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# Whose voice matters? An experimental examination of gender bias in intra-household decision-making<sup>☆</sup>

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## ABSTRACT

We conduct an experiment to examine gender bias in intra-household decision-making in rural Bangladesh. The experiment mimics a real-life scenario, in which a risky choice with high stakes is offered to either spouse and he/she then has to decide whether to make the decision or transfer it to the other spouse. We then observe the decision-making process under alternative experimental conditions to determine intra-household gender bias. We find that women are more likely to allow their spouses to make decisions than men are. Our findings suggest that women's transfer decisions are driven by asymmetries in both power and perceived financial capabilities.

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## 1. Introduction

Despite the apparent progress towards narrowing gender inequality over the past 20 years, women in developing countries have largely remained in relatively disadvantageous positions in many ways, including access to education, labor market opportunities, legal rights, and political participation. [Duflo \(2012\)](#) shows that poverty and a lack of opportunity lead to inequality between men and women. For instance, in rural Bangladesh, women rarely engage in paid employment outside the home, even when their households are deprived. While there is no significant gender gap in terms of children's access to education in Bangladesh ([Hahn et al., 2018](#)), women's income-earning potential has not been realized, which can be attributed to social gender bias regarding their access to economic resources and their power to make decisions within the household.

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This paper uses an experimental approach to identify the factors that underlie the intra-household decision-making processes associated with earning and the allocation of resources. In particular, we investigate whether there exists a gender bias in intra-household decision-making that causes women to hand over control of their finances to their spouses and, if so, what are the determinants of this bias. To this end, we use a lab-in-the-field experiment that enables us to control for the specific factors that affect intra-household interactions. The experiment depicts a household where the decisions are the outcome of a bargaining process between spouses, considering the effects of asymmetric bargaining power and asymmetric information between them.<sup>1</sup> The experiment mimics a real-life scenario, in which spouses need to make decisions that involve risk and face an opportunity to earn money.

In the experiment, we offer two risky choices to either spouse, and allow them to decide whether to make their own choices to transfer the decision-making to their spouse. The subjects were paired as “partner A” and “partner B.” Partner A had the “transfer” option, allowing him/her to either make his/her own decision as to which lottery to select or let his/her partner make the decision. To gather data from both partners, the role of partner A was randomly assigned after both partners had made the decision. Each couple was also randomly assigned to either the private or the public treatment.

We focus on examining whether there are any differences between the male and female partners in terms of their transfer decisions to reflect the existence of gender bias in intra-household decision-making. The partners in each pair were actual married couples. In the public treatment, the information on each partner's options and decisions was fully disclosed to their partners, while it was not disclosed in the private treatments. These conditions were used to examine the potential determinants of the gender differences in spouses' decision-making, in particular the effects of a between-spouse imbalance in decision-making power compared to other factors such as a between-spouse capacity difference.

Finally, in a third treatment, we randomly pair males and females who are not actual couples to verify whether our main results are driven by gender differences in transfer behavior.<sup>2</sup> We call this the *random* treatment and it was conducted in the same environment as the private treatments.

We find robust evidence of gender differences in intra-household decision making, with women being more likely to let their spouses make decisions for them than men in both the private and public treatments. The differences are more pronounced in the public treatment than in the private one, which provides a lower bound to which the gender bias in intra-household decision-making is driven by an intra-household imbalance in decision-making power that prevents women from making their own decisions under the full information disclosure.

Our paper complements the growing literature on behavioral economics that uses lab-in-the-field experiments to explore complex intra-household problems. For example, Ashraf (2009), Hoel (2015), and Castilla (2019) examine the effects of asymmetric information and control over money between spouses on money hiding.<sup>3</sup> A number of field experiments have also investigated intra-household interactions, such as the bargaining power of women (e.g., Almas et al. 2018; Ambler 2015; Jack et al., 2018), households' fertility choices (Ashraf et al., 2014), and households' savings (Schaner 2017). Previous lab experiments also examined the effect of asymmetric information and control over money between spouses on money hiding (Ashraf, 2009; Castilla, 2019) and income pooling (Mani 2011; Iversen et al., 2011). Bateman and Munro (2005), Carlsson et al. (2012), and Carlsson et al. (2013) compare jointly made household decisions to individual ones. They find spouses become more risk averse when they decide jointly than individually. Munro et al. (2010) and Barr et al. (2019) compare decision-making for husband–wife pairs for monogamous and polygamous families. Their results suggest that spouses' behaviors in polygamous households can differ from those in monogamous households.<sup>4</sup> Munro et al. (2014) results also suggest heterogeneity between spouses in the north and south of India.

To the best of our knowledge, the previous studies using experiments did not address the specific problem of voluntary surrendering of decision-making power within a household. We fill this literature gap by investigating the various experimental situations in which couples make decisions that involve risks with high stakes. This enables us to observe the decision-making process under alternative experimental conditions to examine the gender bias in intra-household decision-making in rural Bangladesh.

<sup>1</sup> We depart from both the household standard unitary and collective models, both treating household decisions as coming from a single decision-maker and assuming that all decisions are Pareto efficient. The standard unitary model implies that *households* behave as if they were single *decision-making* units, so that there is no difference in household outcomes between offering credit to either spouse. In the collective model, different household members may have different preferences, which means intra-household bargaining power could be affected by each spouse's option. Ashraf (2009) and Ashraf et al. (2014) find that household outcomes such as fertility or the use of money are strongly influenced by which spouse is given money or access to contraceptives and by the degree of asymmetric information between spouses. Munro (2018) provides a comprehensive survey of the recent experimental work on intra-household decision-making in developing countries. Generally, the previous studies suggest that the standard unitary or collective household models do not apply in reality and there is inefficiency in intra-household decision-making, with the asymmetry of information between husband and wife playing an important role in household decisions (e.g., Ashraf 2009; Hoel 2015; Castilla 2019; Kebede et al. 2014).

<sup>2</sup> For example, if women have lower self-confidence, they would transfer the decision-making to a man, not necessarily their spouse.

<sup>3</sup> In a related study, Goetz and Gupta (1996) use observational data and find that women in Bangladesh exercise little or no control over their loans. Islam et al. (2015) also show that the provision of microfinance in Bangladesh increases women's informal borrowing for consumption but not for investment purposes.

<sup>4</sup> The results of Barr et al. (2019) also show that respondents' behaviors toward their spouses differ from their behavior toward other men or women. While monogamous and polygynous spouses differ in terms of cooperativeness when they interact among themselves, their behaviors do not differ when they interact with men or women (“strangers”) from other households.

## 2. Context and experimental design

### 2.1. Context

Bangladesh provides an ideal context for our study for the following reasons. First, it is a major market for a large number of NGOs that focus on empowering women and improving their bargaining power in household decision-making. Second, the social and cultural norms in Bangladesh define women's role as mainly domestic and, thus, women are expected to have lower bargaining and decision-making power than their spouses (see, e.g., Duflo 2012; Armendáriz and Morduch 2010). In addition to religion and social norms, household characteristics such as individual employment, income (Anderson and Eswaran, 2009), and the ownership of assets (Kabeer 1999) also dictate the subordinate position of women in the decision-making process. In rural Bangladesh, women have rather limited choices in terms of occupation. The institution of purdah, which is commonly practiced among Muslims and upper-caste Hindus, promotes the seclusion of women and enforces their exclusion from public spaces, thus preventing them from seeking employment outside their households (Amin 1997; Kabeer 2001). However, it is also possible that women voluntarily pass the control of money to their husbands, even in the absence of an imbalance in decision-making power. Kabeer (2001, p. 69) presents testimonies from women who consider conformity with purdah as “a voluntary adherence to status norms rather than as a direct manifestation of male control.”

### 2.2. Experimental setting

The experiment was conducted during June–July 2014 with 826 married couples aged 18–55 years from 26 rural villages in three upazilas (Assasuni, Koyra, and Paikgacha) of the Khulna and Satkhira districts. A map of the villages is shown in Fig. 1. According to this figure, the geographic locations of the different treatment groups, as explained below, are randomly assigned. After the villages had been selected for the different treatments (random, public, and private), recruiters went from door to door in each village and randomly invited 832 respondents and their spouses to participate in a study for the better understanding of financial matters. The respondents were told that both spouses would need to be present and make decisions about a real-life scenario to earn a considerable amount of money. There were six invited couples who surveyed but did not show up on the experiment day.<sup>5</sup> Each subject received a fee of 100 taka (approximately USD 1.50 or half the average daily adult wage in the area) for showing up and had the opportunity to earn more money. A session lasted around 2.5–3 h. Each couple could earn up to 2100 taka (including the show-up fee) by participating in the survey and the experiment. The recruiters also conducted a household-level survey with one member of each couple<sup>6</sup> on general household characteristics.<sup>7</sup>

We selected a local school as the experiment venue in each village. Two experiment sessions (with one treatment group per session) were conducted at the same time in each village, to avoid any contamination of the experiment through information leakages. The treatment groups were randomly assigned across villages. There were 31–32 couples per village, with 15–16 couples per session. After the experiment had been completed, an individual-level survey was then privately conducted with each spouse, so that the survey questions did not prime the subjects about the purpose of the experiment. The survey asked questions about the subjects' general awareness and mobility, earnings and assets, household finance and decision-making matters, understanding of risk, and other individual preferences (see the Online Appendix II). A follow-up survey was also conducted two weeks after the experiment.

### 2.3. Experimental procedure

The detailed instructions for the experiment can be found in Online Appendix I. The game involves each subject being matched with another subject of the opposite gender as his/her game partner, each having to make separate choices for the opportunity of earning money for both himself/herself and their partner. Under the *private* and *public* conditions, the couples were husband and wife, while they were random individuals of opposite genders under the *random-couple* condition. The detailed conditions are presented in Section 2.4.

The game is illustrated in Fig. 2. Each subject was endowed with 300 taka at the beginning of the game. In each pair, one partner played the role of partner A, while the other partner was partner B. Partner A was given the choice to “invest” his/her own 300 taka and his/her partner's 300 taka in either a safe or a risky lottery.<sup>8</sup> The lotteries' payoffs and risks are presented in Table 1. The two lotteries have the same set of events—TRIPLE, KEEP, and LOSE—to ensure that any outcome

<sup>5</sup> The working population in the area is largely formed self-employed or day laborers and, thus, it was expected that participating in the experiment would not disrupt their daily income-earning activities.

<sup>6</sup> The survey was completed by whichever spouse was available on that day.

<sup>7</sup> The experiment and surveys were administered by locally-recruited enumerators fluent in the local dialect. Both the recruiters and research assistants were trained by the authors and had had experience in conducting similar field experiments. The experiments were piloted in several stages by the authors and the instructions revised along the way accordingly to ensure the subjects understood the games. One of the authors is a local and has run several randomized field experiments in these and neighboring areas. However, this study was conducted in different villages and was undertaken independently from the other projects.

<sup>8</sup> In the real experiment, we called the safe lottery Paan and the risky lottery Supari. Paan and Supari, respectively, are the betel leaf and nut that are usually chewed together by the locals in Bangladesh (and other South Asian countries) for their stimulant effect.

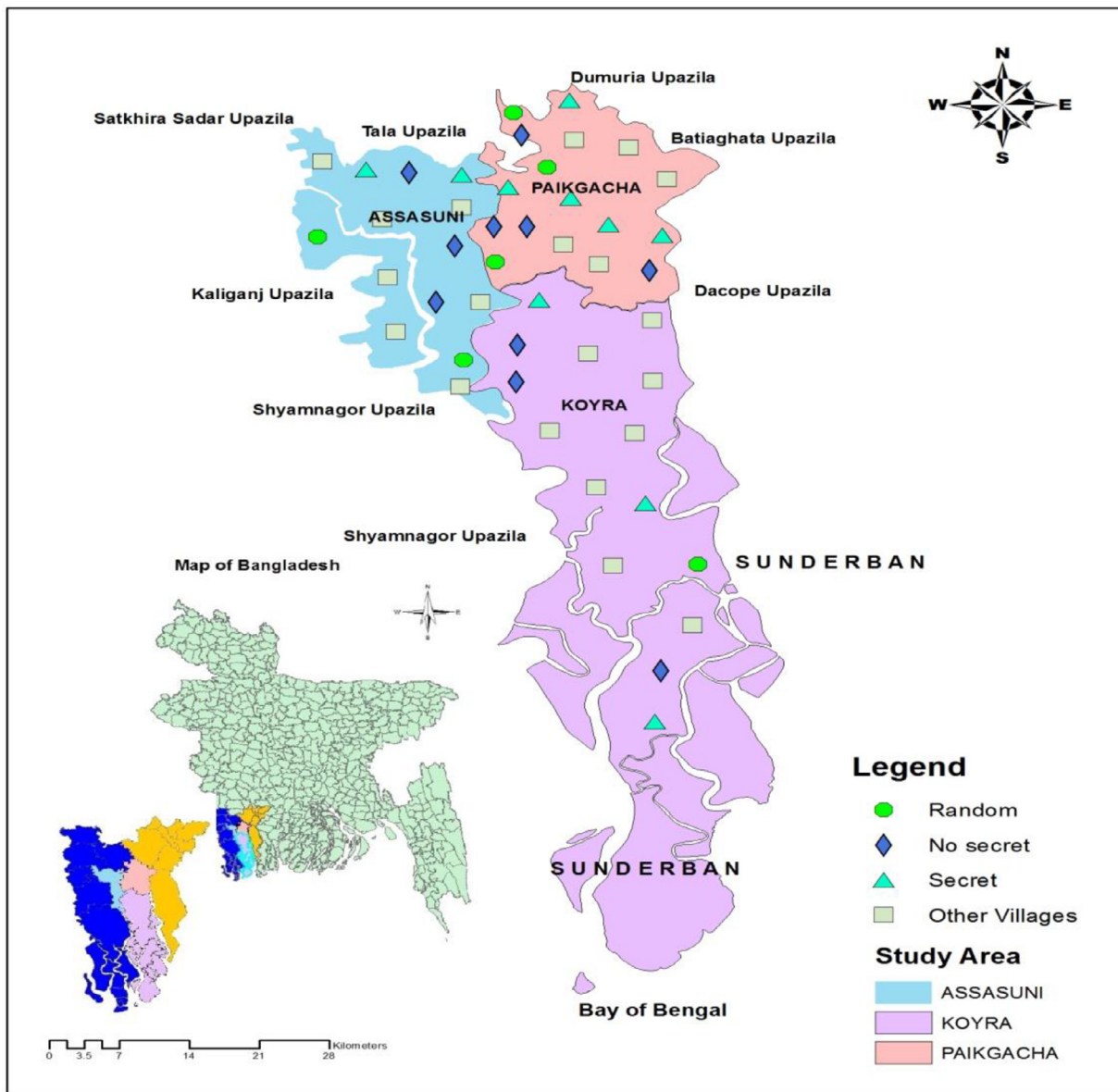


Fig. 1. Map of experiment villages by treatment.

**Table 1**  
Lottery payoffs and risk.

Lottery	Event	Possibility	Payoff (taka per person)	Expected payoff (taka)	Risk (taka)
Safe	TRIPLE	1/10	900	330	66.41
	KEEP	8/10	300		
	LOSE	1/10	0		
Risky	TRIPLE	4/10	900	420	128.69
	KEEP	2/10	300		
	LOSE	4/10	0		

Note: Risk is calculated as the standard deviation from the expected payoff.

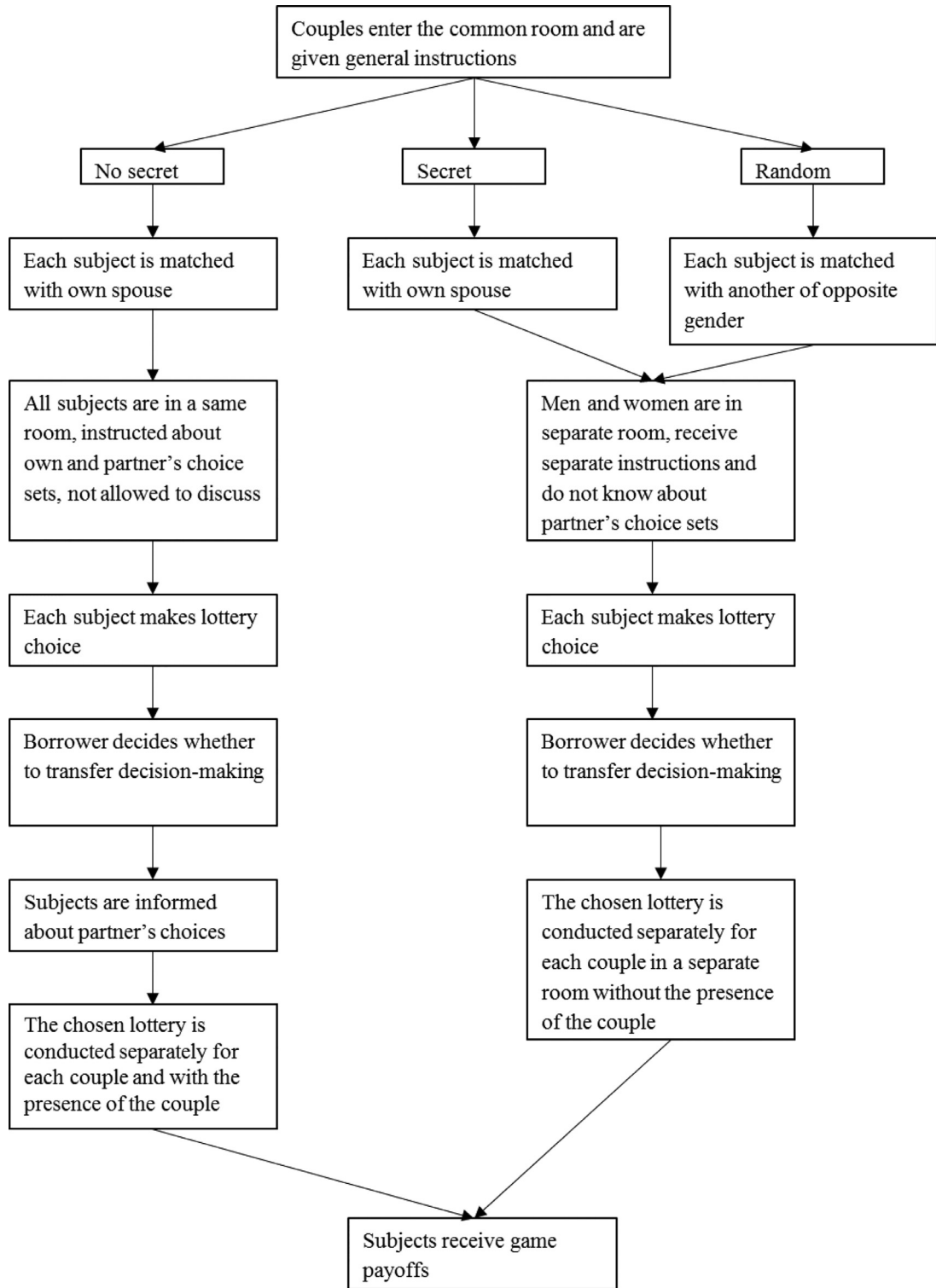


Fig. 2. Experimental procedure.

from choosing one lottery could also be obtained by choosing the other lottery. This feature is critical for the design of our treatments, as discussed in Section 2.4. TRIPLE means the payoff triples the initial amount, so that each player receives 900 taka. KEEP means that the payoff remains the same as the initial amount, which is 300 taka. LOSE means the players receive nothing, losing their initial investment. The risky lottery has a higher expected payoff, but also carries a higher risk. Given that the lotteries are relatively complicated for our subject pool, we provided a visual demonstration, training, and practice before the game.

Specifically, we explained the lotteries by showing the subjects see-through bottles that contained balls of three different colors to reflect the three different payoffs. After making the decision as to which lottery to select, partner A was asked to decide whether he/she wanted to use his/her own lottery choice, regardless of what the partner chose or to use the partner's choice if it was different from his/her own choice. This transfer decision had to be made without discussing with or knowing the partner's choice, thus allowing us to determine who made the final decision. We chose this way of phrasing the task over simply asking them whether to transfer the choice to highlight the potential conflict if the partners made different lottery choices. As the subjects were not made aware of the potential conflict, they might not have taken the decision to transfer the money seriously, as they might have expected their spouses to make the same decision as they did.

At the same time, partner B was also asked which lottery he/she would choose if he/she was to invest his/her and the partner's endowment. The final payoff, which was based on the actual result of the chosen lottery, was determined according to the choices of both partners (i.e., the lottery chosen by partner A if he/she did not transfer the decision making, and that chosen by the spouse otherwise) and distributed equally between them.

The post-game survey included a question regarding the purpose for which each subject planned to use the game payoff, with the following response options: (1) keep it for him/herself for later use, (2) give it to his/her spouse, (3) buy something for him/herself, (4) buy something for his/her spouse, (5) buy something for his/her children or common use, and (6) other. We also made home visits to all subjects two weeks after the experiment day and asked them what they had actually spent the game payoff on using the same response options.

#### 2.4. Experimental treatments and hypotheses development

The recruited subjects were divided into six treatment groups. See the Online Appendix I for detailed instructions and the differences among treatment groups. The treatments differed by the roles of the genders: (1) women played the role of partner A and men the role of partner B or (2) women played the role of partner B and men the role of partner A.

The treatments also differed in terms of the *private* and *public* conditions. Under the public condition, the subjects and their spouses were in the same room, but separated: all men were on one side of the room and all women on the other. Therefore, the instructions for each partner were fully disclosed to the other. Before the experiment, the subjects were told that their spouses would be their game partners and were informed that all their choices would be revealed to their spouses after the decisions were made. However, the men and women were strictly prohibited from talking to each other, allowing them to make their decisions without knowing their partners' choice.

Under the private condition, men were in one room and women in another and the instructors gave them different instructions. The subjects were told that their partners were their spouses, but were not informed of the instructions given to their spouses or their decisions. They were told that all their options and their decisions would be kept confidential and private from their spouses. In sum, the private and public conditions differed in terms of whether the men and women were in the same room and whether the options and the choices made by one subject were revealed to his/her partner.<sup>9</sup>

Although it might not be possible to conceal the amount of money received at the end of the game in a household, partners A in the private condition could always hide their choices from their partners as (1) the lotteries had the same possible payoffs and differed only in the probability of each payoff and (2) the lotteries to determine each couple's payoff were carried out by instructors in different rooms. Finally, the instructors conducted a lottery separately for each couple based on their final choices.

We examine whether women are more likely than men to pass control of the money to their spouses by comparing the decisions made by the female and male A partners as to whose lottery choice to use. Analyzing the differences between the public and private treatments allowed us to isolate the underlying factors that drive a spouse's decision whether to keep or transfer control over the money. The A partners might be handing over the control of the money to their spouses either involuntarily, due to their lower decision-making power, or voluntarily, if they consider that their spouses are in a better position to make risky decisions. However, access to money may not improve a woman's bargaining power if she has limited skills for engaging in autonomous productive activities or if she has sufficient skills to do so but her husband wants to appropriate the money to maintain his own bargaining power. We therefore test the following hypotheses:

**H1.** *Women feel obliged to transfer the control over their money to their spouses due to their lower decision-making power. Therefore, women are more likely to transfer their decision-making option when information is fully disclosed between spouses than when information is not fully disclosed.*

<sup>9</sup> Although it is not essential to have both sets of subjects in the same room to ensure the non-secrecy of the non-private treatments, the setting made the subjects understand that all their options and decisions were revealed to their partners.



**Table 2**  
Demographic characteristics across treatments.

	Mean			t-test p-value		
	No private	Private	Random	No private-Private	Private-Random	No private-Random
No. couples	319	316	191			
Muslim	0.80 (0.40)	0.78 (0.41)	0.75 (0.43)	0.65	0.47	0.26
No. household members	4.69 (1.37)	4.50 (1.18)	4.66 (1.46)	0.06*	0.16	0.87
Annual income Per capital (taka)	15,376 (8277)	16,235 (10,864)	16,038 (7533)	0.26	0.83	0.37
No. years of marriage	16.96 (7.22)	16.78 (7.86)	16.61 (7.79)	0.77	0.81	0.61
Wife's age	34.05 (6.83)	34.85 (7.66)	34.26 (7.15)	0.16	0.39	0.74
Husband's age	40.13 (7.38)	41.03 (7.93)	40.69 (7.19)	0.14	0.62	0.41
Wife's education	4.44 (3.79)	4.28 (4.23)	4.68 (3.14)	0.62	0.26	0.46
Husband's education	4.89 (4.25)	4.44 (4.72)	4.80 (3.83)	0.20	0.37	0.81
age gap	6.08 (2.49)	6.18 (2.24)	6.43 (2.48)	0.61	0.25	0.13
schooling gap	0.45 (3.16)	0.16 (2.98)	0.12 (3.03)	0.23	0.88	0.24

**H2.** Women voluntarily transfer control over their money to their spouses. Therefore, women transfer the decision-making option even when they could hide their options and decisions from their spouses.

The existence of asymmetric information between the spouses under the private treatment created the opportunity for one spouse to hide their choices from the other. If this privacy implementation is perfectly effective, partner A (e.g., the wife) should not be influenced by a perceived power imbalance with her spouse (e.g., the husband) and transfers under that condition can be attributed to partner A's perception of his/her spouse's superior competence. However, the elimination of the power imbalance may not be complete; although partner B cannot verify partner A's choice, an A partner may still fear that their spouse will find out his/her choice.<sup>10</sup> As such, we need to clarify which outcomes justify which conclusions with respect to the effectiveness of power and competence motivations. First, any *difference* between the private and public treatments can be unambiguously attributed to a power imbalance between spouses. Even if *all* transfers in the private treatment were motivated by residual fear, more transfers under the public treatment show that power matters. Note that valid conclusions with respect to power can only be drawn in one direction. While the difference between public and private treatments means that power matters, the absence of an effect does not prove the opposite. In this case, the privacy could have been ineffective. Second, the question is how to interpret transfer decisions in the private treatment. If privacy was (partially) ineffective, transfers could indicate either support for H2 or residual fear due to a lack of effective privacy. These two explanations would be indistinguishable. To address the problem of potential fear in the private treatment, we combined the experimental results with survey data on subjects' perceptions of gender and intra-household relations to test H2.

While the private and public conditions allow us to isolate the effects of an imbalance in decision-making power, it is possible that the potential gender differences in transfer behaviors may merely reflect general perceptions of gender ability, irrespective of intra-household interactions. Gender differences have been studied widely in lab experiments, the studies that are most closely related to our experiment being those that have examined differences in self-confidence.<sup>11</sup> If women feel less confident due to their usual lack of involvement in financial decision-making that involves risk, they could be inclined to transfer control over the money to men in general, not necessarily their spouses. Therefore, we introduced another condition, in which each subject was matched randomly and anonymously (*random-couple* treatment) to another subject of the opposite gender who was not his/her spouse. The subjects were made aware of this matching condition. Other than this condition, the treatments with random-couple subjects have the same conditions as the private treatments. If the gender differences in these treatments are absent or very small, we can rule out the idea that gender bias outside the household explains our data. Otherwise, the treatment is not designed to test specific hypotheses.

### 3. Summary statistics and randomization checks

Table 2 summarizes the demographic characteristics for the private, public, and random-couple treatments. The treatments are generally balanced in most characteristics, except for a slight difference in the number of household members between the private and public treatments. The annual income per capita in the three treatments ranges between 15,000 and 16,000 taka, while the national level is 25,560 taka (HIES Survey Report, 2010). The schooling gaps between spouses are relatively small.<sup>12</sup>

<sup>10</sup> The "fear" considered here is mostly asymmetric. It is only the wife who might worry that her choices will become known to her husband, while the husband has usually more power and will probably not "fear" what the wife knows.

<sup>11</sup> See Niederle and Vesterlund (2011) for a literature review on gender differences in competitiveness and self-confidence.

<sup>12</sup> This is partly attributed to the Female Secondary School Stipend Program, which was introduced nationwide in 1994 (see, e.g., Hahn et al. 2018), as well as to other programs that targeted girls in rural Bangladesh to address the gender imbalance in schooling at that time.

**Table 3**  
Male and female transfer rate.

	Treatment (1)	Mean (2)	Std. (3)	Fisher randomization test			
				(4)	(5)	(6)	
Panel A: Village level				Female-Male (p-value)	Public-Private (p-value)	Private-Random (p-value)	
Male	Public	0.213	0.107		0.827		
	Private	0.252	0.098				0.017
	Random	0.085	0.077				
Female	Public	0.653	0.190		0.028		
	Private	0.430	0.283				0.0002
	Random	0.073	0.047				
Female-male	Public	0.440	0.241	0.001	0.019		
	Private	0.179	0.277	0.038			0.0003
	Random	-0.012	0.047	0.875			
Panel B: Individual level							
Male	Public	0.213	0.410		0.244		
	Private	0.252	0.435				0.001
	Random	0.084	0.261				
Female	Public	0.654	0.477		0.000		
	Private	0.427	0.496				0.000
	Random	0.073	0.261				
Female-male	Public	0.442	0.050	0.000			
	Private	0.175	0.053	0.001			
	Random	0.011	0.039	0.491			

*Notes:* The transfer rate is defined as the number of subjects (male or female) in the village who, when playing “the partner A”, chose to transfer the decision-making regarding the lottery choice to their partners, divided by the total number of participating couples in that session in a village. The female–male transfer rate is the difference between the female and male transfer rates. There were 26 villages in total, and in each village, we ran two sessions simultaneously. In panel A, we aggregate the analysis at the village level. Panel B uses individual level observations. Column (4) is the Fisher randomization test one-sided p-value for the test of the difference between Female and male in each treatment (public, private, random respectively).

Appendix Fig. A1 shows the gender differences in decision-making on different family matters using the survey responses. Although the questions were individually and separately addressed to women and men, there was generally little discrepancy between their answers. Men seem to dominate the decision-making role in all aspects, except in the spending for poultry. As poultry farming is commonly women’s main or only income-earning activity, it may be the only area in which women can have more control than their spouses. Overall, women do not have much decision power, even in the use of their own earnings, with only 16% of women deciding on the use of their own income.

#### 4. Results

We first examine the likelihood that decision-making with respect to the lottery choice will be transferred in each of the three treatments by gender. Table 3 (Panel A) and Fig. 3 report the transfer rates by gender and treatment at the village level. The male (female) transfer rate is defined as the number of male (female) subjects in the village who chose to transfer the decision-making on the lottery choice to their partners when playing partner A, divided by the total number of participating couples in that village. The female–male transfer rate is the difference between the female and male transfer rates. A village-level analysis offers the most conservative estimates, which are less likely to be affected by random factors not related to our treatment conditions, such as possible interactions among couples within a village.<sup>13</sup>

We run Fisher’s two-sample randomization test to compare the village-level transfer rates between treatments.<sup>14</sup> Table 3 shows that the female transfer rate is significantly higher than the male transfer rate under both the public and private treatments, but not the random-couple treatment. From Fig. 3, the average female transfer rates are relatively high, at 65.3% under the public treatment and 43% in the private treatment, compared with the male transfer rates of 21.3% and 25.2%, respectively. There is no statistically significant difference between males and females in the random-couple treatment and both transfer rates are less than 10%. Both the female and female–male transfer rates are significantly higher under the public treatment than the private one, while the male transfer rate does not differ between the two treatments (Panel A, Table 3).

<sup>13</sup> There were 26 villages in total and we conducted two parallel sessions in each village, giving us 52 observations for the session level.

<sup>14</sup> This test examines whether two independent samples are likely to be drawn from the same distribution. It is considered more powerful than the more widely used Mann–Whitney U-test, since it uses the actual values of the variables rather than their ranks. See Moir (1998) for a discussion of the properties of the test, and Appendix Table A1 for alternative results using the Mann–Whitney test, which are similar to those using the Fisher test.



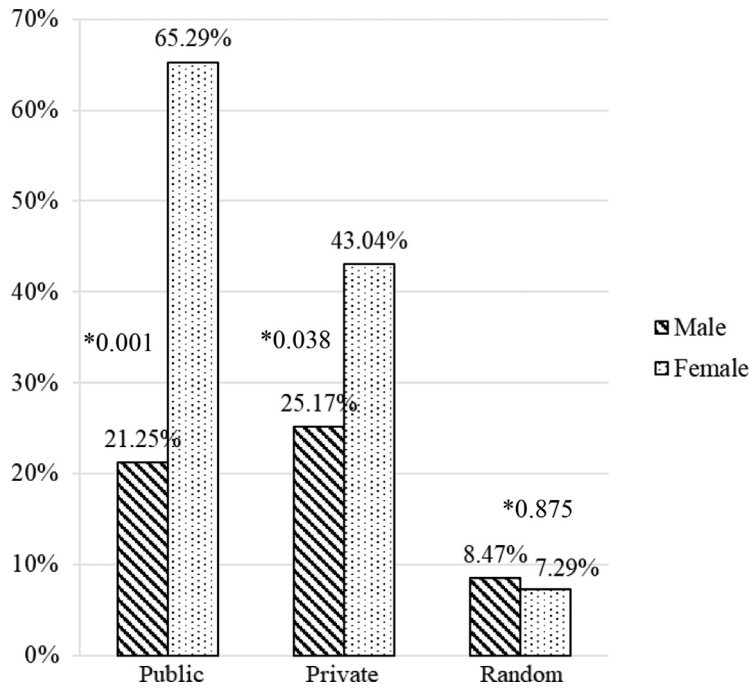


Fig. 3. Village-level transfer rates Notes: p-values reported using \* are from Fisher’s two-sample randomization test to compare the village-level transfer rates between male and female subjects within a treatment.

Panel B of Table 3 shows the transfer rates using individual-level decisions. We performed Fisher’s exact test to examine the differences between treatments, and found that both the transfer rates and one-sided p-values reflect the same results as the village-level findings.

Table 4 reports results from the linear probability model (LPM)<sup>15</sup> regressions that control for the various household characteristics and sub-district fixed effects. We run the following regression:

$$Transfer_{is} = \alpha_1 + \beta_1 Male_i + \gamma_1 Private_i + \delta_1 Random_i + \theta_1 Male_i * Private_i + \mu_1 Male_i * Random_i + \pi_1 X_i + \nu_s + \varepsilon_i, \tag{1}$$

where  $Transfer_{is}$  is a dummy variable that equals 1 if subject  $i$  transferred the decision-making regarding the lottery choice to his/her partner, and 0 otherwise.  $Male_i$  is a dummy variable that indicates the gender of subject  $i$ .  $Private_i$  and  $Random_i$  are dummy variables that indicate whether subject  $i$  was in the private and random-couple treatments, respectively. The public treatment is the base value and coefficient  $\beta_1$  captures the gender effect on decision-making transfer in the public treatment, while coefficients  $\theta_1$  and  $\mu_1$  show the difference in the gender effects between the private and public treatments and between the random-couple and public treatments, respectively.  $X_i$  is a vector of subject  $i$ ’s household characteristics, covering age, schooling, religion, number of household members, and household annual income per capita.  $\nu_s$  captures the sub-district fixed effects. We cluster standard errors at both the village level (26 villages in total) and session level (52 sessions in total).<sup>16</sup>

The regression results displayed in Table 4 yield the same general conclusions as the Fisher test. Men in the public treatment were 44–47% less likely to transfer decision-making than their female counterparts. This finding is consistent with H2. The gender gap is 26–28% wider under the public treatment than the private one. There is a significant difference between women under the private treatment and those in the public treatment. However, we do not observe a difference between men under the public and private treatments. Therefore, the information condition between spouses only affected the wife’s transfer decisions, not the husband’s. Wives were more likely to let their husbands make the risky decision when they know that all of their options and decisions are to be revealed to their husbands. This suggests the existence of a decision-making power imbalance, in which women’s decisions are influenced by their spouses being aware of them making their own decision, while men’s decisions are not. This supports H1. Both men and women were less likely to transfer decision-making under the random-couple treatment than the private one. The gender gap was absent under the random-couple treatment, as is shown by the magnitude of  $\mu_1$ , which fully offsets the gender effect under the private

<sup>15</sup> We also ran a probit model, with results similar to those from the LPM regressions. The results are available upon request.

<sup>16</sup> We also accounted for the small number of clusters at the village level by applying the wild-cluster bootstrap method of Cameron et al. (2008), and obtained similar results. The standard errors were very similar and we do not report them here.

**Table 4**  
Differences in decision making by spouse gender and by treatment assignment.

	(1)	(2)
Male (=1)	-0.44*** (0.057)	-0.47*** (0.055)
Private (=1)	-0.22** (0.093)	-0.23*** (0.085)
Random (=1)	-0.60*** (0.053)	-0.60*** (0.051)
Male* private	0.26** (0.11)	0.28*** (0.096)
Male* random	0.46*** (0.066)	0.51*** (0.066)
constant	0.86*** (0.15)	0.97*** (0.15)
+demographics controls	✓	✓
+ upazila (sub-district) FE	✓	✓
+ corrected standard error for village and session level	✓	✓
+ social capital and mobility (SCM) controls		✓
<i>p</i> -value for joint significance*	0.00	0.00
N	826	826

Notes: \*P-value for joint significance of independent variables reported include variable shown on each column, excluding the constant variable. This table shows coefficients from linear probability model where the dependent variable is a binary variable indicating if the respondent transferred the decision making of lottery choice in the game. Omitted categories in the regressions are female gender and public treatment. Demographic controls are: wife's age, husband's age, wife's schooling, husband's schooling, religion, number of household members, annual income per capita. Social capital and mobility variables are listed in appendix Table A2. Standard errors are corrected for multi-way clustering using the session and village level as reported in parentheses.

\*\*\*  $p < 0.01$ .

\*\*  $p < 0.05$ .

\*  $p < 0.1$ .

treatment (coefficient  $\beta_1$ ). This suggests that the difference in transfer decisions between spouses is not driven by the belief that men are generally better than women at making risky decisions.

Our results are robust to the inclusion of a number of different controls and to clustering. We also control for various social capital and mobility variables, as men and women differ regarding these variables (see Appendix Table A3).<sup>17</sup> We account for any gender differences in these variables across treatments by interacting these variables with the treatment dummies and controls in our regression. The results do not change.<sup>18</sup>

We then ran the following regression on our female subjects, using survey data on spouses' characteristics and perceptions to both confirm our conclusions regarding  $H1$  and seek more evidence for  $H2$ :

$$\text{Transfer}_{is} = \alpha_2 + \beta_2 \text{private}_i + \gamma_2 \text{VarY}_i + \delta_2 \text{private}_i * \text{VarY}_i + \nu_s + \varepsilon_i, \quad (2)$$

where  $\text{VarY}_i$  is a dummy variable that indicates one of the following: (1) the wife has a higher social capital index than the husband, (2) the wife has a high progressiveness index, (3) the wife thinks that she is better at making financial decisions than her husband, (4) the wife thinks that she is better at understanding the lottery than her husband, or (5) the wife thinks that women are generally better than men at making financial decisions.

The social capital index is a measure of how much a subject is exposed to social media and social networks and is based on each subject's responses to three survey questions as to whether the subject: (a) reads the newspaper at least once a week, (b) listens to radio or watches TV at least once a week, and (c) participates in any club/committee/meeting group at least once a month. Each positive response contributes one-third to the social capital measure and, thus, the measure can take values between 0 and 1. The progressiveness index reflects a subject's view on the intra-household relationship between spouses and is calculated based on the subject's responses to three survey questions assessing whether the subject: (a) disagrees that important decisions in the family must be made by men, (b) agrees that a married woman should be allowed to work outside the home if she wants to, and (c) agrees that the wife has a right to express her own opinions even when they conflict her husband's. If the subject agrees with at least two of these statements, she is considered to have a high progressiveness index. Variables (3), (4), and (5) are constructed based on survey questions on each subject's judgement of her abilities relative to her spouse or a general man. Of the five variables, we expected the social capital and progressiveness indexes to be most likely to be correlated with women's decision-making power in the household and, thus,

<sup>17</sup> Table A2 reports a number of indicators of subjects' social capital and mobility by gender. Unsurprisingly, all indicators show significant gender gaps. Women are less exposed to radio, television, and social gatherings than men. Further, women are seen in public places or places outside their villages less frequently and are more likely to seek permission from their spouses to go to such places. Women also earn significantly less than men.

<sup>18</sup> We omitted the results due to space considerations.

**Table 5**

LPM Regressions: determinants of decision making, using spouses' characteristics and perception data.

	(1)	(2)	(3)	(4)	(5)
Private	-0.25** (0.098)	-0.31*** (0.083)	-0.21 (0.13)	-0.25* (0.13)	-0.20* (0.11)
VarY	-0.17* (0.091)	-0.32*** (0.096)	-0.17* (0.084)	-0.14** (0.060)	0.0060 (0.096)
Private*VarY	0.24* (0.13)	0.28** (0.11)	-0.0079 (0.11)	0.039 (0.11)	-0.024 (0.15)
constant variable	0.81*** (0.085)	0.89*** (0.080)	0.85*** (0.086)	0.87*** (0.094)	0.78*** (0.087)
N	316	316	316	316	316
p-value*	0.05	0.00	0.00	0.01	0.16
which VarY is used	higher social capital than spouse	progressive	better than spouse in making financial decision	better than spouse in understanding lottery	Better than men in making financial decision

Note: \*p-value is for joint significance of independent variables (only those shown on each column, excluding the constant variable).

their involuntary transfer decisions and the variables on ability judgement are likely correlated with their voluntary transfer decisions. However, the education level could be correlated with women's involuntary and/or voluntary transfer decisions.

Regression (2) is run only on the private and public treatments. We exclude the random-couple treatment because variable  $VarY_i$  measures between-spouse characteristics and relationships, thus only affecting the behavior of women toward their spouses, not random men.

The results of regression (2) are presented in Table 5. The coefficients in columns (1) and (2) reflect how the social capital and progressiveness indexes are correlated with women's transfer decisions, the correlations being as expected. Under the public treatment, female A partners with higher social capital indexes than their spouses or high progressiveness indexes were less likely (17% or 32%, respectively) to hand over the control over money than those with lower indexes. Under the private treatment, there is little difference between the two types of female A partners. This is consistent with  $H1$ , suggesting that the private treatment could remove the effect of the imbalance in social capital and, as a result, the imbalance in decision-making power between spouses. When this effect is removed under the private treatment, we still observe women to be more likely to hand over control to their husbands, which supports  $H2$ . Columns (3) and (4) show that women's opinions on their understanding of the lottery and their abilities to make financial decisions relative to those of their spouses are correlated with their transfer decisions under both the private and public treatments. Particularly, women who considered themselves better than their spouses at understanding the lottery and making financial decisions were less likely to hand over control over the money. These findings are consistent with  $H2$  and also suggest that women might be willing to let their spouses make decisions because of the belief that their spouses have better numerical and/or financial skills.<sup>19</sup> However, we find no effect of women's opinions on their abilities on transfer decision relative to men in general (Table 5, column (5)).

In the Appendix, we analyze whether there is a gender difference in risk-taking, following Barr and Genicot (2008), Bolton et al., (2015), Cettolin and Tausch (2015), and Islam et al., (2019).<sup>20</sup> We also investigate whether there is a gender difference in the control over earnings, reflected by subjects' responses to survey questions on how they planned to use earnings from the game and how they actually used the earnings (two weeks after the experiment). Using post-experiment survey data, we examine the decision-making in the spending of the money from the lottery separately by men and women. The results in the Appendix are consistent with the findings above—women are more likely to let their spouses take control over the household expenditures, irrespective of which spouse has been offered the choice and whether the woman transferred the control of her own choice.

## 5. Conclusions

This paper analyzes the findings from a lab-in-the-field experiment designed for studying the intra-household decision-making process between spouses in rural villages in Bangladesh. We focus on the control over money use and household expenditures, where one spouse has the opportunity to decide about a risky and profitable project. We focused on modeling

<sup>19</sup> Note that these choices were made by only partner A, as we are interested to examine how prior to transfer risk attitudes affect partners A's decision to transfer the control of the money or not. We find that the subjects' choice of lotteries was highly correlated with both their spouse's choice and their guess as to their spouse's choice. However, this does not reflect their perception of their ability relative to that of their spouse. For example, partner A might guess that his/her spouse would make the same decision as him/herself, but still not be confident in making his/her own decision. Note that the power differentials could also have affected responses to the survey questions about social capital, progressiveness, and understanding about spouses' decision-making. However, we are not examining the causal effects of these variables. We are interested here if people with these characteristics differ in terms of intra-household decision-making.

<sup>20</sup> Risk-taking behaviors involving lottery choices similar to ours have been examined in many recent studies. See, for example, Barr and Genicot (2008), Bolton et al. (2015), Cettolin and Tausch (2015), and Islam et al. (2019).

**Table A1**  
Male and female transfer rate -testing using Wilcoxon rank-sum (Mann-Whitney) test.

	(1) Treatment	(2) Mean	(3) Std.	(4) Two-sample Wilcoxon rank-sum (Mann-Whitney) test	(5) Public-Private	(6) Private-Random
Panel A: Village level				Female-male		
Male	Public	0.213	0.107		0.443	
	Private	0.252	0.098			0.009
	Random	0.085	0.077			
Female	Public	0.653	0.190		0.034	
	Private	0.430	0.283			0.008
	Random	0.073	0.047			
Female-male	Public	0.440	0.241	0.0002	0.037	
	Private	0.179	0.277	0.068		0.050
	Random	-0.012	0.047	0.679		
Panel B: Individual level						
Male	Public	0.213	0.410		0.409	
	Private	0.252	0.435			0.001
	Random	0.084	0.261			
Female	Public	0.654	0.477		0.0001	
	Private	0.427	0.496			0.000
	Random	0.073	0.261			
Female-male	Public	0.442	0.050	0.000		
	Private	0.175	0.053	0.001		
	Random	0.011	0.039	0.772		

Note: Same as in Table 3.

a risky choice involving an intra-household decision-making process, where both spouses decide with high stakes. Based on anecdotal evidence in the literature, we investigated the common phenomenon that many females concede control over the use of their money to their husbands.

We find evidence of a gender difference in intra-household decision making that prevents women from having control over their own money. That is, women were more likely to let their spouses make risky decisions. We thus find evidence of an imbalance of power: Significantly fewer women transfer their decision making when their behaviors could be hidden from their husbands. Women's tendency to transfer decision making increased when information was fully disclosed between spouses, suggesting many women feel obliged to let their spouses make such decisions due to their relatively lower decision-making power. Further, we did not find evidence of an effect based on gender differences, such as self-confidence. We also find that women's decisions to transfer the control over their money use is correlated significantly with the differences in social capital and women's perception of the relationship between spouses.

These findings suggest that women's empowerment could be adversely influenced by gender differences in intra-household decision-making. That is, offering women an opportunity to make decision about own money might not directly translate into improving their access to economic resources or stimulating their participation in the household's income-earning activities and decision-making process if they hand over the control of the money to their spouses. More than 60% of the women given an opportunity to decide about their own money let their spouses make risky decisions under the public treatment, meaning it is important to consider gender differences when designing programs and other policies that target household outcomes.

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.jebo.2020.02.003](https://doi.org/10.1016/j.jebo.2020.02.003).

## Appendix

### Risk-taking and decision making in lottery

In this appendix we examine whether there is a gender difference in risk-taking, using the partners A's choices between the safe lottery and the risky lottery.<sup>21</sup> Overall, we do not find any statistically significant differences between men and women in their choice of lottery (Table A3). However, we find a gender difference in the *private* treatment: women were about 17% less likely to take the risk than men. In the *public* treatment, the percentage of women who chose the risky lottery is higher than that of men; however, the difference is not statistically significant. A possible explanation for the difference

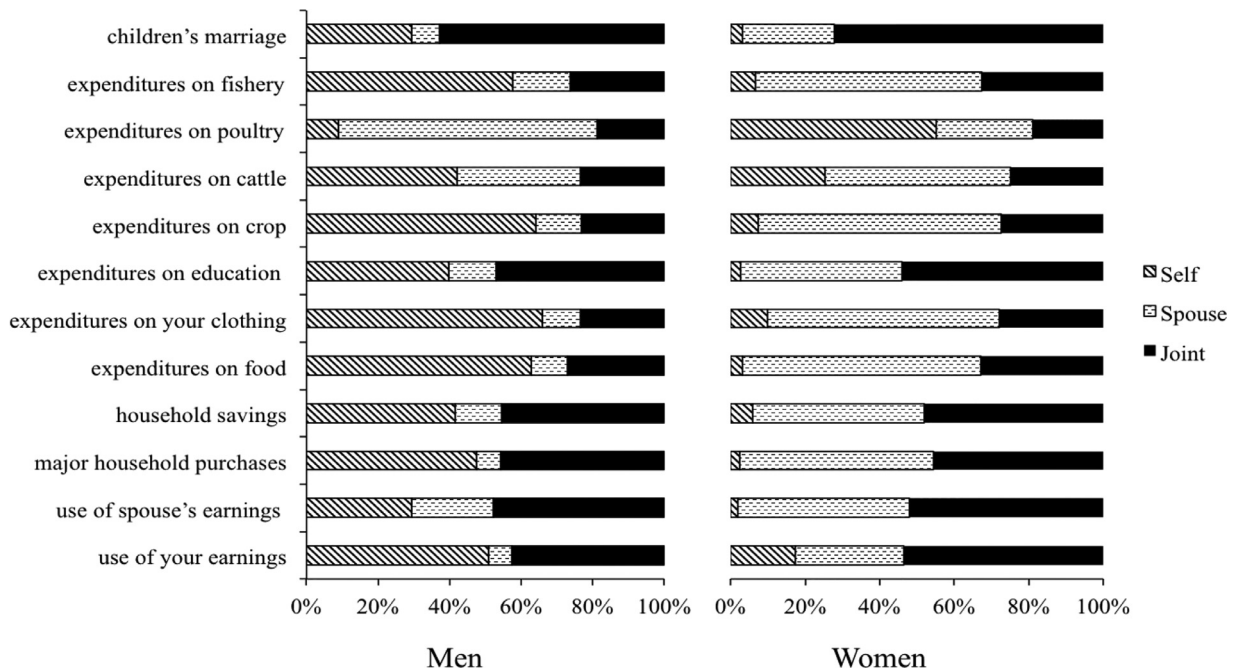
<sup>21</sup> Risk-taking behaviour involving lottery choice similar to ours has been examined in many recent studies. See, for example, Barr and Genicot (2018), Bolton et al. (2015), Cettolin and Tausch (2015) and Islam et al. (2019).

**Table A2**  
Social capital and mobility.

	% / Mean (Std.)	
	Men	Women
Do you read the newspaper at least once a week?	26.27	10.90
Do you listen to the radio or watch TV at least once a week?	50.97	34.02
Do you participate in any club/ committee/ meeting group at least once a month?	37.89	27.00
Do you go on your own at least once a month to:		
public places in your village	79.78	48.55
places outside your village	71.31	36.44
Do you need to seek permission of your spouse to go to:		
public places in your village	14.16	89.71
places outside your village	14.89	87.17
Did you do any income-earning work outside the home in the last one year?	65.01	12.59
Did you do any income-earning work on your own at home in the last one year?	63.32	81.84
How much is your annual earnings in the last one year? (taka)	69,831 (33,446)	8340 (27,218)

**Table A3**  
Probability of choosing riskier lottery (%).

	Men	Women	Fisher exact test one-sided p-value
All	31.36%	31.11%	0.479
Public	32.92%	37.62%	0.123
Private	36.39%	31.01%	0.089
Random	20.42%	20.42%	0.550
<b>Fisher exact test one-sided p-value:</b>			
Private vs. public	0.201	0.047	
Private vs. random	0.000	0.006	
Public vs. random	0.001	0.000	



**Fig. A1.** Intra-household decision making.

between the two treatments is that the subjects' risk-taking behaviors were affected by whether or not their lottery choice was observed by their spouses. Since the subjects in the public treatment expected their choices to be disclosed to their spouses, they might have chosen what they thought their spouse would choose in the lottery rather than revealing their true

**Table A4**  
Male and female transfer rate by risk-taking behavior.

	Treatment	Risk averse	Risk lover	Fisher exact test one-sided p-value
Male	Public	0.257 (0.044)	0.136 (0.045)	0.051*
	Private	0.300 (0.044)	0.143 (0.051)	0.025**
	Random	0.091 (0.033)	0.056 (0.056)	0.529
Female	Public	0.686 (0.046)	0.593 (0.067)	0.160
	Private	0.404 (0.047)	0.479 (0.073)	0.240
	Random	0.053 (0.026)	0.143 (0.078)	0.175

**Table A5**  
Partner As' tentative and actual use of game payoff.

	Difference between subject types and Fisher exact test one-sided p-value			
	Tentative use		Actual use	
	(1) Female partner A-Female partner B	(2) Female transferring- not transferring	(3) Female partner A-Female partner B	(4) Female transferring- not transferring
keep/purchase for self	-0.06 (0.142)	-0.05 (0.282)	0.05 (0.244)	-0.01 (0.527)
give to spouse	0.02 (0.371)	0.13** (0.037)	-0.03 (0.327)	-0.04 (0.371)
purchase for spouse	-0.01 (0.495)	0.02 (0.438)	0.02 (0.365)	0.02 (0.438)
children/common use	0.04 (0.283)	-0.11 (0.15)	-0.03 (0.379)	0.03 (0.445)
Pearson chi2 test p-value	0.615	0.179	0.714	0.865

This table shows the difference in tentative and actual use of game payoff between different subject types with Fisher exact test one-sided p-value in the parentheses. \*\*\*  $p < 0.01$ .

\*\*  $p < 0.05$ , \*  $p < 0.1$ .

preferences. Meanwhile, the subjects in the private treatment did not have the same incentive to hide their true preferences. Thus, we examine our subjects' guesses as to their partners' choice of lottery.<sup>22</sup>

The results suggest that, on average, women expected their spouses to be more risk-taking than themselves, while men expected their spouses to be less risk-taking (statistically significant at the 1% and 5% levels, respectively). We also find that women in the public treatment were significantly more likely to choose the risky lottery than those in the private treatment, and that women's guesses as to their spouse's lottery choice were not significantly different from their own choices. Although the percentage of men choosing the risky lottery was lower in the public treatment than in the private treatment, the difference is not statistically significant. This suggests that if spousal observability has an effect on risk-taking, the effect is stronger for women than for men. Men and women in the random-couple treatment were no different in their levels of risk-taking, and both were less likely to choose the risky lottery in this treatment than in the real-couple treatments. The lower level of risk-taking in the random-couple treatment suggests that the subjects were more cautious when their decision might affect an outsider who is not part of their family.

Next, we examine whether a subject's risk-taking behavior affected his/her decision to transfer the decision-making of the lottery choice. Table A4 reports the percentages of men and women in each treatment who transferred decision-making to their partners according to their risk-taking behaviors. The last column of the table reports the one-sided  $p$ -values from Fisher's exact test on the difference between risk-averse and risk-loving subjects. The  $p$ -values indicate a significant difference between risk-averse and risk-loving men, but not between risk-averse and risk-loving women. In both the private and public treatments, risk-loving men were less likely to let their spouses make the decision than risk-averse men. As has been discussed, men expected their spouses to be less risk-taking than themselves, and thus, men who were risk-lovers were more driven to stick to their own decision rather than to let their spouse decide. We also ran Fisher's exact one-sided test to test whether men's choice of lottery and their guess of their spouse's choice were less likely to be the same for risk-loving men and risk-averse men. The results confirm that such is the case at the 1% confidence level. However, we do not find a similar effect among women. There are no differences in women's transfer decisions between risk-loving and risk-averse women.<sup>23</sup>

<sup>22</sup> The subjects were also asked to make a guess as to their partner's choice when making their own choice, and a correct guess earned 50 taka.

<sup>23</sup> The detailed results of the tests are available upon request. Note that here the woman's choice may not reflect her true risk-preferences, since she made a choice for both herself and her husband, and some women may fear punishment if they choose differently than their spouse would prefer. As conventional measurements of risk-attitudes would have been impractical in the context of our experiment, we have no information on subjects' risk preference beyond their actual choice.



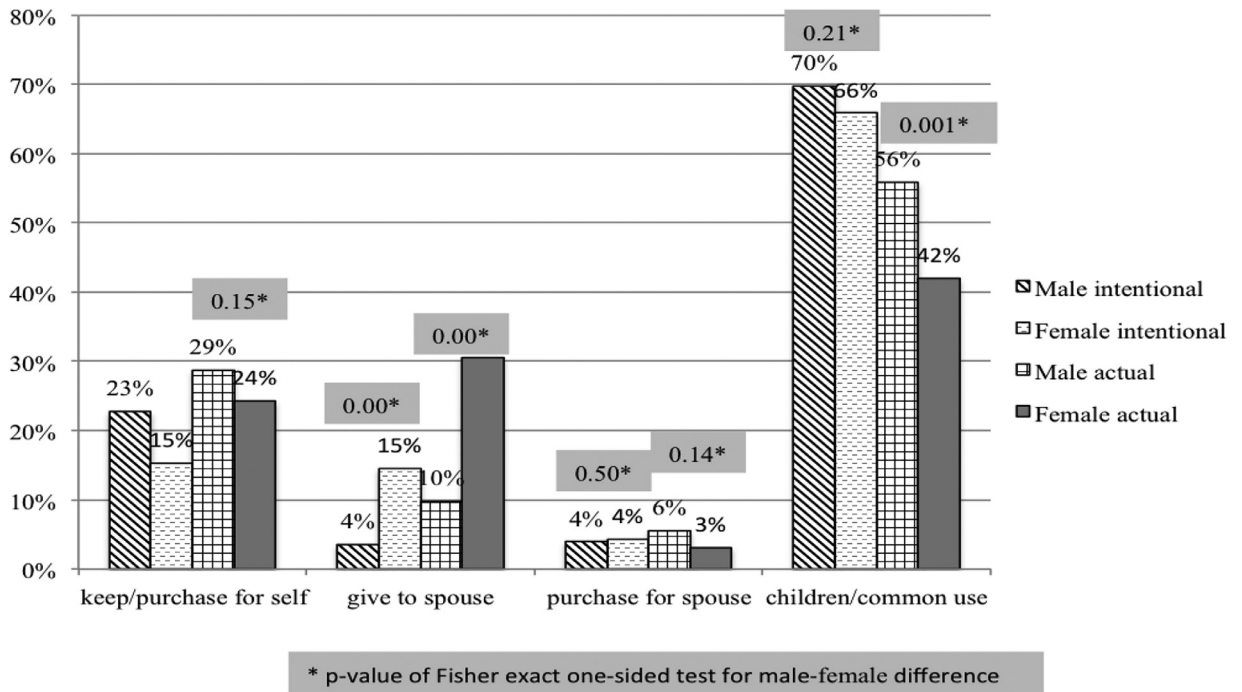


Fig. A2. Tentative and actual use of game payoff by gender.

Decision-making in the spending of earnings

In addition to women’s control over their money, another aspect of women empowerment is the improvement of women’s control over household expenditures. We examined whether female partner As and female partner Bs differed in their usage of earnings from the game. Since the roles of partner As and partner Bs were allocated randomly in our experiment, we were able to examine the effect of giving the wife an opportunity to make risky decision rather than the husband, without facing a selection bias. We examine both the intended and actual uses of earnings. The information on the intended use of earnings was obtained immediately after the game ended.

We run Fisher’s exact test in order to compare the differences in usage types between male partner As and male partners B, female partner As and female partners B, female partner As and male partner As, and female partners B and male partners B. We also run the Pearson chi-squared test to test the differences in distribution for all usages. The test is useful in this case because the usage variable is discrete and there are more than two usage types. The results are reported in Table A3 (columns 1 and 3). There are no significant differences between female partner As and female partner B, either in each usage separately or in the whole distribution, in terms of both intended and actual usages. This suggests that giving money to women may not affect their use of the earnings, and in particular whether they plan to exercise control over the earnings by themselves or to let their spouses take control.

We determine whether there is any correlation between women’s control over money uses and their control over household expenditures by testing whether the two types of female partner As, namely those who passed over the control of the money and those who did not, differed in their intended and actual uses of earnings. Table A3 (columns 2 and 4) displays the results. We found no significant differences for all usages, except for the probability of tentatively handing over the earnings to one’s spouse. Female partner As who let their spouses make the decision were more likely to tentatively hand over their earnings than those who made the decision on their own. However, there was no such difference in terms of their actual use.

Fig. A2 presents the distributions of earning usages by gender for all subjects, both the partner As and the partner Bs, in the public treatment. Men and women had significant differences in their probabilities of tentatively keeping the earnings or spending them for themselves and their probabilities of tentatively handing over the earnings to their spouse. Women were more likely to tentatively give the earnings to their spouses and less likely to tentatively keep them or purchase something for themselves. There was no gender difference in the probability of tentatively spending on one’s children or common use. Among all usages, spending on one’s children or common use was chosen the most frequently (66–70%) for both men and women. Thus, if we look at the intended use of earnings, there is no considerable change in financial household outcome whether the wife or the husband had the money in hand. The K-S test on the distribution of intended earnings usages also indicated no significant difference between men and women ( $p = 0.44$ ). However, the K-S test on the distribution of actual usages indicated a significant gender difference ( $p = 0.002$ ). The difference lies in the probabilities of giving one’s earnings

to one's spouse or of spending on one's children and common use. Women were more likely to hand over the earnings and less likely to spend them on their children or common use. At the same time, we do not find that women were more likely to spend on household common goods, possibly due to their lack of control over spending decisions. This finding, in combination with the data on intended use, suggests that many women who had planned to spend their earnings on their children or common use later decided to hand over the money to their spouses. This limits the extent to which increasing women's incomes could improve their control over the household expenditure, at least for short timeframes and in the local context of our experiment setting.

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