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**An experimental investigation of intra-household  
resource allocation in rural India**

**Savita Kulkarni  
Anirudh Tagat  
Hansika Kapoor**

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# An experimental investigation of intra-household resource allocation in rural India

## Abstract

This study aims to investigate intra-household bargaining outcomes elicited in an artefactual field experiment design where participants completed a purchase task of real commodities. Married couples separately expressed their initial preferences over commodities. The bargaining process in the experiment was exogenously introduced by sharing information about partners' preferences in the treatment group. We hypothesized that the spouse with weaker bargaining position at the household level would consider the information of their partner's preferences while making own consumption decisions more compared to their partner. Therefore, they may deviate from their own preferences when purchasing commodities. More than 230 married couples from two villages in the Tamil Nadu state of India participated in the experiment. It was observed that information about partners' spending preferences resulted in reduced final allocations for female participants. However, the deviation was not significantly different from the original intention to spend. Therefore, information about partners' preferences may not be an effective medium to elicit bargaining power in the context of jointly-consumed household commodities. Subgroup analyses were performed to identify any heterogeneous treatment effects.

**JEL:** C93; D13; J12; J16; O15

**Keywords:** intra-household bargaining, gender, artefactual field experiment, women's empowerment, welfare schemes

## Authors

### Savita Kulkarni

Assistant Professor,  
Symbiosis School of Economics  
Pune, India  
[kulkarnisavita@gmail.com](mailto:kulkarnisavita@gmail.com)

### Anirudh Tagat

Research Author, Department of Economics,  
Monk Prayogshala  
Mumbai, India  
[at@monkprayogshala.in](mailto:at@monkprayogshala.in)

### Hansika Kapoor

Research Author, Department of Psychology,  
Monk Prayogshala  
Mumbai, India  
[hk@monkprayogshala.in](mailto:hk@monkprayogshala.in)

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## Executive summary

Decisions made within the household affect household outcomes. For instance, deciding to allocate more resources toward food rather than recreation yields positive benefits toward overall health. The manner in which husbands and wives arrive at such allocation decisions is therefore of interest to researchers. Given the differences in preferences between men and women with respect to such consumption decisions, the manner in which they allocate resources within the household was examined in this study. First, whether such preferences played a role toward allocation was studied; and second, whether information about each other's preferences played a role toward allocation was investigated. By contextualizing this research problem within intra-household dynamics, particularly of bargaining, the researchers assessed whether women held a weaker bargaining position in the household with respect to resource allocation decisions, as compared to men. The sharing of information was motivated by the assumption that such disparities in information about each other's intentions toward spending behaviour may be associated with bargaining positions. Therefore, this study sought to examine the role of information sharing in intra-household resource allocation through a field experiment in rural India.

## Methodology

The experiment took place in two villages in rural India: Thethoor (Madurai District) and Mallanampatti (Dindigul District) in the Indian state of Tamil Nadu. Husbands and wives from 231 households participated in the study, bifurcated into two conditions: one where they received information about their spouse's intentions regarding purchase decisions ( $n = 102$  couples) and the second where they did not receive such information ( $n = 129$  couples). Couples participated in a real-world purchase task, wherein they were provided with Rs. 100 worth of token money (divided equally between the spouses), and made decisions to spend it on the following commodities: rice, salt, paracetamol, pain relief balm, notebooks, pens, soap, and toothpaste. These commodities were selected on the basis of household consumption between men and women via focus group discussions beforehand. A pilot study was conducted in August, 2015 to test a few commodities, which were then finalized for the main study. The eight commodities represented food, health, education, and sanitation. Thus, this task allowed couples to demonstrate how they would allocate resources toward such commodities (and thereby household outcomes), under conditions of information sharing (knowing what their spouse would decide) and no information sharing (not knowing what their spouse would decide). This is an application of the concessions and claims model that is outlined in Muthoo (1992, 1996) and considers a revocation cost of an initial decision when information sharing is added to the model.

## Key findings

Results showed that (a) spouses were aware of their partners' preferences and were able to correctly predict their partners' choices; (b) Providing information about partner preferences only influenced women's final allocations, and information was not very effective in examining how intra-household resource allocation operated; and (c) Intra-household resource allocations were associated with individual and household characteristics, such as the difference in years of education between spouses, as well as which member participated in a welfare program.

There were differences between men and women in their preferences for commodities: on average, women were almost twice as likely to prefer spending on rice as compared to men. In contrast, men were 1.2 times more likely to spend on pens than women. More than 85% of the individuals did not change their initial preferences, potentially due to status-quo bias or effects of existing intra-household dynamics. Indeed, spouses who had information about their partner's preferences were 36% more likely to correctly guess on what their partner would spend. Thus, giving spouses information about each other's preferences did not lead to any statistically significant differences between their intentions and final decisions. Women reduced their final allocations by about 1.5 times on preferred commodities when they were given information and knew their husband's preferences. These effects appear to vary by heterogeneity of household characteristics such as education, age, and participation in a welfare program. Less educated women, compared to their husbands, lowered their final allocations on preferred commodities by 0.3 times. With respect to participation in a government welfare program, MGNREGS, women in households where only the woman participated reduced their final allocation, whereas men in households where both spouses participated increased their final allocation.

In this setting, we found correlational interactions between intra-household bargaining dynamics and a large-scale employment guarantee programme (MGNREGS). A well-designed welfare scheme with the goal of empowering women may provide financial resources to women but may not obtain desirable results if their bargaining position is low. Our results indicate that intra-household bargaining positions are associated with participation in the employment guarantee scheme. Causal relations may not be drawn based on such a quasi-field experiment, but our study sets the agenda for future research in terms of developing methodology to elicit the intra-household bargaining process and investigating the impact of welfare schemes on the bargaining positions of the beneficiaries. Given that gendered preferences are directly associated with household outcomes, it is recommended that policy stakeholders take cognizance of existing intra-household dynamics when targeting benefits to households.

## I. Introduction

Household decision-making and resource allocation are critical for economic and human development. Traditional economics viewed the household as a collection of individuals who behave in consensus to allocate time and resources for individual and collective wellbeing. However, within households, many factors like age, gender, marital status, income level, and education influence the dynamics of intra-household decision making. In the context of gender and intra-household resource allocation, recent empirical studies have indicated that gender differences exist in household preferences, which may have important welfare implications. For instance, studies have shown that resources, when entrusted to women in the household, are better used for overall family welfare improvements (Quisumbing & Maluccio, 2000; Udry, Hoddinott, Alderman & Haddad, 1995; Quisumbing, 1996). Similarly, women endowed with income are more likely to invest in education, children's nutrition, and housing than men (Thomas 1990; 1994; Hoddinott & Haddad 1995; Duflo 2003). Various countries including the UK and Mexico have designed policies to direct aid, such as food coupons, towards women instead of men. This implies that endowing women in the household with greater decision-making power will have positive spillover effects on the wellbeing of the household and society at large.

The existing literature therefore implies that men and women may have qualitatively different preferences for various goods and services consumed jointly at household level. Preference-consistent consumption, however, depends significantly on an individual's bargaining power in the household. Implicitly, it also assumes that the individual is able to monitor preferences of other members or has information about others' preferences and is aware of the relative bargaining position of each member of the household.

Bargaining interactions between spouses may not be perfectly observable, but household decisions can be considered an outcome of the intra-household bargaining process. Weak bargaining positions may be reflected in preference-inconsistent choices at an individual level if the wife is aware of the conflicting preferences between her and her partner. In the present study, we investigate the intra-household bargaining process by sharing information about spouses' preferences in an experimental setting.

While a survey-based approach may not reveal the precise structure of spousal relationships, household-level secondary data on consumption may reflect a post-bargaining consensus. Therefore, both primary surveys and secondary data may not precisely reveal the dynamics of intra-household bargaining. Thus, a game theoretic bargaining model may be more appropriate to elicit intra-household bargaining interactions. We adapt the two-person sequential bargaining game from Muthoo (1992, 1996) considering the case of intra-household resource allocation between two major household decision-makers: the husband and wife. An experimental methodology was adopted to test such a game theoretic

bargaining model in a more controlled environment in the form of an artefactual field experiment (Levitt & List 2007). Our experiment was administered in a more controlled environment compared to naturally-occurring situations. We manipulated information about spousal preferences, while keeping other things constant. Therefore, it allowed us to establish causal links between information and gender-specific preferences in a contextual environment.

In our novel experimental setting, individuals' preferences for jointly-consumed real commodities were elicited. These were shared with their partners in the treatment group, while the control group did not receive any information. Sequentially, individuals made their consumption decisions separately. Sharing spouses' preferences in the absence of any direct communication or enforcement mechanism was expected to bring more changes in the choices of the individual with relatively weak bargaining power compared to the group having no such information.

The experiment was carried out with 231 randomly-selected married couples from two villages in the state of Tamil Nadu in India. For women, we observed that the information about their partners' initial allocation preferences brought about a reduction in the females' final consumption decision, compared to those who had no such information. However, we find that such a change was not significantly different from their original intent-to-spend, pointing toward the potential ineffectiveness of information in simulating bargaining dynamics. We argue that this may be because partner preferences were already accounted for by individuals in their own intent-to-buy. Therefore, sharing information in this context did not bring any significant changes in final consumption choices. However, this evidence does not imply the absence of bargaining and imbalanced power structure within households.

Our results show that (a) spouses appear to have good knowledge of their partners' preferences and can correctly predict their partners' consumption choices. This suggests that existing intra-household dynamics may be driving behaviour in the experiment. (b) Providing information about their partners' preferences only influences women's final allocations, and may not be a thoroughly effective medium to initiate the bargaining processes between household members in the case of jointly-consumed commodities. (c) Intra-household resource allocations are associated with individual and household characteristics, such as the difference in years of education between spouses, as well as which member participates in a welfare program.

These results reflect bargaining dynamics in the context of consumption decisions in the state of Tamil Nadu.<sup>1</sup> Given the specificity of our sample, future policy research in this area should focus on assessing similar behaviour in a non-subsidy-based state such as Bihar or Gujarat in

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<sup>1</sup> The State government of Tamil Nadu offers extensive subsidies to all households (but particularly poorer households, who may also participate in MGNREGS) for rice, oil, school uniforms (for children studying in government schools), notebooks, mixer-grinders, ceiling fans, among many other agricultural subsidies (Leena, 2014).

India. This will help in eliminating the potential role of state-sponsored consumption subsidies on consumption behaviour.

Another direction that policy can take in light of our study's results is to offer incentives to facilitate coordination between spouses for the consumption demand of specific commodities or services. This is similar to conditional cash transfers where a cash benefit is provided to households under the stipulation that it will be allocated to a particular use (e.g. payment of school fees or vaccination fees). This may be implemented by offering transfers with tied and untied components. A specific portion of the transfer could be in the form of redeemable coupons for nutritious food (e.g. fruits and vegetables) or doctors' fees. Such a measure will ensure that for all sets of household preferences, certain outcomes (perceived to be beneficial for the entire household) will be facilitated.

The remainder of the paper is organized as follows: the first section describes the conceptual framework that guides the experimental design. The second section outlines the experimental setting with subsections on treatments and experimental outcomes. The third section discusses data analysis and results while the subsequent section concludes the paper.

## **II. Conceptual framework**

The proposed research design and methodology aims to build on current empirical literature on intra-household bargaining in India. In order to assess the impact of changes in intra-household bargaining, our field experiment draws on empirical methods that have only recently gained ground, while also laying emphasis on seminal economic theories of households and families such as Basu (2006) and Browning and Chiappori (1998). We first tackle the literature of direct importance: studies that employ field experiments to address questions of intra-household bargaining. Mani (2011) uses an investment game between spouses of the same household (in rural Andhra Pradesh) to investigate the relative importance of key factors (return on investments and informational awareness) that influence the efficacy of household investment decisions. In finding that household members are willing to trade off lower efficiency for more control over decisions, she makes an important case for factors such as identity that may be spurring such 'spiteful' intra-household dynamics. Ashraf (2009) conducts a similar experiment to test the impact of treatment variables like information and communication on making decisions to save money in the Philippines. It was observed that when decision-making was private, men put money in their personal accounts but spent this amount for their own benefits when choices were observable. When it was required to communicate the choices, men put more money in their wives' accounts. The author has drawn an important inference that men (women) whose wives (husbands) control household savings respond more strongly to the treatment. Thus, this confirms that gender-specific differences exist in household decision-making which may be influenced by information. For

a more recent study of the influence of information asymmetry on intra-household allocations, see Castilla and Walker (2013).

Dasgupta and Mani (2015) show that private consumption commodities are more likely to be preferred by men when they exert effort in order to obtain earnings. Our experiment will differ in that there will be no hypothetical effort-demanding task; instead exogenous variations enter via information about spouses' intention to buy. Furthermore, we expect that the proposed artefactual field experiment will be among the first to experimentally investigate consumption choices in the rural Indian population using real commodities (see Beblo, Beninger, Cochard, Couprie & Hopfensitz, 2015). Other studies that examine intra-household dynamics using experimental procedures include Cochard, Couprie and Hopfensitz (2014), Munro, Kebede, Tarazona-Gomez and Verschoor (2014), and Yang and Carlsson (2012).

## 2.1 Theoretical framework

The experiment was designed to investigate the bargaining outcome between spouses in two situations – one in which information about partners' preferences is shared and another in which they are not.

### Household model and predictions

The experimental design was based upon the two-person sequential bargaining game designed by Muthoo (1992, 1996) and Binmore (1998). Under conditions of risk-neutrality, the two players (Husband (H) and Wife (W)) bargain over the allocation of fixed endowments  $\in [0, 1]$  to consumption of the  $k^{th}$  commodity. At time  $t = 1$ , both players decide their intention-to-spend,  $z_i$ ,  $i = \{H, W\}$ , for commodities on display. This initial preference may already take into account existing intra-household dynamics as well as any reference points over consumption given that participants are aware that their spouses are playing the same game. At time  $t = 2$ , the husband-wife pair is randomly assigned to receive a treatment of either no information or information ( $l = 0, 1$ ) by the experimenter. Under the information condition, each individual receives information about the intent-to-spend of their spouse, providing a signal of the initial claim that the partner would like to make over allocation of resources for consumption. Individuals assigned to the no information condition receive no such signals about their partners' intent-to-spend.<sup>2</sup>

The resulting bargaining game plays out as follows: W makes an offer to H (and H to W) that signals her/his preferred allocation distribution for the  $k^{th}$  commodity. The players then simultaneously decide their final allocation,  $x_i \in [0, 1]$  for consumption with this information. The final payoffs for the  $i^{th}$  individual as  $P_i(z)$  form a strategy pair  $z = (z_H, z_W)$ .

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<sup>2</sup> Ashraf (2009)'s 'Public' treatment condition provides a parallel for this experiment's 'no information' condition, however they learn each other's decisions only after they leave the lab. Ashraf's 'Negotiation' treatment condition is similar to our 'Information' condition; however, participants are not informed of each other's decisions but only of their intentions.

In the case that  $z_H + z_W \leq 1$ , there will be no deviations from the initial claim and that  $x_i \geq z_i$  and the utility derived for each player will be  $U_i(x_i)$  from obtaining  $x_i$  share of the allocation of endowments to the  $k^{th}$  commodity. In the case of incompatible claims ( $z_H + z_W > 1$ ), at least one player must revoke his/her initial claim. If player  $i$  receives a share  $x_i < z_i$ , then the cost of revoking the initial claim (i.e. making a concession) is given by  $C_i(x_i, z_i)$ . Thus, if  $x_i \geq z_i$ , then  $C_i = 0$ , but if  $x_i < z_i$ , then  $C_i > 0$ . The cost-of-revoking function ( $C_i$ ) here represents the bargaining power that player  $i$  exercises over the allocation decisions for both members of the household. To summarize, the utility of the household is therefore given by:

$$U_i(x_i, z_i) = \begin{cases} U_H(x_H) & + & U_W(x_W), & 1 \geq x_i \geq z_i \\ [U_H(x_H) - C_H(x_H, z_H)] & + & [U_W(x_W) - C_W(x_W, z_W)], & z_i \geq x \geq 0 \end{cases}$$

Broadly, his model suggests that in any bargaining game between two players, there are significant costs to deviating ('revoking') their original decisions, which vary with the information each player has regarding the strategy of the other player. In the context of intra-household dynamics, we assume that the deviation from stated preferences will impose some 'revocation cost', which determines each spouse's household allocation. The bargaining power can therefore be inferred from these deviations (Muthoo, 1996, p. 145). For instance, the extent to which a player deviates from his or her initial preferences, will represent the magnitude of bargaining power; a higher deviation (from initial preferences) implies a lower cost of revoking one's decision, and hence lower bargaining power, while a lower deviation implies higher cost of revoking one's decision, and hence higher bargaining power. Both players may choose to concede or retain their preferences, making the outcome of bargaining an impasse, respectively.

We attempted to find deviation in individuals' final consumption choice (allocation in terms of purchase quantity or price) from their initial preferences in the replica of a real-world household-level bargaining situation in the experimental setting. In our experimental setup, the deviation from stated preferences was elicited through a purchase task of real commodities. Spouses first expressed their preference for a set of commodities they intended to purchase with the available endowment. These intentions were likely to represent their own preferences as unawareness about their spouses' preferences would not drive them to predict and reconcile their partners' preferences<sup>3</sup>. The bargaining process in the experiment was exogenously introduced by providing the information of the partners' intention to buy. Couples were randomly assigned to a 'full-information' treatment or a 'no-information' treatment. In the former group, individuals' intention-to-buy list was shared with their spouses and then spouses were allowed to alter or retain their own intention-to-buy commodity list.

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<sup>3</sup> Note, however, that initial intentions may already take into account past consumption behaviour or unobservable existing intra-household dynamics. We argue that such existing intra-household dynamics should also be manifested in the real purchase task of the experiment.

The *no-information* group did not receive such information. Nonetheless, this *no-information* group also received the chance to alter their intention-to-buy list while placing the final order. This provision maintained the symmetry in the decision-making process in both groups and also captured time-wise changes in preferences. Deviations from the intention-to-buy in the *no-information* group serve as a benchmark for estimating the bargaining power in the *full-information* condition. Conditioned on information availability, it is possible that being aware of the spouse's intention-to-spend alters the final allocation for any particular commodity. We further attempted to investigate the bargaining positions of spouses in the household by inquiring about expectations of their partners' choices in the final-order.

Both spouses arrived to the experiment together and took decisions in the same room, though separately. The endowment of Rs.100 was framed as a collective endowment with equal division between the spouses.<sup>4</sup> This arrangement was expected to emphasize a sense of household-level collective utility. As a result, the intra-household power relationship was expected to be reflected in the decision-making.

Absolute differences between intentions and final-order forms are considered to be an unambiguous indicator of the bargaining power as it is arguably more context-neutral compared to any other form of personal interaction (face-to-face or telephone conversations). It is important to note that such differences may also be on account of coordination efforts by both individuals to maximize household utility (e.g. both members of households may not wish to purchase the same commodity). However, the coordination problem can be overcome using expectations of spouses' endowments. If information serves as a coordination mechanism (rather than a bargaining facilitator), then it may lead to either a divergence or convergence of allocation choice (that is, purchasing the same commodities or complementary consumption bundles). We provide a test for convergence of allocation choices in appendix C.

Given that information-sharing plays a key role in our experimental setting to simulate bargaining, it is important to understand what the deviations between household allocations in the no information condition and information condition represent. In the case of a collective household model (as noted above), households may use information on spouses' allocations differently, which in turn determine their decisions that are taken at the household level. However, in the case of a unitary model, information may not have a role to play, since spouses will have a tendency toward a cooperative allocation that maximizes the utility of the household without considering their individual utility functions. Sen (2001) suggests that there may be various factors that determine the position of a woman in intra-household bargaining dynamics – such as education and employment opportunities. We account for these in our

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<sup>4</sup> A number of studies have also studied the role of initial endowments in intra-household resource allocation (Doss 2013; Browning & Bourguignon, 1994). Since this was not the core focus of the study, endowments were kept equal.

analyses and provide correlational insights using heterogeneous treatment effects in section III.

Another important merit of our design is the involvement of real monetary endowment and real commodities. Blumenschein, Johansson, Blomquist, Liljas and O'Conor (1998) argue that individuals may treat hypothetical decisions differently from real decisions. The experimental setting in this way was a replica of a real-life situation. Introduction of real money and real commodities helped provide a real-life bargaining situation in the experimental setup. One concern was that a real purchase task may not be incentive-compatible, since households may decide to stock or sell the commodities that they receive as payoffs from the experiment. There are two compelling context-specific reasons against this argument: (a) Stocking or selling in rural India comes with additional costs in terms of time and effort that may not outweigh the benefits of household consumption<sup>5</sup>, given the utility ascribed to these specific commodities<sup>6</sup>. Under the assumption of present bias, individuals are rational to prefer present consumption over future consumption and are therefore disinclined to stock commodities; (b) By the process of backward induction, if couples can predict that there will be another bargaining game while redeeming commodities, they will potentially argue over: (1) who will retain commodities and who will redeem; or (2) whether both will redeem. In the former case, the member who dictates her terms in the household-decisions (i.e. has higher bargaining power), is more likely to redeem. This is mainly because the experimental endowment (50 rupees) was assigned to each individual, who could use it as per their preferences. Therefore, bargaining outcomes during experiment and post-experiment through such uncontrolled processes may not be qualitatively different. In the latter case, it implies that they have equal bargaining power or do not care about collective household utility. Considering these, it was presumed that participants would make their choices carefully.

The list of real commodities were selected after focus-group discussions to determine the most common choice set for individuals who would be the potential participants. On the basis of these discussions (held during the last week of September, 2015 separately in both villages where the experiment was administered), it was decided to offer two commodities per 'category' for individuals to choose from. Care was also taken to ensure that these took into account existing subsidies provided by the local or State governments. These commodities were offered at market prices.

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<sup>5</sup> In addition, participants may anticipate risk of selling below the market price by predicting that many experimental participants may go for this option. Therefore, local shopkeepers may trade for below the market prices and they may face a loss.

<sup>6</sup> Selling these commodities to a local shopkeeper would involve some negotiation given that households are not aware of the precise source of purchase of experimental commodities.

## 2.2 Experimental design

### Experimental setting

The experiment took place between 2<sup>nd</sup> and 4<sup>th</sup> October 2015 in the school buildings of Local Government in two villages: Thethoor (Madurai District) and Mallanampatti (Dindigul District) in the Indian state of Tamil Nadu. The Social and Economic Profile of Rural India (SEPRI)-2014 collected by the Institute of Rural Management Anand (IRMA), a nationally-representative dataset that contains detailed information on household consumption, was used for recruiting households for the experiment. Of these, 70% of the participants were successfully tracked while the remaining were recruited randomly on field. We selected these villages on account of logistical convenience and local partnerships that supported the implementation of the experiment.

Recruiters invited participants and their spouses to the study for which they would each receive Rs. 100 for participation along with the opportunity to obtain additional compensation in the form of commodities. At the time of recruitment, a questionnaire was administered to gather information about household consumption of various commodities. In addition, individuals' time and risk preferences were measured using a separate questionnaire.

A total of 30 experimenters (including two lead experimenters) who were fluent in the local language as well as English were trained to administer the experiment. The instructions were translated into the local language so as to ensure uniformity in the delivery of instructions by these experimenters. Prior to this, the consistency of translation was checked through back-translation into English.

The experiments were run with 231 married couples. Once they arrived at the site, participants gave informed consent to participate in the experiment. They were endowed with Rs. 50<sup>7</sup> (10 five-rupee tokens) per head to conduct a decision-making task. Both spouses

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<sup>7</sup> Rs. 100 may serve as an incentive given that it represents an average household expenditure when visiting the store in rural Tamil Nadu. This is also on account of the high level of consumption subsidies that many households avail. We summarize below a table of average monthly consumption expenditure (with standard errors in parentheses) at the household level for the commodities from SEPRI (or where specific commodity data not available, group of the commodity).

<b>Commodity (or group of commodities)</b>	<b>Average monthly expenditure (Rs.)</b>
<b>Rice (from non-subsidized sources)</b>	1009.95 (4695.03)
<b>Salt</b>	159.89 (436.62)
<b>Personal Care (includes spectacles, torch, umbrella, lighter, etc.)</b>	2807.72 (43395.76)
<b>Toilet Articles (includes toothpaste, hair oil, shaving blades, etc.)</b>	101.14 (109.08)
<b>Household Items (electric bulb, tube-light, glassware, bucket, washing soap agarbatti, etc.)</b>	95.26 (83.84)
<b>Medical expenses (out-of-pocket)</b>	502.29 (945.41)
<b>School Books &amp; Other Educational Articles (newspaper, library, stationery, etc.)</b>	242.41 (1096.94)

Source: Authors' own calculations using SEPRI data (2014)

were sent to two different experimenters sitting in different corners of the room. Each experimental space was arranged at a sufficient distance and in the opposite direction to maintain privacy of the participants' decisions. The adequate physical distance between them prevented any strategic communication between spouses.

However, both were informed that their partner was also engaged in the same decision task. The experimenter gave instructions for each stage of decision-making sequentially (see Appendix A for instructions and experimental forms). Participants were asked to observe the sample product of commodities displayed on a table with respective price tags (written in the local language) and were allowed to gauge the quality of the products by handling them (photo in appendix D).

The available commodities consisted of:

- a) Food
  - i. Rice (Rs. 15) in half-kilogram bags of superior quality
  - ii. Salt (Rs.10) in half-kilogram bags, of superior quality
- b) Health
  - i. Paracetamol (Rs. 15) in one strip of ten tablets
  - ii. Pain Relief Balm (Rs. 10) in 5 sachet packs
- c) Education
  - i. Notebooks (Rs. 15) per unit
  - ii. Pens (Rs. 10) per unit
- d) Sanitation
  - i. Soap (Rs. 10) per unit
  - ii. Toothpaste (Rs. 10) per unit

Participants were first asked to state their *intent-to-buy* or first-hand preferences over commodities, given the endowment allocated to them. Care was taken not to prompt or guide the participants in any way; experimenters helped them only with calculation to ensure that expenses did not exceed the endowment. Similarly, they were informed that any unspent amount was not redeemable in cash. To facilitate the decision-making and calculation, participants were instructed with an example as shown in the instructions in the appendix. Within the *time interval* of 2-3 minutes, participants were asked to place the *final order* after which they exchanged tokens with the experimenter. They were informed that revisions in the intention-to-buy were allowed. After this final-order was placed, participants were also asked to state their expectations about spouses' final order. This information was recorded in the *expectation form* (Appendix A).

## Experimental treatment

Among all participants, a randomly selected group of 129 couples (258 individuals or 56% of the experimental sample) followed the experimental procedure described above. We call this group the *no-information treatment* group. The rest of the participants were randomly selected to be part of what we call the *full-information treatment* group. This group followed the same procedure explained before, except that spouses' intention-to-buy list was shared with the partner during the time interval. After reading their spouses' intention to buy, participants were free to alter their intention and make the final consumption decision. Similarly in the *no-information treatment*, they were allowed to change their intentions while making final choices during the same time span.

Participants in both treatment groups submitted an intention-to-buy form, a final-order form and an expectation-form at the central table. They received their order along with the showup fee after signing the receipt. Table 1 shows that individuals assigned to the information group did not differ significantly in basic household characteristics from those in the control group.

**Table 1: Randomization and balanced table**

	Mean <sup>#</sup>		T statistics (p value)	Observations
	Control Group (N=258)	Treatment Group (N=204)		
<b>Age</b>	46.1	44.45	0.953 (0.342)	402
<b>Household size</b>	3.63	3.85	-1.139 (0.256)	399
<b>Years of education</b>	5.74	6.12	-0.786 (0.433)	298
<b>Caste identity</b>	226	177	0.494 <sup>^</sup> (0.482)	391
<b>Scheduled Caste</b>	33	32		
<b>Other Backward Castes</b>	181	145		

Note. # adjusted for cluster at household level <sup>^</sup> Pearson chi-square; chi-square was not used for Scheduled Tribe and Other Caste since expected cell values were below five (McHugh, 2013).

Results of t-test for equality of means between these two groups shows the absence of statistically significant differences for the characteristics under consideration. Table 2 further describes the differences between males and females within the treatment and control group on individual and household characteristics. We also report measures of subjective well-being, happiness, risk aversion, and impatience. Of these, only data on risk aversion was used in further analyses owing to superior data reliability of these measures.

**Table 2: Individual and household characteristics**

Variable	Information		Obs	No Information		Obs
	Male	Female		Male	Female	
<b>Age</b>	47.92 (11.97)	41.11 (11.69)	93	49.22 (13.34)	42.66 (12.10)	120
<b>Years of Education</b>	7.37 (4.63)	7.89 (5.10)	84	7.52 (4.84)	8.28 (5.51)	111
<b>Household size</b>	3.82 (1.42)	3.83 (1.48)	93	3.66 (1.28)	3.63 (1.26)	120
<b>Percentage Scheduled Caste (SC)</b>	15.69 (36.54)	15.69 (36.54)	102	13.18 (33.95)	13.95 (34.78)	129
<b>Percentage Other Backward Caste (OBC)</b>	68.62 (46.63)	69.61 (46.22)	102	67.44 (47.04)	66.67 (47.32)	129
<b>Percentage Risk Averse <sup>a</sup></b>	80.49 (39.87)	77.38 (42.08)	82	83.81 (37.01)	87.62 (33.09)	105
<b>Percentage Happy <sup>b</sup></b>	85.39 (35.55)	83.53 (37.31)	85	84.82 (36.04)	82.14 (38.47)	112
<b>Subjective Well-being <sup>c</sup></b>	2.50 (0.94)	2.51 (0.88)	85	2.49 (0.54)	2.38 (0.96)	112
<b>Percentage Impatient <sup>d</sup></b>	50.84 (50.42)	46.15 (50.24)	59	60.22 (49.22)	54.54 (50.07)	88

**Note:**

<sup>a</sup> Response to a hypothetical lottery question: Choice between option 1 that guarantees you an income of Rs. 50,000 per month (risk averse) and option 2: an equal chance of receiving either Rs. 1 lakh per month or Rs. 25,000 per month, depending on how lucky you are (risk-loving).

<sup>b</sup> Coded as 1 if 'very happy' or 'happy' was chosen from "Taken all things together how would you say things are these days - would you say you were very happy, pretty happy, or not too happy?" and zero otherwise.

<sup>c</sup> Answer to the question "Please imagine a six-step ladder where on the bottom (the first step), stand the poorest people, and on the highest step (the sixth step), stand the richest people. On which step are you today?"

<sup>d</sup> Takes a value of 1 if questions SI21-22(A-C) were answered with choice 1; zero otherwise

Table 3 shows gender-wise differences in the preferences for these commodities, after controlling for some important demographic characteristics. The preferences are derived from intent-to-buy expressions of individuals. We observed that women preferred more rice compared to men whereas men intended to buy pens more than women. These gender-wise differences were significant at the 5 percent level. This difference in the preferences was also observed when we combined commodities according to their types. We observed that women preferred the food bundle (consisting of rice and salt) more than men. In contrast, men preferred education-related items such as pens and notebooks more. These findings indicate that there are gender-specific consumption preferences for these commodities, similar to studies in the past (Duflo, 2003; Van den Bold, Quisumbing & Gillespie, 2013).

**Table 3: Gender-wise differences in preferences for commodities**

VARIABLES	Intention to spend							
	Rice	Salt	Soap	Toothpaste	Balm	Tablet	Pen	Notebook
<b>Age (years)</b>	0.0507 (0.0389)	0.0187 (0.0248)	0.0252 (0.0235)	-0.0498** (0.0248)	0.0409 (0.0250)	0.0368 (0.0286)	-0.065*** (0.0238)	-0.072*** (0.0261)
<b>Years of education</b>	-0.0139 (0.0826)	-0.0187 (0.0526)	-0.0274 (0.0499)	0.0261 (0.0527)	0.0718 (0.0531)	0.0283 (0.0607)	-0.0931* (0.0506)	-0.0159 (0.0554)
<b>Household size</b>	-0.436 (0.395)	0.192 (0.251)	0.142 (0.238)	0.105 (0.252)	-0.664*** (0.254)	-0.0117 (0.290)	0.316 (0.242)	0.709*** (0.265)

<b>Monthly consumption expenditure (Food), Rs.</b>	0.0003 (0.0015)	0.0001 (0.0009)	0.0002 (0.0009)	0.0005 (0.0009)	-0.0008 (0.0009)	0.0014 (0.0011)	0.0003 (0.0009)	-0.0017* (0.0009)
<b>Gender (Male = 1; Female = 0)</b>	-1.787** (0.902)	0.0454 (0.575)	-0.830 (0.545)	0.619 (0.576)	-0.542 (0.581)	0.432 (0.663)	1.196** (0.553)	0.583 (0.605)
<b>Constant</b>	12.97*** (2.732)	0.801 (1.740)	7.649*** (1.649)	8.635*** (1.744)	4.697*** (1.758)	-1.153 (2.008)	7.754*** (1.673)	3.249* (1.831)
<b>Village fixed effects</b>	Yes							
<b>Observations</b>	316							
<b>R-square</b>	0.034	0.017	0.018	0.021	0.057	0.021	0.085	0.070

Note. Standard errors in parentheses

\*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1

## Experimental outcomes

The bargaining outcome for each individual is interpreted as deviation from the initial intended amount during the final consumption for each of eight commodities. The experimental data was constructed in the panel format where each individual had eight decision-nodes ( $462 \times 8 = 3,696$ ), along with their demographic variables and applicable treatment. The variable 'deviation' ranges between  $[-50, 50]$ . The lowest extreme value of the variable for a commodity indicates that the individual changed his or her initial preference of spending the whole amount on that commodity completely and did not buy it at all. Zero value of the deviation indicated that individuals continued with their initial preferences for a particular commodity. If an individual had no intention-to-buy a particular commodity but finally placed an order for it worth Rs. 50, the deviation indicator takes the value 50. All the interim values are feasible. In order to control for price effects, we also checked for quantities purchased at the intention, final order, and expectation stages of the experiment. Finally, we also computed the extent to which the individual's expectation of their spouse's final allocation differed from actual allocations of the spouse. This indicates a parameter of spousal knowledge on the basis of past consumption decisions or understanding of existing intra-household dynamics. To test if choices were made randomly and test for incentive compatibility, we provide a quantile plot in appendix C. We show that allocation choices were not random by plotting the allocation decisions (Intent and Final) against a discrete uniform distribution using quantile plots. The graphs show that allocation choice across commodities is not equally distributed or equally likely across allocation amounts.

Table 4 summarizes the experimental outcomes by commodity. These are the Intention-to-spend (purchase allocation and quantities), Final allocation (purchase allocation and quantities), Deviation between final and intention-to-spend (purchase allocation and quantities), absolute values of Deviations, and the difference between the expectation of spouses' final allocation and their actual allocation (Difference (E)). We find no significant

differences between the information and no information group on these outcomes across commodities, except in two cases. First, where participants were more accurately able to guess their spouses' final allocation in the case of balm in the information condition; and second, where participants have greater absolute deviations from originally stated intentions when deciding the final allocation toward purchasing a pen. The first finding suggests that information about intent-to-spend made a difference to the expected spousal allocations. The second finding, however, implies that allocation toward purchase of pens was influenced by information.

**Table 4: Mean of experimental outcomes by treatment**

Commodity	Intent		Intent (Q)		Final		Final (Q)	
	Info	No Info	Info	No Info	Info	No Info	Info	No Info
Rice	15.116	15.074	1.008	1.005	16.512	16.544	1.101	1.103
Salt	3.682	3.627	0.368	0.363	3.721	3.480	0.372	0.348
Soap	5.000	5.000	0.500	0.500	5.233	4.706	0.523	0.471
Toothpaste	2.907	2.794	0.194	0.186	2.674	2.941	0.178	0.196
Balm	7.442	7.451	0.744	0.745	6.977	7.157	0.698	0.716
Tablet	7.054	7.157	0.705	0.716	6.357	6.716	0.636	0.672
Pen	3.605	3.480	0.360	0.348	3.682	3.284	0.368	0.328
Notebook	1.977	2.132	0.132	0.142	1.919	2.132	0.128	0.142

Commodity	Difference		Difference (Q)		Absolute Deviation		Difference (E)	
	Info	No Info	Info	No Info	Info	No Info	Info	No Info
Rice	1.395	1.471	0.093	0.098	2.093	2.353	-2.965	-1.985
Salt	0.039	-0.147	0.004	-0.015	1.047	1.127	0.233	0.490
Soap	0.233	-0.294	0.023	-0.029	1.473	1.961	-0.620	-0.882
Toothpaste	-0.233	0.147	-0.016	0.010	1.163	1.324	0.233	1.299
Balm	-0.465	-0.294	-0.047	-0.029	1.240	1.275	0.039	1.225**
Tablet	-0.698	-0.441	-0.070	-0.044	1.395	1.422	-0.349	0.294
Pen	0.078	-0.196	0.008	-0.020	0.775	1.471**	-1.202	-0.686
Notebook	-0.058	0.000	-0.004	0.000	0.872	0.588	-0.252	0.074

Note. \*\* significant at 5% level using t-test for differences in means. Intent refers to Intention-to-spend (purchase allocation and Intent (Q) refers to Intention-to-spend quantities, Final refers to Final purchase allocation and Final (Q) refers to quantities of final allocation commodities, Difference refers to deviation between final and intention-to-spend in terms of purchase allocation. Difference (Q) refers to the difference between final and intention-to-spend quantities. Absolute Deviation refers to absolute values of Deviations, and Difference (E) represents the difference between the expectation of spouses' final allocation and their actual allocation.

### III. Data analysis and results

As evident in Figure 1 (appendix B), the proportion of individuals who continued with their initial preferences was substantially higher than those who changed. This is true for both groups. Approximately 89.4% of the observations in the *no-information* group underlined that the final order was consistent with their initial preferences. This proportion was marginally lower (87.5%) for the *full-information* group. The mean deviation from intent-to-buy while

placing the final order was Rs.0.036 for the *full-information treatment*. It was marginally higher than the mean deviation of Rs.0.031 for the *no-information treatment*. The t-test result ( $p$  value = 0.96) also indicates a non-significant difference in mean value of deviations between these two groups. Similarly, the variations in the deviation for these two groups were slightly different at 4 and 4.2 respectively.

It is important to note that both spouses entered the experimental room together and had information that their partner was also participating in the same experimental task. This might have elicited a sense of collective utility. The spouses are assumed to maximize the collective utility either by purchasing all possible commodities jointly or by increasing the quantity of the most important commodities. In the absence of communication and information about intent-to-buy, individuals may have formed expectations about their partners' final choices and would have aligned their own choices accordingly. If expectations about their partner's final order are well-accounted in the initial preferences by the individual, he/she may not change his/her preferences while placing the final order for the commodities. This will result in zero deviation. We gathered information about the individual's expectations about their partner's final order after they placed their own final order. We calculated commodity-wise difference between the individuals' expectations about their spouses' final orders and their spouses' final orders. Lower frequency of such differences represent greater accuracy of prediction of spouses' final orders and therefore a higher chance of adopting it in their own intentions. This is strongly plausible for the *no-information* group, whose initial expectations about their partners' final order were not influenced by the information-sharing. As shown in Figure 2 (appendix B), around 62.16 percent of observations in the *no-information* group were valued at zero. This implies that commodity-wise expectations matched with those in the final order for relatively more observations. The *full-information* group observed 70.34% observations being zero. The higher proportion of correct guesses (as indicated by zero deviations) underlines that information about partners' initial preferences improved expectations.

These results are substantiated by the Logit regression result, as shown in Table 5. It unambiguously indicates that individuals have a better notion of their spouses' and own bargaining position in the household. It shows that commodity-wise the *full-information* group were 36% more likely to report more correct expectations about their partner's final order compared to the *no-information* group.

**Table 5: Result of Logit Regression for correct guesses**

Guesses	Coefficient	Robust Standard Errors	P value
Treatment =1 for Full-information ; 0 otherwise	0.3673	0.0947	0.000 ***
Constant	0.4964	0.0536	0.000***

Number of obs = 3,696  
Wald chi2(1) = 15.04  
Prob > chi2 = 0.0001  
\*\*\* significant at 1 percent

**Deviations between final and intent-to-order stage**

We use a simple OLS model to determine the impact of the information treatment on experimental outcomes. We also use an interaction with gender and individual characteristics (such as age, years of education, and program participation) to better understand heterogeneous effects. The model is estimated as:

$$Y_{ij}^k = \alpha + \beta_1\theta_i + \beta_2\theta_i * M_i + \beta_3\theta_i * X_i + \beta_4X_i + V_i + \varepsilon_{ij} \quad (01)$$

Where,  $Y_{ij}^k$  is the outcome of interest ( $k$  = deviations in purchase allocations, quantities, and absolute deviations by the  $i^{\text{th}}$  participant for the  $j^{\text{th}}$  commodity),  $\theta_i$  is a dummy variable that takes a value of 1 if the participant belonged to the *full-information* group, and zero if belonging to the *no-information* group. Individual and household characteristics (age, squared age, years of education, household size, and risk preferences) enter through a linear term  $X_i$  as well as an interaction term with information.  $V_i$  is the village fixed-effect. All regressions are clustered at the level of the household.

Table 6 shows regression results for deviation from initial preferences while placing the final order. Statistically non-significant coefficient for the treatment variables confirms that sharing information about spouses' initial preferences, after controlling for various demographic and experimental variables (such as commodities), did not bring any systematic changes in individuals' final orders (compared to the *no-information* group).

**Table 6: Impact of information on experimental outcomes**

VARIABLES	(1) Difference between final and intention order	(2) Difference between final and intention order (Quantities)	(3) Absolute deviations
Information	0.0188 (0.0304)	-0.000119 (0.00418)	0.0790 (0.290)
Information * Female	-0.0739 (0.0804)	-0.00775 (0.00681)	-0.0254 (0.355)
Female	0.125 (0.0808)	0.000935 (0.00908)	0.634 (0.420)
Rice	1.504*** (0.362)	0.105*** (0.0249)	1.456*** (0.288)
Salt	-0.0190 (0.243)	0.000598 (0.0233)	0.337* (0.194)
Balm	0.0437 (0.270)	0.00674 (0.0280)	0.940*** (0.229)
Tablet	-0.0470	-0.0344	0.489**

	(0.286)	(0.0221)	(0.240)
<b>Soap</b>	-0.369 (0.239)	-0.0528** (0.0232)	0.510** (0.196)
<b>Paste</b>	-0.553** (0.267)	0.00281 (0.0242)	0.660*** (0.195)
<b>Pen</b>	0.00467 (0.215)	0.00352 (0.0191)	0.334* (0.188)
<b>Difference between expectation and final order (of spouse)</b>	0.0179 (0.0118)	0.00167* (0.000979)	-0.00222 (0.00970)
<b>Constant</b>	-0.275 (0.298)	0.00327 (0.0309)	-1.683 (1.208)
<b>Village fixed effects</b>	Yes		
<b>Household and individual controls</b>	Yes		
<b>Observations</b>	3,696	3,696	3,696
R-squared	0.020	0.016	0.042

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

Standard errors are adjusted for 230 clusters at household level.

Missing values for variables were replaced by the mean value of the respective variable. Commodity fixed-effects are relative to base variable of purchase allocation toward Notebook.

We find that the average deviation<sup>8</sup> for individuals in the *full-information* group was marginally higher than the *no-information* group, but it was not statistically significant. This result is in accordance with *t*-test results discussed above. This result did not change even when considering the quantities purchased. The interaction effect of information with gender suggests that female participants reduced their final allocation from their original intention, although the effect was not statistically significant.

We further conducted a post hoc power analysis to check whether our non-significant results were caused by lack of statistical power. The observed treatment effect was relatively low at 0.019 and the power was 0.43. It implies that with the given sample size, there is 43% probability of detecting a treatment effect of 0.019 correctly. As the magnitude of the effect was so small, the observability of the treatment effect remains low. If the effect were at least 0.5, we would have 90% probability of detecting it. It is evident from Figure 3 in Appendix B.

The regression results for absolute deviation further confirms that sharing partners' initial preferences did not bring any systematic change in the average deviation of two groups. However, deviations in allocations vary by commodity significantly. This is potentially due to the fact that men and women have different preferences for each commodity, but also that individuals considered some commodities of greater (or lesser) importance when they had to make a conclusive purchase decision. In these cases, it was found that absolute deviations were more likely across all commodities. While individual and household characteristics did not significantly influence deviations in purchase decisions, there were some statistically significant impacts on absolute deviations: the absolute deviations reduce (by 4%,  $p < 0.1$ ) with an increase in education, and increase linearly with an increase in

<sup>8</sup> The treatment effect was not statistically significant (*t*-test = 1.11 ; *p* value = 0.27)) even when only non-zero deviations (423 observations) were analysed. There were 219 non-zero deviations for the *no-information* group and 204 observations for the *full-information* group.

participant age (by 9.7%,  $p < 0.05$ ). It implies that with education, individuals are likely to continue with their own preferences.

### Changes in spouses' final allocations

We further explore the role of information in altering spousal decisions on purchase allocations by regressing the intention of the spouse on the final allocation of the participant. When interacted with information, this will tell us about the incremental impact of providing this information explicitly (as opposed to situations where they may be internalized due to previous bargaining experiences in their regular lives as in the case of the no-information group). We use the following model:

$$F_{ij} = \delta + \gamma_1 I_{-ij} + \gamma_2 I_{-ij} * \theta_i + \gamma_3 \theta_i + \gamma_4 X_i + V_i + \vartheta \quad (02)$$

Where,  $F_{ij}$  is the final allocation decided by the  $i^{\text{th}}$  participant on the  $j^{\text{th}}$  commodity,  $I_{-ij}$  is the intent-to-spend of the spouse of the  $i^{\text{th}}$  participant on the  $j^{\text{th}}$  commodity, and  $\theta_i$  is a dummy variable as in equation 1. Table 7 shows the results of estimating equation 2 by OLS.

**Table 7: Information and final allocation of spouse**

VARIABLES	(1) Final allocation of female	(2) Final allocation of male	(3) Final allocation of female (Quantities)	(4) Final allocation of male (Quantities)
Spouse's intention to spend	0.271*** (0.0446)	0.221*** (0.0429)	0.725*** (0.0369)	0.777*** (0.0418)
Information * Spouse's intention to spend	-0.147*** (0.0523)	-0.0291 (0.0492)	-0.0208 (0.0413)	-0.0342 (0.0471)
Information	0.969*** (0.328)	0.169 (0.301)	0.0121 (0.0222)	-0.00279 (0.0281)
Rice	13.09*** (0.901)	10.46*** (0.844)	0.355*** (0.0512)	0.299*** (0.0427)
Salt	1.077** (0.487)	0.389 (0.530)	0.0461 (0.0281)	0.0499 (0.0303)
Balm	2.445*** (0.513)	1.592*** (0.535)	0.0780** (0.0374)	0.105*** (0.0340)
Soap	3.707*** (0.516)	2.977*** (0.563)	0.0889*** (0.0332)	0.136*** (0.0341)
Paste	3.269*** (0.502)	2.694*** (0.583)	0.0952*** (0.0318)	0.0753** (0.0332)
Pen	0.660 (0.483)	1.074** (0.523)	0.0119 (0.0267)	0.0867*** (0.0327)
Notebook	-0.201 (0.499)	-0.758 (0.500)	-0.0204 (0.0219)	0.00440 (0.0252)
Difference between expectation and final order (of spouse)	0.186*** (0.0308)	0.175*** (0.0284)	0.00325** (0.00144)	0.00403*** (0.00136)
Constant	1.432** (0.580)	2.668*** (0.546)	0.0810** (0.0368)	0.0292 (0.0310)
Village fixed effects	Yes			
Household and individual controls	Yes			
Observations	1,848	1,848	1,848	1,848
R-squared	0.443	0.381	0.656	0.676

Note. Robust standard errors in parentheses \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$  Standard errors clustered at household level.

We note that information has a significant impact on the final purchase allocation of females in the sample. If the final allocation decision was indeed influenced by the level of the intent-to-spend of her husband, then making this information available reduces the female's overall allocation. When her husband's claim is made known, she is more likely to concede by reducing her claim in the final allocation. Thus, she has a lower cost of revocation, implying a weaker bargaining position. The convergence on allocation tests is included in appendix C. We also find that the intention decision of the spouse has a statistically significant and positive impact on the final allocation decision of the participant, regardless of whether this information was available to her/him. This may be indicative of preference-congruence in the case of some commodities between the spouses, a finding first mentioned in Table 3. It also implies that the spouse's intention significantly predicts a participant's final allocation decision and that commodities offered for purchase in the experiment had strong demand within the households.

#### IV. Heterogeneous treatment effects

We also investigate the potential heterogeneity of the treatment impact of providing information on various experimental outcomes. We hypothesize that the treatment effects may vary by differences in age, years of education, and program participation between spouses. These were tested using interactions with the information treatment variable in equations 1 and 2. Note that these are not to be treated as causal impacts but rather as correlational in nature and are described in Tables 8a and 8b.

**Table 8a: Heterogeneous treatment effects on final allocations, difference between final and intent-to-spend, and absolute deviations**

VARIABLES	(1) Final allocation of female	(2) Final allocation of male	(3) inal allocation of female	(4) F Final allocation of male	(5) inal allocation of female	(6) Final allocation of male	(7) Difference between final and intention order	(8) Absolute deviations
Difference in age	-0.0109 (0.00913)	-0.00321 (0.0112)					-0.00121 (0.00507)	
Information * difference in age	0.00919 (0.0149)	0.0153 (0.0145)					0.00416 (0.00749)	
Difference in years of education			0.00239 (0.0108)	-0.00610 (0.00932)				0.00280 (0.00581)
Information * difference in years of education			-0.0339** (0.0162)	0.0182 (0.0139)				-0.0116 (0.00876)
Both participate					0.104 (0.126)	0.357*** (0.132)		
Wife participant					0.0668 (0.130)	0.0288 (0.105)		

Husband participant					0.00130	0.207		
Both participate *					(0.154)	(0.205)		
Information					-0.193	-0.238		
Wife participant *					(0.181)	(0.165)		
Information					-0.361*	-0.112		
Husband participant *					(0.189)	(0.145)		
Information					-0.0525	-0.111		
Constant	1.409**	2.804***	1.397**	2.779***	1.432**	2.668***	-0.329	-0.348
	(0.571)	(0.584)	(0.574)	(0.578)	(0.580)	(0.546)	(0.367)	(0.352)
Observations	1,848	1,848	1,848	1,848	1,848	1,848	3,696	3,696
R-squared	0.443	0.380	0.443	0.380	0.443	0.381	0.020	0.020

Note. Robust standard errors in parentheses \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1  
Standard errors clustered at household level.

**Differences in age.** Table 8a shows the impacts of differences in age on experimental outcomes. A greater difference in ages between spouses is meant to approximate experience. We find no statistically significant impact on deviations (purchase and quantities) as well as absolute deviations. There was also no impact found on the final allocations of the spouse when the decision took into account spouses' intent-to-spend.

**Differences in years of education.** A larger difference in years of education completed between spouses was hypothesized to have an impact on allocation decisions. Table 8a shows no statistically significant impact on the deviations; the final allocation decisions of a participant when taking into account their spouse's intention to spend varied inversely with differences in years of education. In the full information group, a greater difference in years of education resulted in a lower final allocation by female participants (-0.034, p < 0.05).

**Program participation.** Within the empirical literature on intra-household bargaining and allocation of resources, a large number of studies focus on the impact of participation in welfare programs for households (e.g., Ferro, Kassouf, and Levison 2010). Welfare programs such as PROGRESA (Programa de Educación, Salud y Alimentación—Education, Health and Nutrition Program)—Oportunidades in Mexico and Bolsa Familia in Brazil have found varied impacts on intra-household resource allocation. Handa, Peterman, Davis and Stampini (2009) find that income earned from PROGRESA is not spent differently from general income, with husbands and wives having common preferences with respect to consumption expenditure. While they do find benefits for child nutrition, healthcare, and food consumption expenditure, they do not attribute it to having a female-targeted beneficiary. Their results are thus not representative of how middle-class households typically react to exogenous changes in female non-labour income.

**Table 8b: Heterogeneous treatment effects of MGNREGS participation on difference between final order and intent-to-spend**

VARIABLES	(1) Difference between Final Order and Intent-to-spend	(2) Absolute Deviation
Information	0.0188 (0.0304)	0.0790 (0.290)
Information * Female	-0.0739 (0.0804)	-0.0254 (0.355)
Both participate * Female	0.0460 (0.137)	-0.0181 (0.453)
Both participate * Male		1.111** (0.545)
Female participant * Female	-0.148* (0.0817)	-0.242 (0.369)
Female participant * Male		0.0818 (0.427)
Male participant * Female	0.144 (0.192)	1.261* (0.686)
Male participant * Male		0.626 (0.601)
Constant	-0.275 (0.298)	-1.683 (1.208)
Observations	3,696	3,696
R-squared	0.020	0.042

Note. Robust standard errors in parentheses \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1  
Standard errors clustered at household level.

In our study, a large group of households (N = 194) had at least one participant who was part of a government-sponsored welfare scheme. This programme (The Mahatma Gandhi National Rural Employment Guarantee Scheme, or MGNREGS) aims to improve the welfare of men and women independently by offering them temporary employment for a fixed duration of 100 days and for standard wage between genders (variable between Rs. 100 – Rs. 150 per day; USD 1.87 on average). Indeed, the major objective of this programme is to create a strong social safety net for vulnerable groups (which include women). This improvement in social and economic security may be manifested in the form of better quality and quantity of consumption, potentially due to independent decision-making ability within the household. Participants were categorized under four groups – the first group where only the wife participated, the second group where only the husband participated, the third group where both participated and the fourth group where none of them participated (taken as the control group).

Table 8b shows the impacts of participation in MGNREGS on experimental outcomes. Male participants in households where both individuals take part in MGNREGS (1.11; p < 0.05), and female participants in households where the male is the sole MGNREGS participant (1.26, p < 0.1) have larger absolute deviations. For females in households where she is the sole MGNREGS participant, we find reductions in final allocations relative to the original intention to spend (-0.15, p < 0.1). In terms of spousal final allocations, we see that the male members' final allocations (across commodities) are significantly higher in households where both participate (0.357, p < 0.01). Conditioned on information availability,

there is a significant reduction in the female's final allocation in households where she is the sole MGNREGS participant (-0.36,  $p < 0.1$ ). These indicate that participation in MGNREGS may be associated with intra-household resource allocation decisions, and that these associations are mediated by gender.

## V. Conclusions and policy implications

We administered a quasi-field experiment to elicit intra-household bargaining power with respect to jointly-consumed commodities at the household level. The existing literature points out gender-wise differences in the allocation decisions; women were observed to be more concerned about the collective welfare of household and were spending more on education and health services. Such expenditure generates positive externalities from the development perspective. However, women's weak bargaining power in the household may prove to be a serious impediment. This has implications on the welfare of society.

We attempted to initiate the bargaining process by sharing information about spouses' preferences for jointly-consumed household commodities with the individual in the treatment group. We observed sharing information about the spouse's initial preferences did not initiate the bargaining interaction. We also observed that individuals can form better expectations about their partners' choices even in the absence of information about the preferences. This finding implies that individuals have knowledge about their partners' preferences and increases efficient intra-household resource allocation. However, mere awareness about partner preferences does not ensure that efficient allocation will always be obtained. Instead, it will be subject to the asymmetry in the intra-household bargaining power. Individuals with low bargaining power may deviate more frequently from their initial preferences while making final choices.

In this setting, we found correlational interactions between intra-household bargaining dynamics and a large-scale employment guarantee programme (MGNREGS). A well-designed welfare scheme with the goal of empowering women may provide financial resources to women but may not obtain desirable results if their bargaining position is low. Our results indicate that intra-household bargaining positions are associated with participation in the employment guarantee scheme. Causal relations may not be drawn based on such a quasi-field experiment, but our study sets the agenda for future research in terms of developing methodology to elicit the intra-household bargaining process and investing the impact of welfare schemes on the bargaining positions of the beneficiaries.

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## Appendix A

### **Instructions Real Purchase: No Information Condition**

This is an experiment to study decision-making between husbands and wives in the household.

The instructions are very simple. Please listen to them carefully.

- This experiment consists of you making some decisions. Your spouse is making the same decisions separately.
- During the task, you will be given a certain amount of money. This money will be given as five-rupee tokens. In total, there will be 20 five-rupee tokens divided between your spouse and yourself equally. Thus, you and your spouse will get 10 coins each.
- There are no right or wrong decisions; please play the task as truthfully as possible.

Any questions? Yes – Ask me. No – Continue.

#### 1. Intention-to-Order Form

- First, you will be required to state your intention to purchase items from some commodities displayed on the table, with their prices. [Items are on display] Any unspent tokens will not be given to you, so you should attempt to use all the money you have. Please tell me what and how much of each commodity you would like to purchase, and I will make a note of this.
- We are not allowed to pay you directly with cash, so we have selected this group of items from which you can freely choose up to an amount of Rs. 50 that has been allocated to you.

Any questions? Yes – Ask me.

No – Continue.

- Following is an illustration of how you can fill in the order form. Suppose you initially have Rs. 50 (10 five-rupee tokens), then you can choose to allocate the tokens as under:

#### *Sample Intention Order List*

[Please indicate below what you **intend** to spend]

Item	Price (Rs.)	Number	Total Expenditure (Rs.)
Painkiller (crocin)	15	1	15
Notebooks	15	1	15
Pen	10	0	-
Rice (1/2 kg)	15	1	15
Zandy Balm (5 units)	10	0	-
Toothpaste	10	0	-
Salt (1/2 kg)	10	0	-
Soap	10	0	-
<b>Total</b>	95	3	45

- Now, please tell me what and how much you would like to purchase."  
[Participant completes Intention-to-Order form; experimenter notes decisions.]

#### 2. Final Order Form

- I will now give you two minutes to consider your decision and tell me what you would finally like to purchase.

- Once you tell me your final decisions, you will not be able to change them. I will communicate this to the payment desk, and they will then arrange for the commodities and give you the items. Please pay me with the tokens to purchase those items.

- There are no right or wrong decisions.

Any questions? Yes – Ask me. No – Continue.

- Following is an illustration of how you can fill in the order form. Suppose you initially have Rs. 50 (10 five-rupee tokens), then you can choose to allocate the tokens as under:

*Sample Expenditure Order List*  
[Please indicate below what you will spend]

Item	Price (Rs.)	Number	Total Expenditure (Rs.)
Painkiller (crocin)	15	1	15
Notebooks	15	2	30
Pen	10	0	-
Rice (1/2 kg)	15	1	-
Zandy Balm (5 units)	10	0	-
Toothpaste	10	0	-
Salt (1/2 kg)	10	0	-
Soap	10	0	-
<b>Total</b>	95	3	45

If you have any questions, or need assistance of any kind, please ask me. We expect and appreciate your cooperation. We assure you that the results of this experiment or any other details will not be disclosed to anyone, and you will not be identified by name. The data collected are strictly for the purposes of research.”

[Participants given the Final Order form.]

### 3. Expectations Form

Your spouse is making the same decisions separately. Please tell me how do you think he/she spent the Rs. 50.

[Participant completes the expectations form; experimenter notes decisions.]

### 4. Payment and Receipt

- “Hello, we are not allowed to pay you directly with cash, so we have selected this group of items from which have chosen up to an amount of Rs. 50 that has been allocated to you.
- I will now arrange for the commodities that you have chosen and you will receive them in a bag. I will also now pay you Rs. 100 for your time in attending the experiment. Thank you for your participation!”

### **Instructions Real Purchase: Full Information Condition**

This is an experiment to study decision-making between husbands and wives in the household.

The instructions are very simple. Please listen to them carefully.

- This experiment consists of you making some decisions. Your spouse is making the same decisions separately.
- During the task, you will be given a certain amount of money. This money will be given as five-rupee tokens. In total, there will be 20 five-rupee tokens divided between your spouse and yourself equally. Thus, you and your spouse will get 10 coins each.
- There are no right or wrong decisions; please play the task as truthfully as possible.

Any questions? Yes – Ask me. No – Continue.

### 5. Intention-to-Order Form

- First, you will be required to state your intention to purchase items from some commodities displayed on the table, with their prices. [Items are on display] Any unspent tokens will not be given to you, so you should attempt to use all the money you have. Please tell me what and how much of each commodity you would like to purchase, and I will make a note of this.
- We are not allowed to pay you directly with cash, so we have selected this group of items from which you can freely choose up to an amount of Rs. 50 that has been allocated to you.

Any questions? Yes – Ask me. No – Continue.

- Following is an illustration of how you can fill in the order form. Suppose you initially have Rs. 50 (10 five-rupee tokens), then you can choose to allocate the tokens as under:

*Sample Intention Order List*  
[Please indicate below what you intend to spend]

Item	Price (Rs.)	Number	Total Expenditure (Rs.)
<b>Painkiller (crocin)</b>	15	1	15
<b>Notebooks</b>	15	1	15
<b>Pen</b>	10	1	10
<b>Rice (1/2 kg)</b>	15	1	-
<b>Zandy Balm (5 units)</b>	10	0	-
<b>Toothpaste</b>	10	1	10
<b>Salt (1/2 kg)</b>	10	0	-
<b>Soap</b>	10	0	-
<b>Total</b>	95	4	50

Now, please tell me what and how much you would like to purchase.”  
[Participant completes Intention-to-Order form; experimenter notes decisions.]

- Now, I will tell you how much your spouse has decided to spend on each of the same commodities.

[The intent-to-order forms are exchanged with the spouse's experimenter and information is provided. Read out-loud the intent-to order form from the spouse].

## 6. Final Order Form

- I will now give you two minutes to consider your decision as well as the information of your spouse's decisions just communicated to you and tell me what you would finally like to purchase.
- Once you tell me your final decisions, you will not be able to change them. I will communicate this to the payment desk, and they will then arrange for the commodities and give you the items. Please pay me with the tokens to purchase those items.
- There are no right or wrong decisions.

Any questions? Yes – Ask me. No – Continue.

- Following is an illustration of how you can fill in the order form. Suppose you initially have Rs. 50 (10 five-rupee tokens), then you can choose to allocate the tokens as under:

*Sample Expenditure Order List*  
[Please indicate below what you will spend]

Item	Price (Rs.)	Number	Total Expenditure (Rs.)
<b>Painkiller (crocin)</b>	15	1	15
<b>Notebooks</b>	15	2	30
<b>Pen</b>	10	0	-
<b>Rice (1/2 kg)</b>	15	1	-
<b>Zandy Balm (5 units)</b>	10	0	-
<b>Toothpaste</b>	10	0	-
<b>Salt (1/2 kg)</b>	10	0	-
<b>Soap</b>	10	0	-
<b>Total</b>	95	3	45

If you have any questions, or need assistance of any kind, please ask the experimenter. We expect and appreciate your cooperation. We assure you that the results of this experiment or any other details will not be disclosed to anyone, and you will not be identified by name. The data collected are strictly for the purposes of research."

[Participants given the Final Order form.]

## 7. Expectations Form

- Your spouse is making the same decisions separately. Please tell me how do you think he/she spent the Rs. 50.

[Participant completes the expectations form; experimenter notes decisions.]

## 8. Payment and Receipt Desk

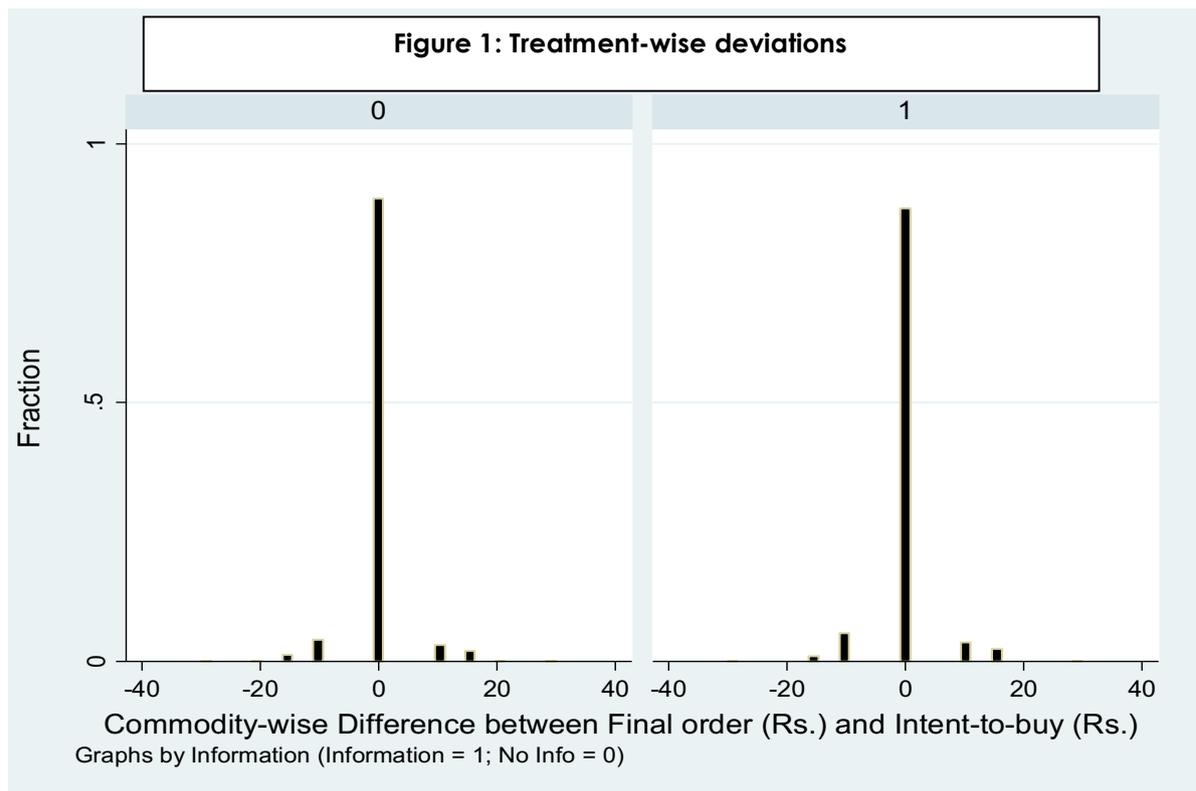
- "Hello, we are not allowed to pay you directly with cash, so we have selected this group of

items from which have chosen up to an amount of Rs. 50 that has been allocated to you.

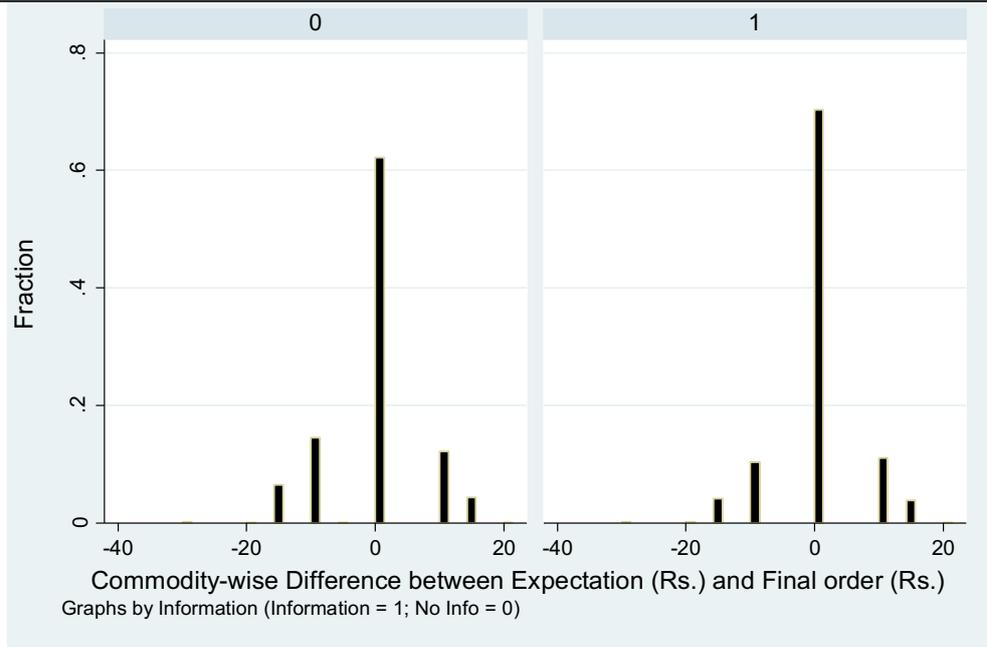
- I will now arrange for the commodities that you have chosen and you will receive them in a bag. I will also now pay you Rs. 100 for your time in attending the experiment. Thank you for your participation!”

## Appendix B

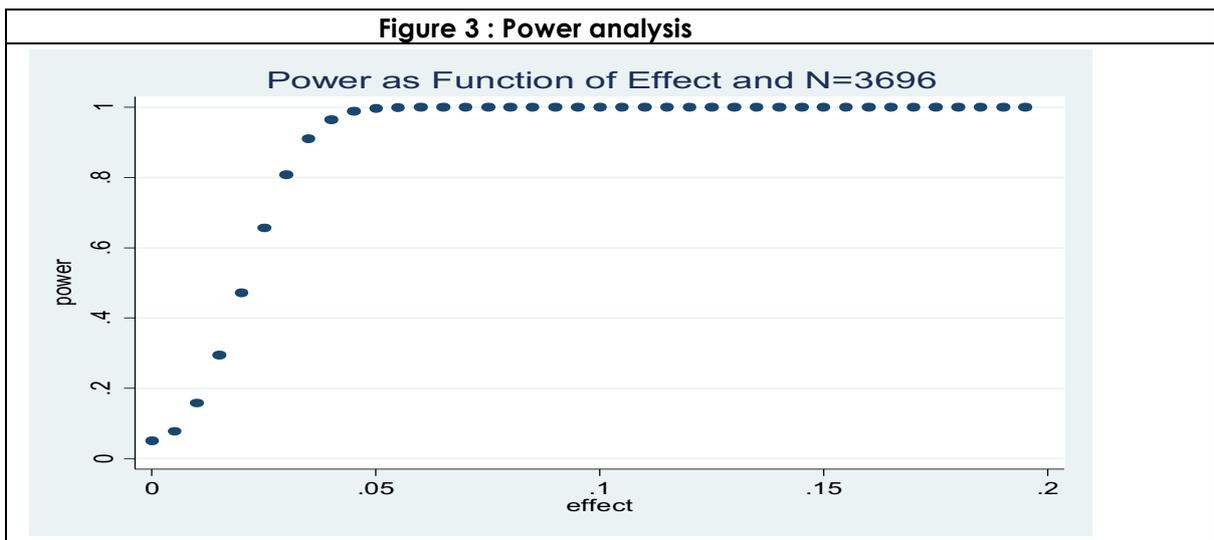
### Figures



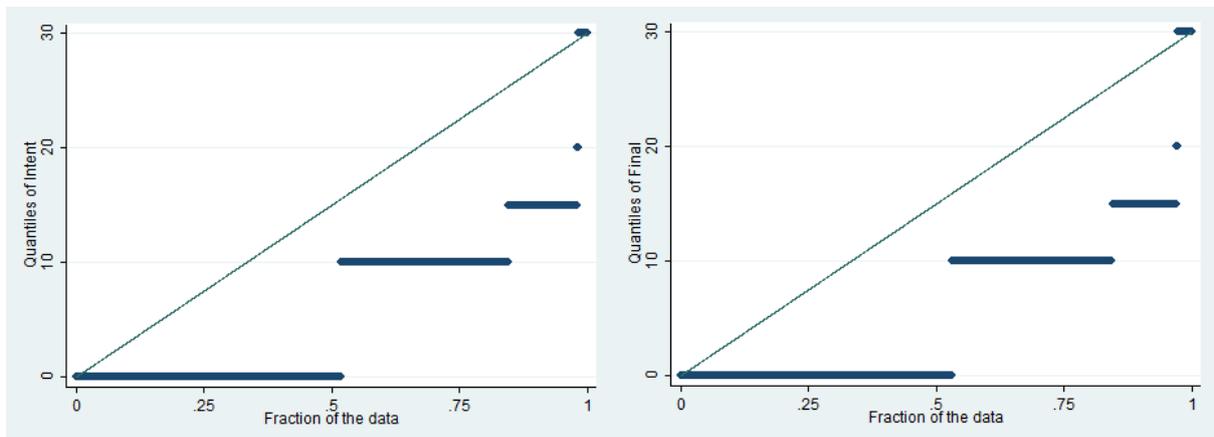
**Figure 2: Difference between expectation and final order**



**Figure 3 : Power analysis**



**Figure 4: Quantile plot of intent and final allocation**



## Appendix C

### Check for allocation convergence

We find that in 60.77 percent of all responses, choice allocations between commodities converged. Participants in the *full-information* condition chose the same final purchase allocations 59.19 percent of all responses, while participant choices in the *no-information* group converged 62 percent of all responses. A proportion test for differences showed a small but statistically significant effect of information on choice convergence (0.028,  $p < 0.1$ ). We also used convergence as a potential outcome variable in regressions to indicate if household members made the same choices, controlling for a number of factors as in equation (1). Though we find no statistically significant effect of information on the likelihood of convergence, the negative sign of information on likelihood of convergence indicates that participants in the treatment group were less likely to choose the same commodities.

**Table A1: Role of information in choice convergence**

	(1)	(2)	(3)
VARIABLES	OLS	Logit	Probit
Information	-0.0269 (0.0242)	-0.118 (0.107)	-0.0745 (0.0654)
Information * Male	-0.00142 (0.00468)	-0.00684 (0.0211)	-0.00359 (0.0126)
Rice	-0.125*** (0.0446)	-0.571*** (0.205)	-0.346*** (0.125)
Salt	-0.138*** (0.0441)	-0.625*** (0.203)	-0.381*** (0.123)
Balm	-0.247*** (0.0440)	-1.075*** (0.200)	-0.660*** (0.122)
Soap	-0.164*** (0.0451)	-0.737*** (0.206)	-0.450*** (0.125)
Paste	-0.167*** (0.0433)	-0.746*** (0.197)	-0.458*** (0.120)
Pen	-0.142*** (0.0454)	-0.645*** (0.208)	-0.392*** (0.127)
Notebook	0.0846** (0.0390)	0.477** (0.222)	0.279** (0.130)
Difference between expectation of spouse's final allocation and actual allocation	0.00287*** (0.00102)	0.0127*** (0.00449)	0.00780*** (0.00262)
Constant	(0.140) 0.747***	1.089* (0.639)	0.657* (0.393)
Observations	3,696	3,696	3,696
R-squared	0.060	0.047	0.046

Robust standard errors in parentheses \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

# Appendix D

Photo: Experimental store

