? experimental evidence from rural uganda. *World Development*, *39*(4), 569–578.

Jankowiak, W., Sudakov, M., & Wilreker, B. C. (2005). Co-wife conflict and co-operation. *Ethnology*, 81–98.

Kaucley N'Koué, B. (2015). *Contribution à l'histoire précoloniale des bèbèlibà du territoire de Kobli (nord-ouest du Benin)* (Mémoire de Maitrise). Abomey-Calavi: Université d'Abomey-Calavi.

Kebede, B., Tarazona, M., Munro, A., & Verschoor, A. (2014). Intra-household efficiency: An experimental study from ethiopia. *Journal of African Economies*, *23*(1), 105–150.

Madhavan, S. (2002). Best of friends and worst of enemies: competition and collaboration in polygyny. *Ethnology*, 69–84.

Mammen, K. (2004). All for one or each for her own: Do polygamous families share and share alike. *Columbia University, manuscript*.

Mulder, M. B. (1992). Women's strategies in polygynous marriage: Kipsigis, datoga, and other east african cases. *Human Nature*, *3*, 45–70.

Munro, A. (2018). Intra-household experiments: A survey. *Journal of Economic Surveys*, *32*(1), 134–175.

Munro, A. (2023). Intra-household experiments. *SSRN Electronic Journal*.

Munro, A., Kebede, B., Tarazona, M., & Verschoor, A. (2019). The lion's share: An experimental analysis of polygamy in northern nigeria. *Economic Development and Cultural Change*, *67*(4), 833–861.

Pierotti, R., Delavallade, C., & Kaur Brar, R. (2023). *Engaging men for women's economic empowerment: Overview of the evidence* (Tech. Rep.). The World Bank.

Rossi, P. (2019). Strategic choices in polygamous households: Theory and evidence from senegal. *The Review of Economic Studies*, *86*(3), 1332–1370.

Tertilt, M. (2005). Polygyny, fertility, and savings. *Journal of Political Economy*, *113*(6), 1341–1371.

Verschoor, A., Kebede, B., Munro, A., & Tarazona, M. (2019). Spousal control and efficiency of intra-household decision-making: experiments among married couples in india, ethiopia and nigeria. *The European Journal of Development Research*, *31*, 1171–1196.

Tables

Table 1: Sample Characteristics

	Husbands				Wives				Polygamous Wives		
	All	**Monogamous**	**Polygamous**	**Diff**	**All**	**Monogamous**	**Polygamous**	**Diff**	**Wife 1**	**Wife 2**	**Diff**
Cohabiting household						.	0.52				
Age (years)	44.19	41.64	46.74	**	36.10	34.99	36.66		40.23	33.09	***
Age gap (Wife1-Wife2)						.	7.14				
Age gap (Husband-wife)					8.94	6.65	10.08	***	6.51	13.65	***
Age at marriage					17.91	18.05	17.84		18.03	17.65	
Exchange marriage					0.26	0.21	0.28		0.34	0.22	*
Arranged marriage					0.57	0.49	0.61	*	0.64	0.59	
Mariage Duration (years)					17.62	16.84	18.01		21.26	14.77	***
Household Size	9.48	6.78	12.17	***							
Nb. Children	7.35	4.85	9.86	***	4.94	4.85	4.99		5.36	4.61	*
Ethnic Group											
Biali	0.30	0.29	0.30		0.29	0.28	0.29		0.29	0.29	
Ditamari	0.34	0.35	0.34		0.33	0.33	0.33		0.33	0.34	
M'berlimè	0.28	0.29	0.28		0.29	0.30	0.28		0.30	0.27	
Others	0.08	0.07	0.08		0.09	0.09	0.09		0.08	0.10	
Religion											
Traditional	0.61	0.56	0.66		0.41	0.38	0.42		0.43	0.42	
Christian	0.29	0.34	0.24		0.49	0.50	0.49		0.50	0.48	
Muslim and others	0.10	0.10	0.09		0.10	0.12	0.09		0.07	0.10	
Went to school	0.58	0.59	0.56		0.32	0.37	0.29		0.27	0.31	
Size collective field (hectare)	4.19	3.90	4.48								
Assets (score)	-0.02	-0.07	0.03		0.00	0.22	-0.22	**	-0.23	-0.18	
Occasional work	0.30	0.41	0.20	***	0.24	0.27	0.23		0.21	0.24	
Has individual field					0.85	0.83	0.86		0.86	0.85	
Size individual field (hectare)					1.24	1.26	1.23		1.31	1.16	
Has managed the granary					0.71	0.91	0.62	***	0.74	0.49	***
Husband manage food	0.33	0.23	0.38	**							
Participates in food management					0.51	0.75	0.39	***	0.50	0.28	***
Has a say on collective field					0.33	0.40	0.29		0.27	0.31	
Has a say on individual field					0.74	0.79	0.72		0.74	0.71	
Has an IGA	0.52	0.49	0.55		0.88	0.92	0.86		0.85	0.87	
Number of IGA					1.17	1.26	1.12		1.07	1.17	
Co-wives help each other						.	0.69				
Co-wives in same IGA group						.	0.54				
Knows husband's savings					0.22	0.23	0.22		0.23	0.20	
Passed test easily	0.75	0.73	0.77		0.72	0.83	0.67	***	0.64	0.70	
N	**172**	**86**	**86**		**258**	**86**	**172**		**86**	**86**	

Note: The table presents key descriptive statistics. 'Wife 1 (2)' refers to the wife who entered the polygamous marriage first (later). 'Exchange marriage'=1 if marriage was based on an arrangement between families that avoids bride-price and precludes separation (see details in Section 3), 'Assets' refers to the Asset score derived from Principal Component Analysis. A higher score indicates a greater likelihood of possessing durable assets, such as motorcycles, bicycles, telephones, radio, plows, etc. 'Occasional work' = 1 if the respondent reports occasional work outside the household for a salary. 'Has managed the granary' =1 if the wife has managed the granary in the last 30 days. 'Participates in food management' =1 if, in day-to-day life, the wife participates (either alone or jointly with her co-wife in polygamous households) in decisions of allocation of food (cereal) in the household. 'Has a say on collective/individual field' = 1 if the respondent participates in decisions about what type of crop to grow and how to allocate the harvest, including decisions on how much to sell or store. IGA refers to Income Generating Activities. 'Co-wives help each other'=1 if both co-wives report assisting each other in domestic, agricultural or financial questions in day-to-day life. 'Passed easily the test'= 1 if the respondent passed the comprehension test on the first attempt, and 0 if passed on the second or third attempt before playing (refer to specific questions in the Appendix B.B). Note */**/*** pairwise mean difference significant at 10%/5%/1%.

Table 2: Contribution in equal share games in polygamous households: regression analyses

	Wives			**Husband**
	All	**Wife 1**	**Wife 2**	
	(1)	(2)	(3)	(4)
Polygamous Wife1-Wife2	2.24	0.12	4.36**	
	(1.52)	(2.18)	(2.08)	
Husband-Wife2				−4.19*
				(2.21)
Reference	*Husband-Wife*			*Husband-Wife1*
Individual FE	*Yes*	*Yes*	*Yes*	*Yes*
Mean contribution (Y)	85.10	85.29	84.91	86.57
Observations	344	172	172	172

* p ≤ 0.1, ** p ≤ 0.05, *** p ≤ 0.01.

Note: This table presents variation in contribution rates Y (as percent of initial endowment) in bilateral games in polygamous households using Fixed effect estimation of Equation 1. In all the games, participating players contribute, and the total revenue in the common pot (total contribution*1.5) is shared equally among them. Each column represents the player. Standard errors in parentheses are bootstrapped and clustered at the village level.

Table 3: Average individual shares across games

	Total average	*Husband Alone T1*	*Joint Decision T2*	*Wives alone T3*	*Pairwise t-test*	
	(1)	(2)	(3)	(4)	(3)-(2)	(4)-(2)
Husband	36.75	45.39	39.94	24.92	-5.45***	-20.48***
	(13.98)	(12.09)	(10.97)	(9.82)		
Wife 1	32.28	27.84	30.97	38.04	3.13***	10.20***
	(7.83)	(6.42)	(7.54)	(5.66)		
Wife 2	30.96	26.77	29.08	37.04	2.32**	10.27***
	(7.13)	(6.29)	(5.34)	(5.17)		
Observations	258	86	86	86	172	172

Note: This table presents the average shares (in percentage of total revenue) allocated to each player by the decision maker(s). To construct these share, we proposed three scenarios of revenue in the common pot to the decision makers, and we asked them to allocate the revenue among all players. All players contribute, knowing who defines the rules but unaware of their individual share if they were not involved in decision making. T1 - The husband decides alone on sharing rules; T2 - All spouses decide together on sharing rules; T3 - The wives decide alone on sharing rules. Note */**/*** pairwise mean difference significant at 10%/5%/1%. Standard deviations in parentheses.

Table 4: Average individual contribution in players-set shares games

	Total average	*Husband Alone T1*	*Joint Decision T2*	*Wives alone T3*	*Pairwise t-test*	
	(1)	(2)	(3)	(4)	(3)-(2)	(4)-(2)
Husband	83.86	87.73	87.56	76.28	-0.17	-11.45***
	(22.58)	(20.11)	(20.90)	(24.76)		
Wife 1	79.83	74.24	81.22	84.01	6.98*	9.77***
	(23.02)	(26.72)	(22.33)	(18.40)		
Wife 2	76.92	69.07	80.17	81.51	11.10**	12.44***
	(27.90)	(30.80)	(27.11)	(24.00)		
Observations	258	86	86	86	172	172

Note: This table presents contribution rates as a percentage of the initial endowment for each game. In all the games the players define the sharing rules of the revenue in the common pot. The game treatments include: T1 - The husband decides alone on sharing rules; T2 - All spouses decide together on sharing rules; T3 - The wives decide alone on sharing rules.. Note */**/*** pairwise mean difference significant at 10%/5%/1%. Standard deviation in parentheses.

Table 5: Player-set shares and contributions: regressions analyses

	Wives Shares	**Contributions**
	(1)	(2)
Joint decision T2 (A)	3.13***	−0.17
	(0.92)	(2.08)
Wives alone T3 (B)	10.20***	−11.45***
	(1.15)	(3.45)
T2 × Wife 1 (C)		7.15**
		(3.39)
T2 × Wife 2 (D)	−0.82	11.28***
	(0.87)	(3.92)
T3 × Wife 1 (E)		21.22***
		(4.92)
T3 × Wife 2 (F)	0.07	23.90***
	(0.67)	(4.84)
Reference	*Husband alone (T1)*	
Individual FE	*Yes*	
Coefficients A+C		6.98
Test A+C=0 (p-val)		0.01
Coefficients A+D	2.32	11.10
Test A+D=0 (p-val)	0.00	0.00
Coefficients B+E		9.77
Test B+E=0 (p-val)		0.00
Coefficients B+F	10.27	12.44
Test B+F=0 (p-val)	0.00	0.00
Mean Y	31.62	77.02
Observations	516	774

* p ≤ 0.1, ** p ≤ 0.05, *** p ≤ 0.01.

Note: This table presents variation (in percentage points) in individual share (as percent of the total revenue) and contribution rates (as percent of initial endowment) across games using Fixed effect estimation of Equation 1. In Column 1, only wives are observed (interaction terms contrasting first and second wives) while in column 2 husbands are observed in addition (interactions contrasting husbands and wives 1 and 2). In all the games, the players define the sharing rules. The game treatments include: T1 - The husband decides alone on sharing rules; T2 - All spouses decide together on sharing rules; T3 - The wives decide alone on sharing rules. Standard errors in parentheses are bootstrapped and clustered at the village level.

Table 6: Participation in defining the shares, beliefs and contribution in polygamous households

	All	**Wives**	**Husbands**
	(1)	(2)	(3)
Participate	6.88***	6.73***	7.02**
	(1.90)	(2.04)	(3.12)
Share	0.28**	0.29**	0.27
	(0.14)	(0.14)	(0.19)
Belief about partner	0.39***	0.41***	0.36***
	(0.06)	(0.08)	(0.07)
Individual FE	*Yes*	*Yes*	*Yes*
Mean Contribution (Y)	80.87	79.17	84.27
Observations	774	516	258

* $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$.

Note: This table presents the estimated coefficients of Equation 2 using fixed effect models. The outcome variable is the contribution rate when players establish the sharing rules for the total revenue. The variable 'participate' takes a value of 1 if the player was involved in defining the sharing rules (T1 and T2 for the husband; T2 and T3 for wives). 'Share' represents the individual share in each game. 'Beliefs about partner' indicate the expected average contribution rate of partners (as a percentage of the initial endowment). Standard errors in parentheses are bootstrapped and clustered at the village level.

Table 7: Polygamous wives agency and contribution in bilateral game

	Collective Field	**Food**	**Marriage**	**Savings**	**Mean agency (2-4)**	**Mean agency (1-4)**	**Share in T1**	**Share in T2**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Husband-Wife HpWp (A)	1.48	0.57	−2.36	−6.07	2.48	7.14**	−7.15	−7.51
	(1.97)	(1.31)	(1.66)	(6.13)	(2.78)	(3.04)	(7.57)	(5.57)
HpWp × Have no say on collective field	−4.53*							
	(2.72)							
HpWp × Don't manage food		−7.31**						
		(3.26)						
HpWp × Exchange marriage			0.69					
			(2.84)					
HpWp × Don't know husband's saving				4.17				
				(6.54)				
HpWp × Mean Agency 2					−9.58			
					(6.40)			
HpWp × Mean Agency						−15.83***		
						(6.02)		
HpWp × Husband share in T1							0.11	
							(0.16)	
HpWp × Husband share in T2								0.13
								(0.14)
Reference (ref.)					*Wife1-Wife2*			
Individual FE					*Yes*			
Coeffients A+(A × agency indicator)	-3.05	-6.74	-1.67	-1.90	-7.10	-8.70	-7.04	-7.38
Test A+ (A × agency)=0 (p-val)	0.17	0.02	0.51	0.27	0.09	0.02	0.34	0.17
Mean of agency indicator	0.50	0.38	0.17	0.92	0.49	0.50	45.39	39.94
Observations	256	344	344	344	344	256	344	344

* p ≤ 0.1, ** p ≤ 0.05, *** p ≤ 0.01.

Note: This table presents the estimated coefficients of Equation 1 using fixed effect models. The outcome variable is the contribution rate in polygamy in bilateral games with an equal share of the revenue in the common pot. The table compares the contribution rates of polygamous wives when playing with their husbands (HpWp) versus when playing with their co-wives (Wife1-Wife2) while interacting with the following lack of agency proxies: "Have no say on collective fields" equals 1 if the two wives declared having no say in the management of collective fields; "Don't manage food" equals 1 if the wives rarely manage the distribution of cereals (as reported by the husband); "exchange marriage" equals 1 if both wives' marriage was based on an arrangement between families that avoids bride-price and precludes separation (see details in Section 3); "Don't know husband's saving" equals 1 if wives declare having no information on their husbands' savings. Mean Agency represents the simple average of lack of agency indicators. Mean Agency 2 considers 3 indicators of agency (Due to missing data in the variable 'no say on collective field'). Husband share in T1 and T2 represents the individual share allocated to the husband when he decides alone on sharing rules (T1) or when all spouses decide together (T2), respectively. Standard errors in parentheses are bootstrapped and clustered at the village level.

Table 8: Polygamous wives agency and husband shares

	Collective Field	Food	Marriage	Savings	Mean agency (2-4)	Mean agency (1-4)	Share in T1	Share in T2
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Joint decision T2 (A)	−3.44	−5.10***	−5.38***	−0.48	−3.03	−1.31		
	(2.43)	(1.48)	(1.38)	(6.29)	(2.88)	(4.66)		
Wives alone T3 (B)	−17.14***	−19.41***	−19.09***	−11.23*	−11.32**	−10.79*	14.17***	6.20
	(2.45)	(2.50)	(2.09)	(6.08)	(5.42)	(5.66)	(3.20)	(5.93)
T2 × Have no say on collective field	−2.62							
	(3.32)							
T3 × Have no say on collective field	−5.95*							
	(3.40)							
T2 × Don't manage food		−0.91						
		(1.52)						
T3 × Don't manage food		−2.79						
		(3.50)						
T2 × Exchange marriage			−0.40					
			(3.17)					
T3 × Exchange marriage			−7.96					
			(5.54)					
T2 × Don't know husband's saving				−5.42				
				(6.57)				
T3 × Don't know husband's saving				−10.07*				
				(5.82)				
T2 × Mean Agency 2					−4.92			
					(4.58)			
T3 × Mean Agency 2					−18.61*			
					(9.90)			
T2 × Mean Agency						−6.89		
						(8.09)		
T3 × Mean Agency						−18.66		
						(11.49)		
T3 × Husband share in T1							−0.64***	
							(0.09)	
T3 × Husband share in T2								−0.67***
								(0.14)
Reference					*Husband alone (T1)*			
Individual FE					*Yes*			
Coefficients A+(A × Agency)	-6.06	-6.01	-5.78	-5.89	-7.95	-8.19		
Test A+(A × Agency)=0 (p-val)	0.00	0.00	0.03	0.00	0.00	0.03		
Coefficients B+(B × Agency)	−23.09	−22.19	−27.05	−21.30	−29.92	−29.45	13.53	5.53
Test B+(B × Agency)=0 (p-val)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34
Mean of agency indicator	0.50	0.38	0.17	0.92	0.49	0.50	45.39	39.94
Observations	192	258	258	258	258	192	172	172

* p ≤ 0.1, ** p ≤ 0.05, *** p ≤ 0.01.

Note: This table presents the estimated coefficients of Equation 3 using fixed effect models. The outcome variable is the individual share of the husband when players define the rules of allocation of the revenue in the common pot. The table presents the change in the share of polygamous husbands in T1 (Husband decides alone on sharing rules), T2 (all spouses decide together) and T3 (co-wives decide alone); interacting with the following lack of women's agency proxies: "Have no say on collective fields" equals 1 if the two wives declared having no say in the management of collective fields; "Don't manage food" equals 1 if the wives rarely manage the distribution of cereals (as reported by the husband); "exchange marriage" equals 1 if both wives' marriage was based on an arrangement between families that avoids bride-price and precludes separation (see details in Section 3); "Don't know husband's saving" equals 1 if wives declare having no information on their husbands' savings. Mean Agency represents the simple average of lack of agency indicators. Mean Agency 2 considers 3 indicators of agency (Due to missing data in the variable 'no say on collective field'). Husband share in T1 and T2 represents the individual share allocated to the husband when he decides alone on sharing rules (T1) or when all spouses decide together (T2), respectively. Standard errors in parentheses are bootstrapped and clustered at the village level.

Table 9: Household efficiency across games: averages

	Equal Share	**Husband alone (T1)**	**Joint Decision(T2)**	**Wives alone(T3)**
	(A)	(B)	(C)	(D)
Monogamous Husband-Wife (1)	90.90	79.71	82.33	82.44
Polygamous Husband-Wife1 (2)	86.95			
Polygamous Husband-Wife2 (3)	83.60			
Polygamous Wife1-Wife2 (4)	86.22			
Polygamous Husband-Wife1-Wife2 (5)	82.89	77.02	82.98	80.60
Pairwise t-test (p-values)				
(1) vs (2)	0.08			
(1) vs (3)	0.00			
(1) vs (4)	0.06			
(1) vs (5)	0.00	0.36	0.83	0.47
N	86	86	86	86

Note: This table presents rates of efficiency, defined as the share of actual gain in the maximum potential gain (full cooperation gain). Each row represents the players involved in the game. In the "Equal share" games, all the participating players contribute and the total revenue in the common pot (total contribution*1.5) is shared equally among players. In T1, the husband makes the allocation decisions for the revenue in the common pot alone; in T2 all spouses decide together on sharing rules; In T3 the wives (wife) decide(s) alone on sharing rules. The four penultimate lines report the p-values of the test of equality of means (of efficiency).

Table 10: Household efficiency across games: regression analysis

	Equal shares (bilateral)		**Player-set shares**
	(1)	(2)	(3)
Polygamous Husband Wife1	−3.95**	−5.10*	
	(1.85)	(2.97)	
Polygamous Husband-Wife2	−7.30***	−8.44**	
	(2.25)	(3.57)	
Polygamous Wife1-Wife2	−4.68**	−5.82*	
	(2.37)	(3.30)	
Joint Decision T2 (A)			5.97***
			(1.38)
Wives alone T3 (B)			3.59**
			(1.55)
T2 × Monogamous (C)			−3.35
			(2.65)
T3 × Monogamous (D)			−0.85
			(2.74)
Monogamous			2.68
			(4.17)
Reference	*Monogamous Husband-Wife*		*Husband alone*
Controls	*No*	*Yes*	*Yes*
Coefficients A+C			2.62
Test A+C=0 (p-val)			0.31
Coefficients B+D			2.73
Test B+D=0 (p-val)			0.14
Mean Efficiency (Y)	86.92	86.92	80.85
Observations	344	344	516

* p ≤ 0.1, ** p ≤ 0.05, *** p ≤ 0.01.

Note: This table presents the variation in efficiency rates across treatments using OLS estimation of Equation 4. Efficiency is defined as the proportion of actual gain to the maximum potential gain (full cooperation gain). In the "Equal share" games, all participating players contribute, and the total revenue in the common pot (total contribution*1.5) is shared equally among them. The first three rows present the players involved in the bilateral games with equal shares. In Player-set share games, the decision-maker regarding sharing rules varies. In T1, the husband makes the allocation decisions for the revenue in the common pot alone; in T2, all spouses decide together on sharing rules; in T3, the wives (or wife) decide(s) alone on sharing rules. Controls include: enumerator Fixed Effects (FE), game order, number of children, husband age, husband ethnicity, husband religion, husband education, whether the husband works outside the household, household assets, and whether the husband has an Income-Generating Activity. Standard errors in parentheses are bootstrapped and clustered at the village level.

Appendix

A Additional Tables and Figures

Table 11: Contribution in equal share games: averages

Partner	*Monogamous HH*		*Polygamous HH*			
	Husband	Wife	Husband	Wife 1	Wife 2	*test diff=0*
Player						
Monogamous HH						
Husband		92.21				
Wife	89.59					
Polygamous HH						
Husband				88.66	84.48	0.22
Wife 1			85.23		85.35	0.97
Wife 2			82.73	87.09		0.22
Three players games			85.52	80.35	82.79	

Note: This table presents contribution rates as a percentage of the initial endowment for each game. Each row corresponds to one player and each column to a partner (for example, the figure reported in the first column indicates that monogamous wives contribute on average almost 90% of their endowment when playing with their husband). The last column reports the results of test of equality of means across partners. In all these games, participating players contribute, and the total revenue in the common pot (total contribution*1.5) is shared equally among them. The last column presents the p-values of tests on the equality of means.

Table 12: Average individual shares across games

	Total average	*Husband Alone T1*	*Joint Decision T2*	*Wives alone T3*	*Pairwise t-test*	
	(1)	(2)	(3)	(4)	(3)-(2)	(4)-(2)
Polygamous Husband	36.75	45.39	39.94	24.92	-5.45***	-20.48***
	(13.98)	(12.09)	(10.97)	(9.82)		
Polygamous Wife 1	32.28	27.84	30.97	38.04	3.13***	10.20***
	(7.83)	(6.42)	(7.54)	(5.66)		
Polygamous Wife 2	30.96	26.77	29.08	37.04	2.32**	10.27***
	(7.13)	(6.29)	(5.34)	(5.17)		
Monogamous Husband	50.07	57.92	51.08	41.23	-6.84***	-16.69***
	(14.91)	(15.28)	(12.56)	(11.76)		
Monogamous Wife	49.93	42.08	48.92	58.77	6.84***	16.69***
	(14.91)	(15.28)	(12.56)	(11.76)		
Observations	258	86	86	86	172	172

Note: This table presents the average shares (in percentage of total revenue) allocated to each player by the decision maker(s). To construct these share, we proposed three scenarios of revenue in the common pot to the decision makers, and we asked them to allocate the revenue among all players. All players contribute, knowing who defines the rules but unaware of their individual share if they were not involved in decision making. T1 - The husband decides alone on sharing rules; T2 - All spouses decide together on sharing rules; T3 - The wives decide alone on sharing rules. Note */**/*** pairwise mean difference significant at 10%/5%/1%. Standard deviations in parentheses.

Table 13: Average individual contribution in players-set shares games

	Total average	*Husband Alone T1*	*Joint Decision T2*	*Wives alone T3*	*Pairwise t-test*	
	(1)	(2)	(3)	(4)	(3)-(2)	(4)-(2)
Polygamous Husband	83.86	87.73	87.56	76.28	-0.17	-11.45***
	(22.58)	(20.11)	(20.90)	(24.76)		
Polygamous Wife 1	79.83	74.24	81.22	84.01	6.98*	9.77***
	(23.02)	(26.72)	(22.33)	(18.40)		
Polygamous Wife 2	76.92	69.07	80.17	81.51	11.10**	12.44***
	(27.90)	(30.80)	(27.11)	(24.00)		
Monogamous Husband	82.52	84.53	84.30	78.72	-0.23	-5.81
	(22.64)	(23.80)	(21.39)	(22.44)		
Monogamous Wife	80.47	74.88	80.35	86.16	5.47	11.28***
	(25.86)	(27.86)	(27.51)	(20.59)		
Observations	258	86	86	86	172	172

Note: This table presents contribution rates as a percentage of the initial endowment for each game. In all the games the players define the sharing rules of the revenue in the common pot. The game treatments include: T1 - The husband decides alone on sharing rules; T2 - All spouses decide together on sharing rules; T3 - The wives decide alone on sharing rules.. Note */**/*** pairwise mean difference significant at 10%/5%/1%. Standard deviation in parentheses.

Table 14: Player-set shares and contributions: regressions analyses

	Wives Shares		**Contributions**	
	Monogamous	**Polygamous**	**Monogamous**	**Polygamous**
	(1)	(2)	(3)	(4)
Joint decision T2 (A)	6.84***	3.13***	−0.23	−0.17
	(1.42)	(0.92)	(2.65)	(2.08)
Wives alone T3 (B)	16.69***	10.20***	−5.81***	−11.45***
	(2.96)	(1.15)	(2.21)	(3.45)
T2 × Wife 1 (C)			5.70	7.15**
			(4.24)	(3.39)
T2 × Wife 2 (D)		−0.82		11.28***
		(0.87)		(3.92)
T3 × Wife 1 (E)			17.09***	21.22***
			(4.65)	(4.92)
T3 × Wife 2 (F)		0.07		23.90***
		(0.67)		(4.84)
Reference	*Husband alone (T1)*		*Husband alone (T1)*	
Individual FE	*Yes*		*Yes*	
Coefficients A+C			5.47	6.98
Test A+C=0 (p-val)			0.13	0.01
Coefficients A+D		2.32		11.10
Test A+D=0 (p-val)		0.00		0.00
Coefficients B+E			11.28	9.77
Test B+E=0 (p-val)			0.00	0.00
Coefficients B+F		10.27		12.44
Test B+F=0 (p-val)		0.00		0.00
Mean Y	49.93	31.62	81.49	77.02
Observations	258	516	516	774

* p ≤ 0.1, ** p ≤ 0.05, *** p ≤ 0.01.

Note: This table presents variation (in percentage points) in individual share (as percent of the total revenue) and contribution rates (as percent of initial endowment) across games using Fixed effect estimation of Equation 1. In Column 1 and 2, only wives are observed (interaction terms contrasting first and second wives in polygamy) while in column 3 and 4 husbands are observed in addition (interactions contrasting husbands and wife/wives). In monogamous households Wife 1 refers to the unique wife. In all the games, the players define the sharing rules. The game treatments include: T1 - The husband decides alone on sharing rules; T2 - All spouses decide together on sharing rules; T3 - The wives decide alone on sharing rules. Standard errors in parentheses are bootstrapped and clustered at the village level

Table 15: Participation, beliefs and contribution: regressions analyses

	All		**Wives**		**Husbands**	
	(1)	(2)	(3)	(4)	(5)	(6)
Participate (A)	6.24***	4.08**	6.38***	4.64	5.60***	3.49**
	(1.42)	(2.08)	(1.63)	(3.88)	(1.49)	(1.76)
Participate × Polygamous (B)		2.79		2.09		3.53
		(3.01)		(4.88)		(3.80)
Share (C)	0.26***	0.26***	0.29***	0.31***	0.24**	0.21**
	(0.09)	(0.09)	(0.09)	(0.12)	(0.10)	(0.10)
Share × Polygamous (D)		0.02		−0.02		0.06
		(0.16)		(0.19)		(0.21)
Beliefs about partner (E)	0.27***	0.12*	0.31***	0.13	0.21***	0.09
	(0.05)	(0.06)	(0.08)	(0.11)	(0.06)	(0.08)
Beliefs about partner × Polygamous (F)		0.27***		0.28**		0.26***
		(0.07)		(0.11)		(0.10)
Individual FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Coefficients A+B		6.88		6.73		7.02
Test A+B=0 (p-val)		0.00		0.00		0.02
Coefficients C+D		0.28		0.29		0.27
Test C+D=0 (p-val)		0.04		0.03		0.15
Coefficients E+F		0.39		0.41		0.36
Test E+F=0 (p-val)		0.00		0.00		0.00
Mean Contribution (Y)	81.08	81.08	79.52	79.52	83.52	
Observations	1290	1290	774	774	516	516

* $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$.

Notes: This table presents the estimated coefficients of Equation 2 using fixed effect estimations. The outcome variable is the contribution rate when players establish the sharing rules for the total revenue. The variable 'participate' takes a value of 1 if the player was involved in defining the sharing rules (T1 and T2 for the husband; T2 and T3 for wives). 'Share' represents the individual share in each game. 'Beliefs about partner' indicate the guess about the contribution rate of the playing partner (as a percentage of the initial endowment). Standard errors in parentheses are bootstrapped and clustered at the village level.

Table 16: Participation, beliefs and contribution in polygamous unions: regressions analyses

	All		**Wives**		**Husband**
	(1)	(2)	(3)	(4)	(5)
Participate (A)	6.88***	7.02**	4.10	2.12	6.46**
Participate × Wife 1 (B)		−2.92			
Participate × Wife 2 (C)		2.23	5.16	6.20	
Share (D)	0.28**	0.27	0.36**	0.26*	0.26
Share × Wife 1 (E)		0.09			
Share × Wife 2 (F)		−0.03	−0.12	−0.19	
Beliefs about partner (G)	0.39***	0.36***	0.46***		
Beliefs about partner × Wife 1 (H)		0.11			
Beliefs about partner × Wife 2 (I)		−0.00	−0.11		
Beliefs about Husband (J)				0.01	
Beliefs about Husband × Wife 2 (K)				−0.03	
Beliefs about Co-wife (L)				0.48***	
Beliefs about Co-wife × Wife 2 (M)				−0.10	
Beliefs about Wife 2					−0.08
Beliefs about Wife 1					0.44***
Individual FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Coefficients A+B		4.10			
Test A+B=0 (p-val)		0.11			
Coefficients A+C		9.26	9.26	8.32	
Test A+C=0 (p-val)		0.01	0.01	0.01	
Coefficients D+E		0.36			
Test D+E=0 (p-val)		0.03			
Coefficients D+F		0.24	0.24	0.07	
Test D+F=0 (p-val)		0.32	0.32	0.74	
Coefficients G+H		0.46			
Test G+H=0 (p-val)		0.00			
Coefficients G+I		0.35	0.35		
Test G+I=0 (p-val)		0.00	0.00		
Coefficients J+K				−0.02	
Test J+K=0 (p-val)				0.84	
Coefficients L+M				0.38	
Test L+M=0 (p-val)				0.00	
Observations	774	774	516	516	258

* p ≤ 0.1, ** p ≤ 0.05, *** p ≤ 0.01.

Note: This table presents the estimated coefficients of Equation 2 using fixed effect estimations for polygamous households. The outcome variable is the contribution rate when players establish the sharing rules for the total revenue. The variable 'participate' takes a value of 1 if the player was involved in defining the sharing rules (T1 and T2 for the husband; T2 and T3 for wives). 'Share' represents the individual share in each game. 'Beliefs about partner (wife i, husband)' indicate the guess about the contribution rate of the playing partner, husband or wife i (as a percentage of the initial endowment). Standard errors in parentheses are bootstrapped and clustered at the village level.

Table 17: Game order and Husband share in T3

	Monogamous		**Polygamous**	
	(1)	(2)	(3)	(4)
T2 before T3	1.23	−10.73	3.43	−10.40
	(3.82)	(12.49)	(3.57)	(11.08)
T2 before T3 × Husband share in T2		0.23		0.34
		(0.25)		(0.27)
Husband Share in T2		0.04		−0.07
		(0.29)		(0.19)
Reference		*T3 played before T2*		
Controls		*Yes*		
Mean husband share in T2		51.08		39.94
Mean T2 before T3		0.71		0.56
Observations	86	86	86	86

Note: This table compares the shares of husbands in T3 in games where T2 (all spouses decide on the sharing rules) was played before T3 (wives/wife decide(s) alone on the sharing rules) and games where T3 was played before T2 using OLS estimation. Controls include: number of children, age, ethnicity, religion, education, whether the individual works outside the household, household assets, whether the individual has an Income-Generating Activity and village Fixed Effects. Standard errors in parentheses are clustered at the village level.

Table 18: Selection: Contribution with Strangers (Equal share)

	Wives	**Husbands**
Polygamous	−0.76	0.19
	(0.90)	(0.97)
Reference	*Monogamous*	*Monogamous*
Ind. & HH controls	*Yes*	*Yes*
Mean of dep.var	50.55	51.28
N	256	172

Notes: Coefficients are estimated by OLS and standard errors are clustered at the village level. * p ≤ 0.1, ** p ≤ 0.05, *** p ≤ 0.01.

Note: This table compares contribution rates of polygamous and monogamous spouses when playing with strangers (individuals outside their household) using OLS estimation. Controls include: relation to the household head, number of children, age, ethnicity, religion, education, whether the individual works outside the household, household assets, whether the individual has an Income-Generating Activity and village Fixed Effects. Standard errors in parentheses are clustered at the village level.

Table 19: Contribution in bilateral game and co-wives' individual agency

	Collective Field	**Food**	**Marriage**	**Savings**	**Mean agency (1-4)**	**Mean agency (2-4)**
	(1)	(2)	(3)	(4)	(5)	(6)
Husband-Wife HpWp (A)	−2.78	0.52	−2.98*	−1.76	1.13	−0.08
	(3.04)	(2.22)	(1.65)	(3.72)	(4.80)	(2.60)
HpWp × Has no say on collective field	2.22					
	(3.29)					
HpWp × Doesn't manage food		−4.52				
		(3.60)				
HpWp × Exchange marriage			2.67			
			(3.23)			
HpWp × Doesn't know husband's saving				−0.61		
				(4.70)		
HpWp × Mean Agency 1					−3.87	
					(8.11)	
HpWp × Mean Agency 2						−3.86
						(5.56)
Reference (ref.)				*Wife1-Wife2*		
Individual FE				*Yes*		
Coeffients A+(A × agency indicator)	-0.56	-4.00	-0.31	-2.37	-2.74	-3.94
Test A+ (A × agency)=0 (p-val)	0.78	0.08	0.92	0.24	0.50	0.27
Mean of agency indicator	0.71	0.61	0.28	0.78	0.60	0.56
Observations	250	344	344	344	250	344

* p ≤ 0.1, ** p ≤ 0.05, *** p ≤ 0.01.

Notes: This table presents the estimated coefficients of Equation 1 using fixed effect models. The outcome variable is the contribution rate in polygamy in bilateral games with an equal share of the revenue in the common pot. The table compares the contribution rates of polygamous wives when playing with their husbands (HpWp) versus when playing with their co-wives (Wife1-Wife2) while interacting with the following lack of agency proxies: "Has no say on collective fields" equals 1 if the wife declared having no say in the management of collective fields; "Doesn't manage food" equals 1 if the wife rarely manages the distribution of cereals; "exchange marriage" equals 1 if the wife's marriage was based on an arrangement between families that avoids bride-price and precludes separation (see details in Section 3); "Doesn't know husband's saving" equals 1 if the wife declare having no information on her husband's savings. Mean Agency represents the simple average of lack of agency indicators. Mean Agency 2 considers 3 indicators of agency (Due to missing data in the variable 'no say on collective field'). Standard errors in parentheses are bootstrapped and clustered at the village level.

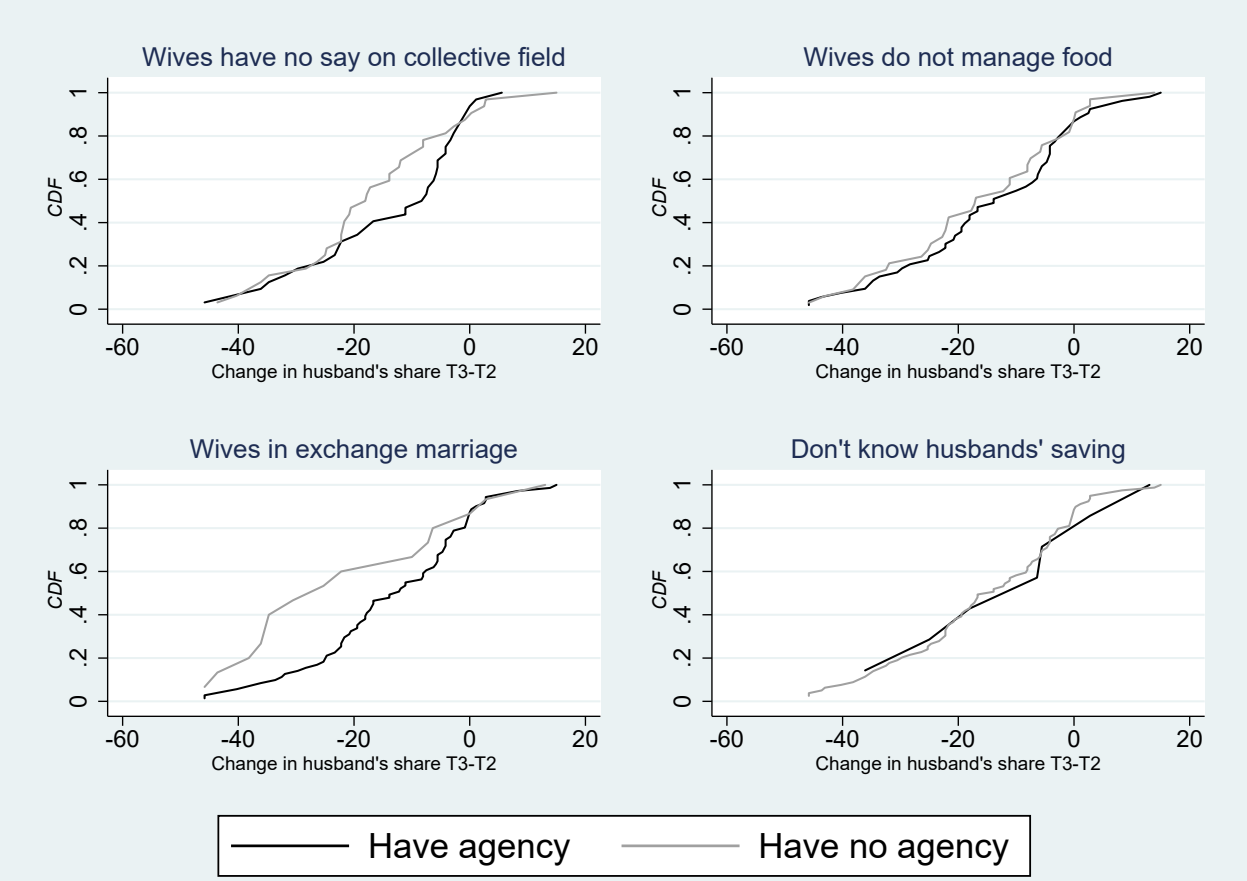
Table 20: Husband share and polygamous wife' individual agency

	Collective Field	**Food**	**Marriage**	**Savings**	**Mean agency (2-4)**	**Mean agency (1-4)**
	(1)	(2)	(3)	(4)	(5)	(6)
Joint decision T2 (A)	−3.34	−5.32***	−4.95***	−4.95	−3.70	−1.25
	(2.42)	(1.58)	(1.44)	(3.05)	(3.20)	(4.22)
Wives alone T3 (B)	−13.98***	−19.09***	−18.60***	−17.34***	−11.85**	−7.66
	(3.23)	(2.94)	(1.72)	(3.09)	(4.88)	(5.42)
T2 × Has no say on collective field	−2.29					
	(2.80)					
T3 × Has no say on collective field	−8.37**					
	(3.70)					
T2 × Doesn't manage food		−0.22				
		(1.31)				
T3 × Doesn't manage food		−2.27				
		(2.98)				
T2 × Exchange marriage			−1.80			
			(2.09)			
T3 × Exchange marriage			−6.74**			
			(3.28)			
T2 × Doesn't know husband's saving				−0.63		
				(3.09)		
T3 × Doesn't know husband's saving				−3.99		
				(4.02)		
T2 × Mean Agency 2					−3.13	
					(4.44)	
T3 × Mean Agency 2					−15.45*	
					(9.07)	
T2 × Mean Agency 1						−6.18
						(6.09)
T3 × Mean Agency 1						−20.41**
						(9.24)
Reference				*Husband alone (T1)*		
Individual FE				*Yes*		
Coefficients A+(A × Agency)	-5.63	-5.54	-6.74	-5.59	-6.83	-7.43
Test A+(A × Agency)=0 (p-val)	0.00	0.00	0.00	0.00	0.00	0.00
Coefficients B+(B × Agency)	−22.35	−21.36	−25.33	−21.34	−27.30	−28.07
Test B+(B × Agency)=0 (p-val)	0.00	0.00	0.00	0.00	0.00	0.00
Mean of agency indicator	0.71	0.61	0.28	0.78	0.56	0.60
Observations	375	516	516	516	516	375

* p ≤ 0.1, ** p ≤ 0.05, *** p ≤ 0.01.

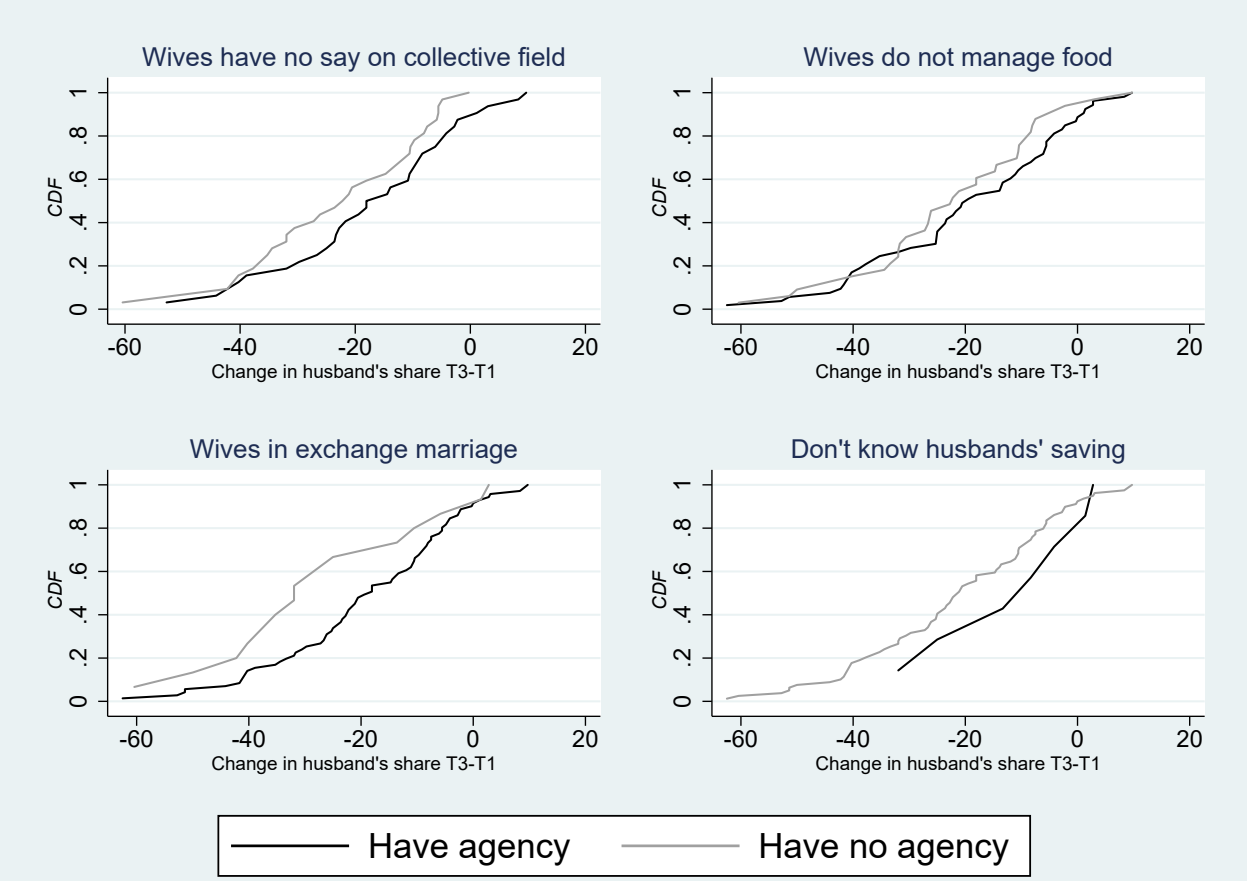
Note: This table presents the estimated coefficients of Equation 3 using fixed effect models. The outcome variable is the individual share of the husband when players define the rules of allocation of the revenue in the common pot. The table presents the change in the share of polygamous husbands in T1 (Husband decides alone on sharing rules), T2 (all spouses decide together) and T3 (co-wives decide alone); interacting with the following lack of woman's individual agency proxies: "Has no say on collective fields" equals 1 if the wife declared having no say in the management of collective fields; "Doesn't manage food" equals 1 if the wife rarely manage the distribution of cereals; "exchange marriage" equals 1 if the wife's marriage was based on an arrangement between families that avoids bride-price and precludes separation (see details in Section 3); "Doesn't know husband's saving" equals 1 if the wife declares having no information on her husband's savings. Mean Agency represents the simple average of lack of agency indicators. Mean Agency 2 considers 3 indicators of agency (Due to missing data in the variable 'no say on collective field'). Standard errors in parentheses are bootstrapped and clustered at the village level.

Figure 1: Change in Husband share T3-T2 and wives agency



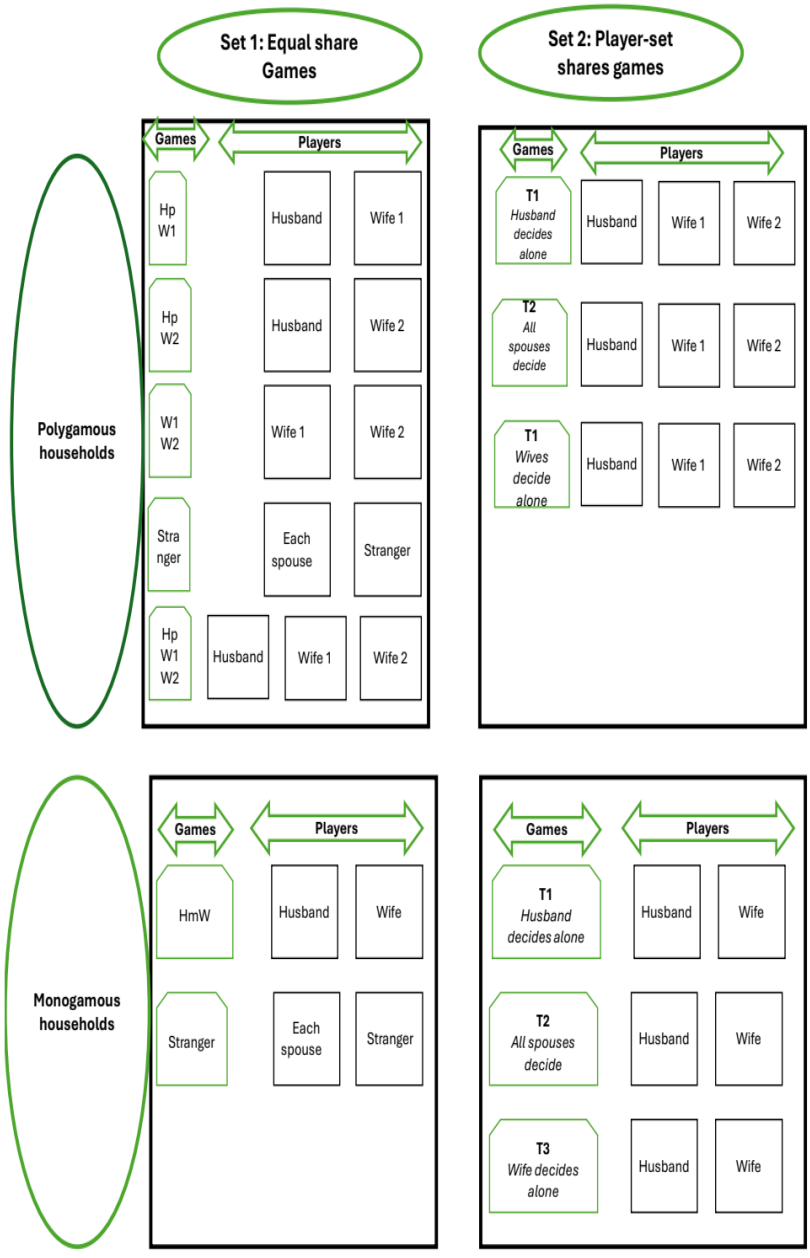
Note: This figure illustrates the cumulative distribution of the difference in polygamous husband shares when co-wives define the sharing rules of the common pot (T3) vs when all spouses jointly define the shares (T2), considering various proxies for women's lack of agency. 'Have no agency' indicates that the two co-wives report lacking agency, while 'Have agency' indicates that they possess agency.

Figure 2: Change in Husband share T3-T1 and wives agency



Note: This figure illustrates the cumulative distribution of the difference in polygamous husband shares when co-wives define the shares (T3) vs when the husband defines the sharing rules (T1), considering various proxies for women's lack of agency. 'Have no agency' indicates that the two co-wives report lacking agency, while 'Have agency' indicates that they possess agency.

Figure 3: Games played with monogamous and polygamous spouses



Note: This figure presents the games played with spouses. All games were public good games. Players decided how much to contribute to a common pot from an initial endowment of 2000 FCFA. Contributions to the common pot were multiplied by 1.5 before being allocated to players. In Set 1 games, the common pot was equally distributed across players. In Set 2 games the shares were set by (some) players (before contributions took place) and not revealed to other players . Games of Set 1 were played before games in Set 2. Within sets, the order of games was randomized. Hp(m) stands for a polygamous (monogamous) husband, W1(2) denotes the first (second) polygamous wife, and W represents the monogamous wife.

B Script

Below is the script of a session involving polygamous households (sessions involving monogamous households followed the same - simplified - structure). Each session included four couples (composed of two co-wives and one husband in the case of polygamous unions and a wife and a husband in the case of monogamous unions). We began by presenting the objectives of the games to the group, followed by an explanation of the principles using real examples. Each household was then isolated and assigned to one enumerator to play the games. The script of the bilateral games was largely inspired by Barr et al. (2019)

Presentation by the supervisor and translation by an enumerator.

Welcome, and thank you for taking the time to join us today. We are researchers from the University of Namur in Belgium. We have invited you here to participate in activities that will help us learn more about how you make decisions regarding the management of common resources in your household. For this purpose, you will play games that involve making decisions about money. We will use real bills for the game, which initially do not belong to you. However, please note that at the end of the activity, you will receive compensation based on the decisions made during the game. Therefore, it is important to take these decisions seriously.

The decisions you will make are not difficult, and there are no right or wrong answers. All you need to think about is making decisions that would correspond to your choices in real life. It is important to seriously consider your decisions because they will affect the amount you bring home. Before asking you to make decisions, we will tell you everything you need to know about the principles of the game, but first, we want to specify a few things.

First, for the game, we will use money that is not yours, but in the end, you will receive payment in money that belongs to you. Let us clarify that the money we will use for payment is not ours. We belong to a research organization that has given us the money to use for research.

Second, this study is about how each of you makes your own decisions. Therefore, it is important that you do not talk or communicate with each other about your decisions unless the enumerator asks you to. Note that you will make decisions privately, and your choices will determine the final compensation that you and your game partners will receive at the end of the activity. Be aware that your partners will never know the decisions you have made or the amount of your compensation (we will come back to this later).

After explaining these general principles, the supervisor took time to detail the rules of the games, starting with the first part of the equal share games. For each scenario, we systematically reminded the players that their contributions and payments were private, and the game chosen for the final payment would remain unknown to all players. The following wording was used: "Note that no one will know what you contributed, what you earned, or

the variant chosen randomly for the final payment in real money."

B.A First Part: Equal Share Games

The game begins when we give each of you an envelope like this one. [HOLD THE ENVELOPE.] It contains money. [TAKE OUT THE MONEY INSIDE AND SHOW IT.] The person you are playing the game with will also receive an envelope with the same amount of money.

Initially, you will make decisions in pairs. You will consider that each of you has a sum of money [Enumerator: give two members of the household (husband and one co-wife) the initial endowment] and that you must contribute to buy seeds for your family field, which belongs to only the two of you. The family field is located in such a way that each of you will go to the market to buy fertilizer and directly put it into the family field. Your partner will not know how much fertilizer has been put into the field. Let's consider this common urn [Enumerator: show the common urn] as representing the family field. At harvest, the production will be sold, and you will obtain 1.5 time what you invested. In other words, from the amount in the common urn, we will add half, and the grand total will represent the money you earn from selling the production on the field that belongs to both of you. This amount will be shared equally between you. For example, if each of you received 2000 FCFA [Enumerator: Take an envelope from one spouse's hands and show 2000 FCFA] and each used the entire amount to purchase seeds and inputs [Enumerator: ask each of the two spouses to put 2000 FCFA into the common urn], there will be a total of 4000 FCFA in the common pot [Enumerator: Open the common pot and show 4000 FCFA], and we will thus add half of 4000 FCFA, which is 2000 FCFA [Enumerator: Add 2000 FCFA to the common pot, making it 6000 FCFA. Enumerator: show the 6000 FCFA in the common pot representing the amount from selling the production of your common field. Each will therefore have 3000 FCFA [Enumerator: Give each 3000 FCFA]. Each will have earned 1000 FCFA more. If at the end of the activities, this variant is chosen randomly for the final payment of one of you , she / he will receive 3000 FCFA. [Enumerator: Show it].

[Enumerator: Take back the envelopes and give each spouse the envelope containing 2000 FCFA]. Another scenario. If each keeps 1000 FCFA in their pocket and only uses 1000 FCFA for purchasing seeds [Enumerator: ask each spouse to put 1000 FCFA into the common urn and keep 1000 FCFA in the envelope], There will be a total of 2000 FCFA in the common pot [Enumerator: Show the 2000 FCFA in the urn], and we will therefore add an additional 1000 [Enumerator: add 1000 FCFA]; making it 3000 representing what you earned when you sold the production on the common field. So each will ultimately have the 1000 [Enumerator: show the 1000 FCFA that remained in each spouse's hands] they kept, and 1500 coming from the sale of the production [Enumerator: give each 1500], making it 2500 FCFA for each [Enumerator: show the total each receives]. Each will have earned an additional 500 FCFA

from their initial two thousand. If at the end of the activities, this variant is chosen for the final payment, we will therefore give each of you 2500 FCFA in real money individually. In short, the more you contribute to the common pot, the greater the gain. If you decide not to put anything in the urn, each returns home with their 2000 FCFA.

ATTENTION: As you will never know what your partner contributed, you will not always put the same amount. Let's look at an example [Enumerator: give the envelopes to the husband and one wife again]. If the husband uses 1500 FCFA for purchasing seeds [Enumerator: ask the husband to put 1500 FCFA into the common urn] and keeps 500 FCFA for himself, and the wife only uses 500 FCFA [Enumerator: ask the wife to put 500 FCFA into the common urn] and keeps 1500 FCFA for herself. There will be 2000 FCFA in the common urn. We will add half, which is 1000 FCFA, so there will be 3000 FCFA in total, considered as the amount earned from the sale. So each will have 1500 FCFA resulting from the sale of the production on the collective field. The husband will therefore have a total of 2000 FCFA [Enumerator: show the 2000 FCFA in the husband's hands] and will have earned nothing more than his initial situation, and the wife will have 3000 FCFA [Enumerator: 3000 FCFA in the wife's hands]. So she has earned 1000 FCFA. If at the end of the activities, this variant is chosen randomly for the final payment of the husband, he will receive 2000 FCFA. If it is chosen for the payment of a wife, she will receive 3000 FCFA.

Let's look at another example [Enumerator: give the envelopes to the husband and one wife again]. If the wife uses 2000 FCFA for purchasing seeds [Enumerator: ask the wife to put 2000 FCFA into the common urn] and keeps nothing for herself, and the husband keeps all 2000 for himself and does not contribute anything [Enumerator: ask the husband to pretend to contribute and put nothing into the common urn]. There will be 2000 FCFA in the common urn [Enumerator: show 2000 FCFA in the common urn]. We will add half, which is 1000 FCFA, so there will be 3000 FCFA in total [Enumerator: show 3000 FCFA in the common urn], considered as the amount from the sale. So each will have 1500 FCFA [Enumerator: give each 1500 FCFA] resulting from the sale on the collective field. The husband will therefore have a total of 3500 FCFA [Enumerator: show the 2000 FCFA in the husband's hands] and will have earned 1500 FCFA more than his initial situation, and the wife will have 1500 FCFA [Enumerator: 1500 FCFA in the wife's hands]. So she has lost 500 FCFA. If at the end of the activities, this variant is chosen randomly for the final payment of the husband, he will receive 3500 FCFA. If it is chosen for the payment of a wife, she will receive 1500 FCFA.

Consider now that the field belongs to all three of you, and you all must contribute to purchase seeds. You will consider that each of you has a sum of money [Enumerator: give each spouse an envelope with 2000 FCFA as the initial endowment]. As you will never know what your partners used for purchasing seeds, you will not always put the same amount. Let's look at an example. If Mr. *name_husband* uses 2000 FCFA for purchasing seeds [Enumerator: ask Mr. to put 2000 FCFA into the common urn] and keeps nothing for

himself, and $name\_wife1$ uses 500 FCFA and keeps 1500 FCFA for herself [Enumerator: ask Mrs. to put 500 FCFA into the common urn], $name\_wife2$ uses 1500 FCFA and keeps 500 FCFA for herself [Enumerator: ask Mrs. to put 1500 FCFA into the common urn]. There will be 4000 FCFA in the common urn [Enumerator: show 4000 FCFA in the common urn]. We will add half, which is 2000 FCFA, so there will be 6000 FCFA in total, considered as the amount from the sale. So each will have 2000 FCFA [Enumerator: give each 2000 FCFA] resulting from the sale on the collective field. The husband will therefore have a total of 2000 FCFA [Enumerator: show the 2000 FCFA in the husband's hands] and will not have earned anything more than his initial situation, $name\_wife1$ will have a total of 3000 FCFA [Enumerator: show 3000 FCFA in $name\_wife1$'s hands], and will have earned 1000 FCFA. $name\_wife2$ will have 2500 FCFA [Enumerator: show 2500 FCFA in $name\_wife2$'s hands], and will have earned 500 FCFA. If at the end of the activities, this variant is chosen randomly for the final payment of the husband, he will receive 2000 FCFA. If it is chosen for the payment of $name\_wife1$, she will receive 3000 FCFA. If it is chosen for the payment of $name\_wife2$, she will receive 2500 FCFA.

After this group phase, each household (comprising the three spouses) is isolated from the others, and one enumerator is assigned to each household to conduct the game. Before starting to play, each spouse must pass the comprehension test described below. If a player does not answer correctly on the first attempt, the enumerator will repeat the explanations until all players pass the test.

B.B Test of comprehension

TEST 1 If you received 2000 FCFA, and you contribute with your husband for seed purchase. If you both contribute the entire amount; how much will you have in total for yourself at the end by selling the production of your common field? In other words, how much will you have for yourself today if both of you contribute the entire amount received?
TEST 2 If you received 2000 FCFA, and you contribute with your husband for seed purchase. If you both contribute 1000 FCFA each; how much total revenue will you have for yourself at the end by selling the production of your common field? In other words, how much will you have in your own account today if both of you contribute half of the received amount?
TEST 3 If you received 2000 FCFA, and you contribute with $name\_wife1$ for seed purchase of your common field. If you contribute 2000 FCFA and $name\_wife1$ does not contribute anything; how much money will you have in the end for yourself? In other words, how much money will you have for yourself today?

When all players had passed the test, the game began with the principle of equal share. First, three bilateral games took place: one between the husband and the first wife, one between the husband and the second wife, and one between the co-wives. The sequence of these games was randomized. Second, each player participated in a round with an unknown

partner selected randomly from those present at the session. Third and finally, there was a three-player game. Note that monogamous couples played only two games in this part: one between the husband and the wife, and one where each player was paired with an unknown individual.

***Contribution process for all games**: Each game began with the involved players receiving an envelope containing their initial endowment. They were then invited by the enumerator to individually and privately contribute to a common pot, represented by a closed box isolated from other players and the enumerator. After making their contributions, each player was asked privately by the enumerator to guess the amount their playing partner would contribute. Once all contributions were made, the enumerator opened the common pot in private and recorded the contributions of each player. To distinguish the contributors, the initial endowment of each spouse was marked with a different color that was not easily noticeable by the player.*

After the first part of the equal sharing games, all households gathered for training on the principles of the second part of the session.

B.C Second Part: Player-set Shares

Now we will still consider that the family field belongs to all spouses, and all must contribute to the purchase of seeds for the family field. The game principle remains the same as before with some variations. We will still add half of what you have contributed to get the amount from selling the production on the family field. Note that this time the distribution will be according to the rules that yourselves will define. In one variant, only your husband will define the sharing rules; in another, all spouses will define them together; and in another, only the wives will define the rules. Note that in all cases, each player will have to contribute. We also remind you that each spouse will have to contribute multiple times, a decision will be chosen randomly; and this will define the final gain which will be known only by the spouse. Note that in all cases, you will not know what your spouse has contributed or earned, and they will not know your gain. No one will know the decision that has been selected for the payment either.

In this part, we also systematically repeated that the contribution, the payment, and the decisions made regarding the shares remain private using the following wording: "Note that no one will know what decision maker(s) has/have decided, nor what each has contributed, nor what you have earned, nor the variant chosen for the final payment in real money." The sequence of the treatments was randomized.

In Treatment 1 in both polygamous and monogamous households, the husband decides on sharing rules. Treatment 2 involves joint decision-making by both spouses in monogamous households and by all three spouses in polygamous households. In Treatment 3, in monogamous households, the sole wife makes the allocation decision, while in polygamous

households, decisions are made jointly by the two co-wives.

Treatment 1: *The husband decides on the sharing rules. He is isolated from his wives, and his decisions are not known by them.*

If all of you have contributed the entire amount for purchasing seeds and there is 6000 FCFA in the common urn, we will add 3000 FCFA, making it 9000 FCFA. Imagine that at the time of selling the production, only the husband went to sell at the market; and therefore, sold for 9000 FCFA. So, for the distribution, knowing that no one knows the amount of the sale [Enumerator: give the husband 9000 FCFA], he can decide to give $name\_wife1$ 2500 FCFA [Enumerator: ask the husband to give 2500 FCFA to $name\_wife1$], 3000 to $name\_wife2$, and keep 3500 FCFA FOR HIMSELF. If at the end of the activities, this variant is chosen for the final payment, and if everyone has contributed the entire amount, we will therefore give each 2500 FCFA in real money to $name\_wife1$, 3000 FCFA to $name\_wife2$, and 3500 to *name_husband*.

Treatment 2: *All spouses decide on the sharing rules*

If *name_husband* contributed 1000 FCFA, $name\_wife1$ contributed 1500 FCFA, and $name\_wife2$ contributed 500 FCFA [Enumerator: Ask each to put the indicated amount into the common pot]. In the common urn, there are 3000 FCFA, we will add 1500 FCFA, making it 4500 FCFA representing the amount of the sale. Let's imagine that this time the buyer came to the house and met everyone. This time, everyone discusses the sharing. If you all agree that the husband will have 2000 FCFA, $name\_wife1$ 1500, and $name\_wife2$ 1000 FCFA [Enumerator: give each the indicated amount]. In the end, the husband will have the 1000 FCFA he kept and the 2000 FCFA he received, making it 3000 FCFA [Enumerator: show 3000 FCFA that the husband has]. He has therefore gained 1000 FCFA. $name\_wife1$ will have the 500 FCFA she kept and the 1500 FCFA she received, making a total of 2000 FCFA. She therefore did not gain anything. $name\_wife2$, in turn, will have the 1500 FCFA she kept and the 1000 FCFA she obtained from the sale. This makes a total of 2500. She therefore gained 500 FCFA.

Treatment 3: *The wives decide on the sharing rules before playing. They are isolated from their husband, and their decisions are not known by him.*

If *name_husband* bought seeds for 1500 FCFA, $name\_wife1$ for 1000 FCFA, and $name\_wife2$ for 1500 FCFA [Enumerator: Ask each to put the indicated amount into the common pot]. In the common urn, there are 4000 FCFA, we will add 2000 FCFA, making it 6000 FCFA representing the amount of the sale. This time, let's consider that at the time of the sale, the husband was traveling and only the wives knew the amount of the sale, so they must decide how to distribute the money from the sale [Enumerator: give the wives 6000 FCFA and ask the husband to step aside a bit. If they agree and decide to give 1000 FCFA to the husband, 3000 FCFA to $name\_wife1$, and 2000 to $name\_wife2$ [Enumerator: give each the indicated amount]. In the end, the husband will have the 500 FCFA he kept and the 1000 FCFA he received, making it 1500 FCFA [Enumerator: show 1500 FCFA that the husband

has]. He has therefore lost 500 FCFA. $name\_wife1$ will have the 1000 FCFA she kept and the 3000 FCFA she received, making a total of 4000 FCFA. She therefore gained 2000 FCFA. $name\_wife2$, in turn, will have the 500 FCFA she kept and the 2000 FCFA she obtained from the sale, making a total of 2500 FCFA. She therefore gained 500 FCFA.

After the group training for the second part, an enumerator was assigned to each household. Before contributing, the decision maker(s) defined the sharing rules in isolation from other players, as described below

When playing (All treatments)

[For these questions, the $DECISION\_MAKER(S)$ will be isolated from other players]. In this activity, all spouses will contribute a portion or all of the received amount to the common pot. You, $DECISION\_MAKER(S)$, have the responsibility of defining the sharing rules. To do this, imagine that you have sold the agricultural production from the FAMILY FIELD and that you must distribute the amount of the sale between you all, knowing that your partners are absent and do not know the amount of the sale. How much will you give to each? To help you, we will present below the probable amounts of sale on the collective field and you will redistribute after reflecting.

If the amount of the sale of the family production amounts to 6000 [Enumerator: Give the $DECISION\_MAKER(S)$ 6000 FCFA in real money]. I leave you to decide for a few minutes to distribute this amount. [Enumerator: leave for a maximum of 5 minutes until the $DECISION\_MAKER(S)$ calls you] Give me the share you intend to give to $name\_Husband$, $name\_wife1$ and $name\_wife2$ [Encode the amount allocated to each and take back all the money].

If the amount of the sale of the family production amounts to 4000 [Enumerator: Give the $DECISION\_MAKER(S)$ 4000 FCFA in real money]. I leave you to decide for a few minutes to distribute this amount. [Enumerator: leave for a maximum of 5 minutes until the $DECISION\_MAKER(S)$ calls you] Give me the share you intend to give to $name\_Husband$, $name\_wife1$ and $name\_wife2$ [Encode the amount allocated to each and take back all the money].

If the amount of the sale of the family production amounts to 2000 [Enumerator: Give the $DECISION\_MAKER(S)$ 2000 FCFA in real money]. I leave you to decide for a few minutes to distribute this amount. [Enumerator: leave for a maximum of 5 minutes until the $DECISION\_MAKER(S)$ calls you] Give me the share you intend to give to $name\_Husband$, $name\_wife1$ and $name\_wife2$ [Encode the amount allocated to each and take back all the money].

After the phase of rule setting, all players contribute to the common pool knowing who defined the sharing rules, but not knowing the rules themselves (unless they were involved in defining them). The contribution process was the same as in Part 1.