Joint Accounts in the Fintech Era: How Does Labelling, Transparency and Approval Rules Affect Spousal Financial Decision Making?

Pre-Analysis Plan

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Abstract

This study revisits the topic of joint accounts and assess how their terms, increasingly varied due to innovations in the fintech sector, affect intrahousehold allocation decisions. Through an experimental lab setting in Kolkata, India, we assess the impact of labeling, transparency and spousal approval on expenditure allocations of spouses. We also assess the impact of personally earning money on subsequent expenditure decisions of couples and specifically under different joint account terms. This study contributes to the literature in three ways. First, we contribute to existing experimental literature on joint accounts, extending it in the context of the fintech era. Second, we contribute to the literature on the impacts of financial product access/individualization on welfare-enhancing allocation decisions. Third, we contribute to the social protection literature on the relevance of workfare versus transfers. Specifically, we build on the behavioral economics concept of mental accounting, where Thaler (2008) suggested that earned money may be treated differently to unearned money.

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1. Introduction

Numerous studies on financial inclusion for women recommend financial product individualization for female empowerment. The need to be financially independent is now a predominant message from policy makers on women empowerment (Anderson and Baland, 2002; Field et al., 2021; Aker et al., 2016). However, current trends towards financial product individualization may not be optimal for couples and families with significant shared expenditure and shared savings/investment goals. This study revisits the topic of joint accounts and assesses how their terms, increasingly varied due to innovations in the fintech sector, affect intrahousehold allocation decisions. Through an experimental setting, we will assess the impact of labeling, transparency and spousal approval on expenditure allocations of spouses. We will also assess the impact of personally earning money on subsequent expenditure decisions of couples and specifically under different joint account terms.

While traditional banks in developing countries typically offer joint accounts, the standard joint account is cumbersome to use, lacks variation in rules of access and approval procedures, and there is no a priori reason to think the product is optimally designed for couples. On the other hand, emerging digital banking products provide users with flexibility to account for variations in transparency or approval procedures. While we know that digital financial services are effective in increasing household spending and savings (Lee et al., 2019, Suri and Jack, 2016, de Mel et al., 2020), there is limited evidence on either the differential rules of joint accounts (labelling, transparency, and approval mechanisms) or the gender differentiated effect of digital financial services.

In any case, joint accounts have, in recent decades, not formed any significant part of the growth in financial inclusion; a process that has been dominated by individualisation. Individualisation of accounts is likely to lead to several situations detrimental to family units and even to female empowerment. For example, joint wealth is likely to be lodged into the dominant spouse's individual account, denying the less empowered spouse access, approval rights and even transparency. Research exists to suggest that asymmetric control over joint resources is likely to have real effects. For example, Schaner (2017) finds that providing ATM cards to male, female and joint accounts only resulted in an increase in activity under male and joint accounts, suggesting that joint accounts along with male accounts are controlled by male partners.

This study contributes to four different strands of literature. First, we will contribute to existing experimental literature on joint accounts, extending it in the context of the fintech era. Ashraf (2009) through a lab in the field experiment in Philippines analysed the effects of information and communication on household resource allocation. She finds that when spouses negotiate regarding resource allocation, men are more likely to deposit in their wife's account. Schaner (2015) provides insights on selection into joint accounts. Households with poor information flows are less likely to choose joint accounts, while couples well-matched in their discount factors make more use of joint accounts and make more efficient investment decisions. Our study will specifically advance the work of Ashraf (2009) by comparing the relative impacts of five forms of financial arrangements (account types) in increasing levels of 'jointness'.

Our focus on joint accounts will provide an important addition to the literature on how couples manage their finances in developing countries, in particular, in relation to privacy and control of resources. Experimental evidence shows that women are more likely than men to reveal the need to hide resources from their spouses (Anderson and Baland, 2002; Dupas and Robinson, 2013). In a study on microenterprises, Fiala (2017) finds that women who hide money from their husbands show increased economic outcomes. The opposite is true for men in the sample; men who hide resources from their wives show reduced economic outcomes in their business. Providing women control and privacy over household resources and decisions has been a focus for programs that aim to draw women towards financial inclusion and empowerment. However, recent studies indicate that there could be unintended consequences in providing women with privacy and control over resources. For example, in Zambia, Ashraf et al. (2014) finds that while women who were given contraceptives without revealing information to their husbands were more likely to seek family planning services and less likely to give birth, they also reported less subjective well-being after the experiment. As mentioned earlier, in a study in Kenya, providing ATM cards for male, female and joint accounts resulted in increasing transactions only for male and joint accounts (Schaner,

2017). Providing ATM cards to women reduced women's control over her account because the cards made it convenient for their spouses to withdraw money. Also, pooling resources into joint accounts can improve spending patterns in households. For example, Gladstone et al. (2019) provides evidence through an experiment that couples who pooled their money in joint accounts are more likely to spend on utilitarian products than luxury goods.

Second, we will contribute to the literature on the impacts of financial product access/individualization on welfareenhancing allocation decisions. Many studies have shown that female control over resources leads to greater household public goods investments, including investments in children. Field et al. (2016) find that salary transfers to wife's individual account improve her bargaining power and labor supply, while the recent conditional cash transfers literature has found that transfers to women have improved school attendance and health care (Bobonis 2009; Lim et al 2010). Our study will provide insights into how money is allocated to expenditure under different forms of joint accounts.

Third, our study will provide insights on aspects of gender targeting. Recent literature in intrahousehold decision making has consistently demonstrated the positive impacts of targeting women for welfare schemes (Duflo, 2003; Attanasio and Lechene, 2002; Akresh et al., 2016, Field et al. 2016; Armand et al., 2020). Evidence suggests that targeting women for transfers or workfare programs improves her bargaining power within the household, thus increasing spending on household goods and children. As a result, women are increasingly the main recipient of social protection programs. Although there are several studies that support targeting women as beneficiaries for policies, it is still unclear whether women personally earning money, or not, has differential impacts on household allocation of resources.

Fourth, we will contribute to the social protection literature on the relevance of workfare versus transfers. Specifically, we build on behavioral economics concept of mental accounting, where Thaler (2008) suggested that earned money may be treated differently to unearned money. Results from a ten-day lab in the field experiment in Kenya provided some evidence that participants who had to work for transfers spent more on non- staple, non-drink food items and less on non-food items relative to the participants who received free unrestricted vouchers (Bhanot, Han and Jang, 2018). While the literature has focused on households as one singular unit in order to measure impact of workfare versus transfers, our work will be the first to study the impact of women personally earning money on allocations and expenditure patterns. Half of our study participants will engage in half an hour of mundane work and the other half will not, in advance of allocation decisions in a lab. This variation will allow us to isolate whether the origin of money in a joint account affects how it is allocated by spouses. Our findings will have important implications for social protection programs, such as ongoing discussions about universal income programs, and for the intersection of literature on labor force participation, gender pay gaps and financial product independence.

We plan to test our hypotheses on the effect of different types of joint accounts and source of the earnings in Kolkata, India and hope the setting provides strong external validity. The sample involves couples from urban/semi-urban Kolkata who have access to physical or digital financial services.

The learnings from this study can play an important role in improving access and usage of financial services by women, thereby improving outcomes for families. Previous studies on household bargaining highlights that one size does not fit all. Tailored policies based on underlying preferences can help women overcome barriers related to financial inclusion. Existence of heterogeneous rules for joint accounts based on control, privacy, resource labelling and communication can also promote continuous usage of financial services by women. By learning more about the specific roles of transparency and approval rules under workfare, it is possible to improve the match between couples and joint accounts.

2. Research Questions

There are two core research questions.

1) What are the effects of different financial arrangements among couples such as

- i. a private individual account,
- ii. a private account with resources labeled joint
- iii. a joint account with no approval required,
- iv. a joint visible account with approval required, and
- v. a joint account and in person negotiated solution on allocation and spending decisions?

2) What is the impact of personally earning money on subsequent expenditure decisions of couples under different financial arrangements based on privacy, labeling and communication? Does workfare for women affect couples' expenditure decisions?

We also address an ancillary research question by capturing women's choices under different scenarios of plausible deniability of winnings.

3) How does spousal plausible deniability of winnings affect women's allocation and spending decisions?

2. Research Strategy

2.1. Sampling

Participants in this study are 1,000 couples who live in semi-urban Kolkata, India selected at random from the client pool maintained by several microfinance organizations and NGOs based in Kolkata. Participants are initially contacted via phone and asked if they are willing to participate in the study.

To be eligible for the study, households must meet the following criteria:

- The household head is married and his/her spouse lives within the household.
- Both the head and spouse are literate in local language.
- Both the head and spouse have individual bank accounts.
- Both the head and spouse are 60 or less years of age.

We restrict the sample to couples who are 60 years or less and have individual bank accounts due to restrictions on usage of survey instruments and pay-out options provided by our partner organization respectively. However, the population of the study are couples who make household decisions on a day-to-day basis and have access to financial services, physical or digital.

2.2. Assignment to Treatment

This study uses random assignment to establish a causal relationship between different types of intervention and outcomes. One thousand couples are selected based on the eligibility criteria determined by their age, literacy, relationship status and having an individual bank account each. There are two randomization levels: one, based on a work requirement of female partners, and second, based on various joint account terms such as privacy, labeling, and communication. The first level of randomization determines whether the female partner would work during the first half an hour. The second level of randomization determines differential levels of information,

labeling, and communication among couples concerning their financial decisions. Two hundred couples will be in each treatment arm which has restrictions on information, labeling, and communication to complete an allocation game, with half coming from the 'task' stream and half from the 'gift' stream. The various treatment arms and associated interventions are described as in Figure 1.



Figure 1. Assignment to treatment

During the second level of randomization, participants are randomized into five treatment groups, namely:

- 1. **Private individual account** Participants are informed that their choices will be kept private from their spouse. We refer to this group as "Private".
- 2. **Private account with resources labeled joint** Participants are informed that theirs is a private account in which participant has full control over decisions and their choices will be kept private from their spouse, but any amount they receive from this experiment is for common family expenditures. It will be communicated to them that the amount is for family expenditures and can help them achieve their family financial goals.
- 3. Joint account with no approval required Under this treatment arm, participants would be able to see the decisions made by their partner after they decide on how to allocate the money and the respective expenditure decisions. Their partner is informed on their screen about the choice after the experiment, which cannot be changed later. Participants under this treatment arm take decisions without consultation with partner but information on their decisions is later shared with their partner.
- 4. Joint account with approval required Under this treatment arm, once male partners make decisions on how to allocate the money, they will be given a chance to "approve" or "reject" the decision made by their female partner. If the husband "approves" her decision, then the game ends, and her choice will be enacted. If the husband "rejects" her decision, wife would have to choose again until the husband "approves" of her decision. This sequential game will go on for three rounds or until the husband "approves" wife's decision.

If the husband does not approve wife's decision three times, husband will forgo his chance to accept or reject the allocation during the fourth round. However, he will be able to see the decision that the wife made. This treatment arm allows for communication between couples about their choice virtually, revealing their preferences to respective partners.

5. Joint account with an in-person negotiated solution - Under this treatment arm, female partners are required to communicate and negotiate their decision in person with their husband in a separate room. After the negotiation, the male and the female partner jointly make their allocation and expenditure decisions. This treatment arm is similar to "joint account with approval required" except that couples communicate their choices in-person before making a decision. We also capture participants' preference before the in-person negotiation to understand the difference between preferred choice and outcome of negotiation between couples.

Under the different types of treatment at the first and second randomization levels, couples make decisions on how they wish to allocate a certain amount of money into six different options such as: depositing in their own bank account, depositing in their partners' bank account. depositing to a third persons' bank account, a personal gift voucher to buy female clothing, footwear and other accessories, a personal gift voucher to buy male clothing, footwear and other accessories, a personal gift voucher to buy male clothing, footwear and other accessories, and a shared gift voucher to buy household items. Participants are also asked how they plan to spend the amount towards different types of expenditure which ranges from savings to children's expenditure to different types of daily expenditure goods such as food items and personal goods. We will also capture information on for whom participants would like to spend the amount on, for example, for self or partner or children or other family, non-family members.

2.3. Timeline of the Experiment Session

The experiment session will begin with a survey to record household and individual characteristics of the participants, which will approximately take around half an hour. During the next half an hour of the experiment, each couple will first be randomized into a 'task' or 'gift' stream depending on the task allotted to them during the first half an hour. Under the "task" stream, female spouses will work for half an hour for 400 rupees¹ at a moderately intensive mundane task of packing rice into small bags while their partner watches on or reads some magazine in the same room. Women are expected to achieve a target of 30 small bags within the timeframe of half an hour. Under the "gift" stream, female spouses will receive 400 rupees while both male and female participants enjoy some magazines and other temporary, within-room distractions.

After half an hour of working or waiting, all couples will enter the lab for a session to complete an allocation game on how they would like to spend the 400 rupees earned/received by women under varying conditions of privacy, labelling and communication between partners, the five treatment arms of the second level randomisation. Both partners will be in separate rooms during the allocation game and will be given an android tablet each with survey CTO installed. Men and women will be asked separately on how they would like to split 400 rupees that women earned or received into one or more options as below:

- 1. Deposit in their own bank account
- 2. Deposit in their partners' bank account
- 3. Deposit to a third persons' bank account
- 4. A personal gift voucher to buy female clothing, footwear, and other accessories
- 5. A personal gift voucher to buy male clothing, footwear, and other accessories
- 6. A shared gift voucher to buy household items

¹ Four hundred rupees is the average daily wage for participants of this study.

While women will be asked how they wish to spend the money they earned or received, men will be asked how they wish their wife to spend the money she earned or received during the first round. In this round, it will be the women's decision on allocation that will be enacted after the lab session. Participants will be asked to choose any amount ranging from zero to four hundred rupees² into the above five categories. Choosing to deposit in a bank account provides participants with flexibility to decide later how they wish to spend the amount received. Whereas, choosing vouchers will be a way of committing to a particular consumption good. Private vouchers will only be redeemable for purchase of 'female' items (or male' items). For example, if the wife chooses 'x' amount to be allocated to a personal gift voucher for female products, she will receive a gift voucher only redeemable for items such as clothes, footwear, and other items for women. As a follow up to the question on how they would allocate the amount women earned or received, we will also record how they plan to spend the amount towards different types of expenditure and for whom the expenditure is expected to be made for. The participants' answer to the follow up question on expenditure need not be binding in the sense that we will not be able to restrict their expenditures to the items they choose in the allocation game.

Following this, both male and female play another round of allocation game where they will be given an opportunity to win 400 rupees with a 25% probability through a lottery system. This is in addition to the 400 rupees women win in the first round of work or no work. This contrasts with the first round of allocation game where both the partners have full information that women receive 400 rupees from working or waiting. The lottery allows for plausible deniability to a spouse after the lab session. This will help us identify the difference in their choices, when we move from a setting of certain to uncertain earnings, allowing for greater freedom in allocation choice.

Similar to the first round of allocation game, under the joint account rules related to privacy, labeling, and communication in their respective treatment arm, participants (both men and women) will be asked to make decision on how they would like to split 400 rupees they might win through lottery into one or more options as below:

- 1. Deposit in their own bank account
- 2. Deposit in their partner's bank account
- 3. Deposit to a third person's bank account
- 4. A personal gift voucher to buy female clothing, footwear, and other accessories
- 5. A personal gift voucher to buy male clothing, footwear, and other accessories
- 6. A shared gift voucher to buy household items

As a follow up, both male and female partners will be asked how they wish to spend the money towards different expenditures and for whom the expenditures would be incurred for if they win the lottery. To minimize the anchoring effect from the first round of allocation game, we precede the second allocation game with questions on risk preferences and time preferences. We also record the Engel curve for each participant at the end of the survey to validate that the allocation and expenditure choices of participants are purely from the treatment types and not from the income elasticity of different types of goods.

The allocation games will be followed by some games to assess mental bandwidth of the participants. Through such games, we intend to assess the impact of privacy and communication between partners on their mental well-being.

Figure 2 outlines the timeline of the experiment session.

² For easier pay-out options, participants are allowed to choose amounts only in denominations of 100.



Figure 2. Timeline of the experiment

2.4. Study Hypotheses

We expect to test the following hypotheses in the study:

- 1. Labelling (H1): Resources labelled as joint in private account are more likely to be shared and allocated towards household public goods. (T1 v T2, Allocation Game 1)
- 2. **Visibility (H2)**: Visibility of transactions increases the amount of resources shared and allocated towards household public goods. (T1/2 v T3/4/5, Allocation Game 1)
- 3. **Approval (H3)**: An approval requirement increases the amount of resources shared and allocated towards household public goods. (T3 v T4, Allocation Game 1)
- 4. **Negotiation (H4)**: Face-to-face negotiation increases to the greatest extent the amount of resources shared and allocated towards household public goods. (T3/T4 v T5, Allocation Game 1)
- 5. Sense of ownership (H5): Personally earning income increases the sense of ownership and lessens sharing and public good expenditure. (W0 v W1)
- 6. Household Money and Account Type (H6): Joint accounts protect shared money. (T2 v T3, Allocation Game 1)
- 7. **Plausible deniability (H7)**: Plausible deniability of the lottery decreases the likelihood for women to allocate towards shared resources (Allocation Game 2 v Allocation Game 1 for T1/2/3)

2.5. Attrition from the Sample

The experiment design does not involve follow-up surveys. Hence, we do not expect any significant attrition from the sample. However, spouses will be allowed to leave the session before completing the session if they wish to. In this case, they would only get the show up fee of rupees 200.

2.6. Variables

We rely on participants' decisions during the allocation game to measure the impact of labeling, transparency, spousal approval, and negotiation on couples' expenditure decisions under different work requirements. We explore the following set of primary outcomes outlined below in Table 1.

Primary Outcomes	
Variable	Definition
Share to Self	Share of money allocated towards own account and personal gift voucher
Share to Spouse	Share of money allocated towards partner's' account and partner's gift voucher
Share to Household Good	Share of money allocated towards shared gift voucher
Visibility	 Binary (0/1) - 1 if participant chooses one of the below in the allocation game, 0 otherwise Deposit the amount in their partner's bank account A personal gift voucher to buy female clothing, footwear, and other accessories A personal gift voucher to buy male clothing, footwear, and other accessories A shared gift voucher to buy household items
Sharing with Spouse	 Binary (0/1) - 1 if participant chooses one of the below in the allocation game during the second hour, 0 otherwise Deposit the amount in their partner's bank account A personal gift voucher to buy female (male) clothing, footwear, and other accessories A shared gift voucher to buy household items
Share towards Expenditure - Food and	Binary (0/1) and percentage share

Table 1

necessities	 Binary (0/1) - 1 if participant chooses items in 'food and necessities' for the follow up question on expenditure, 0 otherwise. Percentage share - share of money participant spends on 'food and necessities' Food and necessities - rice, wheat, vegetables, fruits, milk and dairy items, pulses, eggs, fish, chicken, meat, electricity bills, water bill, and rent.
Share towards Expenditure - Personal goods and services	 Binary (0/1) and percentage share Binary (0/1) - 1 if participant chooses items in 'personal goods and services' for the follow up question on expenditure, 0 otherwise. Percentage share - share of money participant spends on 'personal goods and services' Personal goods/services - haircuts, female products like sanitary pads, tobacco, alcohol, soap, shampoo, travel, male products like razors, and mobile recharge.
Expenditure - Savings and investments	 Binary (0/1) and percentage share Binary (0/1) - 1 if participant chooses items in 'savings and investments' for the follow up question on expenditure, 0 otherwise. Percentage share - share of money participant spends on 'savings and investments' Savings and investments - house repairs, savings, invest in business, education expenses like books, uniforms, and repayment of loans.
Beneficiary of expenditure - Wife	Binary $(0/1)$ - 1 if participant chooses items in the follow up question on expenditure for wife, 0 otherwise.
Beneficiary of expenditure - Husband	Binary $(0/1)$ - 1 if participant chooses items in the follow up question on expenditure for husband, 0 otherwise.
Beneficiary of expenditure - Children	Binary $(0/1)$ - 1 if participant chooses items in the follow up question on expenditure for children, 0 otherwise.
Beneficiary of expenditure - Other family members	Binary $(0/1)$ - 1 if participant chooses items in the follow up question on expenditure for other family members ³ , 0 otherwise.
Beneficiary of expenditure - Everyone in the household	Binary $(0/1)$ - 1 if participant chooses items in the follow up question on expenditure for everyone in the household, 0 otherwise.

 $^{^{3}}$ We provide with follow up options on whether the family members belong to husband's family or wife's family.

We measure participant's emotional well-being after the allocation games using a set of variables as in Table 2.

Secondary Outcomes	
Variable	Definition
Emotional well being	 Standardized index of variables measuring how often participant felt the following during the session (options range from 'often' to 'never') Nervous, tense, or uneasy Felt difficult to concentrate on what they were doing Sad Tired Could not cope with things asked to do Felt confident about the future
Mental Bandwidth	Psychomotor vigilance test (reactive function): Average and best reaction time taken to click on a target that appears on the screen
	Hearts and flower test (executive function): Number of times participant accurately answer tests based on congruent and incongruent blocks.
	Memory test: Number of correct answers respondent gives to memory test
	Raven's test (abstract reasoning): Number of correct answers participant gives in a test to determine the missing element in a pattern

Table 2

In addition, we will also collect data on household and individual characteristics as control variables for the regression analysis. Males will be interviewed for household control variables described below while male and female partners will be interviewed for individual level control variables. These are defined as below in Table 2.

Table 3

Variable	Definition	
Household Controls		
Household size	Number of individuals living in the household	
Number of adults over 60	Number of adults above 60 and living in the household	
Number of children	Number of children below age 18	
Housing Quality	Number of rooms in household used for sleeping	
Individual Controls		
Age	Age of the respondent	

Parents living in the same household	Binary (1/0) - 1 if a parent of respondent stays in the same house
Education	Categorical; Highest level of education attained
Literacy	Binary (1/0) - 1 if the respondent can read or write in local language
Employment status	Categorical; description of current employment status of respondent
Previous month income	Income earned by the respondent during the previous month
Typical month income	Income earned by the respondent during a typical month
Contribution to household income	Proportion of income that respondent earns to the total income of household; categorical
Use of formal bank account	Binary (1/0) - 1 if the respondent has a formal bank account, 0 otherwise
Use of formal joint bank account	Binary (1/0) - 1 if the respondent has a formal joint bank account with his/her spouse, 0 otherwise
Use of mobile money/ wallets	Binary (1/0) - 1 if the respondent has ever used mobile money or online wallets such as paytm account or google pay account, 0 otherwise
Sharing of information on financial product with spouse	Binary (1/0) - 1 if partner knows the PIN or password to the mobile money account (conditional to answering "Yes" to previous question), 0 otherwise
Use of informal savings accounts	Binary (1/0) - 1 if the respondent uses informal savings products like savings group, microfinance, home, relatives, 0 otherwise

2.7. Balancing Checks

We plan to use a joint test of orthogonality to test balance across treatment groups. First, we run the following linear regression:

$$Treat = a + \Sigma b_i X_i + u$$

where the dependent variable *Treat* is the category of treatment or control group, a is the constant term, X_i 's are the household demographic characteristics.

We would then test the joint hypothesis, $b_i = b_j$ for $i \neq j$ with an F test to check for balance between treatment and control group. In the second stage of randomization where there are multiple treatment groups, we will perform a multinomial logit regression and then test for joint orthogonality of coefficients.

In case there is attrition of participants during the lab session (non-completion), we will check if there is a statistically significant difference in attrition rates between treatment groups at α =0.05 level. If we find a significant difference between attritors and non-attritors, Lee bounds (Lee, 2009) will be implemented.

2.8. Statistical Power

A total of 1,000 couples, with 500 per treatment arm in the first level of randomisation based on work requirements is sufficient to detect a minimum detectable effect size (MDES) of 0.085⁴. For comparison between treatment arms with varying levels of restrictions for accounts, 200 couples in each of the five groups is sufficient to detect a MDES of 0.135. To find the effect of account types on allocation decisions, a sample size of 100 couples in each of the 10 groups can detect MDES of 0.187 for couples where the female partner works for an hour and 0.192 for couples where the female partner does not work during the first hour of the experiment.

Experiment arm	Sample size per arm	Power	Alpha	MDES
Task vs Gift	500	0.8	0.05	0.085
Individual vs Joint account	200	0.8	0.05	0.135
Task X (Individual vs Joint account)	100	0.8	0.05	0.187
Gift X (Individual vs Joint account)	100	0.8	0.05	0.192

3. Empirical Analysis

3.1. Treatment Effects

To estimate the causal effect of treatments in this study, we perform the following empirical specification for participant i:

$$Y_{i} = \alpha_{i} + \beta_{T_{1}}T_{1i} + \beta_{T_{2}}T_{2i} + \beta_{T_{1}T_{2}}T_{1i}T_{2i} + \gamma_{i}X_{i} + \varepsilon_{i}$$

where we define Y_i to be the outcome variable as described in Table 1 for participant i, T_1 and T_2 the first and second level of treatment arms respectively and, X_i is defined as the vector of household and individual level controls. β_{T_1} estimates the treatment effect of wife earning money on intrahousehold allocation, β_{T_2} estimates the treatment effect of differential levels of privacy, labeling and communication terms of financial products on intrahousehold allocation, and $\beta_{T_1T_2}$ estimates the interaction effects of personally earning money and different rules of joint account.

We perform all the above specifications separately for men and women and then perform Fisher's exact tests to compare means.

3.2. Heterogeneous Effects

To test whether treatment effects vary heterogeneously across groups with specific individual level and intrahousehold characteristics, we will re-run the empirical specification, interacting the treatment with variable of interest for heterogeneity.

⁴ All power calculations for this study are performed at an 80% power and a 5% significance level.

We will study the following dimensions of heterogeneity and are defined as in Table 4.

- Women's agency index
- Quality of relationship index
- Income dynamics
- Economic dynamics
- Information sharing within household
- Intrahousehold decision making index
- Willingness to pay
- Time preference
- Risk preference
- Subjective well-being index

Table 4

Heterogeneous treatment effects		
Variables	Definition	
Women's agency index (only female partner)	 Standardized index of women's agency for the following: Opinion listened to in the decision of what to buy when an expensive item like a bicycle or a cow is purchased by the household Need to ask the permission of other household members to buy clothing for herself Allowed to buy things in the market without asking the permission of your partner Permitted to visit women in other neighborhoods to talk with them People consulted with for decisions regarding your children's health care 	
Quality of Relationship Index (only female partner)	 Standardized index of two components: Frequency she expresses her disagreement with partner's opinion (1-4; often to never) Binary (1/0) 1 if she agrees that wife has the right to express her opinion when she disagrees with what her husband is saying 	
Income Dynamics (both partners)	 Standardized index of four components: Frequency husband gives wife money for HH purposes (1-4; often to never) How the amount is typically determined When wife has small amounts of money, such as 20 or 50 rupees, how often can you decide how to spend it on your own Can use money earned by wife to purchase clothing for yourself or children without asking the permission of anyone else 	
Economic dynamics (only female partner)	 Standardized index of four components: In the last 12 months, frequency current partner taken money against your will Frequency current partner refused money for household necessities, 	

	 even if there is money available Frequency wife had to give all or part of the money you earned to her partner Frequency wife had to give all or part of the money you earned to partner's family members
Information sharing within household	Binary (1/0) 1 if participant has ever hidden income/part of income from partner
(both partners)	Binary (1/0) 1 if participant has ever hidden expenditure/part of expenditure from partner
	Standardized index of whether wife was part of the following decisions in household:
Intrahousehold female empowerment index (both partners)	 Decision on how participant's earnings will be spent Decision on how partner's earnings will be spent Minor purchases such as clothing, personal grooming, groceries, etc. Major purchases such as land, TV, other electrical appliances, etc. Children's education Visits to family or relatives Personal health care
	Amount participant is willing to give up to have full control over money in game where participant is given 3 choices: 800 rupees for participant's partner, 600 rupees food participant and partner jointly, and 400 rupees for participant
Willingness to Pay (WTP) (both partners)	 WTP is 400 rupees if participant chooses 400 rupees for himself/herself WTP is 0 if participant chooses 800 rupees for his/her spouse WTP is 200 rupees if participant chooses 300 each for them and their partner
	More WTP indicate less control over money by the participant
Time preference (both partners)	Time preference measured using "near term" and "distant term" questions ⁵ . Defined as "impatient" if respondent chooses immediate reward in either question; "Hyperbolic" if respondent chooses immediate reward in the near-term frame combined with the choice of the delayed reward in the distance frame; "patient now and impatient later" if individuals are patient now but in six months are not willing to wait

⁵ "Near term" and "future term" questions are as follows:(1) Would you prefer to receive 250 rupees guaranteed today, or 350 rupees guaranteed in 1 month? (2) Would you prefer to receive 250 rupees guaranteed in 6 months, or 350 rupees guaranteed in 7 months? One US \$ is equivalent to 73 rupees and the daily wage of the sample is 400 rupees.

Risk Preference (both partners)	Risk Averse if participant chooses sure outcome over lottery when pay- out of sure outcome is less than lottery
Subjective well-being index (both	Self-Efficacy: General Self Efficacy Scale (standardized score of 8 items)
partiters)	Stress: General Anxiety Disorder (standardized score of 7 items)

3.3. Standard Error Adjustments

Randomization is done at the household level for the sample. We will use robust standard errors to correct for heteroskedasticity for all specifications.

We will perform multiple hypothesis test adjustment using False Discovery Rate (FDR) correction. Following Benjamini et al. (2006) and Anderson (2008), we will report sharpened q values over the set of p values associated with each hypothesis. Thus, in our analysis, we will report p values and sharpened q values. Similar to the approach while computing treatment effect, we will also perform FDR adjustments in heterogeneous treatment analysis.

4. Fieldwork

4.1. Data Collection

Prior to the experiment, we organized a two-day pilot in which we made sure that modules and the experimental protocol ran smoothly and made adjustments based on the issues faced. an issue arises. We made note of all such adjustments. The data from the pilot will not be used in the main analysis.

We expect the data collection process to take five weeks excluding the pilot. Enumerators will be trained for two days before the first pilot, one day after the first pilot and one day post second pilot for smooth execution of the modules and experiment. There will be a total of 8 lab sessions daily where 4 are run parallelly. There will be 8 couples per lab session, making it possible to survey 64 couples in a day. Hence surveying 1,000 couples will take 16 days and we keep 3 days as buffer in case of unforeseen events.

Data from the experiment will be sent directly from participants' tablets to the research teams' computers, and then downloaded via .csv output from the Survey CTO platform, through which the modules are run. The data will be kept anonymous and hosted on a folder shared among the research team. Data protection procedures have been approved by both IFMR-LEAD's IRB and Trinity College Dublin's IRB.

4.2. Data Processing

Data processing will involve cleaning the data, managing the data, and analyzing the data. Data will be reviewed after lab sessions each day to check for errors, if any. We anticipate data processing to start after all the lab sessions are done and the data is transferred to the research team anonymously. The research team will share the ownership over the processed data which will be used and stored in cloud and local computers. Data processing is expected to finish within four weeks.

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