

Household Bargaining and Spending on Children: Experimental Evidence from Tanzania

By CHARLOTTE RINGDAL[†] and INGRID HOEM SJURSEN[‡]

[†]FAIR, Norwegian School of Economics and CREED, University of Amsterdam [‡]FAIR and Norwegian Center for Taxation (NoCeT), Norwegian School of Economics, Center for Applied Research at NHH (SNF), and Department of Economics and Misum, Stockholm School of Economics

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This paper studies whether an increase in women's intrahousehold bargaining power causes couples to allocate more resources to their child's education, and, if so, what the underlying mechanisms for this might be. We conduct a between-subject lab experiment with couples and vary the relative bargaining power between spouses. The paper provides two main insights. First, increasing the wife's bargaining power improves gender equality in allocation to children's education. However, it does not increase the amount invested in the child's education. Second, we show that the difference in time preferences between spouses matters for how much the household invests in the child's education. It benefits the child that the most patient spouse has more relative bargaining power. This implies that increasing the wife's bargaining power may reduce the allocation to the child's education if she is the less patient spouse. The results provide new insights into the current debate on female empowerment, and highlight the importance of incorporating a broader set of preferences in the analysis of intrahousehold decision-making.

INTRODUCTION

Since the UN Millennium Development Goals were launched in the year 2000, there has been an increased focus on female empowerment in international development aid strategies. Female empowerment is undoubtedly a goal of great intrinsic importance, but the policy debate has also focused on other reasons for empowering women. In particular, it has been argued that female empowerment increases women's intrahousehold bargaining power which in turn increases spending on goods and services that benefit children (see, for example, Thomas 1990, 1993; Attanasio and Lechene 2002; Duflo 2003; Gitter and Barham (2008); Browning *et al.* 2014). The assumed positive externalities of female empowerment are also reflected in implemented policies; most conditional cash transfer programmes that aim to improve living conditions for children target women (Fiszbein and Schady 2009).

The empirical and theoretical evidence for the positive effect of an increase in women's bargaining power on spending on children is, however, mixed. In this paper, we present evidence from a novel lab experiment with a between-subject design focusing on household investments in children's education. We exogenously vary the spouses' control over money and use this as a proxy for relative bargaining power between the husband and the wife in the experiment. The design allows us to causally identify whether an increase in the wife's bargaining power affects how much a couple allocates to one of their children's education. We shed light on the underlying mechanisms by investigating the role of time and risk preferences, and the gender of the child, factors that have received less attention in the household decision-making literature.

The experiment was conducted with 287 married couples in Dar es Salaam, Tanzania. The main outcome of interest is how the couples distribute a fixed endowment between the wife, the husband, and one of their children in primary school. The amount allocated

to the child is an investment in his or her education in the form of tutoring. We exogenously vary the wife's control over the allocation in four experimental treatments. The first treatment is a dictator game where the husband is the dictator and makes the allocation decision. The second and third treatments are Rubinstein shrinking-pie bargaining games; the husband makes the first proposal for the allocation decision in the second treatment, and the wife makes the first proposal in the third treatment (Rubinstein 1982). Finally, the fourth treatment is a dictator game where the wife is the dictator and makes the allocation decision. The treatments are designed to capture variation in the wife's bargaining power. In the first treatment, the husband has complete bargaining power. In the second and third treatments, the bargaining power is shared between the spouses. In the fourth treatment, the wife has complete bargaining power. The remainder of this paper refers to control over money as bargaining power. However, we acknowledge that 'bargaining power' is a broad term and that control over money captures only part of it.

Studying household decision-making in a lab experiment allows us to tightly control the factors influencing decisions. Thus we can cleanly identify causal effects, and study the importance of time and risk preferences for household investments in children's education. However, the lab methodology also has some important drawbacks. First, the decision-making situation in the lab might be very different from how households usually make decisions about children's education. Second, the recruitment procedure may have given rise to a selection bias. We discuss these threats to the external validity, that is, the degree to which our findings can be generalized to other settings and samples, in the third subsection of Section IV.

The paper offers two main insights. First, increasing the wife's bargaining power improves gender equality among the children, but does not increase the amount invested in the child's education. These findings shed new light on how an increase in the wife's bargaining power affects intrahousehold decision-making. Second, we find that the effect of an increase in bargaining power depends on the difference in time preferences between spouses. When the wife is less patient than the husband, giving her full bargaining power decreases the allocation to the child's education by 11.5 percentage points compared to when the husband has full bargaining power. When the wife is as patient or more patient than the husband, giving her full bargaining power increases the share allocated to the child's education by 7.7 percentage points. These findings show the importance of time preferences in the decision-making process in the household.

Our study relates to the growing literature on the role of women's bargaining power in household decision-making in developing countries. Earlier empirical studies such as Thomas (1990, 1993), Kennedy and Peters (1992), Case and Deaton (1998), Phipps and Burton (1998), and Doss (2006) generally find positive correlations between survey measures of bargaining power (wife's education, earnings, or assets at marriage) and children's welfare (clothes, food, nutrition, education, health and childcare). However, Thomas (1990, 1993) finds no evidence of men and women spending income differently when they both have earnings. As Duflo (2012) points out, these correlations do not imply causation and might be misleading.¹ To overcome this problem, researchers have used natural experiments that exogenously change women's bargaining power. A seminal paper by Lundberg *et al.* (1997) uses a change in the recipient of child benefits in the UK (from men to women) and finds that after the change, a larger budget share is spent on women's and children's clothing. Chou *et al.* (2010), on the other hand, use the expansion of the school system in Taiwan and do not find any differences in the effects of men's and women's education on children's health.

In the last two decades, a large strand of the household decision-making literature has focused on studying cash transfer programmes. For instance, Attanasio and Lechene (2002, 2010) and Rubalcava *et al.* (2009) find that conditional cash transfers to women in Mexico (*Oportunidades*) increase the family's budget share spent on food and children's clothing. However, because the transfers were given to women only, these studies do not shed light on the importance of the receiver's gender for spending on children. To overcome this problem, Bobonis (2009) uses rainfall shocks as an instrument for changes in household income. He finds that increases in household income caused by rainfall shocks have a smaller effect on expenditures on children's goods compared to cash transfers targeted to women in *Oportunidades*, which the author interprets as evidence for women devoting more of their earnings to meet collective consumption needs.

Recent randomized controlled trials (RCTs) that exogenously vary the gender of the cash transfer recipient generally find that cash transfers cause an improvement in child outcomes, but do not identify differential effects for transfers given to women and transfers given to men (Benhassine *et al.* 2015; Akresh *et al.* 2016; Haushofer and Shapiro 2016). An exception is a study by Armand *et al.* (2020) who find that women spend significantly more on food (especially meat, fish and dairy products) than men. Importantly, the RCT-based studies do not shed light on whether the null effects of gender of recipient are because (i) the cash transfers were not large enough to change relative bargaining power, or (ii) men and women have similar preferences about investments in children. The present study sheds light on which of the two reasons is more likely, and provides evidence for other underlying mechanisms that can explain investments in children's education.

Another related strand of the household decision-making literature uses lab experiments to test household models, including efficiency and cooperation within the household. Iversen *et al.* (2011), Kebede *et al.* (2014), Munro *et al.* (2014), and Bjorvatn *et al.* (2020) use public good games and find that the wife contributes less to the common pool than the husband does. In these studies, the wife's decision reduces the household income more than the husband's decision does. Similarly, Castilla and Walker (2013) and Hoel (2015) find evidence of inefficiencies and hiding of income when the wife is the decision-maker. Jakiela and Ozier (2016) find that women are willing to conceal their initial endowment, even though it reduces their potential earnings in the experiment. This literature suggests that women do not always make choices that are in the best interest of the household. Moreover, a seminal paper by Ashraf (2009) shows that when women control household savings, men are more likely to keep money for themselves when choices are non-observable, and commit money for private consumption when choices are observable. We contribute to this literature by cleanly identifying the causal effect of an increase in female bargaining power on couples' investments in their children's education, conducting, to our knowledge, the first lab experiment where the outcome is real investments in children. We also provide novel insights into how spouses' time and risk preferences, and the gender of the child, shape couples' decisions and interact with relative bargaining power.

Finally, our study relates to the theoretical household literature. Household models provide different predictions for how the provision of public goods (in our case, investments in children) is influenced by a change in relative bargaining power. Historically, the most commonly used category is the unitary model, where the household's preferences are represented by a utility function without any explicit process aggregating the preferences of the spouses (Samuelson 1956; Becker 1991). Thus this model does not provide any prediction of how a change in relative bargaining power affects household decision-making. Cooperative models, such as bargaining models

(Manser and Brown 1980; Lundberg and Pollak 1996) and the collective model (Chiappori 1988, 1992), predict that an increase in the wife's bargaining power (weakly) increases the provision of the public good if the wife cares more about the public good than the husband does. Non-cooperative models (Ulph 2006; Browning *et al.* 2009) have ambiguous predictions that depend on the wife's initial bargaining power; an increase in the wife's bargaining power might reduce the provision of the public good.

The paper is organized as follows. Section I describes the experimental design, and Section II discusses the empirical strategy. Section III provides the results, and Section IV discusses the results and limitation of the study design. Finally, Section V concludes.

I. SAMPLE AND EXPERIMENTAL DESIGN

Sample and setting

The experiment was conducted with 287 couples in Dar es Salaam, Tanzania. The couples were recruited by distribution of invitation letters to pupils in four different primary schools in a relatively poor ward (see Online Appendix D.1). The couples signed up for the study by returning a slip with their name and contact information to their child's teacher. They were then called by one of the research assistants to schedule a session. We discuss the issue of potential selection biases of our recruitment strategy in the third subsection of Section IV.

Each spouse received a TZS5000 show-up fee (approx. USD2.3), and had the opportunity to earn more during the experiment. All sessions took place in the afternoon between 1 pm and 5 pm, and each session consisted of between 15 and 30 couples. On average, each household earned TZS40,000 (approx. USD18.6), including the show-up fee. This corresponded to more than two days' worth of wages for low-paying jobs (Africapay 2018). In addition, we provided one child in each household with an average of 3.4 weeks of tutoring (worth TZS17,000/USD7.8).

Table 1 provides background characteristics for participants by gender. The average participant is close to 39 years old, and the men are on average eight years older than the women. The couples care for an average of 3.2 children, of whom 1.4 are in primary school. Comparing our sample to the Tanzania Demographic Household Survey (DHS), we find that the households in our sample are larger than the average household in urban Tanzania (5.2 members versus 4.3 members) (Tanzania National Bureau of Statistics 2016, p. 37). This suggests that our sample can be considered as relatively poor. Most of the respondents have completed primary school or a higher level of education. Men are more educated than women. In addition, there are large gender differences in employment status. While 41% of women report being unemployed, only 5% of men do the same. Our data on education and occupation are not comparable to the DHS.

Experimental setup and conditions

The sequence of events is described in Figure 1. At arrival, we conduct a background survey, with both spouses present. Couples are subsequently randomized to one of the four treatments, and the husband and the wife are placed in separate rooms according to their treatment. They then face three incentivized tasks. All the tasks are choices of how to allocate a monetary endowment. To illustrate the choice environment, the participants receive laminated pictures of TZS500 and TZS1000 notes. They are asked to place the money in different cups illustrating their choice, and the research assistants record the

TABLE 1
BACKGROUND CHARACTERISTICS BY GENDER

	Wife (1)	Husband (2)	Total (3)	<i>p</i> -value (4)
<i>A. Background</i>				
Age	34.95 (0.45)	42.66 (0.59)	38.80 (0.41)	0.000***
Number of children			3.17 (0.07)	
Children in primary			1.40 (0.03)	
Male child			0.40 (0.02)	
<i>B. Education</i>				
No/some/completed primary	0.38 (0.03)	0.35 (0.03)	0.36 (0.02)	0.508
Some secondary	0.50 (0.03)	0.39 (0.03)	0.45 (0.02)	0.010**
Completed secondary or more	0.13 (0.02)	0.26 (0.03)	0.19 (0.02)	0.000***
<i>C. Employment status</i>				
Unemployed	0.41 (0.03)	0.05 (0.01)	0.23 (0.02)	0.000***
Self-employed	0.52 (0.03)	0.67 (0.03)	0.60 (0.02)	0.000***
Private sector	0.03 (0.01)	0.20 (0.02)	0.11 (0.01)	0.000***
Observations	287	287	574	574

Notes

The table reports descriptive statistics for parents (age, education, employment status) and households (number of children, number of children in primary school, chosen child's gender). Column (1) reports means for wives, column (2) reports means for husbands, column (3) reports means for the total sample, and column (4) reports *p*-values for a two-sided *t*-test of difference in means between husband and wife.

In panel A, we report background variables for the household. 'Age': participant's reported age. 'Number of children': total number of children the couple cares for. 'Children in primary': total number of children the couple is caring for that are currently attending primary school in Dar es Salaam. 'Male child': share of chosen children that are male.

In panel B, we report education variables. 'No/some/completed primary': share of participants who have no formal schooling, some primary school, or completed primary school as their highest obtained level of education. 'Some secondary': share of participants with some secondary school as their highest obtained level of education. 'Completed secondary or more': share of participants with completed secondary school or higher as their highest obtained level of education.

In panel C, we report occupation variables. 'Unemployed': share of unemployed participants. 'Self-employed': share of self-employed participants. 'Private sector': share of participants employed in the formal private sector. Remaining participants are employed in the formal public sector.

Mean coefficients; standard error of mean in parentheses.

*, **, *** indicate $p < 0.10$, $p < 0.05$, $p < 0.01$, respectively.

answers. By simplifying the tasks in this manner, we ensure that literacy is not a requirement to participate in the study. The participants were paid for all the tasks in the experiment, and they were not aware of the tasks to be done before facing them.

To understand the mechanisms underlying the couple's decision, we elicit time and risk preferences using two separate tasks. In both tasks, the participants are explicitly told that neither their spouse nor any other participant will be informed about their

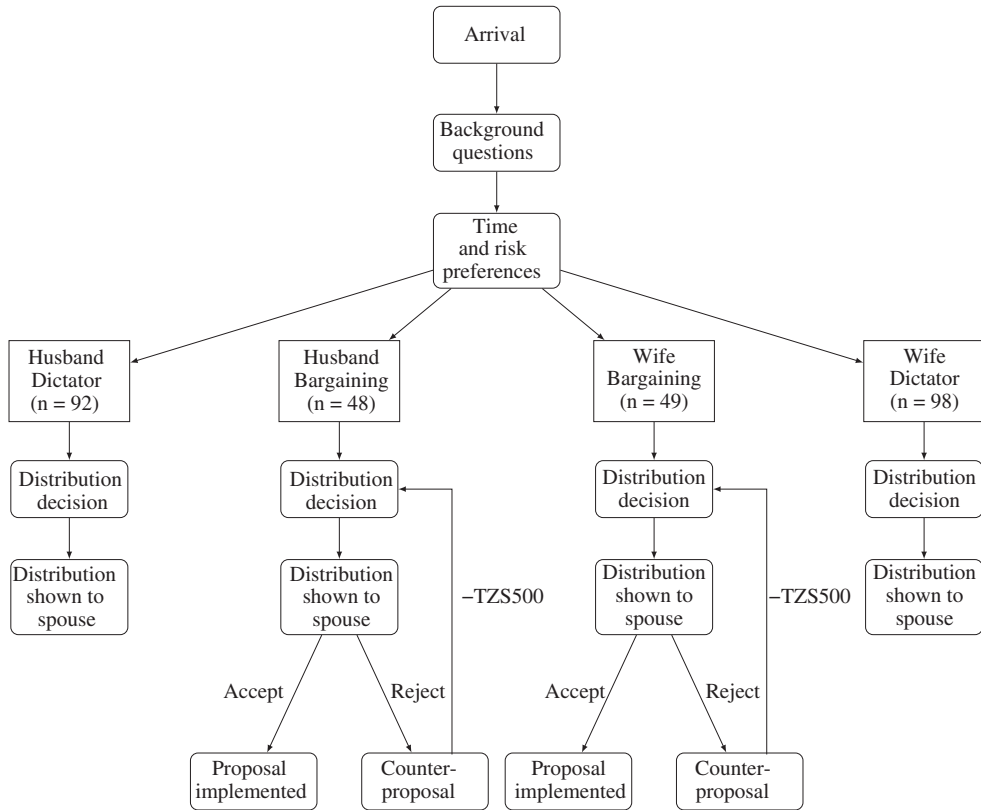


FIGURE 1. Diagram of experimental design.

decision (instructions are provided in Online Appendix D.2). We base the time preference task on Angerer *et al.* (2015) and Andreoni and Sprenger (2012) because of its simplicity. The participants allocate TZS3000 between the day of the experiment and three weeks later in increments of TZS500. Any amount that they choose to receive after three weeks is doubled. Earnings from the time preference task are paid out through M-Pesa, an SMS-based money-transferring system.²

In the risk preference task, based on Gneezy and Potters (1997), the participants decide how much of TZS3000 they want to keep and how much they want to invest in a risky option in increments of TZS500. After their decision, the participants draw a card from a bag to determine whether the invested money is tripled (green card) or reduced to nothing (red card). They are informed that the probability of winning and losing is the same. Note that risk-neutral (and risk-seeking) individuals should invest the entire TZS3000 endowment in the risky option. Thus the risk preference task can be thought of as a measure of the degree of risk aversion. Earnings from this task are paid out in cash at the end of the experiment.

In the third task, the couples allocate a TZS15,000 endowment between the wife, the husband and their child. If a couple has more than one child in primary school, then one is randomly selected. The name of the chosen child is communicated to the husband and the wife before they make the decision. For every TZS1500 allocated to the child, the child receives one week of tutoring. The couples can allocate amounts of TZS0, TZS1500, TZS3000, and so on, up to TZS15,000, and the maximum possible amount of

tutoring is ten weeks. The regular price of tuition is TZS5000 per week per child, implying a multiplier of 3.33. The husband's and wife's earnings from the distributive task are paid out in cash. The allocation to the child is paid out as a certificate for tuition.

At the time of our study, children in the study area attend primary school in the morning for free. In the afternoon, parents can choose to pay for extra tuition. The tuition is conducted Monday to Friday from 3 pm to 5 pm. It includes tutoring, a speed test each day, and a weekend test. The children are taught in groups of 25–40, and the main focus of the teaching is mathematics, English and science. We wrote contracts with the tutors teaching the children in each of the four schools. We chose tutoring as the investment good because it has some general properties that we think are important when studying allocations to children. It is an investment good that benefits the child and for which the household has a demand.

Prior to the experiment, we conducted a survey with 120 respondents in an area similar to the one within which the experiment was conducted. When asked to choose three items they would have liked to get from a list of 12 items, those related to education were very popular (57% gave private tutoring, 29% school books, and 10% school uniform as their first choice). 54% of men and 64% of women indicated tutoring as one of the three items. Based on this survey, we deduced that both men and women demanded tutoring. To ensure that the allocation to the child could not easily be undone after the experiment, we chose to use individualized certificates for tutoring, which are difficult to sell. Furthermore, as tuition is rather expensive, most of the couples in our sample could not afford it on a regular basis.

The structure of the distributive task is determined by the treatment to which the couples were assigned:

Husband Dictator	Dictator game with the husband as dictator
Husband Bargaining	Rubinstein shrinking-pie bargaining game with the husband as first proposer
Wife Bargaining	Rubinstein shrinking-pie bargaining game with the wife as first proposer
Wife Dictator	Dictator game with the wife as dictator

In Husband Dictator, the husband decides how to allocate the endowment. He indicates his allocation decision by dividing the total endowment between three cups: one with a picture of a woman, one with a picture of a man, and one with a picture of a child. The participants are required to place all the notes in the different cups, making the fact that the amount allocated to the husband, the child and the wife must sum to TZS15,000 very salient to them. In all treatments, these cups are taken to the decision-maker's spouse by the research assistants, and the decision-makers are aware that the spouse will be informed about their allocation. In Husband Bargaining and Wife Bargaining, the first proposer makes a proposal of how to allocate the endowment. The proposal is then shown to the spouse, who can either agree or disagree. If the spouse agrees, then the proposal is implemented. Otherwise, the endowment is reduced by TZS500, and he or she makes a counter-proposal. The couples can go back and forth until an agreement is reached or there is no money left. We chose the cost of bargaining based on two factors: (i) to avoid the game continuing indefinitely, and (ii) for the cost to be low so that the couples did have the possibility to bargain. Wife Dictator is similar to Husband Dictator, but the wife has the role of dictator.

The treatments are designed to exogenously increase the wife's bargaining power in the experiment. When the husband is the dictator, the wife has no bargaining power. In the two bargaining treatments, the bargaining power is shared between the spouses, but

the first proposer has the upper hand through a first-mover advantage. Finally, in the fourth treatment, the wife has complete bargaining power. We refer to the increase in the wife's bargaining power as 'small' when comparing Husband Dictator to Husband Bargaining, as 'intermediate' when comparing Husband Dictator to Wife Bargaining, and as 'large' when comparing Husband Dictator to Wife Dictator. Note that we cannot know the exact division of bargaining power in the different treatments, but it is reasonable to assume that the wife's bargaining power satisfies Husband Dictator \leq Husband Bargaining \leq Wife Bargaining $<$ Wife Dictator. We cannot disentangle the spouses' bargaining powers in the experiment and their bargaining powers outside the lab. However, as we have random assignment to treatment, we can assume that assignment to treatment is uncorrelated with spouse's bargaining power outside the lab, and should therefore not be a main driver of the results.

We chose a Rubinstein shrinking-pie game for the two bargaining treatments to make them as comparable to the dictator treatments as possible. In this setup, the only difference between the dictator and bargaining treatments is the receiver's opportunity to make a counter-proposal.

Wife's involvement in decision-making

After respondents finish the time, risk and allocation task, we ask both husband and wife questions about how the household generally makes decisions. Specifically, we ask them about who in the household usually has the final say in four decision domains: children's education, wife's health, major household purchases and visiting the wife's family and relatives. The possible responses are 'husband alone', 'wife alone' and 'husband and wife together'. These types of questions are used in many household surveys, including the Demographic and Health Surveys.

The descriptive results from these questions are reported in Table 2. We note that most of the decisions are taken jointly by husband and wife. Between 62% and 85% of women, and between 72% and 85% of men, report that decisions in each domain are taken jointly. For both men's and women's reporting, a woman is most likely to make decisions alone when it concerns her own health, while men are most likely to make decisions about visits to the wife's family and relatives. Together, the results do not suggest that men or women are solely responsible for any household decision.

TABLE 2
DECISION-MAKING POWER

	Wife's report			Husband's report		
	Husband	Joint	Wife	Husband	Joint	Wife
Children's education	0.13	0.80	0.07	0.13	0.82	0.05
Wife's health	0.14	0.62	0.24	0.18	0.72	0.11
Major household purchases	0.11	0.85	0.04	0.13	0.85	0.03
Visiting wife's family/relatives	0.28	0.62	0.10	0.18	0.76	0.06

Notes

The table reports descriptive statistics for the wife's decision-making power as reported by the wife and the husband, respectively. Each question asks about the main decision-maker in the different domains.

Hypotheses

A pre-analysis plan was registered at the American Economic Association Randomized Controlled Trials Registry before we collected the data. This plan specifies the empirical strategy, including the hypotheses to be tested, the regression approach, and the dimensions to be studied in the heterogeneity analysis.³ We present the hypotheses here.

We have several *ex ante* (pre-specified) hypotheses about the spouses' preferences and the effect of an increase in the wife's bargaining power on allocation to the child. In line with previous literature and policies, our hypotheses are based on the assumption that women 'care' more about their children than men do. For the main treatment effects, we formulate two hypotheses. First, we hypothesize (Hypothesis 1) the allocation to the child's education to be higher in Wife Dictator than in Husband Dictator (because women care more about the child). Second, if the household behaves according to a collective household model (and the wife cares more about the child's education than the husband), then an increase in the wife's bargaining power should increase the allocation to the child's education. In other words, we hypothesize (Hypothesis 2) that the allocation to the child would be highest in Wife Dictator, second highest in Wife Bargaining, third highest in Husband Bargaining, and lowest in Husband Dictator. Note that this prediction depends on the model used. A unitary model predicts that the allocations will remain unchanged regardless of the distribution of bargaining power. A non-cooperative model, on the other hand, predicts that allocation to the child is lower in the two bargaining treatments than in the two dictator treatments. A more thorough discussion of a cooperative and a non-cooperative model can be found in Section IV.

The second set of hypotheses concerns heterogeneous treatment effects. *Ex ante*, we hypothesize that differences in time and risk preferences between spouses affect the treatment effects (see, for example, Schaner 2015). Specifically, we expect that being more patient is positively associated with the allocation to the child's education. Therefore, giving the more patient spouse more bargaining power has a stronger effect on allocation to the child compared to when the less patient spouse is given more bargaining power. If the wife is more patient than the husband, then an increase in her bargaining power should have a larger (positive) effect on the allocation to the child than if she is less patient than the husband (Hypothesis 3). Similarly, we also posit that more risk-averse individuals would allocate less to the child (if the returns to investing in a child's education are perceived to be uncertain). Therefore, if the wife is more risk-averse than the husband, then we expect that giving her more bargaining power has a smaller effect on the allocation to the child than if she is less risk-averse than the husband (Hypothesis 4). We are also testing the *ex post* hypothesis that the gender of the child affects the allocation. Based on previous literature, we expect that men favour boys and that women favour girls (Gupta *et al.* 2003). Thus if the chosen child is a girl, the effect of increasing the wife's bargaining power has a larger (positive) effect than if the child is a boy (Hypothesis 5).

II. EMPIRICAL STRATEGY

In this section, we provide the empirical strategy for the main analysis and the heterogeneity analysis.

Main analysis

We first investigate whether an increase in the wife's bargaining power increases the share allocated to the child (Hypotheses 1 and 2) by estimating the regression

$$(1) \quad y_c = \alpha + \beta_{HB} \text{Husband Bargaining}_c + \beta_{WB} \text{Wife Bargaining}_c \\ + \beta_{WD} \text{Wife Dictator}_c + \delta_S S + \delta_X X_c + \varepsilon_c,$$

where y_c is the share of the endowment allocated to the child for couple c , α is a constant, Husband Bargaining $_c$, Wife Bargaining $_c$ and Wife Dictator $_c$ are treatment dummies taking value 1 if couple c is in Husband Bargaining, Wife Bargaining and Wife Dictator, respectively, S is a set of indicator variables for each session, X_c is a vector of background variables, and ε_c is the error term.⁴ Vector X_c consists of child and parent background variables (including time and risk preferences) as well as intrahousehold differences in education, and time and risk preferences (the variables are defined in Table 4). All regressions are estimated with ordinary least squares and robust standard errors.

Tables A.1 and A.2 in Online Appendix A report balance regressions for spouse and child background variables. Overall, the treatments are well-balanced. In terms of time and risk preferences, however, we find imbalances between treatments (see Online Appendix Table A.3).

Husband Dictator is the reference category in equation (1), and we interpret the estimated treatment effects relative to a situation where the husband has complete bargaining power. From equation (1), we obtain estimates of the causal effect on y_c of a small (β_{HB}), intermediate (β_{WB}) and large (β_{WD}) increase in the wife's bargaining power.

We also estimate equation (1) for y_{Hc} and y_{Wc} , the shares allocated to the husband and the wife, respectively. Note that these regressions were not specified in the pre-analysis plan.

Finally, we do a set of robustness tests. The rationale behind these and the results can be found in Online Appendix B. In the results section, we mention the results for the robustness checks only if these are different from those reported in the main analysis.

Heterogeneity analysis

To shed light on the underlying mechanisms affecting the allocation to the child's education, we study heterogeneity in the treatment effects. To do this, we use the elicited preferences and background data collected in the survey. We focus on time and risk preferences, and the gender of the child. In particular, we test whether the treatment effect is different for couples where (i) the husband is more patient (Hypothesis 3), (ii) the husband is less risk averse (Hypothesis 4), and (iii) the chosen child is a boy (Hypothesis 5). The analysis of the pre-specified heterogeneity dimensions not reported in the main analysis is reported in columns (1), (2), (4) and (5) of Table A.5 in Online Appendix A.⁵

We estimate the following regression for each of the three dimensions, separately:

$$(2) \quad y_c = \alpha + \beta_{Var} \text{Var}_c \\ + \beta_{HB} \text{Husband Bargaining}_c + \theta_{HB} \text{Husband Bargaining} \times \text{Var}_c \\ + \beta_{WB} \text{Wife Bargaining}_c + \theta_{WB} \text{Wife Bargaining} \times \text{Var}_c \\ + \beta_{WD} \text{Wife Dictator}_c + \theta_{HD} \text{Wife Dictator} \times \text{Var}_c \\ + \delta_S S + \delta_X X_c + \varepsilon_c,$$

where Var_c is an indicator variable for couples where the husband is more patient or less risk averse, or couples where the chosen child is a boy, and $\text{Husband Bargaining} \times \text{Var}_c$, $\text{Wife Bargaining} \times \text{Var}_c$ and $\text{Wife Dictator} \times \text{Var}_c$ are interaction terms between the indicator variable and the respective treatment indicator variables.

On the basis of these regressions, we study whether there are significant differences in treatment effects between subgroups. The estimated subgroup difference in the causal effect of small, intermediate and large increases in female bargaining power are given by θ_{HB} , θ_{WB} and θ_{WD} . As an illustration, if Var_c is an indicator variable for the husband being more patient than the wife, then the estimate θ_{WD} shows whether the effect of a large increase in female bargaining power is different for couples where the husband is more patient than the wife and couples where he is not.

III. RESULTS

We first provide descriptive results for the allocation decisions made for the household endowment and in the time and risk preferences tasks. Next, we report the main analysis of the treatment effects on the share allocated to the child, and on the share allocated to the wife and the husband, respectively. We then discuss heterogeneous treatment effects.

Allocation decisions

Table 3 reports descriptive statistics for allocations to the child, husband and wife, and for allocations to the future and the risky option for the husband and the wife, respectively. On average, the couples allocate a share of 0.34 to the child. Moreover, the mean share allocated to the husband, 0.29, is significantly smaller than the mean share allocated to the wife, 0.37 ($p < 0.001$). In terms of time and risk preferences, the husbands in our sample are significantly more patient ($p = 0.094$) and less risk averse than the wives ($p < 0.001$).

In Figure 2, we display intrahousehold differences in patience and risk aversion. Couples are sorted into six categories: husband most patient/least risk averse, husband and wife equally patient/risk averse, and wife most patient/least risk averse. The figure illustrates that there is large variation in the differences in time and risk preferences between spouses. In about 84% of the couples, the husband and the wife have different time preferences, and about 80% have different risk preferences.

Main analysis

Table 4 reports regressions for comparisons of Husband Dictator with the three other treatments (see Tables A.6–A.8 in Online Appendix A for extended regression tables). In column (1), we include only the treatment indicator variables Husband Bargaining, Wife Bargaining and Wife Dictator. In columns (2)–(5), we sequentially add session fixed effects and background variables. We focus on the full specification in column (5). We do not find a significant effect of a small or a large increase in the wife's bargaining power. However, an intermediate increase in the wife's bargaining power significantly reduces the share allocated to the child's education. The descriptive results on treatment effects are in line with the regression analyses, and are reported in Online Appendix C.

In terms of background variables, we find a positive, but small, effect of the husband's age and a negative effect of the wife's age. Note that the effect of the wife's age is not robust to using the final share in Table B.1 of Online Appendix B.

TABLE 3
ALLOCATION DECISIONS

	Mean	S.D.	1st quartile	Median	3rd quartile
Allocation to child	0.34	0.22	0.20	0.30	0.40
Allocation to wife	0.37	0.19	0.27	0.33	0.43
Allocation to husband	0.29	0.18	0.17	0.30	0.40
Share invested in future, husband	0.74	0.26	0.67	0.67	1.00
Share invested in future, wife	0.70	0.28	0.50	0.67	1.00
Share invested in risky option, husband	0.70	0.28	0.50	0.67	1.00
Share invested in risky option, wife	0.59	0.29	0.33	0.50	0.83

Notes

The table displays the mean, standard deviation, 1st quartile, median and 3rd quartile for shares allocated to child, husband and wife, as well as for the share allocated to the future and share allocated to the risky option by husbands and wives, respectively.

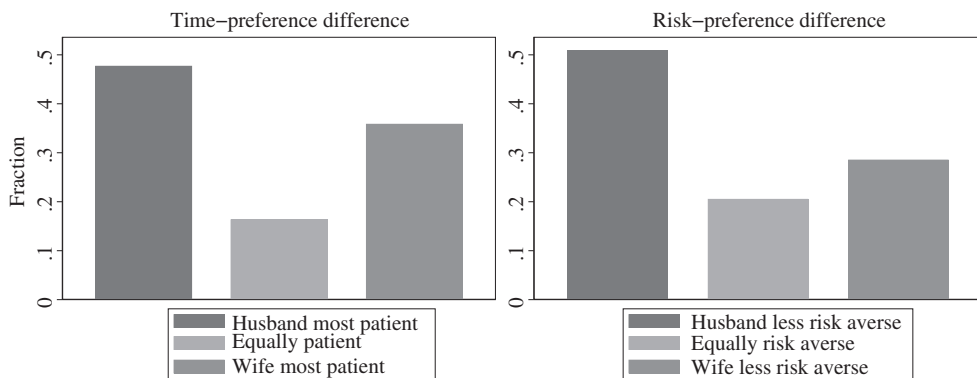


FIGURE 2. Time and risk preferences between husband and wife.

Notes: The figure provides a simplified illustration of differences in time and risk preferences between the husband and the wife. Couples are divided into three categories: husband most patient/least risk averse, husband and wife equally patient/risk averse and wife most patient/least risk averse. Time preferences are measured by the share allocated to the future and the fraction of couples in each of the three categories is illustrated in the left panel. Risk preferences are measured by the share allocated to the risky option and the fraction of couples in each of the three categories is illustrated in the right panel.

Based on this regression, we formulate the following main result.

Result 1 Increasing the wife's bargaining power relative to Husband Dictator does not increase the allocation to the child's education ($\beta_{HB} = 0.022$, $p = 0.577$, $\beta_{WB} = -0.079$, $p = 0.044$, $\beta_{WD} = 0.004$, $p = 0.901$; see column (5) of Table 4).

Result 1 suggests that we can reject Hypotheses 1 and 2. In fact, an intermediate increase in the wife's bargaining power reduces the allocation. As there is no significant difference between Husband Dictator and Wife Dictator, this is likely not a consequence of different preferences when it comes to allocation to the child's education, but rather due to some other aspects of the bargaining situation (see Section IV for a discussion).

Next, we consider the effect of increasing the wife's bargaining power on the share allocated to the wife and the husband in Table 5. Both columns show the full specification where all background variables and the indicator variables are included. A

TABLE 4
EFFECT OF INCREASING THE WIFE'S BARGAINING POWER ON THE ALLOCATION TO THE CHILD'S EDUCATION

	(1)	(2)	(3)	(4)	(5)
Husband Bargaining	0.012 (0.039)	0.016 (0.039)	0.021 (0.040)	0.026 (0.038)	0.022 (0.039)
Wife Bargaining	-0.103*** (0.036)	-0.100*** (0.035)	-0.096*** (0.035)	-0.080** (0.040)	-0.079** (0.039)
Wife Dictator	-0.019 (0.034)	-0.019 (0.033)	-0.015 (0.034)	0.003 (0.032)	0.004 (0.032)
Male child			0.020 (0.026)	0.037 (0.026)	0.036 (0.026)
Chosen child's standard			0.001 (0.007)	0.006 (0.007)	0.005 (0.007)
Age, husband				0.003** (0.002)	0.003** (0.002)
Age, wife				-0.004* (0.002)	-0.004* (0.002)
Husband more patient					0.050 (0.045)
Husband less risk averse					-0.067 (0.042)
Session fixed effects	No	Yes	Yes	Yes	Yes
Child background	No	No	Yes	Yes	Yes
Parent background	No	No	No	Yes	Yes
Parent difference	No	No	No	No	Yes
HB vs. WB	0.003	0.003	0.004	0.023	0.028
WB vs. WD	0.011	0.012	0.013	0.019	0.021
HB vs. WD	0.385	0.334	0.331	0.537	0.637
Couples	287	287	285	284	284
R ²	0.031	0.115	0.124	0.199	0.210

Notes

The table reports regressions of the share allocated to the child (with possible discrete values 0,0.1,0.2,...,0.9,1) on the treatment variables: 'Husband Bargaining' (indicator variable taking the value 1 for couples in Husband Bargaining), 'Wife Bargaining' (indicator variable taking the value 1 for couples in Wife Bargaining), 'Wife Dictator' (indicator variable taking the value 1 for couples in Wife Dictator), and a set of explanatory variables. 'Session fixed effects': indicator variables for each of the 11 different sessions of the experiments.

'Child background' is as follows. 'Male child': indicator variable taking the value 1 if the child is a boy. 'Chosen child's standard': variable taking values corresponding to the chosen child's school standard between 1 and 7. 'Children total': indicator variable for couples with two or more children. We also include indicator variables for which of the four schools the child is attending.

'Parent background' is as follows. 'Age_{*i*}' ($i = H, W$, $H =$ husband, $W =$ wife): count variable for reported age of individual i . 'Self-employed_{*i*}': indicator variable taking the value 1 if i is self-employed. 'Highest level of education_{*i*}': discrete variable taking the values 0 = No formal education, 1 = Some primary school, 2 = Primary school completed, 3 = Some primary school, 4 = Secondary school completed, 5 = More than secondary school. 'Share allocated to future_{*i*}': share allocated to the future by i . 'Share invested in risky option_{*i*}': share allocated to the risky option by i .

'Parent difference' variables are as follows. 'Husband most educated': indicator variable taking the value 1 for couples where the husband is more educated than the wife. 'Husband most patient': indicator variable taking the value 1 for couples where the husband allocates more to the future than the wife. 'Husband least risk averse': indicator variable taking the value 1 if the husband allocates more to the risky option than the wife.

Robust standard errors in parentheses.

*, **, *** indicate $p < 0.10$, $p < 0.05$, $p < 0.01$, respectively.

TABLE 5
EFFECT OF INCREASING THE WIFE'S BARGAINING POWER ON THE ALLOCATIONS TO WIFE AND HUSBAND

	Allocation to wife (1)	Allocation to husband (2)
Husband Bargaining	-0.017 (0.031)	-0.007 (0.035)
Wife Bargaining	0.066** (0.031)	0.003 (0.035)
Wife Dictator	0.092*** (0.028)	-0.104*** (0.031)
Male child	0.003 (0.025)	-0.037 (0.023)
Chosen child's standard	-0.004 (0.006)	-0.001 (0.006)
Age, husband	-0.000 (0.001)	-0.003*** (0.001)
Age, wife	0.003 (0.002)	0.001 (0.002)
Husband more patient	0.038 (0.037)	-0.074* (0.039)
Husband less risk averse	0.034 (0.040)	0.037 (0.039)
Session fixed effects	Yes	Yes
Child background	Yes	Yes
Parent background	Yes	Yes
Parent difference	Yes	Yes
HB vs. WB	0.019	0.771
WB vs. WD	0.412	0.000
HB vs. WD	0.000	0.002
Couples	284	284
R^2	0.225	0.187

Notes

The table reports a regression of the share allocated to the wife (with possible discrete values 0, 0.033, 0.67, 0.1, ..., 0.933, 0.967, 1) in column (1), and a regression of the share allocated to the husband (with possible discrete values 0, 0.033, 0.67, 0.1, ..., 0.933, 0.967, 1) in column (2) on the treatment variables 'Husband Bargaining' (indicator variable taking the value 1 for couples in Husband Bargaining), 'Wife Bargaining' (indicator variable taking the value 1 for couples in Wife Bargaining), 'Wife Dictator' (indicator variable taking the value 1 for couples in Wife Dictator), and a set of explanatory variables.

See Table 4 for the definitions of 'Session fixed effects', 'Child background', 'Parent background' and 'Parent difference'.

Robust standard errors in parentheses.

*, **, *** indicate $p < 0.10$, $p < 0.05$, $p < 0.01$, respectively.

large increase in the wife's bargaining power increases the share allocated to her and decreases the share allocated to the husband. The share allocated to the husband is not affected by a small or intermediate increase in the wife's bargaining power. An intermediate increase in the wife's bargaining power increases the share allocated to her, but the effect is not robust to the specification using the final share allocated to the wife (see Table B.5 in Online Appendix B).

Based on these regressions, we formulate the following result for the allocation to husband and wife.

Result 2 A large increase in the wife's bargaining power increases the allocation to her and reduces the allocation to the husband ($\beta_{WD} = 0.092$, $p = 0.001$, see column (1) of Table 5; and $\beta_{WD} = -0.104$, $p = 0.001$, see column (2) of Table 5). An intermediate increase in the wife's bargaining power increases the allocation to her, but does not affect the allocation to the husband ($\beta_{WB} = 0.066$, $p = 0.038$, see column (1) of Table 5; and $\beta_{WB} = 0.003$, $p = 0.920$, see column (2) of Table 5).

Result 2 shows that giving the wife full bargaining power benefits her. Together, Results 1 and 2 indicate that in our study, increasing the wife's bargaining power benefits her economically, but does not increase investments in children's education.

Heterogeneity analysis

In this subsection, we investigate whether different types of couples are affected differently by an increase in the wife's bargaining power. Because we have smaller samples, and therefore less power, in the bargaining treatments, we focus on heterogeneities in the effect of a large increase in the wife's bargaining power.

Column (1) of Table 6 considers whether the effect of increasing the wife's bargaining power on the allocation to the child's education is different between couples where the husband is more patient than the wife and couples where the wife is at least as patient as the husband (see Table A.4 in Online Appendix A for tests of equality of the coefficients of the treatments). In line with Hypothesis 3, we find that it is. When the wife is at least as patient as the husband, a large increase in bargaining power increases the share allocated to the child's education by 7.7 percentage points. Conversely, when the husband is more patient than the wife, a large increase in the wife's bargaining power decreases the allocation to the child's education by 11.5 percentage points. These results are robust to using alternative definitions of the difference in time preferences (see Table B.6 in Online Appendix B). Based on the regression in column (1), we formulate the following result for differences in time preferences between the husband and the wife.

Result 3 The effect of a large increase in the wife's bargaining power is dependent on the intrahousehold difference in time preferences. When the husband is more patient than the wife, a large increase in the wife's bargaining power *reduces* the allocation to the child's education ($\theta_{WD} + \beta_{WD} = -0.115$, $p = 0.022$). When the wife is at least as patient as the husband, a large increase in her bargaining power *increases* the allocation to the child's education ($\beta_{WD} = 0.077$, $p = 0.074$).

Next, we consider differences in risk preferences between the husband and the wife in column (2) of Table 6. We find that the effect of a large increase in the wife's bargaining power is not different between couples where the husband is less risk averse than the wife and couples where the wife is less risk averse than (or as risk averse as) the husband (rejecting Hypothesis 4).

The findings on differences in risk preferences can be summed up as follows.

Result 4 The intrahousehold difference in risk preferences makes no difference to the effect of a large increase in the wife's bargaining power ($\beta_{WD} = 0.017$, $p = 0.745$ and $\theta_{WD} + \beta_{WD} = -0.020$, $p = 0.631$).

TABLE 6
 HETEROGENEITY IN TIME AND RISK PREFERENCES DIFFERENCES, AND GENDER OF THE CHILD

	Var		
	Husband most patient (1)	Husband least risk averse (2)	Male child (3)
Var	0.101* (0.056)	-0.077 (0.059)	0.119** (0.046)
Husband Bargaining	-0.004 (0.079)	-0.037 (0.058)	0.084* (0.047)
Wife Bargaining	-0.054 (0.050)	-0.081 (0.058)	-0.028 (0.047)
Wife Dictator	0.077 (0.043)	0.017 (0.053)	0.054 (0.040)
Husband Bargaining × Var	0.040 (0.094)	0.135* (0.079)	-0.173** (0.082)
Wife Bargaining × Var	-0.032 (0.084)	-0.003 (0.075)	-0.110 (0.076)
Wife Dictator × Var	-0.191*** (0.065)	-0.037 (0.068)	-0.115* (0.064)
Husband Bargaining (Var)	0.036 (0.045)	0.098* (0.053)	-0.089 (0.066)
Wife Bargaining (Var)	-0.085 (0.065)	-0.083 (0.051)	-0.138** (0.062)
Wife Dictator (Var)	-0.115** (0.050)	-0.020 (0.041)	-0.061 (0.051)
Session fixed effects	Yes	Yes	Yes
Child background	Yes	Yes	Yes
Parent background	Yes	Yes	Yes
Parent difference	Yes	Yes	Yes
Couples	284	284	284
R ²	0.243	0.226	0.229

Notes

The table reports heterogeneity regressions of the share allocated to the child (with possible discrete values 0,0.1,0.2,...,0.9,1) on the treatment variables. Column (1) reports a regression with 'Husband most patient' (indicator variable taking the value 1 for couples where the husband allocates more to the future than the wife), interaction terms between the treatment indicator variables and 'Husband most patient': 'Husband Bargaining × Husband most patient', 'Wife Bargaining × Husband most patient' and 'Wife Dictator × Husband most patient', and a set of explanatory variables. Columns (2) and (3) report similar regressions for the indicator variables 'Husband least risk averse' (indicator variable taking the value 1 for couples where the husband allocates more to the risky option than the wife) and 'Male child' (indicator variable taking the value 1 for couples where the child randomly chosen to receive tutoring was male), respectively. 'Treatment (Husband most patient)': sum of estimated parameters for the treatment indicator variable and 'Treatment × Husband most patient'. 'Treatment (Husband least risk averse)': sum of estimated parameters for the treatment indicator variable and 'Treatment × Husband least risk averse'. 'Treatment (Male child)': sum of estimated parameters for the treatment indicator variable and 'Treatment × Male child'.

See Table 4 for definition of 'Session fixed effects', 'Child background', 'Parent background' and 'Parent difference'.

Robust standard errors in parentheses.

*, **, *** indicate $p < 0.10$, $p < 0.05$, $p < 0.01$, respectively.

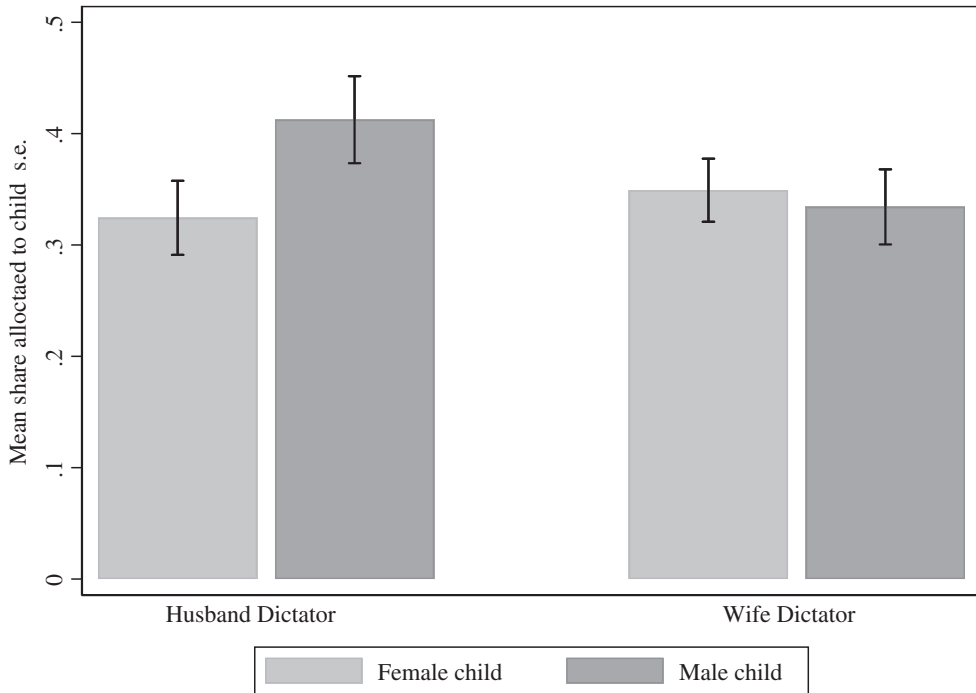


FIGURE 3. Shares allocated to the child in dictator treatments, by gender of child.

Notes: The figure illustrates the mean shares allocated to female and male children in Husband Dictator and Wife Dictator, respectively.

Finally, we consider the gender of the child in column (3) of Table 6. The significant coefficient of the interaction term ‘Wife Dictator \times Var’ shows that the effect of a large increase in the wife’s bargaining power is significantly different between couples where the child is female and couples where the child is male. A large increase in the wife’s bargaining power reduces the allocation for couples where the child is male, and increases the allocation for couples where the child is female, though these effects are not statistically significant. Figure 3 illustrates the mean share allocated to the child’s education by gender of the child, for Husband Dictator and Wife Dictator, respectively, and sheds more light on these results. It shows that in Husband Dictator, couples allocate significantly more to male than female children ($p = 0.088$), whereas there is no gender difference in Wife Dictator ($p = 0.737$). This is partly in line with Hypothesis 5. Returning to Table 6, it also shows that a small increase in the wife’s bargaining power affects male and female children differently, but due to the low number of observations in the bargaining treatments, these results should be interpreted with care. Based on the regression results, we formulate the following result on the importance of the gender of the child.

Result 5 In Husband Dictator, more is allocated to male than female children ($\beta_{Var} = 0.119, p = 0.010$). In Wife Dictator, there are no gender differences in allocation to children’s education ($\theta_{WD} + \beta_{WD} = -0.061, p = 0.202$).

Result 3 provides evidence that the time preferences of the spouse with the upper hand in the bargaining situation are important, whereas Result 1 shows that gender of the decision-maker is less so. Result 4 shows that risk preferences are not an important

attribute in determining the allocation to the child. Finally, Result 5 shows that increasing the wife's bargaining power makes allocations to boys' and girls' education more equal.

IV. DISCUSSION

This section consists of three parts. First, we link Results 1 and 2 to theories on household decision-making. We also discuss how we can understand the reduction in the allocation to the child in Wife Bargaining. Second, we investigate potential confounding factors that can influence our results with a focus on women's bargaining power outside of the lab. Third, we discuss some limitations of the study.

Explaining bargaining results

Theoretical framework There exist several strategies to model household behaviour and within-household distribution of resources. Common to all these approaches is that children are modelled as a household public good. Let $U^s(q^w, q^h, Q)$ denote the utility function of spouse s ($s \in \{w, h\}$). Here, q^w and q^h denote the wife's and the husband's private consumption, and Q is the public good (i.e. the allocation to the child). $U(\cdot)$ is increasing concave in all elements and allows for caring between spouses. In the following, we will distinguish between two main classes of household models, namely the cooperative and non-cooperative classes.

In the household decision-making literature, the collective model as developed by Chiappori (1988, 1992) is the most commonly used cooperative model (Browning *et al.* 2014). With this setup, the household maximizes a weighted sum of the two spouses' utility functions:

$$\max_{q^w, q^h, Q} \mu U^w(q^w, q^h, Q) + (1 - \mu) U^h(q^w, q^h, Q),$$

where μ and $(1 - \mu)$ are the bargaining powers of the wife and the husband, respectively. If the wife and the husband have different preferences over the allocation to the child, Q , then a change in the distribution of bargaining power will lead to a monotonic change in the allocation to the child. Specifically, if the wife has a stronger preference for the allocation to the child than the husband does, then an increase in μ leads to a monotonic increase in the allocation to the child. If, on the other hand, the wife and the husband have the same preferences over the allocation to the child, then changes in μ will not affect the allocation. The allocation to the wife (husband) monotonically increases (decreases) in the wife's bargaining power assuming that both spouses care more about their own consumption than their spouse's consumption.

In a non-cooperative framework, a natural process to consider is a voluntary contribution game in which each spouse contributes to the public good, and spends the rest on private consumption. The decision-making process is then characterized by the two spouses solving the following:

$$\begin{aligned} \max_{q^{w,w}, q^{h,w}, Q^w} \{ & U^w(q^w, q^h, Q^w + Q^h) \text{ s.t. } PQ^w + q^{w,w} + q^{h,w} = Y^w \}, \\ \max_{q^{w,h}, q^{h,h}, Q^h} \{ & U^h(q^w, q^h, Q^w + Q^h) \text{ s.t. } PQ^h + q^{w,h} + q^{h,h} = Y^h \}, \end{aligned}$$

where Y^s is the income of spouse s , Q^s is the contribution to the public good of spouse s , $q^{w,w}$ is the contribution to the wife's private consumption of spouse s , $q^{h,s}$ is the contribution to

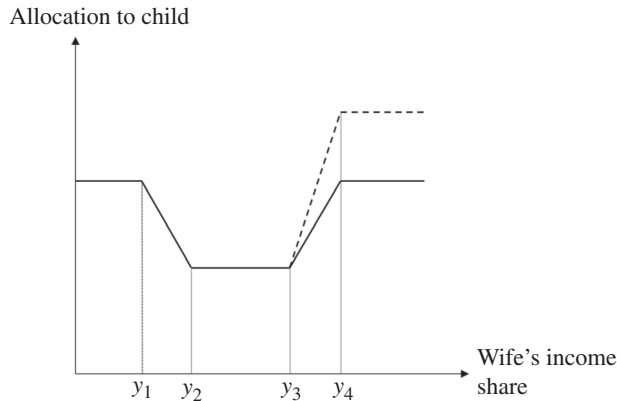


FIGURE 4. Non-cooperative model.

Note: The figure displays the predictions for the allocation to the child in a non-cooperative framework.

the husband's private consumption of spouse s , and P is the price of the public good (price of private consumption is normalized to 1). Bargaining power is measured as relative income. As shown by Browning *et al.* (2009), the outcome of this decision-making process leads to underprovision of the public good for certain distributions of income and therefore a non-monotonic change in the allocation to the child.

Figure 4 illustrates the effect of increasing the wife's bargaining power on the allocation to the public good. If the husband has all the income, then he allocates Q^h to the child and makes a transfer to the wife equivalent to $q^{w,h}$. As the wife's income increases up to y_1 , the husband gradually decreases his transfers to the wife's private consumption while the wife uses her income on her own private consumption. There are no changes in the allocation to the child. Between y_1 and y_2 , the husband decreases his contribution to the public good while the wife is not yet contributing. Therefore the allocation to the child is reduced. Between y_2 and y_3 , both spouses contribute to the public good, and a decrease in the husband's contribution to the public good is exactly offset by an increase in the wife's contribution. Thus we have an area of local income pooling where an increase in the wife's income share does not affect the allocation to the child. After y_3 , the husband stops contributing to the public good, while the wife continues to increase her contributions. The dashed line displays the case where the wife has a stronger preference for the public good than the husband, and the solid line displays the case where the wife and the husband have similar preferences. Finally, above y_4 , the wife starts to make transfers to the husband (i.e. $y^{h,w} > 0$), and keeps the allocation to the public good constant.

In the experiment, we manipulated not the income, but the bargaining process. Therefore a non-cooperative framework based on a voluntary contribution mechanism might seem misleading. Basu (2006) uses a cooperative bargaining framework with a non-cooperative element. Specifically, the spouses' bargaining powers depend in part on an endogenous decision. Using the example of child labour (a public bad), Basu (2006) shows that decisions can be non-monotonic in a spouse's bargaining power. The intuition is similar to the voluntary contributions model. Thus even if Basu (2006) uses a cooperative bargaining framework, the outcome is inefficient because of the non-cooperative ingredient (Browning *et al.* 2014).

Results 1 and 2 in light of the theory The theory shows that in both a non-cooperative and a cooperative framework we would expect a monotonic increase in the allocation to

the wife as her bargaining power increases, and a monotonic decrease in the husband's allocation. Figure C.2 in Online Appendix C illustrates the allocations to the child, the wife and the husband. The allocation to the wife displays a monotonic increase in the wife's bargaining power, and the allocation to the husband displays a monotonic decrease in the wife's bargaining power. This is in line with the theoretical predictions.

Result 1 shows that an increase in the wife's bargaining power does not increase the allocation to the child. The share allocated to the child is not significantly different between the two dictator treatments. This indicates that men and women do not have different preferences when it comes to spending on children's education. If this finding generalizes to other domains, then it offers a potential explanation for why recent RCTs do not find differential effects for cash transfers to men and women. Moreover, an intermediate increase decreases the allocation to the child.

The changes in the allocations to the child are perhaps puzzling. However, a non-monotonic change in the allocation to the child can be reconciled with a non-cooperative framework. A possible explanation for the non-monotonic change in the allocation to the child is that the wife wants to avoid that the husband rejects her proposal, and that she underestimates his preferences for allocation to the child. Thus she gives more to the husband and less to the child than in Wife Dictator. This explanation is in line with previous studies showing that the wives tend to underestimate the husbands' preferences for a public good (Kebede *et al.* 2014) and studies showing that spouses have inaccurate beliefs about each other's preferences (Bateman and Munro 2005; Afzal *et al.* 2018; D'Exelle and Ringdal 2020). Comparing allocations in Husband Dictator to allocations in Husband Bargaining, on the other hand, we find no significant differences in allocations to child, husband and wife. The finding that a wife acts differently in the role as first proposer compared to in the role as dictator can be explained by a woman being more concerned about making her husband happy so that he will accept the proposal.

Confounding factors

Some aspects of the experimental design warrant caution in interpretation of the treatment effects.

First, we do not have information on how the spouses plan to spend the amount that they allocate to themselves, and cannot rule out that either of them prefers to spend their money on other goods for their children, such as clothing and food. If women spend more of the money that they allocate to themselves on goods and services that benefit children than men do, then our results could be consistent with the notion that increasing the wife's bargaining power leads to higher investments in children.

Second, we do not have information on what happens in the interaction between the spouses after the experiment. Thus we cannot address what Munro (2018) refers to as the 'undoing problem': the actions taken in the lab may be offset in subsequent interactions. On the one hand, the allocations made in the lab can potentially be changed after the experiment. In the context of our experiment, because the allocation to the child was paid out as an individualized certificate for tutoring, undoing it is difficult. In terms of allocations to the husband and wife, we cannot rule out undoing. On the other hand, the allocations made to the child in the lab might lead the household to reallocate money that they planned to use on education for that child to something else that does not necessarily benefit him or her. We limit this problem by choosing an investment good that many households cannot normally afford.

Third, the effect of the treatments may depend on the real distribution of bargaining power within the household. For example, if the wife has low bargaining power and

believes that the husband might change the allocation that she makes in the lab, then she might allocate more to the child as this is paid out in kind. However, because we have random assignment to treatments, such differences should not be driving our results. To study whether households where the wife has a higher intrahousehold bargaining power respond differently to an increase in the wife's bargaining power in the experiment, we conduct a heterogeneity analysis using the wife's employment status as a proxy for her intrahousehold bargaining power. The results are reported in Table A.5 of Online Appendix A, and show that there is no difference in the effect of the Wife Dictator treatment between couples in which the wife is unemployed (less bargaining power) and couples where she is employed (more bargaining power). We conducted a similar analysis using the decision-making questions described in the third subsection of Section I as a proxy for the wife's bargaining power. In the analysis, we use both an indicator variable for whether the wife was involved in decisions about children's education and an index based on all four decision domains. We find no differential effects between couples where the wife is more or less involved in household decision-making, but due to small variation in responses, this analysis is underpowered.

Fourth, the in-kind nature of the allocation to the child may affect the behaviour in the lab. The amount allocated to the child is committed to tutoring and difficult to liquidate. This can explain why parents do not allocate everything to the child, despite the high multiplier. This is not an issue if the in-kind nature of the investment good affects men and women equally as we would then see only a reduction in the level of investment, but no effect on the treatment differences. If, on the other hand, the in-kind nature of the allocation to the child affects women differently from men, then the treatment differences from the analysis might be misleading. This would be particularly the case if the wife has less access to liquidity and takes the opportunity in the experiment to get a higher cash payment at the expense of the investment in children. To test this, we can use the wife's employment status as a proxy for her liquidity constraint. If the wife is unemployed, then she has limited access to money for herself. However, as shown in Table A.5 of Online Appendix A, whether or not the wife is unemployed does not influence the treatment differences. Therefore we do not think that the in-kind nature of the allocation to the child affects the treatment differences.

Finally, all participants conducted the time and risk preferences in the same order, and before they made the household allocation decisions. The lack of randomization of tasks could potentially affect our results, because how much the household earns in the time and risk preferences task could potentially affect how much is invested in the child. For instance, households who won the risk lottery may be more inclined to invest in the child. To investigate this possibility, we conduct robustness checks in which we control for whether the main decision-maker won in the risk preference task, how much the main decision-maker earned in the risk preference task and how much the main decision-maker earned in total in the time and risk preferences task together, respectively, in Table B.4 of Online Appendix B. We do not find that controlling for the earnings of the main decision-maker changes the results, or is significantly correlated with the allocations to children.

Limitations

While conducting a lab experiment has the advantage of cleanly identifying causal effects and underlying mechanisms, our research design also has some important limitations. In this subsection, we discuss these in more detail.

Our study design gives rise to two potential threats to external validity. First, in the experiment, we investigate the effect of an increase in *experimental* control over a household endowment, which we consider as a proxy for bargaining power in the lab. Whether our findings can be generalized to increases in the wife's bargaining power *outside* the lab is an empirical question that the present study cannot answer. However, a handful of studies show that, in general, spouses' behaviour in the lab correlates well with field behaviour (Hoel 2015; Schaner 2015; Zou 2015; Barr *et al.* 2017; Fiala 2017; Hoel *et al.* 2017).

Second, our invitation-based recruitment procedure is a potential source of selection bias, which may affect the degree to which we can expect our findings to apply to the general population. We do not know how many invitation letters were sent out and therefore we do not know the fraction of couples that chose to participate. In addition, we do not know whether the couples that signed up for the study are different from the couples that did not sign up.

Furthermore, there might be a selection bias in terms of the gender of the child. For example, couples with boys might be more likely to sign up than couples with girls because they believe that investments in boys have higher returns. However, when the couples were invited to the experiment, they were told only that the experiment was about household decision-making, and education was not mentioned. Furthermore, we do not see significant differences in the gender composition of children between sessions, or between couples with one child in primary school and couples with more children in primary school.

Finally, all the couples that received an invitation to participate have at least one child in primary school and are, as such, already investing in their child(ren)'s education. While there are no school fees for public primary schools in Tanzania, parents have to pay for school materials (UNESCO 2011). This can affect the allocation to the child in two ways. On one hand, it is plausible that our sample is generally more willing to invest in their children's education than the general population who have children of primary school age. If this is the case, then they may allocate more to their children in our experiment than parents who are not letting their children attend primary school would. On the other hand, our respondents might be less willing to allocate to the child in the experiment because they are already investing in their children's education outside of the experiment. We do not expect a potential bias from inviting only couples with children already in school to be large in our sample because the primary school enrolment and attendance rates in Tanzania are generally high. In the population census from 2012, 91.6% of children between ages 7 and 13 were currently attending school (Tanzania National Bureau of Statistics 2015) in Dar es Salaam. In line with this number, the Demographic and Health Survey from 2015–16 reports that 88.5% of the school-age population were currently attending primary school (Tanzania National Bureau of Statistics 2016, p. 44).

V. CONCLUSIONS

Our paper studies the effect of an increase in the wife's bargaining power on couples' spending on children's education. We do not find any evidence that such a change in relative bargaining power increases the share allocated to the child. This finding challenges not only earlier studies such as those by Thomas (1990, 1993), but also the general view among policymakers that increasing female bargaining power leads to higher household spending on children. However, we acknowledge that the outcome that

we study—spending allocations to children’s education—is a particular type of investment. We do not know whether our results generalize to other types of investments, such as investments in children’s nutrition. Our results further suggest that it is the attributes of the main decision-maker (time preferences) and the child (gender of the child), not the gender of the decision-maker, that matter.

We show that time preferences play an important role in household decision-making. This is in line with Schaner (2015), who finds that couples that have similar time preferences are more likely to choose the most efficient savings account than couples who have different time preferences. In particular, when one spouse has complete bargaining power, it is better for the child that it is the most patient spouse. This finding is in line with previous studies; Ahiakpor and Swaray (2015) find a positive association between male household heads’ patience and investments in children’s education in rural Ghana. Tanaka and Yamano (2015) also find that the more patient the household head is, the higher are the educational expenditures in Uganda. In our sample, men tend to be more patient than women, implying that, on average, it is more beneficial for investments in children’s education if the husband is the main decision-maker.

We also show that husbands allocate more money to boys than to girls. Wives, on the other hand, allocate the same amount to boys and girls. The result is partly consistent with previous studies; Dizon-Ross and Jayachandran (2015) find that in rural Uganda, men favour boys, but also that women favour girls, and Raley and Bianchi (2006) find that in the USA, men spend more time with boys than with girls, whereas women spend as much time with boys as they spend with girls. Including women in the decision-making process by increasing their bargaining power gives a more gender-equal allocation to the children in our study, and in the long run, female empowerment may consequently lead to societies becoming more gender-equal.

The results presented in this paper point to several avenues for future research. First, studying the spouses’ preferences, such as time preferences and risk preferences, seems to be important in future research in order to increase our understanding of the underlying mechanisms determining household behaviour. Second, considering other types of spending on children, such as on nutrition and health, is important in order to understand the generalizability of our study. Finally, while random assignment of couples to different treatments ensures internal validity, the sample is not necessarily representative. Recent randomized controlled trials have taken a step towards testing the generalizability of our and other experimental results, but have, to our knowledge, not studied the role of time preferences and gender of the child.

Our study suggests that increased spending on children’s education might not be an instrumental reason for targeting women with cash transfers, but gender equality (among both children and adults) might. Thus it is of great importance to understand how we can most efficiently target poor children.

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NOTES

1. The correlations might be misleading for two reasons. First, a woman's education or earnings could be correlated with unobserved dimensions of ability, family background and society that potentially can directly determine children's welfare. Second, the comparison of the effects of men's versus women's earnings or education can be correlated with unobserved characteristics of men (e.g. more educated women marry more educated men who care more about their children). For a full discussion, see Duflo (2012).
2. M-Pesa is an SMS-based money-transferring system allowing an individual to deposit, withdraw and transfer money with a phone. The receiver could easily liquidate this money, or use it to pay bills such as phone and electricity bills. To ensure that allocations to the day of the experiment do not reflect a preference for cash over mobile money, both payments in the time-preference task are made using M-Pesa. To make sure that the payments were given to the spouse making the decision, we asked them to give us their personal M-Pesa numbers. In 48 couples (equally distributed across treatments), the husband and the wife provided us with the same number. For these, we do not know whether the number belonged to the husband or to the wife. We do not find any difference in the spouses' time preferences or the time-preference gap for couples who reported different phone numbers compared to couples who reported the same number. Furthermore, dropping couples reporting the same number from the analysis does not significantly change our results. Note that only the time-preference task was paid out using M-Pesa.
3. See <https://www.socialscisearchregistry.org/trials/770> (accessed 19 August 2020).
4. We deviate slightly from the pre-analysis plan, where we specified equation (1) with one indicator variable for the two bargaining treatments. When designing the experiment, we did not think the gender of the first proposer would matter. However, we find that it does, and have therefore chosen to analyse Husband Bargaining and Wife Bargaining separately. Due to logistic challenges in recruiting participants, we collected about two-thirds of the planned sample size.
5. Note that our definition of the decision-making dummies deviates slightly from the pre-analysis plan. We use indicator variables taking value 1 if the wife is involved in decisions about *children's education* (i.e. decision is made jointly or by the wife alone), instead of indicator variables taking value 1 if the wife participates in more than two of the four decisions that we ask about, because we perceive education decisions to be the most relevant. In addition to the decision-making dummies, Table A.5 in Online Appendix A reports results for two alternative measures of decision-making power, namely wife's employment status (column (3)) and the first factor of a factor analysis of the discrete responses ('husband alone' = 1, 'husband and wife together' = 2, and 'wife alone' = 3) to questions about the four areas of decision-making as reported by the wife and the husband, respectively.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article:

- Appendix A Additional tables
- Appendix B Robustness checks
- Appendix C Descriptive results
- Appendix D Experimental materials