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Parental risk preferences, maternal bargaining power, and the educational progressions of children

Lab-in-the-field evidence from rural Côte d'Ivoire

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Abstract: We analyse the effect of parental risk preferences and a novel measure of maternal bargaining power over educational expenses—elicited via lab-in-the-field experiments in rural Côte d'Ivoire—on the educational progression of boys and girls. Data from 135 couples and their children show that the father's risk aversion is negatively associated with school attendance for boys and lowers the likelihood of transition from no schooling to primary schooling for both boys and girls. The mother's risk aversion, on the other hand, has a positive association with the transition into primary schooling and a negative association with the transition into secondary schooling only for girls. The mother's bargaining power is also negatively associated with girls' schooling, while greater bargaining power for mothers who are relatively more risk averse than the father adversely impacts the transition into primary schooling for boys. Our findings are in line with suggestive evidence that points to a preference for current income generated by the employment of boys in high-value cash crop production and the concern for girls' safety associated with traveling long distances to attend secondary schools.

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1   Introduction

The human capital-growth nexus is well established in the economics literature. For developing countries, especially those in sub-Saharan Africa (SSA), recognition that early investment in education can break the vicious cycle of poverty has led national governments and international donor agencies to focus on the promotion of a variety of education-related supply- and demand-side interventions. Notable supply-side interventions include compulsory primary schooling laws, better incentives for teachers, and expansion of school lunch programmes, while the most famous demand-side intervention has been through conditional cash transfers that incentivize poor families to send their children to school.[1] These interventions have yielded significant results in the past couple of decades in terms of primary school enrolment rates in SSA (United Nations 2015).[2] Nevertheless, the transition rates beyond primary school remain low. In SSA only 35 per cent of boys of secondary school age are reported to attend school, and the percentage is even lower for girls.[3] The transition to tertiary education is negligible, despite evidence that university degrees generate both the highest returns in the labour market and the highest boosts to long-term growth (Schultz 2004; Kuepie et al. 2009).

In this paper, we explore whether enrolment rates and the progression from primary to secondary and post-secondary education in a rural developing economy is shaped by parental risk preferences and intra-household bargaining power over educational expenses. By eliciting—via lab-in-the field experiments—fathers' and mothers' risk preferences and mothers' bargaining power over educational expenses in rural Côte d'Ivoire, we identify any potential bias that favours school attendance and eventually the schooling progression of boys over girls through secondary schooling. Our analysis reveals a negative association between fathers' risk aversion and school attendance of children of either gender. Mothers' risk aversion, on the other hand, has a positive association with the transition into primary schooling and a negative association with the transition into secondary schooling for girls. Mothers' bargaining power is also negatively associated with girls' schooling, while greater bargaining power for mothers who are relatively more risk averse than the fathers adversely impacts the transition into primary schooling for boys. We attribute these findings to a preference for current income generated via the employment of boys in high-value cash crop production and the concern for girls' safety associated with traveling long distances to attend secondary schools.

Our study contributes to two strands of the growing field experiment literature: one that links household or parental risk preferences, and the other that links intra-household bargaining power over educational expenses to child educational outcomes in developing countries. With respect to risk preferences, Tanaka and Yamano (2015) and Sovero (2018) reach a consensus that parental risk aversion has a negative impact on children's years of education. While both these papers use an intertemporal investment modelling framework as a starting point for their analyses, there are

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interesting conceptual differences in the interpretation of the results. Tanaka and Yamano (2015) establish that the negative effect of parental risk aversion on child education can be explained better by the head of household's security concerns for young children having to undertake a long walk to school in Uganda rather than by an aversion to risky educational investments. Instead of focusing on the behavioural characteristics of the head of household, Sovero (2018) explores the potentially differential effect of the mother's and father's risk aversion on child well-being in Mexico. She concludes that the effect of the mother's risk aversion dominates that of the father's and leads to prioritization of investments in boys over girls. More recently, Tabetando (2019) for rural Uganda and Basu and Dimova (2021) for rural Ethiopia find the household head's risk aversion to be negatively related to children's educational outcomes for poorer households. Tabetando's finding is attributed to household credit constraints, while Basu and Dimova argue that uncertain returns to education may lead households to view income from child labour as a safe option and investment in education as a gamble, especially when the children's future income acts as old-age insurance for the parents. While the precise mechanics of the link between parental risk aversion and child educational outcomes vary due to differences in institutional and cultural norms across countries, our findings with regards to the father's risk preference is broadly consistent with the literature insofar as greater risk aversion impedes educational investment in children (both boys and girls).[4] What are novel findings, however, are the results that (i) the mother's risk aversion does not impact the educational progression of boys but has a positive impact on school attendance and on the educational progression of girls from no schooling to primary schooling but a negative impact on the transition from primary to secondary schooling and (ii) greater bargaining power for relatively risk-averse mothers acts as an impediment to the educational attainment of boys.

The second strand of the experimental literature linking mothers' bargaining power elicited via lab-in-the-field experiments to child educational outcomes is sparse, with Ringdal and Hoem Sjursen (2021) as the only exception. While numerous lab-in-the-field experiments have been undertaken in developing countries to test the theoretical predictions of the non-unitary models of household behaviour,[5] the link between mothers' bargaining power and child-specific investments remains understudied. Ringdal and Hoem Sjursen's study in Tanzania offers three important insights: (i) an increase in the mother's bargaining power does not increase investment in child education, (ii) for a mother who is less patient than the father, an increase in bargaining power reduces investment in child education, and (iii) increased bargaining power of mothers who are relatively more risk averse than the fathers has no effect on the investment in child education. In contrast, we find that greater bargaining power of the mother over the allocation of educational expenses significantly lowers the likelihood of school attendance for girls and has no impact on the likelihood of school attendance for boys. Greater bargaining power of mothers who are relatively more risk averse than their husbands, however, lowers the likelihood of school attendance for boys, although this association is statistically not strong.[6] These differences in the findings may well be attributed to the differences in experiment design and external validity given the stark difference in locations (rural Côte d'Ivoire versus urban Dar es Salaam, Tanzania).

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[4] While our focus is on studies undertaken in developing countries, in one of the earliest studies on the subject, Heineck and Wölfel (2012) show that mothers' risk aversion negatively affects children's enrolment in upper-secondary schools in Germany.

[5] Munro (2015) offers an exhaustive review of field experiments on bargaining undertaken in developing countries, while Donni and Chiappori (2011) offer an excellent overview of the theoretical non-unitary models of household behaviour.

[6] We were unable to conduct experiments to elicit patience profiles of the spouses due to the limited amount of time we were allowed to spend in the villages, particularly in western Côte d'Ivoire.

Nevertheless, identification of women's bargaining power within the household is tricky given that several individual and within-marriage characteristics (education, income, age at marriage, bride price, gender of the first-born child) are endogenous to the bargaining power of a spouse. Lab-in-the-field and natural experiments both offer a partial solution to this endogeneity issue by observing the decision-making process of a spouse within a controlled environment. Thus, the insights obtained from Ringdal and Hoem Sjursen (2021) and our field experiments should be evaluated against those obtained via natural experiments and randomized control trials. Examples of results obtained from this latter group of papers include Duflo and Udry (2004), who find that an unanticipated increase in women's income share results in greater expenditures for food. An unanticipated increase in men's' income, on the other hand, results in greater educational expenditures for children. This finding is echoed in macro- and community-level research. Chattopadhyay and Duflo (2004) witness stronger preferences for children's education amongst men and stronger preferences for necessities like drinking water amongst women—a finding also echoed by Benhassine et al. (2015) for a patriarchal society like Morocco where targeting cash transfers for schooling at fathers leads to an increase in children's primary school enrolment. Martinez (2013), on the other hand, finds that a change in the law allowing unwed mothers to receive child support in Chile led to increased school attendance for children, while Bobonis (2009) finds that an unanticipated income increase for the household caused by variations in rainfall leads to a smaller increase in expenditure for children's clothing and education compared to the conditional cash transfer programme PROGRESA, which targets only mothers in Mexico. Finally, the literature linking exogenous income shocks to the existence of parental gender bias amongst children reveals an interesting pattern for South Africa: Duflo (2003) finds that an increase in the grandmother's income through a pension reform resulted in the prioritization of investment of girls, while Edmonds (2006) finds that an increase in the grandfather's income induces a prioritization of investment for boys. For Côte d'Ivoire, we find instead that greater bargaining power of the mother, in itself, adversely affects the schooling outcome for girls, while greater bargaining power of mothers who are relatively more risk averse than their husbands adversely affects the schooling outcome for boys.

Advantages notwithstanding, nuances in the experimental design as well as country-specific institutions and social norms raise questions about the external validity of results obtained from lab-in-the-field experiments. Thus, a brief note about our geographical focus and experimental design is in order. Rural Côte d'Ivoire has a low transition rate from primary to secondary schooling even though return to secondary education is deemed high.[7] This peculiarity is the major motivation behind our geographical choice, not to mention that studies analysing schooling outcomes in Francophone Africa are sparse. Second, while the effectiveness of free schooling and conditional cash transfers on school enrolment patterns have been analysed for this part of the world, the potential impact of household behavioural preferences has yet to receive attention. Based on a total of 135 couples across five rural villages, we first use lotteries with varying probabilities of success to capture the risk preferences of each parent. For our second experiment, we design a novel mechanism for eliciting bargaining power over educational expenditures amongst couples with children. In the first step of this experiment, each partner is asked to allocate a fixed endowment between their private account and a common pot. In the second step, each partner is separately asked to allocate the amount in the common pot amongst various categories of household expenditures including food, transportation, health, transfers to parents, and children's education. In the third step, couples are required to confer with each other and jointly allocate the amount in the common pot amongst these various household expenditure categories.

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[7] See Schultz (2004) and Fink and Peek (2014). While the return to education is high, there is also uncertainty associated with finding good jobs.

This stepwise decision making allows us to extrapolate the bargaining power of a spouse by focusing on the allocation decision between the second and the third step.[8] The two experiments above are further supplemented by a detailed household survey that allows for exploring the differential effect of the two sets of parental preferences on the upward mobility of boys and girls through Côte d'Ivoire's schooling system.

The rest of the paper is organized as follows. Section 2 provides information about the socio-economic conditions in Côte d'Ivoire and our field setting. Section 3 describes the experiments, while Section 4 highlights the descriptive statistics associated with the household survey. Section 5 outlines the empirical methodology used for the analysis of the role of parental preferences and intra-household decision-making dynamics on child educational outcomes and discusses the empirical results. Section 6 concludes.

2   Background and data collection

2.1   Socio-economic context

The schooling system in Côte d'Ivoire is based on the French model, whereby primary education lasts from age 6 through 11, middle school (collège) commences after 11 and continues until 15, high school (lycée) starts after 15 and goes until 18, and university starts thereafter. In 1992, Côte d'Ivoire adopted a 'National Education Plan for All', envisaging, amongst others, improved access to basic (primary and secondary) education, retention of students in school until the age of 16, and enhanced quality of education (Oyeniran 2017). This has resulted in raising the gross primary enrolment rate to 94 per cent. However, the primary school completion rate is only 61 per cent, while the enrolment rate in middle school drops to 31 per cent (Education Policy Data Center (2014) based on UNESCO statistics). Aside from classical reasons for the low educational progression rates, such as poverty and credit constraints, a key factor in Côte d'Ivoire is geography: more than 93.6 per cent of secondary schools are in urban areas, such that children are required to cover between 17 and 24 km to attend school (International Cocoa Initiative 2017; World Bank 2015). Beyond these physical barriers to educational attainment is a tight urban labour market with high competition for jobs. However, for those able to find urban jobs, the dividend to high school education is high (World Bank 2015).

The combination of geographical factors, production structure, and social norms creates peculiar distinctions in the value of schooling for boys and girls from the parents' point of view. Geographically, while most villages in our sample have a primary school, children need to cover a non-negligible distance to the nearest urban secondary school. Coupled with a high incidence of violence and rape, including by peers and teachers, sending a girl to high school is a risky undertaking (Japan International Cooperation Agency 2013). From the production structure viewpoint, boys are a disproportionately large agricultural labour resource compared to girls, particularly in cocoa farms (Abou 2014). Finally, a social norm in the form of grooms paying a bride price to the girl's family has perpetuated an incentive for teenage marriages and early withdrawal of girls from school (Japanese International Cooperation Agency 2013).

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[8] Our bargaining experiment circumvents the difficulties that lab-in-the-field experiments involving voluntary contributions face wherein it is difficult to ascertain whether a contribution to the common pot is driven by risk aversion or by alternative considerations (Croson and Gneezy 2009).

2.2 Fieldwork

Our sample is drawn from five villages in Côte d'Ivoire: three villages in the south-eastern area near Abidjan (Andokoi, Ashokoi, and Gbrebo) and two villages in the south-western area near Soubré (Galea 2 and Logboayo). The approximate location of these two sets of villages is highlighted in Figure 1, while some key characteristics related to their ethnic composition are highlighted in Table 1.

Figure 1: Key survey areas

Source: Google Maps. The circles are the authors' addition.

Table 1: Ethnic and migrant composition of the surveyed villages

Villages	Internal migrants (allochtone)	External migrants (allogène)	Non-migrant populations (autochtone)
Villages in the region of Soubré			
GALEA 2	Baoulé, Sénoufo, Agni, Koulango	Burkina Faso, Togo, Mali, Benin, etc.	Bakoué
LOGBOAYO	Baoulé, Koulango, Ando	Burkina Faso	Bété
Villages in the region of Abidjan			
ANDOKOI	Baoulé, Bété, Agni, Gouro, Yacouba, Sénoufo	Burkina Faso, Mali	Attié
ASHOKOI	Baoulé, Sénoufo, Agni	Burkina Faso	Attié
GBREBO	Baoulé, malinké	Burkina Faso, Mali, Niger, Senegal, etc.	Ebrié

Source: authors' compilation based on primary survey data collected by the authors.

As indicated in Table 1, the dominant ethnic group across the villages is Baoulé, while migrants from Burkina Faso dominate the (international) migrant population. Two villages, one from each of the two surveyed regions, namely Galea 2 near Soubré and Bregbo near Abidjan, are representative of the so-called CEDEAO (Communauté des Etats de l'Afrique de l'Ouest) villages in the sense that they are populated by migrants from a number of West African countries, notably Burkina Faso, Liberia, Sierra Leone, and Mali.

Table 2 highlights the key occupational traits and agricultural production characteristics of each of the villages. While cocoa is the key source of income in the villages in the West, villages in the East are primarily involved in the production of rubber. Across all villages, men are mostly involved in the production of cash crops and high-value agriculture, while the production of food crops is the prerogative of women. There is a slight difference in the portfolio of food crops produced in the West and in the East. The key subsistence crops in the West are rice, tomato, yam, and cassava, while the key subsistence crops in the East are tomato, yam, and banana. Among the Western villages, cocoa production is organized in a cooperative only in Galea 2, while among the Eastern villages, Bregbo has a high-value agricultural cooperative devoted to animal husbandry (fish, poultry, and pigs). A particularly interesting village in the Eastern area is that of Andokoi, where a large proportion of the women are involved in non-agricultural production organized through a women's cooperative.

Table 2: Main crops and occupational structure

Villages	Main crop	Secondary crops	Cooperatives
Villages in the region of Soubré			
GALEA 2	Cocoa	Rice, tomato, yam, cassava	Cocoa cooperative
LOGBOAYO	Cocoa	Rice, tomato, yam, cassava	No
Villages in the region of Abidjan			
ANDOKOI		Tomato, yam, banana	Non-agricultural cooperative
ASHOKOI	Rubber	Tomato, yam, banana	No
BREGBO	Rubber	Tomato, yam, banana	Fish, poultry, and pig cooperative

Source: authors' compilation based on primary survey data collected by the authors.

The governance structure also differs across villages located in the West and in the East. In the Western ones, village chiefs are mostly appointed via a democratic voting procedure while chiefs in the Eastern villages are elected by the generation-based village management committee. Democratic voting takes place only when there is significant disagreement amongst committee members. In sum, the choice of villages in our sample is not only representative with respect to key production and export crops in the country (namely cocoa and rubber) but also reflects sufficient heterogeneity in livelihoods and institutional settings. We use village fixed effects to account for these differences in our empirical analysis.

3   Experiment design

In each village, we undertook lab-in-the-field experiments to capture individual risk preferences, cooperation amongst spouses, and women's bargaining power within the household followed by a survey that was undertaken by every participant. We sought permission for the experiments and the survey from the village chiefs who provided us with a list of couples residing within the village. From the list, we randomly selected couples—the only stipulation being that a couple should have at least one child together of school or university-going age (between 6 and 22 years). Each participant was paid CFA5,000 as the participation fee with the opportunity to win an additional amount from the risk experiment through a random draw.[9] As explained later in this section, this
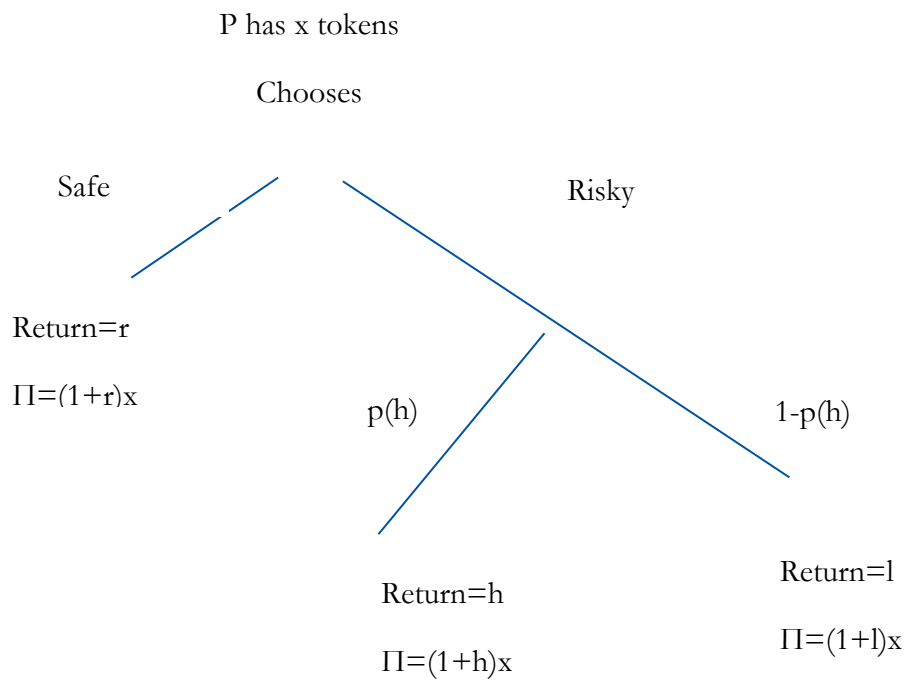
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[9] The participation fee of CFA5,000 is roughly equal to two days of average pay for an agricultural worker in rural Côte d'Ivoire. In 2016 when the experiments were undertaken, the average agricultural wage per month was approximately CFA53,000 (Global Living Wage 2020).

participation fee equals the initial endowment for each partner in the bargaining game. The games started with an experiment to elicit individual risk preferences, followed by an intra-household bargaining experiment.[10]

3.1 Risk preferences

Elicitation of individual risk preferences is usually conducted via the presentation of a lottery where individuals face a sequence of options involving a safe return and a risky one. The risky investment yields either a high or a low return depending on the associated probability of success p(h). An individual's choices across various combinations of safe and risky returns reflect the value of the minimum acceptable probability (MAP), i.e. the minimum value of p(h) for which this individual chooses the risky over the safe investment. In effect, our measure of risk preference is defined as the distance between the revealed MAP and the probability p* that equates the expected payoff from the risky return with the safe one, i.e., p* is the probability associated with an actuarially fair gamble. The risk preference game tree is presented in Figure 2.

Figure 2: Risk preference game tree

P has x tokens

Chooses

Safe   Risky

Return=r

$\Pi=(1+r)x$

p(h)   1-p(h)

Return=h

$\Pi=(1+h)x$

Return=l

$\Pi=(1+l)x$

Source: authors' illustration.

An individual with MAP > p* is considered risk averse, while someone with MAP ≤ p* is considered a risk taker. The experiment design mirrors the Multiple Price List (MPL) method

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[10] In the instructions for the risk and bargaining game in Appendices 1 and 2, we describe in detail how the participants were informed about the two tasks that they were about to embark upon. We went over the instructions in French and played a hypothetical risk experiment with different payoffs than the actual one, and the allocation game where participants were asked to distribute an arbitrary endowment between their individual needs and the common pot. Researchers and research assistants worked in pairs while on the ground, which enabled them to notice potential misunderstanding among the participants. In the event of any misunderstanding, the instructions and the games were explained in a different yet scripted way to allow for better understanding.the problematic part. Participants were also repeatedly encouraged to raise their hand if there was any confusion with the instructions and/or survey questions, which allowed us to promptly resolve the issue.

popularized by Holt and Laury (2002). One concern raised about MPL methods is that participants may get confused and not understand the instructions, leading to meaningless choices in the activity (Charness et al. 2013). To minimize misunderstanding, we modify the original protocol replacing one set of lotteries by a fixed 'safe' return option. Appendix 1 reproduces the experiment protocols used in the field.

The experiment unfolds as follows: we first present individuals with a scenario where each receives CFA50,000, which they are asked to invest in a project of their choosing. We then introduce nine sequential choices for individuals to make, between a safe return and a lottery (see Appendix 1). The safe return option guarantees a return of CFA65,000, while the lottery option offers a return of either CFA80,000 or CFA35,000 with varying probabilities. The payoffs for all choices remain the same, but the probability of success in the lottery improves as the subject gets closer to the ninth and last choice. All nine choices have the same conditions and the same returns, except that the probability of success for the uncertain investment increases sequentially.

We record the probability at which an individual switched from choosing the safe return option to playing the lottery. For a risk-neutral individual, the switch technically occurs when the probability of winning the lottery is 0.7 because $p(h)=0.7$ yields a higher expected payoff than the safe return: $80,000 \times 0.7 + 35,000 \times 0.3 = 66,500 > 65.000$. Note that the probability p^* that makes the game actuarially fair is 0.67, where a risk-neutral individual is indifferent between the safe return and the lottery options. This corresponds to a probability not materialized in the game, which falls somewhere between the sixth ($p(h)=0.6$) and seventh ($p(h)=0.7$) choices. For simplicity, we approximate $p^*=0.7$.

An individual switching from the safe return option to the lottery at a probability of success lower than 0.7 is characterized as a risk taker, whereas an individual switching to the lottery at 0.7 or a higher probability of success is characterized as risk averse. Extremely risk-averse individuals never switch to the lottery while extreme risk takers switch instantly at probability 0.1 of winning the lottery. Using a lottery setting allows for reproducing a situation in which the risk described to individuals does not depend on other individuals but only on pure chance.[11]

One 'winner' is randomly drawn at the end of the game to make the earnings credible and ensure elicitation of realistic risk preferences. To determine the winner and their final prize, we randomly draw one ID number from all participants' numbers, as well as an integer *n* between 1 and 9 to play out one of the decisions they made during the activity. If their choice at step *n* was to go with the safe return option, they receive CFA65,000. If they chose the lottery, then a lottery is performed with the corresponding probability setting, and the winner receives CFA35,000 or CFA80,000 depending on the draw. For instance, if the individual chose the safe return option at row 3 ($p = 0.3$), the lottery bag would contain three orange balls and seven white ones. The individual receives CFA35,000 if a white ball is drawn and CFA80,000 if it is an orange ball. This procedure is consistent with Azrieli et al. (2018) who find that remunerating one randomly chosen decision is the best incentive-compatible mechanism.

Figure 3 highlights the individual results of the risk preference game. Recall that higher values in the choice set indicate higher levels of risk aversion. Each of the points on the horizontal axis indicate the level at which the individual switched from the safe towards the risky choice, where 10 indicates that no such switch was made, and the individual retained the preference for the safe

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[11] Bohnet and Zeckhauser (2003) find that in sequential games, first movers appear to be more risk averse (i.e. they declare a higher MAP) when the risk comes from another individual than when risk is determined by nature (e.g., a lottery).

option throughout. Most of the responses across both men and women cluster around the safest options, and women seem more likely than men to stay with the safe option throughout. This is consistent with the implicit assumption in poverty trap models, whereby poor people, the majority in our sample, are more likely to be risk averse. This assumption is supported by the further observation that the relationship between risk aversion and income, irrespective of whether we use the household or individual income of either spouse, is negative.

Figure 3: Risk preferences of husbands and wives
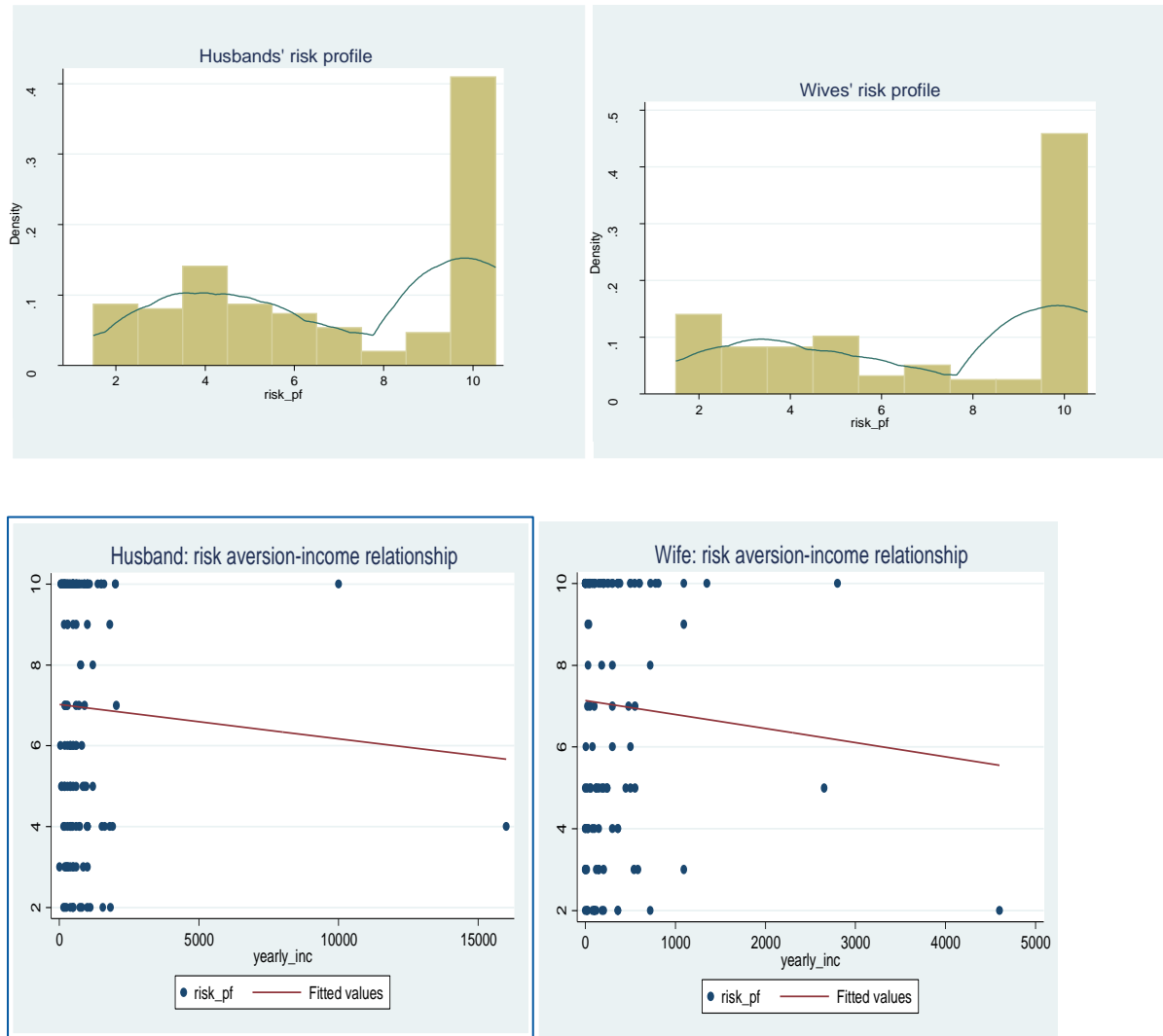
Source: authors' compilation based on primary survey and experiment data collected by the authors.

3.2 Intra-household bargaining

Our intra-household bargaining game is conducted as a two-step process that combines elements of both non-cooperative and collective decision making typically observed within a household. Step 1 uses a version of a public good game, adopted from Munro et al. (2011), in which spouses separately decide between keeping an allocated budget for their individual benefit or contributing to a common (household) pot. We innovate in Step 2 by introducing common pot allocation games across three rounds where spouses decide, first individually and then jointly, on how best to allocate the common pot across various expenditure items. The public good game and the individual allocation of the common pot are played in separate rooms for the men and women during the first two rounds, while the reunited spouses jointly decide on the common pot

allocation in the last round. This sequential decision making allows us to subsequently construct a measure of *relative* bargaining power of the wife. A reproduction of the detailed instructions and response sheets used in the country for this experiment can be found in Appendix 2.

Intra-household bargaining: Step 1

In Step 1, wives and husbands are asked to sit in separate rooms with no opportunity to communicate and play a public good game with their spouse as counterpart. The couples play three times, with a different setting in each round—the initial income allocation varies as well as the identity of the spouse who will decide how to spend the household common pot. The basic sequence of each round is as follows:

1. Individuals are told who, the wife or the husband, will decide how to spend the household money pot in this round. The order is the same for all couples: the wife decides in the first round, the husband does in the second, and both decide together in the third.
2. An initial income is simultaneously allocated to each spouse individually. Both wives and husbands are told to assume that their partner has an identical initial income allocation. The initial income is identical for both spouses and equalled CFA4,000 in rounds 1 and 3 and CFA5,000 in round 2.[12]
3. Individuals are asked to choose how much of their initial income they contribute to the household common pot, knowing that, when contributed, each unit of CFA1,000 is multiplied by 1.5. Individuals can choose to contribute 0, 1, 2, 3, 4, or 5 units of CFA1,000, depending on their total initial endowment. Wives and husbands play simultaneously; their decisions only take effect in Step 2 (below).
4. Individuals are then asked to guess how many units of CFA1,000 their spouse contributed to the household common pot.

The variation in settings allows to control for the effect of expected bargaining power on intra-household cooperation. The initial income is presented as individuals' pay for participating in the experiments, thus avoiding any cognitive bias that a 'free' income might create in a cooperation game. The multiplying factor of 1.5 applied to each income unit that contributed to the household common pot aims to mimic the positive externalities that are expected from cooperation.

In Table 3 we present the means of the total amounts contributed by the spouses across the three rounds, as well as the proportional contributions of each spouse. Recall that we changed the initial endowment from CFA4,000 in round 1 to CFA5,000 in round 2 to address a potential anchoring effect. However, given that wives decide solely on the allocation of the common pot in round 1 (lower initial endowment for both spouses) while husbands decide solely on the allocation of the common pot in round 2 (with a higher initial endowment for both spouses), it is important to verify whether the contributions across the two rounds are driven by the endowment effect (greater amount of money allocated in the second round) or by the power effect (decision making being switched from the wife to the husband with a higher initial income).[13] The test of equality of contributions across the rounds indicates that the endowment effect matters more than the power effect. While the total amounts contributed by both the husband and the wife change almost proportionally with the change in the endowment, there is no significant change in the

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[12] We vary the endowment across the three rounds to eliminate anchoring, i.e. ensure that participants do not simply replicate the allocation from the previous round for the subsequent round(s).

[13] We are grateful to an anonymous referee for alerting us to this possibility.

proportional contributions by either spouse across round 1 and round 2. Thus, we are confident that the greater endowment in round 2 is not viewed by the participants as synonymous with a greater decision-making power of the husband.

Table 3: Contributions to the common pot across the three rounds

	Women	Test-equality across rounds	Men	Test-equality across rounds		
Variable	Mean	Std. dev.	t-stat(p-value)	Mean	Std. dev.	t-stat(p-value)
Total sum contributed R1	2.878	1.259		2.595	1.142	
Total sum contributed R2	3.565	1.365	-6.997(0.000)	3.305	1.435	-8.3542(0.000)
Total sum contributed R3	3.038	1.105	6.476(0.000)	2.648	1.239	6.4296(0.000)
Proportion contributed R1	0.719	0.315		0.649	0.286	
Proportion contributed R2	0.713	0.273	0.292(0.7701)	0.661	0.287	-0.6741(0.5014)
Proportion contributed R3	0.759	0.276	-2.666(0.0087)	0.662	0.309	-0.0507(0.9597)

Source: authors' compilation based on experiment data collected by the authors.

Our repeated public good game with varied settings further provides key intermediate metrics to proxy fathers' and especially mothers' relative bargaining power, which are central variables of interest. Finally, the sum of the contributions by each spouse in each round of Step 1, multiplied by 1.5, provides the total value of the household money pots that form the basis for Step 2 of the experiment. The value of households' money pots in each round for each couple is computed by the experimenters after collecting the first part of the individual response sheets.

Intra-household bargaining: Step 2

Step 2 aims at measuring the revealed preferences of spouses with respect to different expenditure categories. It also allows us to compute a proxy for each spouse's relative bargaining power within the household. The individuals play twice, once by making allocation decisions individually and a second time by deciding together with their spouse. A key point to note here is that spouses are only told that they must jointly decide on the allocation of the common pot **after** they have made their individual allocations. The sequence of Step 2 is as follows:

1. Individuals play out the round in which they were given the responsibility to allocate the household money by themselves. Each wife is told the real value of the household money pot from the first round (the sum of their and their husband's contribution multiplied by 1.5), and each husband is told the real value of the pot from the second round (the sum of their and their wife's contribution multiplied by 1.5).
2. Individuals are asked to distribute the total household money between seven possible expenditure categories (food, health, children's education, money transfers to children, money transfers to parents, housing, and transportation). The

proposed seven expenditure categories replicate the daily life expenses of the average farm household in Côte d'Ivoire.

3. Spouses are reunited and seated together in the same room for the last move and are told the real value of the household money pot from the third round.

4. Spouses are given a few minutes to discuss and decide together how to distribute the total household money between the same expenditure categories.

The allocation decisions in round 1 for women and round 2 for men provide proxies for the revealed preferences of either spouse for various expenses (measured as the proportions of the total sum allocated to each category). Figure 4 highlights the differences in the proportional allocation to education via histograms for men and women. Consistent with Chattopadhyay and Duflo (2004), we observe that the plots for educational shares are more skewed to the right for men compared to women, while the opposite is true (though less clearly so) for basic needs such as food expenditures.

Figure 4: Histogram of preferred expenditure shares from round 1 of the bargaining game

share education, wife

share education, husband
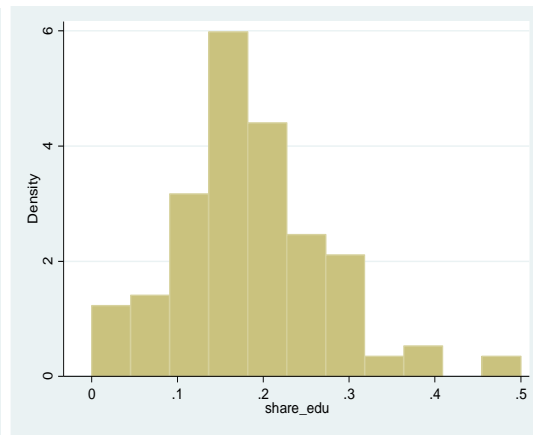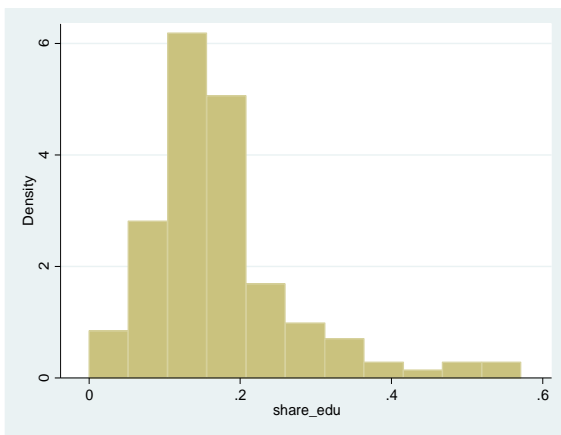
share food, wife

share food, husband
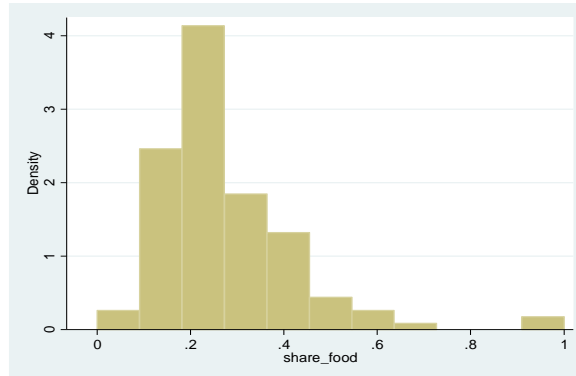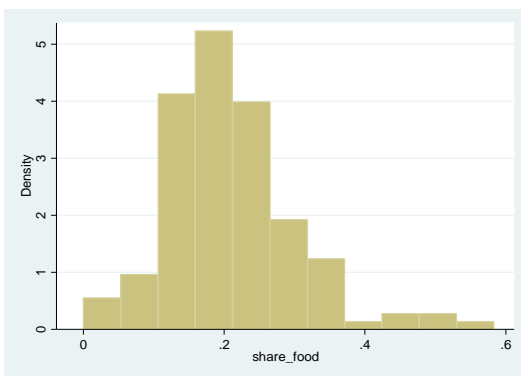
Source: authors' compilation based on primary survey and experiment data collected by the authors.

Our measure of relative bargaining power is based on comparing the differences between the proportional allocation of the common pot to educational expenses made by a spouse when s/he is the sole decision maker—in round 1 for women and in round 2 for men—and the proportional allocation of the common pot to educational expenses collectively made by the couple. Numerically, we define MBP = 1 for all $|F(I) - J| > |M(I) - J|$, where $F(I)$ and $M(I)$ are the husband's and wife's individual proportional allocations, respectively, J the joint proportional

allocation by the couple, and MBP the wife's relative bargaining power. Whenever the wife is closer to her preferred level of educational expenditures (as compared to the husband) in the bargaining process, our binary indicator of the wife's relative bargaining power equals 1, which happens to be the case for 44 per cent of the couples. Intuitively, the wife's relative bargaining power is higher when her own allocation is closer to the joint allocation compared to the husband's. The smoothed kernel density plots of the difference between the individual proportional allocation and the joint proportional allocation towards educational expenditures for both men and women are presented in Figure 5A. Men have greater bargaining power than women over the allocation of resources towards education, and this pattern is also observed for food expenditures, as depicted in Figure 5B.

Figure 5A: Kernel density plots of the difference between individual proportional and joint proportional contributions to educational expenditures by husbands and wives
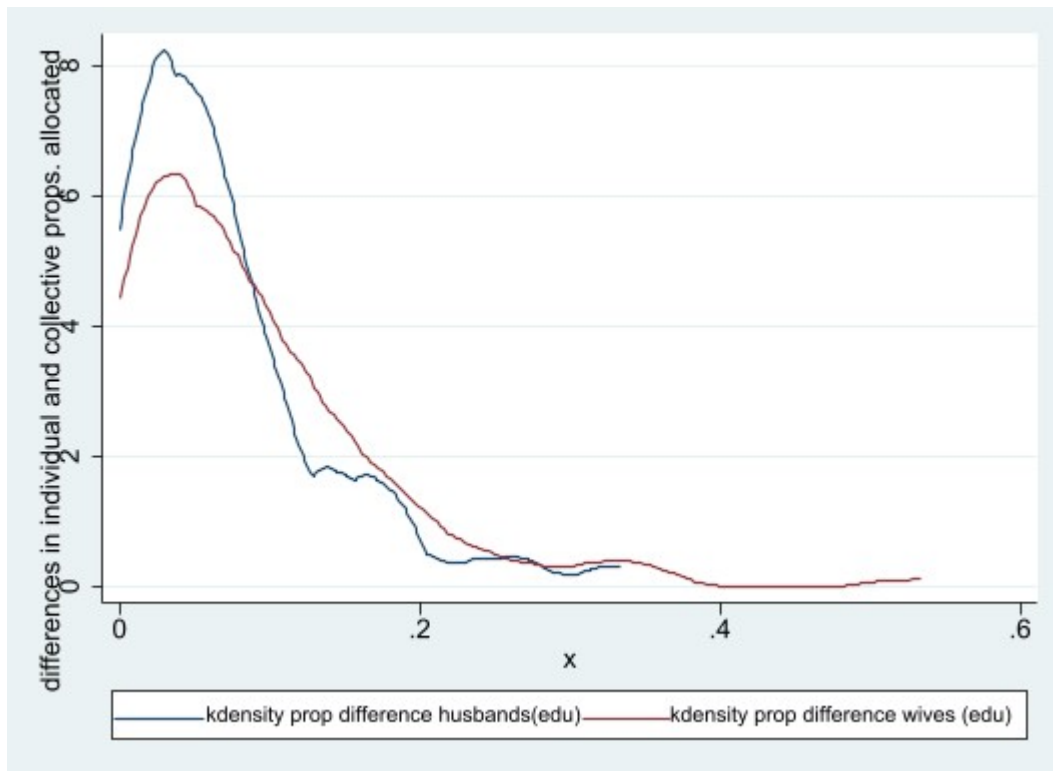
Source: authors' compilation based on experiment data collected by the authors.

Figure 5B: Kernel density plots of the difference between individual proportional and joint proportional contributions to food expenditures by husbands and wives
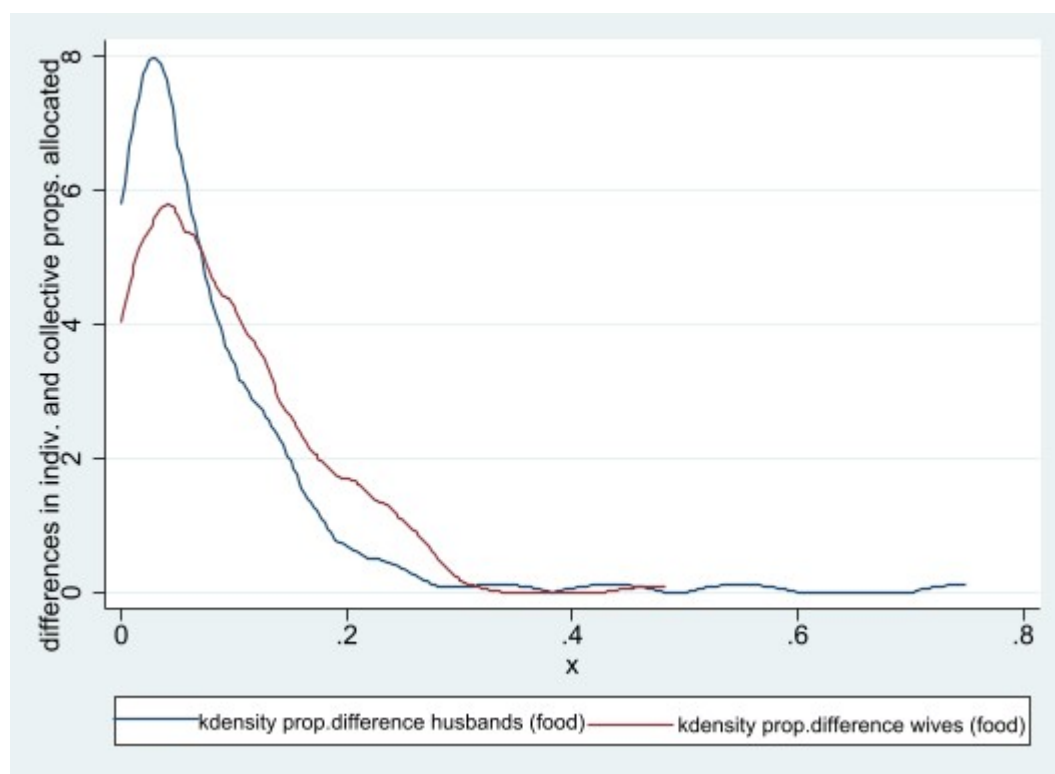
It is worthwhile to point out the difference in our experiment to capture bargaining power compared to Ringdal and Hoem Sjursen's (2021) experimental design, given that theirs is the only paper (to the best of our knowledge) that relates women's bargaining power to education expenses. Ringdal and Hoem Sjursen use four treatments to capture bargaining power over education expenses. Two of the treatments are from a dictator game where the husband and wife alternate as the proposer, and the other two treatments are from a Rubenstein shrinking-pie game where again the husband and wife alternate as the first mover. In comparison, we have three quasi (non-random) treatments—two non-cooperative and one collective—where respectively the husband exclusively, the wife exclusively, and the couple jointly decide on the allocation of the common pot to various household expenditures including education expenses. In the next section we present the empirics of these non-cooperative and collective allocations to educational expenditures on the likelihood of school attendance for boys and girls. Subsequently, we relate our measure of the wife's bargaining power described above to the likelihood of school attendance and the progression through the schooling system for boys and girls. A second key difference is that the bargaining games in Ringdal and Hoem Sjursen are conducted with reference to a randomly selected child for every couple. In our experiment, the allocation to education expenses is not child specific, which allows us to circumvent the issue of child-specific characteristics known only to either the father or the mother that might influence the allocation decision by a spouse. Instead, any gender bias with regards to children by either the father or the mother is accounted for in the regressions since our dependent variable is a particular child's schooling outcome, and multiple children in our data share the same parent. To account for potential household-level correlation, and thus underestimation of the effects, we cluster the standard errors at the household level.

4   Survey data and descriptive statistics

As a second step in our fieldwork, we requested each spouse to complete a short questionnaire containing information on the demographic structure of the family, educational attainment of the children, their own education, and their own occupational status and incomes. We requested each spouse to separately complete the questionnaire to eliminate any inconsistencies in the reporting of any data, particularly for children. Any inconsistencies (number, gender, birth order, and educational status of children) were reconciled on the spot.[14] Given that our main interest is child educational outcomes, we construct a data set at the child level, where information on parents is the same for each child within a household. After accounting for missing observations and restricting the sample to children and young adults in the 6–22 age group, we are left with 334 observations for our empirical analysis to test for the implications of parental behavioural preferences on children's educational outcomes.

Table 4 highlights child and household characteristics of interest to us for the sample as a whole and for each of the five villages. With respect to the behavioural variables of interest, we observe that approximately half of the men and women are risk averse, with the proportion of risk-averse men being slightly higher than the corresponding proportion of women (0.5060 of the men versus 0.4341 of the women). These proportions vary across the villages. In Ashokoi and Bergbo, the proportion of risk-tolerant men is significantly higher than average, while in Andokoi (the village characterized by a non-agricultural women's cooperative), the proportion of risk-tolerant women is significantly higher than average. On average, women allocate less money to education than men. This pattern holds across four of the five villages and is only reversed in Logboayo. Given greater revealed preference for educational expenditures by men compared to women, we hypothesize that greater relative bargaining power for mothers might adversely impact children's educational outcome.

The average age of children is 12.59. The average number of children per household is 5.0749, with girls representing slightly more than half of the sample. The average education of fathers is 6.75 years, indicating a completion of at least middle school, while mothers' education is substantially lower at an average of 3.05 years of schooling. Indeed, more than half of the mothers in our sample have no education at all. The average annual household income is CFA621.1138, approximately equivalent to USD$1,000. While slightly more than half of the men reported being a farmer as their primary occupation, fewer (approximately one-third) of the women reported farming as their primary occupation. The most obvious explanation for this is the land ownership pattern in Côte d'Ivoire, which excludes women by tradition. Land is typically only allocated to women by their spouses, mainly for subsistence farming purposes.

Table 4: Descriptive statistics

Variables	Andokoi	Ashokoi	Bregbo	Galea 2	Logboayo	Total
Child age	12.8909	11.5672	13.2424	12.0706	13.4426	12.5868
	(0.2911)	(4.6424)	(4.1326)	(4.4207)	(4.8529)	(4.5976)
Number of girls	1.9818	2.403	2.6969	3.3176	3.5902	2.8413
	(1.1302)	(1.8754)	(1.4355)	(1.1973)	(1.3463)	(1.5232)

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[14] Couples with foster and step children residing within the household and belonging to the school-going age (6–22 years) group were excluded from the analysis.

Number of siblings	3.8000	3.3284	3.6970	4.6706	4.7213	4.0749
	(1.8298)	(1.9648)	(1.3470)	(1.6285)	(1.2128)	(1.7077)
Mother's years of education	3.4364	5.2836	4.7879	1.5176	0.5246	3.0539
	(3.4575)	(4.2097)	(4.4011)	(2.7282)	(1.5980)	(3.8683)
Father's years of education	7.2364	8.4925	7.8182	4.7529	6.0000	6.7455
	(4.9327)	(4.3358)	(4.9580)	(3.9997)	(2.8461)	(4.4679)
Mother's risk aversion	0.3091	0.6567	0.4545	0.5529	0.5082	0.5060
	(0.4664)	(0.4784)	(0.5017)	(0.5001)	(0.5041)	(0.5007)
Father's risk aversion	0.6545	0.2687	0.2576	0.4706	0.5574	0.4341
	(0.4799)	(0.4466)	(0.4407)	(0.5021)	(0.5008)	(0.4963)
Mother's allocation to education	1,163.64	1,492.02	1,528.79	1,230.59	1,959.02	1,463.967
	(787.95)	(919.62)	(572.91)	(1,224.94)	(1,005.38)	(983.70)
Father's allocation to education	1,436.36	1,634.33	2,045.46	1,864.71	1,435.25	1,705.24
	(707.46)	(1,085.66)	(1,568.26)	(970.97)	(1,263.87)	(1,173.12)
Mother's bargaining power	0.2909	0.7313	0.5455	0.2471	0.3607	0.4311
	(0.4583)	(0.4466)	(0.5017)	(0.4339)	(0.4842)	(0.4960)
Household yearly income	786.4545	329.4701	526.053	396.9412	1207.59	621.1138
	(458.1405)	(308.8742)	(402.6678)	(267.5026)	(2,121.061)	(10,062.36)
The mother is a farmer	0.0000	0.5672	0.1212	0.4706	0.7049	0.3862
	(0.0000)	(0.4992)	(0.3289)	(0.5021)	(0.4599)	(0.4876)
The father is a farmer	0.2182	0.4179	0.1515	0.9765	1.0000	0.5808
	(0.4168)	(0.4969)	(0.3613)	(0.1525	(0.0000)	(0.4942)
Observations	55	67	66	85	61	334

Note: the figures in brackets are standard deviations.

Source: authors' compilation based on primary survey and experiment data collected by the authors.

Further, noticeable variations in the socio-economic and demographic characteristics across the villages exist. There are two significantly poorer villages, Ashokoi (in the Abidjan area) and Galea 2 (in the Soubré area), with annual household incomes approximately half of that of the sample average. In the case of Galea 2, this coincides with substantially lower levels of education of both men (4.75 years of education on average) and women (only 1.51 years of education on average) and reflects its status as a village with a high proportion of migrants from Burkina Faso and Mali. In the case of Ashokoi, the only important difference with the other villages in the area is the absence of a cooperative and the significantly lower incidence of non-farm employment for both men and women. In terms of the occupational structure, an interesting characteristic is the complete absence of farm occupations amongst women in the case of Andokoi (where all working-age women are involved in a non-agricultural cooperative) and the absence of non-farm employment amongst men in Logboayo.[15]

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[15] In a companion paper (Dimova et al. 2022), we explore the allocation behaviour of the spouses across various household expenditure items and find that husbands prioritize food expenditures while wives prioritize transfers to

5 Empirical analysis

5.1 Empirical strategy

Our empirical analysis of the link between parental risk preferences, the mother's relative bargaining power, and child educational outcomes proceeds in two steps. First, we estimate a child's probability of attending school using a logistic function:

$$p(y_i = 1|x_i) = \frac{\exp(\beta x_i)}{1 + \exp(\beta x_i)} \tag{1}$$

where $y_i = 1$ when the child attends school at the time of the survey, and x_i is a vector of observed child and household characteristics. The most important explanatory variables of interest to us are the levels of risk aversion of the mother and the father, and the relative bargaining power of the mother over educational expenditures. The binary risk aversion variable of each parent takes the value of 1 for $p^* \geq 0.7$, as described in Section 3A, and 0 otherwise. As described in Section 3B2, the binary mother's relative bargaining power variable takes the value of 1 if the absolute difference between the husband's own proportional allocation to education and the joint proportional allocation exceeds the absolute difference between the wife's own proportional allocation to education and the joint proportional allocation, and 0 otherwise.

The child level control variables include the age of the child, number of girls, and number of siblings in the household.[16] We also control for mother's and father's education, household's yearly income, and mother's and father's primary occupation. Given the high incidence of farming as a primary occupation, we assign a value of 1 in the case where a parent is a farmer and 0 otherwise. Following stylized empirical literature, we estimate a logit model that explores the propensity of children and adolescents to be enrolled in school, separately for girls and boys aged 6–22 years (Ashraf et al. 2020). Our results are robust to the inclusion of village fixed effects.

5.2 Empirical results

We first start by analysing the impact of non-cooperative and collective decision making with regards to household educational expenses on the likelihood of children's school attendance. In Table 5, the marginal effects from the logit model of girls' and boys' school attendance reveal that non-cooperative decision making regarding the proportional allocation of household expenditures towards education by either spouse has a significant pro-son bias, which disappears when the proportional allocation is collectively determined by the couple. For girls, non-cooperative or collective decision making has no significant impact on the likelihood of school attendance.

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parents, and both have similar average priorities with respect to educational expenditures. This behaviour is correlated with the education of the wife, the income of the husband, and the bride price.

[16] The inclusion of these variables follows the work of Akresh et al. (2012) who analyse how sibling rivalry exerts an impact on the parents' decision of whether and how much to invest in their child's education.

Table 5: Marginal effects from the logit model on child schooling as a function of parents' non-cooperative and collective decision making and binary risk aversion variable

Variables	Boys			Girls		
	Wife	Husband	Couple	Wife	Husband	Couple
Child's age	0.0141***	0.0149***	0.0146***	-0.000525	-0.000524	-0.000800
	(0.00449)	(0.00472)	(0.00494)	(0.00446)	(0.00427)	(0.00449)
Number of girls	-0.00633	0.0115	0.00233	-0.0132	-0.0130	-0.0124
	(0.0224)	(0.0209)	(0.0230)	(0.0215)	(0.0205)	(0.0210)
Number of siblings	-0.0213	-0.0329*	-0.0306	0.00294	0.00351	0.00358
	(0.0193)	(0.0194)	(0.0212)	(0.0132)	(0.0132)	(0.0130)
Mother's education	0.0267**	0.0218**	0.0261**	0.000100	9.50e-05	0.000830
	(0.0111)	(0.0102)	(0.0117)	(0.00803)	(0.00796)	(0.00782)
Father's education	-0.00404	-0.00583	-0.00645	0.0155**	0.0152***	0.0148***
	(0.00440)	(0.00430)	(0.00459)	(0.00638)	(0.00490)	(0.00514)
Father is risk averse	-0.105**	-0.0969**	-0.0938**	-0.0540*	-0.0540*	-0.0516*
	(0.0473)	(0.0484)	(0.0478)	(0.0321)	(0.0311)	(0.0300)
Mother is risk averse	-0.0718*	-0.0631	-0.0569	0.0965**	0.0953**	0.0924**
	(0.0420)	(0.0407)	(0.0412)	(0.0465)	(0.0396)	(0.0396)
Education allocation	**0.0414****	**0.0530****	**0.0221**	**0.00211**	**-0.00283**	**-0.0127**
	(0.0200)	**(0.0227)**	**(0.0265)**	**(0.0162)**	**(0.0166)**	**(0.0259)**
Household yearly Income	0.0693	0.0383	0.0554	-0.0244***	-0.0249***	-0.0244***
	(0.0642)	(0.0389)	(0.0614)	(0.00708)	(0.00700)	(0.00650)
The mother is a farmer	0.0372	0.0169	0.0347	-0.0741*	-0.0760**	-0.0803**
	(0.0536)	(0.0502)	(0.0573)	(0.0404)	(0.0387)	(0.0375)
The father is a farmer	-0.185**	-0.180**	-0.209**	0.0217	0.0212	0.0287
	(0.0892)	(0.0843)	(0.100)	(0.116)	(0.115)	(0.123)
Observations	154	154	154	180	180	180

Note: standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Source: authors' compilation based on primary survey and experiment data collected by the authors.

Table 6 highlights the marginal effects from the logit model of girls' and boys' school attendance with a binary measure of the mother's relative bargaining power over educational expenses, replacing the non-cooperative and collective proportional allocations. In the first and third columns, we report the results based on the binary risk aversion variable described in Section 3. The likelihood of school attendance falls for children of either gender if the father is risk averse with a fall of 8 percentage points for boys and 5 percentage points for girls, even though at only 10 per cent significance. By contrast, maternal risk aversion is positively associated with the school attendance of girls (an increase of 11 percentage points) but has no impact on the same for boys. The mother's relative bargaining power, however, is highly significant at the 1 per cent level on lowering school attendance for girls but has no impact on the same for boys. The marginal effect of the mother's relative bargaining power variable is of roughly the same size as that of the mother's risk aversion variable with regards to girls' school attendance. This suggests that greater relative bargaining power of the mother over educational expenditure tends to neutralize the positive effect of the mother's risk aversion on girls' school attendance.

While the likelihood of older boys attending school is positive, Table 6 reveals interesting patterns with regards to the effect of parental education and occupational choice on the schooling outcome for boys and girls. While the mother's education has an insignificant impact on school attendance for boys and girls (possibly due to universally low mother's education level), the father's education has a significant positive impact on the schooling outcome for girls only. In terms of occupation, farming as an occupation for the father has a significant negative impact on the likelihood of school attendance for boys, while the mother being a farmer has a significant negative impact on the same for girls. Finally, richer households are less likely to encourage school attendance for girls.

Table 6: Marginal effects from the logit model on child schooling as a function of the binary measure of the mother's bargaining power

Variables	Boys		Girls	
	Binary risk preference	Categorical risk preference	Binary risk preference	Categorical risk preference
Child age	0.0134**	0.0143**	0.000493	-0.000296
	(0.00673)	(0.00673)	(0.00426)	(0.00440)
Number of girls	0.0107	0.0119	-0.0171	-0.0310
	(0.0285)	(0.0295)	(0.0292)	(0.0273)
Number of siblings	-0.0327	-0.0389	0.00496	0.0123
	(0.0228)	(0.0243)	(0.0144)	(0.0148)
Mother's years of education	0.0312	0.0369	0.00406	0.00120
	(0.0246)	(0.0270)	(0.00842)	(0.00852)
Father's years of education	-0.00576	-0.00773*	0.0191***	0.0208***
	(0.00461)	(0.00458)	(0.00597)	(0.00715)
Mother's risk aversion	-0.0918	-0.0155	0.115***	0.0193***
	(0.0597)	(0.00995)	(0.0440)	(0.00459)
Father's risk aversion	-0.0856*	-0.0130*	-0.0578*	-0.00932**
	(0.0477)	(0.00724)	(0.0305)	(0.00468)
Mother's bargaining power	-0.0808	-0.0769	-0.119***	-0.120***
	(0.0777)	(0.0712)	(0.0326)	(0.0335)
Household yearly income	0.0412	0.0384	-0.0178***	-0.0158***
	(0.0485)	(0.0347)	(0.00602)	(0.00567)
The mother is a farmer	0.0107	0.0557	-0.125***	-0.148***
	(0.0607)	(0.0699)	(0.0426)	(0.0431)
The father is a farmer	-0.246**	-0.291**	-0.00494	0.0139
	(0.120)	(0.134)	(0.114)	(0.139)
R-squared	0.232	0.235	0.167	0.166
Observations	154	154	180	180

Note: robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Village fixed effects are accounted for.

Source: authors' compilation based on primary survey and experiment data collected by the authors.

5.3 Robustness checks

In this subsection, we first analyse whether our results are robust to alternative specifications of the father's and mother's risk aversion and the mother's relative bargaining power variables. Second, we employ a sequential logit regression to analyse the progression of children through the various stages of schooling. Finally, we analyse whether the interaction of the mother's relative bargaining power with her *relative* risk aversion impede the educational outcomes for boys and girls differentially.

Categorical measure of risk aversion

We use a categorical risk preference variable taking values between 2 and 10 for all the risk preference options faced by the subjects during the risk assessment experiment where 2 represents the highest level of risk tolerance and 10 represents the highest level of risk aversion. The second and fourth columns in Table 6 report the results when the categorical risk aversion variable is used. A comparison of the first and second columns, and the third and fourth columns, in Table 6 shows remarkable consistency in the results irrespective of whether we use the binary or the categorical measure of risk aversion. As a result, we only use the binary risk aversion measure due to greater ease of interpretation in the rest of the analysis.

Categorical measure of relative bargaining power

We construct a continuous measure of the mother's relative bargaining power as $|F(I) - J|$ - $|M(I) - J|$ = MBP, where F(I) and M(I) are, as before, the father's and mother's individual proportional allocations, J the joint proportional allocation, and MBP the mother's relative bargaining power. A large positive value of MBP in this case would imply a high mother's relative bargaining power while a low negative value would imply a high father's relative bargaining power. As reported in Table 7, our findings are robust to this construct with the statistical significance of the variables remaining the same when compared with the binary measure of the mother's relative bargaining power. Once again, the father's risk aversion is negatively associated with school attendance for both boys and girls, while the mother's risk aversion positively affects school attendance for girls and has no effect on the school attendance for boys. The mother's relative bargaining power counters the effect of risk aversion (albeit to a larger extent compared to the binary relative bargaining power measure) and negatively impacts school attendance for only girls. The results related to parental occupation, household income, and the father's education remain robust, and the only minor difference is the positive effect of the mother's education on the likelihood of school attendance for boys but at only 10 per cent significance.

Table 7: Marginal effects from the logit model on child schooling as a function of the continuous measure of the mother's bargaining power

Variables	Boys		Girls	
	Binary risk aversion	Categorical risk aversion	Binary risk aversion	Categorical risk aversion
Child age	0.0141**	0.0148**	0.000224	-1.24e-05
	(0.00570)	(0.00581)	(0.00422)	(0.00466)
Number of girls	0.0132	0.0134	-0.0180	-0.0484*
	(0.0255)	(0.0263)	(0.0232)	(0.0267)
Number of siblings	-0.0345	-0.0386*	-0.00108	0.0106
	(0.0218)	(0.0211)	(0.0137)	(0.0147)
Mother's years of education	0.0273*	0.0322*	0.00130	0.000134
	(0.0161)	(0.0192)	(0.00775)	(0.00773)
Father's years of education	-0.00533	-0.00718	0.0206***	0.0295***
	(0.00460)	(0.00471)	(0.00595)	(0.00774)
Mother's risk aversion	-0.0669	-0.0122	0.130***	0.0315***
	(0.0466)	(0.00779)	(0.0502)	(0.00645)
Father's risk aversion	-0.0949*	-0.0142**	-0.0611**	-0.0101**
	(0.0520)	(0.00678)	(0.0294)	(0.00444)
Mother's bargaining power	-0.326	-0.315	-0.533***	-0.845***
	(0.270)	(0.284)	(0.196)	(0.196)
Household yearly income	0.0386	0.0343	-0.0139**	-0.00633
	(0.0412)	(0.0318)	(0.00667)	(0.00580)
The mother is a farmer	0.0254	0.0680	-0.0730**	-0.116***
	(0.0687)	(0.0741)	(0.0366)	(0.0443)
The father is a farmer	-0.219**	-0.264**	0.0105	0.0552
	(0.105)	(0.112)	(0.110)	(0.106)
R-squared	0.3683	0.3747	0.3491	0.4083
Observations	154	154	180	180

Note: robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Village fixed effects are accounted for.

Source: authors' compilation based on primary survey and experiment data collected by the authors.

Educational progression of boys and girls

It has long been the norm in the literature on education to proxy educational outcomes by either completed years of education (Birdsall 1985) or current enrolment (Singh 1992) or the incidence of ever attending school (Cochrane et al. 1986). Yet, one could argue that such measures of schooling achievement are problematic in an environment such as that of Côte d'Ivoire where the dropout rates are very high and few children progress through the schooling system. To account for these context-specific and methodological issues, we estimate a sequential logit model following Buis (2017) and, in the tradition of Lillard and Willis (1994), complete a robustness check of the results obtained from the logit model. Our sequencing is based on three levels of educational

attainment: no schooling, primary education, and middle/high school (or higher) and follows the structure highlighted in Figure 6. After completing a level of education k, an individual i has the option to continue to the next level with probability p_{ki} or exit with probability (1-p_{ki}). The estimates of these transition probabilities are given by:

$$\hat{p}_{ki} = \frac{\exp{(a_k + \sum_m \beta_{km})}}{1 + \exp{(a_k + \sum_m \beta_{km})}}, \ \ if \ p_{k-1,i=1} \tag{2}$$

Figure 6: Sequential educational attainment tree
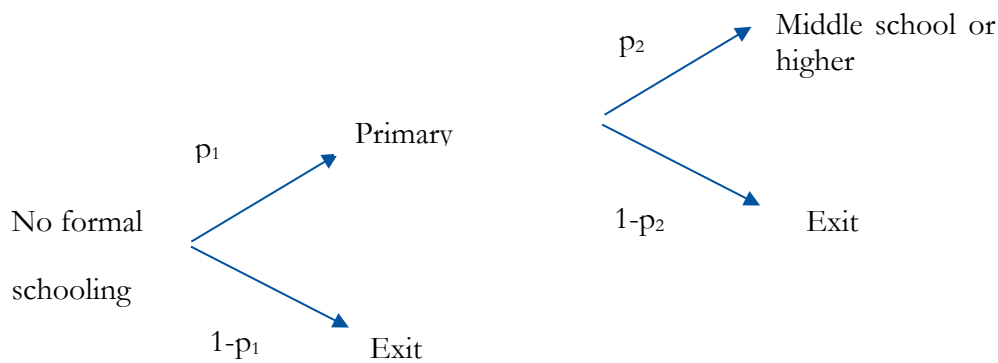
Source: authors' illustration.

It is important to note that while each of the villages in our data set has a primary school within a 10- to 20-minute walk, in all cases, the children will need to commute long distances should they choose to attend middle school and (particularly) higher than middle school facilities. Also, 8.46 per cent of the child sample over the age of 6 have never attended school, 59.70 per cent of these children transited to primary school, and 31.84 per cent completed primary school and transited to middle school or higher stage. The stages in our transition tree are based on numbers of cases in each category, as well as on the conceptual importance of distinguishing between: (i) primary school attendance and completion and (ii) moving on to middle school and higher levels of schooling.

The sequential logit results confirm and enrich the results from the logit model. Table 8 reports log odds ratios from this model in which we focus on the binary risk aversion variable and the binary measure of the mother's relative bargaining power. Note that a ratio greater than 1 indicates a positive association between the variable of interest and the outcome variable, while a ratio of less than 1 indicates a negative association.[17] The log ratios of the risk aversion variable for either spouse are less than 1, indicating a negative effect of either parents' risk aversion on the boys' transition from no schooling to primary schooling. The log odds ratio of the mother's risk aversion variable, however, is more than 1 for the transition of girls into primary schooling but less than 1 for the transition into middle school. Thus, the positive association between maternal risk aversion and schooling from the logit model is confirmed but only for the lower transition stages. Interestingly, the mother's relative bargaining power over educational expenses has a negative

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[17] While the overall number of observations are reported in Table 8, the sequencing part of the model only accounts for the children that have reached a certain node.

association with the transition into primary schooling for girls. It reduces, but does not neutralize, the positive association of maternal risk aversion on girls' schooling at this level. However, maternal relative bargaining power affects the higher schooling transitions for girls. Further, farming as the primary occupation of the father reduces the chances of young boys to transition into primary schooling. However, if these boys manage to complete primary school, then the sons of farmers have a greater chance to transition to middle school than the sons of non-farmers.

Table 8: Log odds results of the role of the binary parental risk aversion variable and binary measure of the mother's bargaining power on the educational transitions

	Boys		Girls	
	No school–primary	Primary–higher	No school–primary	Primary–higher
Child age	1.2192***	1.3364***	1.0074	1.2142***
	(0.0907)	(0.0693)	(0.0594)	(0.0468)
Number of girls	1.3364	3.0276***	0.5855	1.2509
	(0.5606)	(0.8671)	(0.2927)	(0.2861)
Number of siblings	0.5297	0.5201***	1.3581	0.8564
	(0.2209)	(0.1180)	(0.4277)	(0.1729)
Mother's years of education	1.8438**	0.9994	1.1514	0.9659
	(0.4908)	(0.0758)	(0.1623)	(0.0683)
Father's years of education	0.9111	1.0511	1.4373***	0.9517
	(0.0873)	(0.0618)	(0.1768)	(0.0543)
Mother's risk aversion	0.2089*	1.0277	9.2439**	0.3239**
	(0.2003)	(0.5044)	(8.6419)	(0.1519)
Father's risk aversion	0.2107*	0.7129	0.5685	1.9390
	(0.1953)	(0.3882)	(0.4267)	(0.8398)
Mother's bargaining power	0.2773	0.5889	0.2085*	0.9406
	(0.2439)	(0.3127)	(0.1927)	(0.4206)
Household yearly income	2.0003	1.2630	0.7150	0.6290
	(1.8973)	(0.2838)	(0.1684)	(0.2079)
The mother is a farmer	1.4430	1.0719	0.1260*	0.8078
	(1.4560)	(0.7147)	(0.1394)	(0.4480)
The father is a farmer	0.0106***	7.8411***	2.4925	0.5057
	(0.0182)	(5.8990)	(3.7389)	(0.3949)
Constant	10735***	0.0036***	0.0000	0.1534*
	(35808)	(0.0044)	(0.0000)	(0.1736)
Log likelihood	-98.544942		120.3073	
N observations	177	177	206	206

Note: the table highlights the odds ratios of transitioning from one level to another. An odds ratio of 1 indicates that an individual or household characteristic does not have any impact on the likelihood of transitioning. An odds ratio greater than 1 indicates that the variable increases the likelihood of transitioning to the next educational level, while an odds ratio less than than 1 indicates that the variable reduces the likelihood of transitioning to the next level. The figures in parentheses are standard errors, clustered at the household level. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Source: authors' compilation based on primary survey and experiment data collected by the authors.

A word of caution while interpreting our sequential logit results due to the unresolved debate in the literature on the stability of risk preferences. The second stage of the sequential logit model looks at the transition of children to middle school and higher levels of education, which may have happened several years prior to the time at which parental risk preferences were elicited by our lab-in-the-field experiment. While the classical economics literature assumes stability of risk preferences, more recent conceptual frameworks point to the possibility that lifetime events and shocks may lead to at least temporary alterations of risk preferences (Schildberg-Hörisch 2018). In

other words, the result from our sequential logit estimates with respect to the second transition from primary to secondary schooling needs to be treated with caution.

What underlying mechanisms might be at play behind the observed effects of parental risk aversion and the mother's relative bargaining power on the educational outcomes for boys and girls? Our empirical results in Tables 5, 6, and 8 need to be evaluated against the following established facts for Côte d'Ivoire: (i) crop production is undertaken along gender lines—males in the production of cash crops and females in the production of staples (Duflo and Udry 2004), with the production of cash crops entailing greater income volatility (Dimova and Gbakou 2013), (ii) boys' labour is considered a productive input in agriculture (Abou 2014), (iii) while the return to secondary education is high, there is an accompanying risk of unemployment (Schultz 2004; Keupie et al. 2009; Oyeniran 2017), (iv) the safety of girls is a concern especially when secondary school attendance involves travel over longer distances (Japanese International Cooperation Agency 2013), and (v) prevalence of early marriage and the norm of receiving a bride price by the parents of girls could be a significant amount for poorer families (Fenn et al. 2015; Jacoby 1995).

Thus, the result that the likelihood of school attendance for boys is adversely affected if fathers are either risk averse or are engaged in farming can be attributed to a combination of an aversion to risky educational returns and a preference for current income generated via the employment of boys in cash crop production. The mother's occupation has a similar effect on the likelihood of school attendance for girls, i.e. need for labour in the production of staples, while maternal risk aversion favouring primary school attendance for girls may well be driven by the possibility of obtaining a higher bride price for better educated daughters[18] even though concern for safety acts as a barrier for the transition of girls from primary to secondary schooling. A mother's increased relative bargaining power acting as an impediment for girls' school attendance is not surprising. As Table 5 shows, the non-cooperative allocation in relation to the collective one by either spouse exhibits a strong son preference. However, since boys are typically employed in high-value cash crop production, greater relative bargaining power of the mother over educational expenses seems to leave the preference for current income unaltered. It further seems from our results that the influence of the mother's greater relative bargaining power is only observable on the decisions that the mother can control, i.e. allocation of girls' labour to staple crop production and concern for the safety of older girls. However, absent loss aversion experiments and explicit questions in the survey related to perceptions of safety, our interpretation of the pathways through which parental risk aversion and maternal relative bargaining power affects the educational outcomes for boys and girls should be treated only as a plausibility.

Relative risk aversion and bargaining power

Table 9 reports the set of results where *relative* maternal risk aversion interacts with the binary measure of the mother's relative bargaining power. We define relative maternal risk aversion as the difference between the categorical risk aversion of the mother and the father. Thus, a positive value implies a higher maternal risk aversion (mother prefers the lottery rather than the safe return at a higher probability p(h) of winning compared to the father). We find that greater relative bargaining power for mothers who are also relatively risk averse has a negative impact on the likelihood of school attendance for boys (albeit at only 10 per cent significance). But the mother's relative risk aversion alone has no effect on the school attendance for boys. However, the opposite is the case for girls. Greater relative bargaining power for mothers who are also relatively risk averse has no impact on the likelihood of school attendance for girls, but relative risk aversion

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[18] Ashraf et al. (2014) point out that in the context of bride prices and absence of female land ownership, investing in girls' education may well be a rational choice amongst risk-averse mothers.

(exclusively) has a significant adverse impact on the likelihood of school attendance for girls. Occupational choice of the parents is also strongly associated with the likelihood of children's school attendance. Farming as an occupation for the father is negatively associated with the boys' school attendance, while farming as an occupation for the mother is negatively associated with the girls' school attendance.

Table 9: Marginal effects of relative maternal risk aversion and binary measure of the mother's bargaining power on school attendance

Variables	(1) Boys	(2) Girls
Child age	0.0151***	0.000298
	(0.00562)	(0.00462)
Number of girls	0.0114	-0.0228
	(0.0217)	(0.0222)
Number of siblings	-0.0398**	0.00309
	(0.0202)	(0.0133)
Mother's years of education	0.0257**	-0.00285
	(0.0113)	(0.00685)
Father's years of education	-0.00701	0.0221***
	(0.00548)	(0.00763)
Mother's bargaining power	-0.568**	-0.653***
	(0.273)	(0.231)
Mother's relative risk aversion	-0.00656	0.0180***
	(0.00591)	(0.00383)
Mother's relative risk aversion*bargaining power	-0.111*	-0.0208
	(0.0628)	(0.0459)
Yearly income	0.0356	-0.0149*
	(0.0344)	(0.00777)
The mother is a farmer	0.0385	-0.0830**
	(0.0536)	(0.0374)
The father is a farmer	-0.201**	0.0174
	(0.0940)	(0.114)
R-squared	0.344	0.3691
Observations	154	180

Note: standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Source: authors' compilation based on primary survey and experiment data collected by the authors.

6   Conclusion

Our analysis of the implications of parental risk preferences and the mother's relative bargaining power over the educational expenses of children highlight three novel findings. First, the association between parental risk preference and educational progressions highlights a greater tendency to treat boys as a productive asset and greater tendency to protect girls. Greater risk

aversion on the part of either parent means that boys are less likely to be enrolled in school than girls when they are still at primary school age. For girls, while maternal risk aversion has a positive impact on the transition from no schooling to primary school, it impedes the transition to higher levels of education.

The mother's relative bargaining power over the allocation of educational expenses—a key focus of our study—has an adverse impact on the educational progression of girls and no impact on the educational progression of boys. This result contrasts with the finding by Ringdal and Hoem Sjursen (2021) that an increase in the wife's bargaining power (relative to a dictator husband) does not increase investment in education for either boys or girls. This negative association between the mother's relative bargaining power and the educational progression of girls is orthogonal to the findings from natural experiments evaluated by Martinez (2013) for single mothers in Chile, Bobonis (2009) with respect to both income shocks and conditional cash transfers in Mexico, and Duflo (2003) with respect to pension reforms in South Africa. Moreover, greater bargaining power to wives who are relatively more risk averse than their husbands lowers the likelihood of school attendance for boys. We hypothesize that these results may be driven by a high valuation of current income from the employment of boys in cash crop (cocoa and rubber) production in rural Côte d'Ivoire.

References

Abou, P. (2014). 'A Re-Examination of the Determinants of Child Labour in Côte d'Ivoire'. AERC Research Paper 289. Nairobi: African Economic Research Consortium.

Akresh, R., E. Bagby, D. De Walque, and H. Kazianga (2012). 'Child Ability and Household Human Capital Investment Decisions in Burkina Faso'. *Economic Development and Cultural Change*, 61: 157–86. https://doi.org/10.1086/666953

Akyeampong, K. (2009). 'Revisiting Free Compulsory Universal Basic Education (FCUBE) in Ghana'. *Comparative Education*, 45: 175–95. https://doi.org/10.1080/03050060902920534

Ashraf, N., N. Bau, N. Nunn, and A. Voena (2020). 'Bride Price and Female Education'. *Journal of Political Economy*, 128: 591–641. https://doi.org/10.1086/704572

Ashraf, N., E. Field, and J. Lee (2014). 'Household Bargaining and Excess Fertility. An Experimental Study in Zambia'. *American Economic Review*, 104: 2210–37. https://doi.org/10.1257/aer.104.7.2210

Azrieli, Y., C. Chamber, and P. Healy (2018). 'Incentives in Experiments: A Theoretical Analysis'. *Journal of Political Economy*, 126: 1472–503. https://doi.org/10.1086/698136

Baird, Z., C. McIntosh, and B. Özler (2009). 'Designing Cost-Effective Cash Transfer Programs to Boost Schooling Among Young Women in Sub-Saharan Africa'. World Bank Policy Research Working Paper 5090. Washington, DC: World Bank. https://doi.org/10.1596/1813-9450-5090

Basu, A.K., and R. Dimova (2021). 'Household Preferences and Child Labour in Rural Ethiopia'. Discussion Paper No. 14062. Bonn, Germany: Institute of Labour Economics (IZA). https://doi.org/10.2139/ssrn.3775967

Benhassine, N., F. Devoto, E. Duflo, P. Dupas, and V. Pouliquen (2015). 'Turning a Shove into a Nudge? A Labelled Cash Transfer for Education. *American Economic Journal: Economic Policy*, 7(3): 86–125. https://doi.org/10.1257/pol.20130225

Bennell, P., and K. Akyeampong (2007). 'Teacher Motivation in Sub-Saharan Africa and South Asia'. London: Department for International Development (DFID).

Birdsall, N. (1985). 'Public Inputs and Child Schooling in Brazil'. *Journal of Development Economics*, 18(1): 67–86. https://doi.org/10.1016/0304-3878(85)90007-0

Bobonis, G. (2009). 'Is the Allocation of Resources within the Household Efficient? New Evidence from a Randomized Experiment'. *Journal of Political Economy*, 117: 453–503. https://doi.org/10.1086/600076

Bohnet, I., and R. Zeckhauser (2003). 'Trust, Risk and Betrayal'. *Journal of Economic Behavior & Organization,* 55(4): 467–84. https://doi.org/10.1016/j.jebo.2003.11.004

Buis, M. (2017). 'Not All Transitions are Equal: The Relationship Between Effects on Passing Steps in a Sequential Process and Effects on the Final Outcome'. *Sociological Methods and Research*, 46(3): 649–80. https://doi.org/10.1177/0049124115591014

Charness, G., U. Gneezy, and A. Imas (2013). 'Experimental Methods: Eliciting Risk Preferences'. *Journal of Economic Behavior & Organization*, 87: 43–51. https://doi.org/10.1016/j.jebo.2012.12.023

Chattopadhyay, R., and E. Duflo (2004). 'Women as Policy Makers: Evidence from a Randomized Policy Experiment in India'. *Econometrica*, 72(5): 1409–43. https://doi.org/10.1111/j.1468-0262.2004.00539.x

Cochrane, S., K. Mehra, and I. Osheba (1986). 'The Education Participation of Egyptian Children'. Education and Training Series Report EDT45. Washington, DC: World Bank.

Croson, R, and U. Gneezy (2009). 'Gender Differences in Preferences'. *Journal of Economic Literature,* 47(2): 448–74. https://doi.org/10.1257/jel.47.2.448

Dimova, R., P. Abou, A.K. Basu, and R. Viennet (2022). 'Négociation au sein des ménages ivoiriens: résultats expérimentaux du milieu rural'. Manchester: University of Manchester.

Dimova, R., and M. Gbakou (2013). 'The Global Food Crisis: Disaster, Opportunity or Non-Event? Household Level Evidence from Côte d'Ivoire'. *World Development*, 46: 185–96. https://doi.org/10.1016/j.worlddev.2013.02.007

Donni, O., and P. Chiappori (2011). 'Nonunitary Models of Household Behavior: A Survey of the Literature'. In J.A. Molina (ed.), *Household Economic Behaviors*. New York: Springer, pp. 1–40. https://doi.org/10.1007/978-1-4419-9431-8_1

Duflo, E. (2003). 'Grandmothers and Granddaughters. Old-Age Pensions and Intrahousehold Allocation in South Africa'. *World Bank Economic Review*, 17(1): 1–25. https://doi.org/10.1093/wber/lhg013

Duflo, E., and C. Udry (2004). 'Intrahousehold Resource Allocation in Côte d'Ivoire: Social Norms, Separate Accounts and Consumption Choices'. NBER Working Paper 10498. Cambridge, MA: NBER. https://doi.org/10.3386/w10498

Edmonds, E.V. (2006). 'Child Labour and Schooling Responses to Anticipated Income in South Africa'. *Journal of Development Economics*, 81(2): 386–414. https://doi.org/10.1016/j.jdeveco.2005.05.001

Education Policy Data Center (2014). 'Côte d'Ivoire: National Education Profile'. Washington, DC: Education Policy Data Center. https://www.epdc.org/sites/default/files/documents/EPDC%20NEP_Cote%20d%20Ivoire.pdf

Fenn, N.S., J. Edmeades, H. Lantos, and O. Onovo (2015). 'Child Marriage, Adolescent Pregnancy and Family Formation in West and Central Africa'. New York: International Center for Research on Women (ICRW), UNICEF.

Fink, G., and E. Peek (2014). 'Returns to Education in Low and Middle-Income Countries: Evidence from the Living Standards and Measurement Surveys'. Working Paper 120. Cambridge, MA: Program on the Global Demography of Aging at Harvard University. http://www.hsph.harvard.edu/pgda/working/

Gelli, A. (2015). 'School Feeding and Girls' Enrollment: The Effects of Alternative Implementation Modalities in Low-Income Settings in Sub-Saharan Africa'. *Frontiers in Public Health*, 3: 1–7. https://doi.org/10.3389/fpubh.2015.00076

Global Living Wage (2020). 'Anker Living Wage Reference Value: Rural Côte d' Ivoire 2020'. https://www.globallivingwage.org/wp-content/uploads/2020/11/Rural-Cote-dIvoire-LW-Reference-Value_EN_FINAL.pdf

Heineck, G., and O. Wölfel (2012). 'Parental Risk Attitudes and Children's Secondary School Track Choice'. *Economics of Education Review*, 31: 727–43. https://doi.org/10.1016/j.econedurev.2012.05.004

Holt, C., and S. Laury (2002). 'Risk Aversion and Incentive Effects'. *American Economic Review*, 92(5): 1644–55. https://doi.org/10.1257/000282802762024700

International Cocoa Initiative (2017). 'Education and Child Labour Risk for Older Children in Côte d'Ivoire'. https://cocoainitiative.org/knowledge-centre-post/education-and-child-labour-risk-for-older-children-in-cote-divoire/

Jacoby, H. (1995). 'The Economics of Polygyny in Sub-Saharan Africa: Female Productivity and the Demand for Wives in Côte d'Ivoire'. *Journal of Political Economy*, 103: 938–71. https://doi.org/10.1086/262009

Japanese International Cooperation Agency (2013). 'Country Gender Profile: Côte d'Ivoire'. Tokyo: Mitsubishi 4FJ Research and Consultancy Co, Ltd.

Kuepie, M., C. Nordman, and F. Roubaud (2009). 'Education and Earnings in Urban West Africa'. *Journal of Comparative Economics*, 37(3): 491–515. https://doi.org/10.1016/j.jce.2008.09.007

Lillard, L., and R. Willis (1994). 'Intergenerational Educational Mobility: Effects of Family and State in Malaysia'. *Journal of Human Resources*, 29(4): 1126–67. https://doi.org/10.2307/146136

Martinez, C. (2013). 'Intrahousehold Allocation and Bargaining Power: Evidence from Chile'. *Economic Development and Cultural Change*, 61: 577–605. https://doi.org/10.1086/669260

Munro, A. (2015). 'Intra-Household Experiments: A Survey and Some Methodological Observations'. Working Paper 15-03. Tokyo: National Graduate Institute for Policy Studies (GRIPS).

Munro, A., B. Kebede, M. Tarazona-Gomez, and A. Verschoor (2011). 'Autonomy or Efficiency: An Experiment on Household Decisions in Two Regions of India'. Discussion Paper 10-33. Tokyo: GRIPS. https://doi.org/10.2139/ssrn.1821285

Oyeniran, R. (2017). 'Basic Education in Côte d'Ivoire: From Education for All to Compulsory Education. Challenges and Perspectives'. *Journal of Education and Learning*, 6(2): 283–93. https://doi.org/10.5539/jel.v6n2p283

Ringdal, C., and I. Hoem Sjursen (2021). 'Household Bargaining and Spending on Children: Experimental Evidence from Tanzania'. *Economica*, 88: 430–55. https://doi.org/10.1111/ecca.12353

Schildberg-Hörisch, H. (2018). 'Are Risk Preferences Stable?' *Journal of Economic Perspectives*, 32(2): 135–54. https://doi.org/10.1257/jep.32.2.135

Schultz, T.P. (2004). 'Evidence of Returns to Schooling in Africa from Household Surveys: Monitoring and Restructuring the Market for Education'. *Journal of African Economies*, 13: 95–148. https://doi.org/10.1093/jae/ejh044

Singh, R. (1992). 'Underinvestment, Low Economic Returns to Education, and the Schooling of Rural Children: Some Evidence from Brazil'. *Economic Development and Cultural Change*, 40(3): 645–64. https://doi.org/10.1086/451965

Sovero, V. (2018). 'Risk Preferences and Child Investments. Evidence from Mexico'. *Review of Economics of the Household*, 16(4): 1027–47. https://doi.org/10.1007/s11150-017-9372-2

Tabetando, R. (2019). 'Parental Risk Aversion and Educational Investment: Panel Evidence from Rural Uganda'. *Review of the Economics of the Household*, 17: 247–70. https://doi.org/10.1007/s11150-018-9437-x

Tanaka, Y., and T. Yamano (2015). 'Risk and Time Preferences on Schooling. Experimental Evidence from a Low-Income Country'. Discussion Paper 14-24. Tokyo: GRIPS.

United Nations (2015). 'The Millennium Development Goals Report 2015'. New York: United Nations.

World Bank (2015). 'Republic of Côte d'Ivoire. Côte d'Ivoire Urbanization Review'. Report N. AUS10013. Washington, DC: The World Bank.

Appendix 1: Eliciting risk preferences

A   Instructions

Imagine, if you had won CFA 50,000 and you had to choose how to invest them to improve production in your fields.

- If you choose to invest in **project "A",** production improvements will make you earn an additional **CFA 65,000.**

TAKE the lottery bag with 2 colored balls and 8 white balls.

- If you choose to invest in **project "B"**, the additional money your earn depends on chance. The lottery bag shows you how many chances of earning different amounts of money.

For instance, with a lottery containing 10 balls, with 2 colored and 8 white balls:

You earn CFA **80,000** if we draw one of the 2 colored balls

You earn CFA 35,000 if we draw one of the 8 white balls

Look at Table #1:

- The only thing that changes from one row to the next is the number of orange and white balls in the right side of the table. Colored balls are the ones that make you win the most money if they are drawn.
- I am going to read Table 1 row by row.
- In each row, circle A if you prefer to invest in Project A, or circle B if you prefer to invest in Project B.

Remember:

- This money is real. We will draw one winner among you, who will receive either Project A or Project B money, depending on what they choose.
- We will randomly draw one of Table 1's row.
- If, in this row, the winner chose to invest in Project A, he or she will receive the corresponding money.
- If the winner chose to invest in Project B, he or she will play the lottery as described in the row, and he or she will receive the most money if he/she draws a colored ball, or the least money if he/she draws a white ball.

Check with the other experimenter in the room that participants do not circle randomly. If it is the case, explain the game again and repeat that the probability to win the most money increases with the number of colored balls.

B   Response sheet: Table 1

1	65 000 Fr	A	B	**80 000 Fr** ❶ 35 000 Fr ①②③④⑤⑥⑦⑧⑨
2	65 000 Fr	A	B	**80 000 Fr** ❶ ❷ 35 000 Fr ①②③④⑤⑥⑦⑧
3	65 000 Fr	A	B	**80 000 Fr** ❶ ❷ ❸ 35 000 Fr ①②③④⑤⑥⑦
4	65 000 Fr	A	B	**80 000 Fr** ❶ ❷ ❸ ❹ 35 000 Fr ①②③④⑤⑥
5	65 000 Fr	A	B	**80 000 Fr** ❶ ❷ ❸ ❹ ❺ 35 000 Fr ①②③④⑤
6	65 000 Fr	A	B	**80 000 Fr** ❶ ❷ ❸ ❹ ❺ ❻ 35 000 Fr ①②③④
7	65 000 Fr	A	B	**80 000 Fr** ❶ ❷ ❸ ❹ ❺ ❻ ❼ 35 000 Fr ①②③
8	65 000 Fr	A	B	**80 000 Fr** ❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽ 35 000 Fr ①②
9	65 000 Fr	A	B	**80 000 Fr** ❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽ ❾ 35 000 Fr ①

Appendix 2: Intra-household bargaining power

A   Instructions (non-gendered)

1. Step 1: public good games (3 rounds)
2. Step 2: individual allocation of household money

B   Response sheets for the individuals

Note: the response sheets display the instructions for [WIVES]. The response sheets for husbands were the same, except the rules for household money allocation decisions were inverted between rounds 1 and 2. The response sheets' text is slightly altered [between brackets] where relevant.

3. Step 1: public good games (three rounds)
4. Step 2: individual allocation of household money

C   Response sheet for couple allocation

A   Instructions (non-gendered)

Step 1: public good games (three rounds)

During this game, spouses will be separated in two rooms.

Each of you has earned between CFA 4,000 and 5,000 for participating today. You can see this amount in the wallet drawn on the sheet of paper in front of you (point **1**).

In the other room, your spouse also earned between CFA 4,000 and 5,000.

This game allows you to do the following:
- Decide whether you want to contribute part of this money in a common pot with your spouse, to spend on common family expenses; and how much;
- And if you want to keep part of this money for your own personal expenses.

Your spouse must make the same choice.

The amount going to the common pot increases: if you decide to put CFA 1,000 of your own money in the pot, they become CFA 1,500. But if you keep CFA 1,000 to yourself, they remain CFA 1,000.

We will specify a rule that determines who decides how to use the money in the common pot (you or your spouse). You are going to play 3 rounds in this game, each time with a different rule.

At the end of this game, we will randomly draw one of the three games and we will give you an envelope with the money you decided to keep for yourself in that round. We will also give an envelope to your husband or wife with their own money, and a third enveloped to the spouse who was the one to decide on common expenses for that round.

For instance: (1) in my wallet, I have 4 banknotes of CFA 1,000. How much do I have in total? *4,000*
(2) I want to put 2 banknotes in the common pot. I tick the box for 2 banknotes. Look, how much does it create for the common pot? *3,500*
(3) If my spouse received CFA 5,000, I think he/she put 3 banknotes in the pot. I tick the box for 3 banknotes
Other example: (1) 2 banknotes (2) 0 banknote (3) 1 banknote

Do you have any question? If you have questions during the game, raise your hand and somebody will come to see you right away.

For the 1ˢᵗ round, the rule is the wives decide how to spend the money in the common pot for family expenses.

In your wallet (point 1), there are 4 banknotes of CFA 1,000. The total sum is written next to the wallet.

<u>Out of this total,</u> you must decide how much to contribute to the common pot (**2**). Tick the box for the number of banknotes of CFA 1,000 you want to put in the common pot (0 1 2 3 or 4)

Now, imagine if your spouse also received CFA 4,000. Tick the box for the number of banknotes of CFA 1,000 you think your spouse put in the common pot 90 1 2 3 or 4)

Have you all finished with this sheet?

For the 2ⁿᵈ round, the rule is the husbands are the ones who decide how to spend the money in the common pot for family expenses.
1. *CFA 5,000 in the wallet*
2. *How much do you put in the pot?*
3. *Imagine if your spouse also received CFA 5,000…*

For the 3ʳᵈ round, the rule is that you decide with your spouse, by discussing together, how you want to spend the money from the common pot for family expenses.
1. *CFA 4,000 in the wallet*
2. *How much do you put in the pot?*
3. *Imagine if your spouse also received CFA 4,000*

We will now collect the sheets. You can take a 10-minute break but please stay in the room.

Step 2: individual allocation of household money

<u>After the break</u>

The amount written in front of you is the total sum in the common pot for family expenses.
You can decide how you want to spend this money. For this, you can choose 1, 2 or 3 options about the following (*read*)

		How much?
1	Food	CFA
2	Health	CFA
3	Children's education	CFA
4	Money transfers to children	CFA
5	Money transfers to parents	CFA
6	Housing	CFA
7	Transportation	CFA

Choose 1, 2 or 3 options and write how much money you want to spend on each other them.

Be careful, you cannot spend more than the total sum written at the top of your sheet.
For instance: if there are CFA 8,000 in the common pot, you cannot spend 5,000 on food and 4,000 on children's education. Why? Because 5,000+4,000=9,000 > 8,000. *Make sure the participants understand.*

Have you all finished? We will now collect the sheets.

Now, half of you go to the other room to sit with your spouse. Once you get there, tell the others to come and sit with their spouses who stayed here.

(In the room with couples sitting together)

The amount written in from of you is the total sum in the common pot for family expenses for this last round.
Take 5 minutes to discuss and decide which things you want to spend this money on, and how much to spend. You can choose to spend on any of the following list (*read the list above*)
Write your answers on the paper.

B Response sheets for individuals

Note: the response sheets display the instructions for [WIVES]. The response sheets for husbands were the same, except the rules for household money allocation decisions were inverted between rounds 1 and 2. The response sheets' text is slightly altered [between brackets] where relevant. The alterations are as follows for the husband's version of the response sheet:
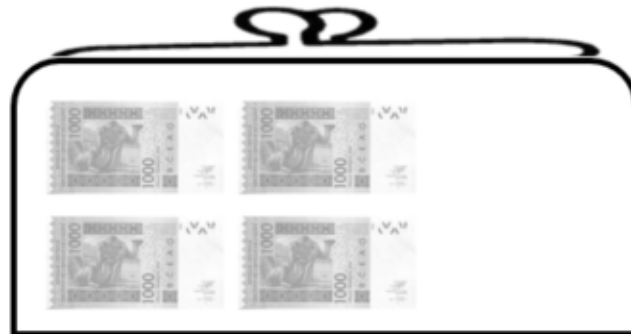
- [YOU] (Step 1, 1st round) becomes [YOUR WIFE]
- [YOUR HUSBAND] (Step 1, 2nd round) becomes [YOU]
- [1st round] (Step 2) becomes [2nd round]

Step 1: public good games (three rounds)

1st round: [YOU] are the one to decide how to spend the money from the common pot for family expenses.

1) You have

= **CFA 4,000**

2) In the common pot for family expenses,

YOU PUT:	In the end, this results in:
☐ 0	0
☐ 1	CFA 1,500
☐ 2	CFA 3,000
☐ 3	CFA 4,500
☐ 4	CFA 6,000

3) Imagine if your spouse had CFA 4,000

YOU THINK **YOUR SPOUSE** PUT

☐ 0	0
☐ 1	CFA 1,500
☐ 2	CFA 3,000
☐ 3	CFA 4,500
☐ 4	CFA 6,000

2nd round: it is [**YOUR HUSBAND**] who decides how to spend the money from the common pot for family expenses.

1) You have
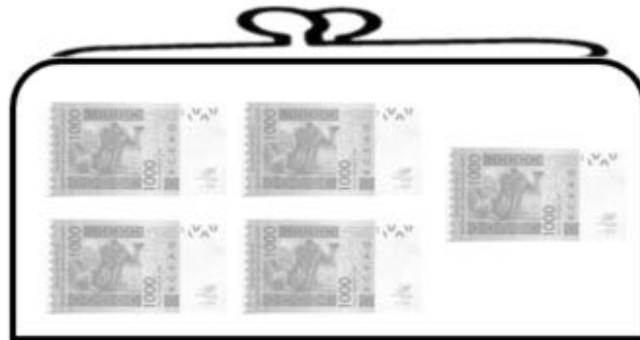
= **CFA 5,000**

2) In the common pot for family expenses,

YOU PUT: In the end, this results in:

☐ 0   ⟹   0

☐ 1   ⟹   CFA 1,500

☐ 2   ⟹   CFA 3,000

☐ 3   ⟹   CFA 4,500

☐ 4   ⟹   CFA 6,000

☐ 5   ⟹   CFA 7,500

3) Imagine if your spouse had CFA 5,000

YOU THINK **YOUR SPOUSE** PUT

☐ 0   ⟹   0

☐ 1   ⟹   CFA 1,500

☐ 2   ⟹   CFA 3,000

☐ 3   ⟹   CFA 4,500

☐ 4   ⟹   CFA 6,000

☐ 5   ⟹   CFA 7,500

3rd round: YOU and YOUR SPOUSE decide __TOGETHER__ how to spend the money from the common pot for family expenses.

1) You have

= CFA 4,000

2) In the common pot for family expenses

__YOU PUT :__   In the end, this results in:

☐ 0   ⟹   0

☐ 1   ⟹   CFA 1,500

☐ 2   ⟹   CFA 3,000

☐ 3   ⟹   CFA 4,500

☐ 4   ⟹   CFA 6,000

3) Imagine if your spouse had CFA 4,000

YOU THINK __YOUR SPOUSE__ PUT

☐ 0   ⟹   0

☐ 1   ⟹   CFA 1,500

☐ 2   ⟹   CFA 3,000

☐ 3   ⟹   CFA 4,500

☐ 4   ⟹   CFA 6,000

Step 2

[1st **round], YOU** are the one to decide how to spend the money from the common pot for family expenses.

There is CFA ……………………………. in the common pot for family expenses

What do you want to spend this money on?

		How much?
1	Food	CFA
2	Health	CFA
3	Children's education	CFA
4	Money transfers to children	CFA
5	Money transfers to parents	CFA
6	Housing	CFA
7	Transportation	CFA

C   Response sheet for couple allocation

3rd round YOU and YOUR SPOUSE decide <u>**TOGETHER**</u> how to spend the money from the common pot for family expenses

There is CFA ……………………………. in the common pot for family expenses

What do you want to spend this money on?

		How much?
1	Food	CFA
2	Health	CFA
3	Children's education	CFA
4	Money transfers to children	CFA
5	Money transfers to parents	CFA
6	Housing	CFA
7	Transportation	CFA